Thinkwell’s Macroeconomics

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# Thinkwell's Macroeconomics Video Transcripts

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Introduction to Economics

The Basics of Economics

Defining Economics

Students sometimes begin the economic course with a misperception, and that is that economics is about money. Absolutely not! Economics is a much broader set of tools that can apply to all kinds of decisions that you make in daily life. The definition of economics is this: economics is the study of rational choice under conditions of scarcity. That definition has two terms in it that are key. The first is scarcity. Scarcity means an imbalance between the amount of something that people want and the amount that’s freely available. One of the best ways to come to grips with the concept of scarcity is to try to imagine something that isn’t scarce. What would that be? Sometimes students suggest air isn’t scarce; it’s all around us. Yes, but the kind of air that people want, clean, breathable air, is certainly scarce, and especially scarce in cities with a lot of pollution. At one point in Tokyo there were vending machines on the street where people would insert a coin to buy a breath of breathable, clean air. In that case, air was scarce. There was an imbalance. People wanted more of it than there was freely available.

Well, what about space? There seems to be plenty of space. Yes, but there’s not a lot of space in cities. There’s less space in your dorm room than you’d want. All this stuff has to be parceled out because there isn’t as much as people would like to have it were freely available.

What about garbage? There seems to be plenty of garbage; no scarcity of garbage. Aha! But see, that’s where the definition comes into play. It’s not that there is an infinite amount of garbage. There is a strictly limited amount of garbage. The reason garbage is not scarce is that nobody wants it. Scarcity is an imbalance between the amount of something that people want and the amount of that good that is freely available. Anytime something is scarce we’ve got to figure out how to use it, how to share it, how to parcel it out among its competing uses, and that requires some kind of decision, some kind of choice, and that leads us to the second term - rational choice.

Rational choice, or the word “rationality,” in economics, refers to people making calculated, self-interested decisions. It requires that you be willing to consider costs and benefits, all of the factors that are involved in a decision, and choose that course of action that is most satisfying to you, the one that maximizes your wealth, the one that maximizes your satisfaction from the way you use your limited income or your limited amount of time. We say that an agent is rational if that agent considers cause and effect; if that agent considers the consequences of his or her choices and chooses those courses of action that provide the most satisfaction. Rational choice is calculated self-interest.

So if we have calculated, self-interested people operating in a situation of scarcity, then we’ve got economics. One example of this is the concept of opportunity cost. We imagine that when people make a choice they consider the opportunity cost of that choice. The opportunity cost of a choice is the best alternative you give up when you make that choice. For instance, if you go to your economics class one morning, the best alternative might have been an extra hour’s worth of sleep. Rather than staying in bed and sleeping, you chose to come to your economics class instead. Your sleep was the opportunity cost of your choice. If you are enrolled in college this year, you’re getting a good education, which might be satisfying in its own right. It may also be that that education is your key to a higher salary that leads to more goods and services in the future. But the opportunity cost of those goods and services in the future, and the satisfaction of your expanded mind, is the money that you’re not making now, and all of the toys that you could be buying with the income that you’re giving up. Because you’re in school you aren’t holding down a job with all the time that you are using studying and attending classes. The time away from work is lost income, lost goods and services, and lost satisfaction. So the opportunity cost of your investment in your future is the present satisfaction you can get from a higher paycheck. There’s an opportunity cost.

There’s no such thing as a free lunch. Anything that you enjoy, you enjoy at the cost of giving up something else. If you enjoy driving a pick-up, the opportunity cost is you’re not driving a Volkswagen that day. If you enjoy a vacation to the Bahamas, your opportunity cost might be a trip to California. Every choice you make involves an opportunity that you don’t choose.

Well, what does this have to do with money? Not very much. You see, the point is, economics is not about money; economics is about analyzing the way people make choices in conditions of scarcity. We can make predictions about how you choose to use your time between studying, working, playing, spending time with friends. We can come up with an economic model that predicts the way you’ll respond if we know enough about your preferences, your abilities, and the constraints that are put on you from the outside. We can also come up with economic models of who people choose to marry, economic models of when countries go to war. There are even economic models of which religions people choose to affiliate with. One economist has even suggested that you can come up with an economic model of who chooses to commit suicide as an economic calculation if the costs and the benefits are aligned properly, people
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   **Defining Economics**
   just choose to checkout. Now, some people are offended by this. They think, “Well, why should we have an economic model of these very personal things?” And maybe you’re right, but the point is economics is a very flexible set of tools, and it seeks to apply itself anywhere rational agents are operating in a situation of scarcity; anywhere that there are goods and services that are strictly limited, that have to be shared in some way.

   In the next lecture we’ll look at another definition of economics, one that has to do with value, and this might seem a little more applicable to business.
We’ve said that economics is the study of rational choice in the face of scarcity. Let’s talk now about what it means for economics to be a study. Economics is called a social science, or a behavioral science. And, as a science, economics is a disciplined way of thinking through problems. The scientific method is a tried and true way for knowledge to accumulate. To ask questions, to craft explanations, and to come up with ways of testing those explanations against what’s going on in the real world.

So economics, as a science, uses the scientific method to understand the way the world works. The scientific method begins with a question. That is, all science begins with curiosity about the world works. If you want to be a scientist you should develop the habit of curiosity. That is, asking the question why at least three times a day. You drive through a little town and you wonder why are all the gas stations clustered on the four corners of the main intersection? Or you go to the grocery store and you wonder why are there 150 different kinds of breakfast cereal, and yet, there are only really three categories - cereal that tastes like fruit, cereal that tastes like chocolate, and cereal that’s good for you. Why? Why? Why? Ask the question why and you’re training your mind to be scientific and preparing yourself to be sharper and more flexible.

Economics really asks three questions over and over again. The first question is, what should we produce? That is, what are we going to produce of all the possible baskets and bundles and combinations of goods and services that we can create in our economy? What combination of houses and cars and clothes and vacations and medical care are we going to create out of our limited resources? The second question is, how will it be produced? That is, how will we combine labor and capital and raw materials to create the goods and services that satisfy our needs and wants? And the third question is, who is going to get it? That is, how will these goods and services be divided among all of the people in the economy, each of whom wants more?

What will we produce? How will it be produced? And who will get it? These are the questions that economics asks. Economics also asks more specific questions about each of these general categories, such as, what would happen if we imposed a minimum wage law on the labor market? Would it create unemployment? Would it increase the wealth of workers? What would be the consequence? We’re asking a question here, and that’s the beginning of science.

What would happen if consumer income increases? Would it lead to more spending or more saving or something else? Ask the question, and the next thing you know, you’ll find yourself at the second step of the scientific method, that is, you’ll be building a model.

What is an economic model? What is a scientific model? A model really is nothing more than a map. Think for a moment about the way a map works. You begin with a question. How do I get from the theatre district to the Metropolitan Museum if I’m in New York City? Well, that answer is going to depend on the method of transportation that you choose. If you want to know how I would find the best walking route; that is, which streets should I take and can I cut through Central Park, you’re going to want to use this map. It’s a street map of New York City that has the parks and restaurants and theatres and museums right here in different colors.

On the other hand, if you’re planning to take the subway from the theatre district and find out how close you can get to the Metropolitan Museum, you’ll want to use this inset map, which instead of the streets, focuses on the subway routes, each of them being color-coded. The map that you want to choose depends on the question that you originally asked. If you’re going to be riding the subway and your question is, which subway should I take, you don’t need a map that has a lot of streets on it. You want all that detail cut away so that you can clearly see the subway routes.

On the other hand, if you’re going to be above ground, walking on the streets, you don’t care what’s underneath you. The subway routes are irrelevant and would only add clutter to this picture. So a good map is one that includes enough information to help you answer your question without irrelevant information that would only distract you and clutter the picture.

The same is true with a model. If we want to ask ourselves what is it that determines the amount of money that households spend on consumer goods and services each year, what determines consumer spending, and when does it rise, and when does it fall, we’re going to want to build a relationship between consumer spending and other variables that influence it. We’re going to be looking for those variables that probably have the most direct impact on the consumer’s choice to spend or save money, and to ignore the rest.
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What Economists Do

So as we’re building this model, we’re going to want to include things, like consumer income, taxes, the stock market, and other factors that influence how much money people choose to spend. We can probably ignore other things that bear less on the consumer spending decision, such as the gender of the children or the color of the breadwinner’s hair. I mean, these are real facts from the real world, but they probably aren’t very important in determining how much money people spend.

Margaret Mead once said that a model that is completely realistic is no more useful than a map with a scale of one-to-one. The only reason the map helps you is that it’s simple enough and simplified enough to help you see the big picture and the details that are necessary in helping you guide your way through the city. On a typical map you won’t see trees and dogs and cars, because they’re not necessary. And by eliminating them, and showing you the grid of the streets, you are helped in navigating your way around New York.

So we build a model, and perhaps that model is a story whereby people make spending decisions based on their income, their taxes, and their age. People who are younger tend to spend more and save more in their middle years and spend it in retirement. We build a relationship among these variables and that becomes our model of how consumers make their spending decisions.

Now, once we’ve got a model the relationships that we imagine hold among the variables allow us to derive certain hypotheses. Hypotheses are predictions about how the world works. One hypothesis might be than increase in consumer income leads to an increase in consumer spending. Now, that hypothesis is something we can test. We can go out and get data from the real world and compare the relationship between observed consumer income changes and changes in consumer spending. And if our data matches the predictions of our model, then we believe that we’ve explained something about the real world. We believe that since our story matches the facts, we’ve come to understand more thoroughly the way the world works. This is the scientific method. Ask a question, isolate the variables that are related and important and build a model, and then come up with some predictions or hypotheses that you can test against the data in the real world, and when that happens, you’re doing science.

Now, one of the things that helps you be a careful and disciplined scientist is looking at these changes in a careful way; that is, trying to isolate the variables from one another and looking at the effect of one variable while holding the other variables constant. For instance, we want to know what happens to consumer spending when consumer income changes, and we’re trying to predict a relationship between income and consumption that will explain something about the way the world works. Well, if we want to do that, we need to hold constant the other factors that influence consumer spending decisions. So if we hold taxes constant - my pink bar here over the t means that I’m holding taxes constant - and we look at consumers of a particular age so that we hold age and demographic factors constant, then what’s the relationship between income and consumer spending? And perhaps we predict in our model that if you increase income and hold everything else constant, consumer spending will also increase. This assumption that we’re holding everything else constant has a name. That assumption is called “ceteris paribus,” and the question that we ask is, what will happen to consumer spending if we increase consumer income ceteris paribus; that is, holding constant all of the other variables that also influence consumption decisions? So whenever you hear me use the term “ceteris paribus,” what I’m doing is I’m isolating a variable. I’m saying, “What will happen to consumption when income increases? Let’s focus on income and hold everything else constant.” That’s what ceteris paribus means.

So you’re training now to be an economist. You’re training to use the scientific method in order to answer questions about the way the world works. So what are you going to do with this training once you’ve sharpened these skills? Well, you can find economists in all walks of life. Economists show up in business, they show up in government, and they show up in academics. In business, economists make forecasts about what’s going to happen to interest rates and consumer spending and housing starts. They look at the big picture and help to advise the people who are making decisions in corporations about when to launch a new product, and when to expand their operations, and into which countries.

In government you find economists doing research, collecting data, figuring out how to finance the government debt, when to impose new taxes, and looking at broadly what’s happening in the economy to consumer spending, business spending, and imports and exports.
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**What Economists Do**

And finally, in academics, not only do you find people who are teaching your economics classes, you also find high caliber researchers who hold academic positions in research universities. They are supported to do research and answer questions, like what will happen when a minimum wage is imposed, or what’s the relationship between income and consumption, or what’s the effect of tariffs and quotas on the flow of international trade. Economists show up in business, government, and academics, and, as you train to be an economist you’ll find that you can use these tools even if your title isn’t economist, because these logical, scientific ways of thinking pay off in all kinds of lines of business.

There’s one more thing to say about economics as a study, and that is that we want to make a careful distinction between positive economics, on one hand, and normative economics, on the other. Positive economics is economics as a predictive, descriptive social science. Positive economics seeks to answer the question, how does the world work? What is going on? Whenever we do positive economics we’re making observations. We’re asking questions like, what will happen when a minimum wage law is imposed on the labor market? Will we see unemployment? Will we see an increase in wealth? Positive economics answers the question, what will happen in the bread market if we impose a tax on the sales of bread? Positive economics answers questions about the way the world works, what is, predictions and descriptions.

On the other hand, normative economics is about making judgments or evaluations. Normative economics answers the question, how should the world work? What is a good outcome? Normative economics answers the question, should we have a minimum wage law at all, or is there a better way to provide for low-income workers, perhaps an earned income tax credit or some other policy? Normative economics is about norms, and norms are standards of judgment - what is good, what is better, and what is bad. Whenever we’re doing normative economics we’re seeking to come up with the best policy for a particular situation. Should the government pay off the national debt? Should we have a tax on gasoline or cigarettes? Normative economics answers the questions, what is good?

Now, of course, if you’re going to want to make judgments about the way the world should work, you’d probably better have a pretty good understanding about the way the world actually does work. That is, if you want to build a garden that you think is beautiful, you need to know a lot about the way plants grow and which ones respond to sunlight and which ones respond to fertilizer. You need to understand the structure of the economy before you start saying what it is that the government ought to do, or what it is that corporations should be allowed or prohibited from doing. To make judgments, you should have an understanding of the structure of the relationships and the economy. So positive economics and normative economics are very closely related.

So if you want to be an economist you’ll be using a scientific method to describe and make predictions, and eventually make recommendations about what kind of policies help lead to good outcomes.
I know what you’re thinking. You’re wondering what the difference is between micro and macro and you want to know which one’s easier. Well, let’s start with this explanation. Microeconomics is about the decision-making process of individuals. Households deciding whether they’re going to buy apples or oranges, a firm deciding whether it’s going to install a computer or hire another worker. Macroeconomics is about the aggregate. Whenever you lump together all of these households and business and the government and foreign trade, what kind of organism do you get? In fact, that’s a good way of thinking about it. Let’s use a biological metaphor.

Microeconomics is like the study of a cell, the mitochondria and the nucleus and the way energy is created and the way the cell works. We put the microscope in on this particular cell and we look at its chemical processes. Macroeconomics is stepping back and letting these cells merge until they become a body, something that doesn’t look like a cell at all, but in fact, has arms and legs and does different things. Cells metabolize energy; bodies reach over and pick up an apple and eat it. Macroeconomics is about the study of the economy as an organism. It’s an organism that has its own vital signs, like inflation and unemployment, and the interest rate, and the money supply. Macroeconomics is a look at the overall economy as an organism. Microeconomics is looking at how the cell works.

So, apart from this metaphor, how does this work in economics? Well, in microeconomics we’re going to be answering questions about the way individuals respond to changes in relative prices. For instance, in microeconomics we ask the question, if the wage rate goes up, will a household supply more labor or less? You can argue it either way. A higher wage causes you to substitute your energy away from leisure towards labor so that you can afford to buy more toys. On the other hand, the higher wage increases your wealth, which inclines you then to want to take more vacations and to work less. Microeconomics is the study about the way a particular household would respond to a change in its incentives created by movement in the wage.

Macroeconomics, on the other hand, steps back and looks at all of these households together and asks a question like, what happens when productivity increases in our economy? Will the overall employment rate, that is, the percentage of people who are actually able to work, working in jobs - will that increase or decrease? Do computers increase employment in the economy or do they reduce it? Macroeconomics asks questions about the money supply. Now, I know I told you before probably that economics isn’t about money. Well, that's only partly true, because once you’re talking about economics as the study of the economy as an organism, money is the life blood of that organism, and whenever the Federal Reserve creates and prints and puts into circulation more money, well, people have more in their bank accounts and they can compete more aggressively for goods and services in the market, and that will probably, in fact, most definitely, have an influence on the price level, as well as the ease of getting credit and a loan if you are a business that wants to expand.

Macroeconomics does study money, and it looks at how the Federal Reserve’s activity in the economy, the creation and circulation of money, influences the price level, which in turn, may influence businesses’ investment decisions and household purchases.

Microeconomics, on the other hand, pretty much ignores money. We treat the world as if it’s one big barter system where you trade apples for cups of coffee without having to use bills or change. In microeconomics we look at the relative prices. Everything is expressed as maybe two apples equals a cup of coffee without thinking about how things are paid for. Whenever relative prices change, people change their purchasing decisions; they change their spending patterns. But in macroeconomics money is studied much the way that blood is studied in biology. It carries things through the system. It carries nutrition. When the blood supply increases that changes the health of the organism. Too much or too little blood within a body can create problems. The same thing is true of money in the economy.

So one important difference between macro and microeconomics is that micro is the study of individual decision-making, macroeconomics is the study of the economy as an organism. Another important distinction is that while microeconomics doesn’t really pay much attention to money as a phenomenon, macroeconomics takes money very seriously, and the money supply is an important determinant of the health of the economy.

Now, in micro and macroeconomics both there are actors; that is, people who are making decisions. Let’s look at who we’re going to be studying in macroeconomics and talk about how our perspective on them differs from the way we thought about them in microeconomics. The important players in the macro economy are households, businesses, the government, and the rest of the world, which is linked to a particular economy by foreign trade. In
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Macroeconomics and Microeconomics

Macroeconomics, the spending of households is called consumption. Whenever households spend money they are said to engage in consumption. The alternative to consumption is savings. And another thing a household can do is it can use its income to pay taxes.

Now, in microeconomics we answered questions like what happens when this household goes to the grocery store? Do they buy apples or do they buy oranges. In macroeconomics, on the other hand, we’re going to ask about what determines the amount of consumption spending overall that this household will do in a year, and we’ll look at variables like income, taxes, and age, as influential on the consumption decisions of this household.

What about businesses? In microeconomics we answered questions like, will this business choose to hire an extra worker or an extra machine at this point? That is, in what ratio will this business employ capital and labor, and if the wage rate increases, we’ve found that businesses were inclined to hire less labor because it was more expensive, and substitute and hire more capital instead. That’s a microeconomic analysis. On the macro side what we do is we look at the big picture. When interest rates go up, or interest rates go down, are businesses inclined to do more investment spending or less. That is, what influences the overall amount of spending that businesses are inclined to do? Rather than looking at individual decisions within the firm, we consider businesses as part of this overall organism, and we ask what determines the amount of spending that they plan to do.

Next, we look at the government. From the point of view of microeconomics, we didn’t talk that much about the government because the government seems to mainly be a policy player. In microeconomics the government set the tax rates, which influence people’s purchasing decisions. In macroeconomics, on the other hand, we usually think about government spending as a stimulus to the economy, or government debt as creating bonds, which create a financial market, which has other benefits for the economy. Government plays a big role in macroeconomics as a policy player, not in the sense of influencing individual decisions as they did by setting tax rates in micro, but because the government can choose to pump up the economy by spending more money, or to slow it down by spending less. Also, the Federal Reserve, although not technically part of the federal government, really seems like a government entity. That is, the Central Bank is kind of part of the government, and it’s the Central Bank that determines the amount of money that’s in circulation, which influences the price level and other factors and variables in the economy.

Finally, have foreigners, and we didn’t talk about foreigners in microeconomics at all, but now the foreign sector becomes very important, because the demand for our goods overseas determines the amount that we can export, and that’s going to determine how much factories are going to be inclined to produce. Factories tend not to produce goods they can’t sell, and foreign demand becomes an important component in the macro economy.

So these are the players in the macro economy. These are the players, and the way that we think about them in macroeconomics is broadly. Consumers spend money, pay taxes, and save. Businesses spend on investment goods. The government increases spending, maybe runs a deficit, maybe pays off its debt. And foreigners, depending on the exchange rate, they buy more of our goods or less.

Now, there’s one more thing that we’re going to want to consider whenever we think about macroeconomics. I’ve already mentioned the importance of money in macroeconomics, and that raises the question of being careful whenever we’re discussing a particular economic story of being clear about whether we’re talking about a real variable or a nominal variable. Anything measured in terms of money is considered nominal. So, for instance, if I hold up this cup of coffee and you can see the price tag on it, if I want to talk in real terms, it’s one cup of coffee. When we talk about real goods and services we’re talking about physical, tangible, actual goods and services that people enjoy - cups of coffee, apples, haircuts, vacations, medical care.

However, this is also $1.25 worth of coffee. That is, I can represent this coffee in nominal terms, like talking about how much money I would have to pay to get it in the market. Things measured in terms of money are called “nominal variables.” So here is one dollar, a nominal measure, and here is $1.25 worth of coffee, another nominal measure. The neat thing about nominal measures is they’re very easy to add up. If an apple is 0.50 and a cup of coffee is $1.25, 0.50 and $1.25 is $1.75, that’s nominal spending. That’s how much money I’ve paid out today to get the things I enjoy for breakfast. However, real goods and services are actual things that are harder to add up, because they’re in some respects non-conformable. I mean, how do you add apples and oranges and coffee and medical care? What we tend to do economics is we add up the dollar amounts that are paid for these goods and services and we divide by something that reduces them to a common denominator.
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**Macroeconomics and Microeconomics**

I’m going to be discussing that later, but right now I want you to be clear on the distinction between real and nominal variables, things that are measured in terms of money are nominal; things that are measured in terms of physical goods and services are real.
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Overview of Economic Systems

Every economic system must answer three questions. The first question is, what will be produced? That is, what combination of goods and services is our economy going to make with its limited resources? What combination of cars and houses, medical care, and vacations are we going to produce. The second question is, how will these goods be produced? What production methods will be used? What way will labor and capital and resources be combined to produce the goods and services that satisfy our wants and needs? And the third question is, who gets the goods? That is, how is the output divided among the people in the economy, each of whom probably wants more? These are three questions that every economic system must answer.

Well, let’s consider the way that one extreme kind of economic system might answer these questions. My extreme example is going to be a system of pure laissez faire. Laissez faire is a French word that means, “let do,” or “leave it alone.” In a laissez faire system individuals are allowed to make decisions completely for themselves. I decide how I want to use my time, energy, and talent. Maybe I want to be a carpenter and go and hammer nails for money. Maybe I want to build houses and charge people for my services. Or perhaps I sit and think about what I’m good at and decide that I should be a teacher, and I go and I deliver lectures and write books, and earn my money that way.

In a laissez faire system every man and woman in the economy makes his or her own choices about how to use their talents, and typically, in a laissez faire system, prices that arise in market interactions become the guide to people about what they should do. I see that teachers earn a lot of money and carpenters earn less. I’m a relatively good teacher; I’m not so great a carpenter, so I divert my energy into teaching. I train myself to become a better teacher. I’m responding to the incentives in the market prices. This is a laissez faire system. It’s a system in which people are directed, coordinated, and motivated by impersonal prices in the market, and these prices coordinate action among millions of people until they begin to hum along like a bee hive, everyone specialized, doing his or her own thing. And the outcome is the wealth that is created. Some people make cars, other people are teachers, other people build houses, and other people raise vegetables. That’s an extreme laissez fair system. And what you’ll get is the law of the jungle.

Now, the good thing about laissez faire is it allows for maximum individual freedom. Another good thing about laissez faire is that everyone in the economy can respond to information as he or she sees it. Information is distributed throughout the economy. You know things that I don’t know, you see opportunities that I can’t see, you can discern your own talents probably a lot better than I can, and whenever you respond to the information that only you have, you’re going to create wealth that I couldn’t create if I were trying to tell you what to do.

So laissez faire allows the freedom and the good use of all available information. On the other hand, laissez faire often creates messes whenever individuals are doing their own thing and pursuing their own advantage opportunistically. Consider one case. When you’re at a football game everybody’s sitting there enjoying the game, sitting in their seats, watching the fun out on the field, and sure enough, inevitably some bozo stands up. Now, when this bozo stands up, the person behind him or her also has to stand up just to see around, and before too long everybody, just to be able to see at all, is on their feet. Now, no one can see any better than they could see originally, and everyone’s legs are getting tired, and you’re more likely to have beer spilled on you. This is a problem, and it’s a problem that’s a breakdown of the system because people are acting selfishly. This is what happens when we have pollution and litter. It’s what happens when people decide not to get a flu shot, it’s what happens when individuals impose costs on other people or make choices that don’t consider others because there are no prices or other signals in the system to guide them. After all, if I had to pay every time I threw down trash, then that price would connect me to other people. But because I can do it thoughtlessly, we wind up with a lot more litter than we would otherwise get.

Also, sometimes in laissez faire systems, someone will amass a large amount of power because they own a lot of stuff and they can start telling people what to do. You wind up with monopolies and concentrations of power that we’d like to break up and restore competition and other incentives to create wealth, as opposed to hoard it and turn it into power that’s actually inefficient.

So there are all kinds of things that can go wrong with this view of the world in laissez faire, so that inclines us to consider another extreme, and that is planned economy. Let’s have a wise, central planner, who looks over all of the resource that we have and considers everything that people want, and puts together some master plan that’s the creation of a beautiful garden. You go and plant these flowers, you go and be a carpenter, you go and be a teacher, and we’ll all trade and have a lot of wealth. Well, this view of the world is great, because we’d like to believe there is
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someone who has our best interests at heart, who sees the world clearly enough, who sees from 30,000 feet and can direct us in the creation of something better than whenever we’re all doing our own thing.

The problem with this view; however, is where does this central planner actually get the information that he or she needs to craft this perfect view of the world? How does he or she know what people really want and who’s good at what? Not only that, but how does he or she actually get each individual to play their part in the system? How does the central planner get you to be a teacher and you to be a carpenter? What incentives and motivations are offered? Or does this become coercive. See? Central planning seems to deny the possibility of a great amount of individual freedom. Either that, or the central planner starts giving out monetary incentives that look a lot like what we’ve got over in the laissez faire market, so why not go back there?

The central planner doesn’t get as much information as the individuals have over here in the jungle view of the world. If the central planner can get that information, can craft the perfect view of the world, then even then you’ve got the problem of motivating people to play their part in this picture. Now, all that aside, you’ve still got the problem that once somebody’s got enough power to tell people what to do, how do we keep them from abusing that? Aren’t people inclined to behave selfishly and opportunistically once they’ve got their finger on the switch? The problem with central planning is that people at the top can’t always be trusted to act in the best interest of everyone in the economy, and people in the economy are all going to be diverting their energies into influencing the central planner to do things their way, which creates a great deal of lobbying and waste.

So here we have two extreme views of the world—laissez faire, which can break down and turn into a mess, and central planning, which can turn into an abuse. So which outcome is better? Well, your answer to that question is probably going to depend on your politics and your philosophy. But in the real world what we see is that there are all kinds of mixed systems. Every economy has some degree of laissez faire and some degree of planning. In the United States, for instance, which prides itself on being a freewheeling, democratic, dog-eat-dog sort of free market, we have all kinds of little islands of central planning. They’re called corporations. I mean, what’s the difference between a centrally planned corporation and what the Soviet Union aspired to in the 1970’s? You’ve got a group of people here, responsible to shareholders, that are making decisions about what this manager will do and what this division’s responsibilities are, and who’s going to turn out what products on what timetable. So, these corporations exist, but they exist within a sea of freewheeling competition and laissez faire. So there’s a mixed system, a system in which individuals can be entrepreneurs and start businesses, that in which there are many organizations, which are centrally planned that are part of the landscape.

On the other hand, you look at the situation in China, for instance, in which the government maintains a lot of authority over the way the economy works, and yet what the government is choosing right now to do is to allow more laissez faire in order to increase incentives for more productivity and wealth creation. So here’s another mixed system, one where the government isn’t afraid to direct traffic, and in fact, it’s not even afraid to drive some of the bigger cars, but it also allows individuals to be competitive, to make decisions according to their assessment of their gifts and talents and market opportunities.

Every economy involves some mixture of these two extremes - laissez faire and central planning. The role of the government then in any economic system is to regulate the mix of these two. In some countries the government decides to deregulate and stay out of commercial decision-making. At the same time; however, trying to prevent everyone from standing up at the football game, trying to prevent the accumulation of monopoly power, trying to keep people from pollution and encourage people to get flu shots.

Other governments decide to take a more active role in the actual allocation of resources. They direct bank lending; they allow licenses for certain people to enter certain kinds of work. You get more government involvement in these cases. But every country and every economic system can be placed on a spectrum somewhere between the jungle and the garden, somewhere between the free-wheeling, freedom-loving, free market, laissez faire view of the world, and between the view of the world in which some wise planner oversees and directs people so as to create the best possible outcome. The truth is that whenever you’re trying to use information well in a system, and whenever you’re trying to allocate resources to provide the most satisfaction, that every situation is different and every situation calls for some different mix between planning and free markets.
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Case Study: The Work of Adam Smith

This is Adam Smith, the father of modern economics. Smith was born in 1723 in Kilcaldy, Scotland, and apart from being abducted by gypsies at the age of three, led a relatively unremarkable childhood. He went to college at Oxford University where he studied Moral Philosophy and at the age of 28 was appointed as a professor of logic at Glasgow University. A year later he became the Chair of Moral Philosophy.

Moral Philosophy is the study of the right way for people to live together, and the moral philosophers had an argument with that great philosopher, Thomas Hobbs, who had written that people were basically inclined to savagery, and unless there was a strong authoritarian government that kept people in line, that life was inclined to be nasty, brutish, and short, as we lived out the law of the jungle. But Adam Smith disagreed with Thomas Hobbs, and the lectures that he gave at Glasgow University were compiled in 1759 into his first important book, The Theory of Moral Sentiments. Smith had a different view of human nature. He believed that we were hard-wired to be compassionate and cooperative. That indeed, there was a benevolent providence who guided us through the moral sentiments to get along with one another, to be trusting and cooperative, and that this nature was what made us capable of the production of great wealth.

In this book, Smith argues that the foundations for civil society are our moral sentiments, our hardwiring towards respect for one another. Now, a few years later in 1776 after Smith had moved to London, he published what has become his most important work, an inquiry into the nature and causes of the wealth of nations. In this book, Smith extends his view of human nature to become a foundation for a wealthy economy. Smith wrote this book about the time that the British Parliament was passing all kinds of laws to impede trade among countries. It was the aim of England to get more of its own industries exporting. This is a philosophy called "mercantilism," that believed that exports are good because they bring in money from abroad, whereas imports are bad. Smith disagreed completely. He said, "Look, the aim is not to pile up our coffers with foreign money; the aim is to have a good standard of living, and that England should be as mindful of its consumers who could enjoy an expensive import and increase their standard of living as it is concerned about its producers making a lot of money."

In this book, Smith lays out a view of how the market works. It is his belief that individuals, by pursuing their own self-interest, are led as if by an invisible hand, to create an economy that is wealthy and productive. In fact, Smith argues that we more often create wealth by following self-interest; that is, responding to our own assessment of our talents and our opportunities for making money, than when we intentionally try to do something good for the economy.

Consider a passage from this important book; a passage that's often quoted to explain the way wealth is created. "It is not from the benevolence of the butcher, the brewer, or the baker that we expect our dinner, but from their regard to their own interests. Every individual neither intends to promote the public interest nor knows how much he is promoting it. He intends only his own gain, and he is in this as in many other cases, led by an invisible hand to promote an end, which was no part of his intention, nor, is it always the worst for society that it was no part of it." By pursuing his own interests, he frequently promotes that of the society more effectually than when he really intends to promote it. That is, if you want to create a wealthy country; that is, if you want to have a common wealth, the best thing, Smith argues, is to assess what it is that you're good at, and look in the economy at where it is that you can make a profit, because as individuals make profit, they're adding profit for society as a whole.

Now, remember, Smith wasn't saying that we should all be selfish. Self-interest and selfishness are two subtle different things. Smith believed that we would be pursuing profit and commercial gain in the context of a society in which people had moral sentiments. That is, respect for one another, respect for property rights, respect for the law, respect for telling the truth, and the accurate representation of their good and services. If people were basically ethical and compassionate and collegial, then the pursuit of self-interest was the most effective way to make the country rich.

Smith, on his travels in England, observed an instance in which he saw the benefits of the market economy. Here was as pin factory in England, a place where straight pins for clothes were manufactured. Smith walked into this factory and what he saw was a remarkable division of labor. He saw that the tasks that went into making a straight pin had been divided so that each person had their own job to do. One person pulled the wire; another sharpened the point on the end of the pin. Yet another person put the cap on the pin, or the head. Another person stacked the pins into the papers in which they were sold. So the production of straight pins involved several tasks, and the division of labor made this easier to do.
Case Study: The Work of Adam Smith

"Imagine," Smith says, "If you had to do all these tasks yourself? Not only are there some tasks you're not especially good at, but you'd have to set up for each new job." That is, you have to go get one set of tools to stretch the wire, another set for grinding the point on, and so forth. But when there is division of labor, each person has his or her own job. Each person concentrates and specializes in an aspect of the job that he or she is especially good at. Plus, you economize on setup time. Instead of moving from one job to another, you keep doing the same thing over and over, and this created an incredible increase in productivity. One person may be able to produce 10 pins a day. But four people could produce 10,000.

"Now," Smith said, "You've got to worry about this guy who's stretching wires all day. Isn't he going to become kind of dull and bored? Can you really let such a person play an active role in the government?" Smith was concerned about what the production process, and specialization and division of labor would do to the human spirit, and that was his advice to managers - beware that you don't make your workforce dull with excessive specialization. But it's this invisible hand that sticks with us, this belief that by each of us doing our own thing in the context of an economy where we respect one another and property rights, that we create the wealthiest possible outcome.

Now, Smith was concerned about cases like pollution, where people were doing what they thought was good, but at the same time imposing costs on other people. He was concerned about monopolies, where concentration of economic power could lead to inefficiency. He was concerned about cases where one person knew more about the good being traded than the other person, so that trust could break down and people behaved offensively. He was also concerned about the poor, and how the market didn't always provide for them. But in the end, it's hard to tell whether Smith is really coming down on the side of saying that laissez faire is the way to run the economy, although he definitely believed in a free market. Or whether he's saying that these exceptions, these problems that can arise in a laissez faire economy justify more involvement from the government. You can read the books either way. Either Smith was a free marketer, or he was a careful apologist for the role of the government in the economy.

Whichever way you look at it, it's hard to forget that individuals pursuing self-interest, creating something of great wealth, that metaphor sticks with you, and it seems that Smith laid down the challenge to all future economists to justify government intervention because, he says, "Leaving people to their own best lives about how to make money is the surest way to ensure the wealth of a nation."
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Using Graphs to Understand Direct Relationships

Economists use graphs to represent a lot of their analysis, so we'll take a while here to review how graphs work and see how we'll be applying them throughout the lessons. You're familiar with graphs like pie charts, which show you how one sum can be divided up into its parts. You're also familiar with bar charts that show you how a sum changes over time or can be divided up also into its parts. In economics we're going to use graphs in two-dimensional space, and these graphs usually represent relationships between two variables, or in some cases, relationships among three variables. What we'll do in this lesson is show you how those graphs work, and prepare you for tools that we'll be using in other lessons.

Let's start by having a look at the two-dimensional graph space. We have a vertical axis, along which we measure the quantity of one variable, and a horizontal axis along which we measure the quantity of another variable. And usually these two variables are related in some way that the economist finds interesting. Let's look at an example of information that we represent in this two-dimensional space. Suppose we want to graph the relationship between two variables - consumption and household income. Consumption is the amount of money that a household spends on goods and services, and income is their income, the money that they take in from work and other sources.

Now, how are we going to represent the relationship between consumption and income? Let's start by graphing income on the horizontal axis, and I will use this abbreviation, INC, to stand for the household's income, and we'll measure this income in dollars, so I'll put a dollar sign here to remind me that everything's that's measured on this axis is measured in dollars. Now, I can calibrate the axis by marking off these tick marks and putting numbers along them so that I have a scale along which to represent my information. Let me let each of these tick marks represent $10,000 worth of annual income. So, the first tick mark here I could label 10 for $10,000. The second tick mark I could label 20, the third I could label 30, and I might want to be careful here not to put too many numbers close together, or the graph could start to get crowded and unwieldy. So what I'll do is I'll skip every other 10,000 and represent 10, 30, 50, 70,000. Here's 80, I'll skip it. 90, 100,000, 110,000, and 130,000, and the numbers, of course, continue as you go out. The numbers increase representing larger annual incomes as you move to the right.

On the vertical axis now I'll represent the other variable, and this is going to be consumption spending, which I'll represent with the letter C. So as I increase my vertical altitude here, I'm increasing the consumption spending of this household. I'll put a dollar sign here to remind me that consumption is measured in dollars, and I'll do the same thing that I did on the horizontal axis. I'll calibrate using 10's, and I'll skip every other one so that I don’t get too crowded. Here’s $50,000 in annual consumption spending, here’s 70, here’s 90, here’s 110, and just let the numbers go on up.

Now, what I do in this space now that I've created it is I can represent information about consumption spending. Suppose I have a table of numbers, and one of the numbers that I have - suppose I have a table of numbers and each one of these numbers represents the income spending information for a particular household. Each data point that I have represents the behavior of a household, so I'm going to put data points in this graph, and each point will represent the behavior of one particular household. Suppose I have a household and I know that their annual income is $30,000 and their annual consumer spending is $40,000. Now, you might ask, "How can that happen? If their income is only $30,000, how can they spend $40,000?" Well, perhaps they have other sources from which to get money. Perhaps they have a savings that they can draw on, or perhaps they receive payments from the government or other sources of income. So if I know that a household that has a $30,000 annual income is spending $40,000 a year on consumption spending, I will go up to this point and put a dot where those two numbers come together.

Now, notice, the horizontal coordinates of this point represent the income of the household; that is, $30,000. The vertical coordinates represent the consumption spending. So see, each point in this space represents a combination of two pieces of information about a single household - their annual income and their consumption spending for that year. I can label this point with a pair of numbers that represent its coordinates. I'll write first the horizontal coordinates; that is, 30 to represent their income, or $30,000, and second I'll write the vertical coordinates of 40 to represent the spending data.

Now, sometimes you'll hear the information represented here called the x variable or this number called the x-axis. The horizontal axis is sometimes referred to as x, and the first number here represents the x coordinate. Sometimes this axis is called the y-axis, and the number that’s represented here is the y coordinate. So, the numbers in parenthesis are the x and the y, the horizontal and the vertical numbers here, written side by side. And each point in this space will have two numbers, two coordinates associated with it.
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Using Graphs to Understand Direct Relationships

Now, let’s suppose that I have data on a lot of households, and I know the income and the spending for several households. I can represent the points in this space and form what we call a scatter diagram. A scatter diagram just tosses the points out into space and looks at them. So why don’t we do that? If I have information, say, that a house that has an income of $10,000 was spending $30,000 that year, I could put a point here with a horizontal coordinate of 10, and a vertical coordinate of 30. Suppose I know that a household that had $90,000 annual income was spending $70,000? So let’s put a point up here with a horizontal coordinate of 90 and a vertical coordinate of 70. By the way, what was that household doing? They were spending less than their income and they were saving the difference. And then, suppose I have a lot of other points? I’ll just graph some samples here. Suppose I had a point like this one, and a point like this one, and a point like this one, and a point like this one, and so forth? Each point represents a combination of income and spending for one particular household. And as I fill in the information that I have, in each case I’m representing the household’s income by the horizontal, and the household’s consumption by the vertical.

This is a scatter plot. It’s information arrayed in a two-dimensional space to represent two variables for each data point. That is, the income, the associated consumption spending, for one particular household. Now, once you’ve got a scatter plot like this, the next thing that you’re tempted to do is to fit a line to that information to notice the general relationship between the two variables. Notice, as we look at this information, in general, as income increases, consumption spending increases for these data points. We say that there is a direct relationship between income and consumption, a direct relationship or a positive relationship between these points.

If I wanted to notice the general relationship I could fit a line to these points that would look something like this, and this line represents the general relationship between consumption and income. That is, in general, for the points in this data set, as income increases, consumption spending increases. The thing that’s important to notice here is because of the direct relationship, the line that passes through these points has a positive slope. Now, what does that mean, a positive slope? I’ll get to that in just a moment, but I want to stop here and make the point that in economics one of the first things that we do is we notice general relationships between data points. We notice, for example, that when income increases, consumption increases, we observe a positive or a direct relationship among the points.
Now we’ll look at another relationship between two variables represented graphically. In this case, we’ll look at the behavior of a hamburger customer, Bob, and we’ll look at what Bob does when the price of hamburgers changes. I’m going to now look at a data set that represents the price of hamburgers and the quantity of hamburgers that Bob consumes every week. Let’s look at the relationship between these two variables.

When the price of hamburgers is $5.00, Bob doesn’t buy any; they are too expensive. Even if the price drops down to $4.50 per hamburger, Bob still doesn’t buy any hamburgers. If the price drops down to $4.00 per hamburger, Bob decides to treat himself to one hamburger a week. If the price falls to $3.50, Bob buys two hamburgers each week, and so forth. Every time the price of hamburgers drops by 0.50, Bob decides to buy one more hamburger per week, and finally, if hamburgers drop down to a price of $1.00 apiece, Bob buys one every day. That is, seven hamburgers per week.

Let’s now represent this relationship between two variables, price and quantity, in a graph. The first thing that I’ll do is I will draw two axes and calibrate them. Here are my axes for this particular problem. The two variables that I’m interested in analyzing are the price of hamburgers and the quantity of hamburgers consumed per week. So let me go ahead then and calibrate my axes. On the horizontal axis I’m going to represent the quantity of hamburgers consumed by Bob every week. So as I increase my distance from the origin, that is, the place where the axes intersect, as I increase my distance from the origin horizontally, Bob is buying more and more hamburgers every week, and those numbers are represented here: 1, 2, 3, 4, and so forth.

On the vertical axis I’ll represent the price the hamburgers sell for. The sale price of hamburgers is represented on the axis here increasing $1.00, $2.00, $3.00, $4.00, and so forth, per hamburger. So on the vertical axis we have price per hamburger. On the horizontal axis we have hamburgers consumed per week.

If you look in the box you’ll see the information that we were just looking at about Bob’s behavior. In the box you see the number of hamburgers that Bob buys at different prices. I’m going to now transfer that information that’s in the tables into a picture here, a representation of the relationship between price and quantity.

Let’s start then with a price of $5.00: Bob buys no hamburgers. At a price of $4.50, Bob also buys no hamburgers, so we have points here that are actually on the axis. That is, zero hamburgers are purchased, so Bob is behaving in a way that gives us points that are on the axis. So here’s a price of $4.50 per hamburger, and no hamburger is consumed in a week. Now, when the price drops down to $4.00 per hamburger, Bob actually buys a hamburger. Now we have a point in our space that’s right here—one hamburger at a price of $4.00, so that gives us a dot right here to represent Bob’s behavior. The coordinates of this point are 1 and $4.00. If the price drops down to $3.50—so we’ll be looking at a price that’s right here on the vertical axis—Bob buys two hamburgers per week. So now we have a point that looks like this. At a price of $3.00 Bob buys three hamburgers per week, so now we have a point that looks like this. At a price of $2.50 Bob buys four hamburgers, so that lets us drop down to another point like this--$2.50, four hamburgers. In each case I’m finding a pair of numbers, like $2.00 and five hamburgers, and I’m putting a dot at the horizontal, vertical coordinates. Six hamburgers at $1.50, so find the $1.50 point and six hamburgers and put a dot there. And finally, we get seven hamburgers when the price drops down to $1.00, and that gives us a point like this.

So these dots represent Bob’s behavior, that is, the quantity of hamburgers that he consumes as the price of hamburgers changes. Now we can connect the dots in this diagram and form the demand curve for Bob. That is, we can draw a line that represents the relationship between the price of hamburgers and the number of hamburgers that Bob consumes in a week. Let me go ahead and do that. I’ll draw a line here that connects all of these dots, and it looks like this, and this is Bob’s demand curve.

We can even put a label on it; label it with the letter D to let us know that this is Bob’s demand for hamburgers, the relationship between the price of burgers and the quantity that’s consumed. Now, if I want to, I can write down the formula for this demand curve, and I’m going to go ahead and do that. Now, I knew the formula before we started because I used the formula to form the tables. The formula for Bob’s demand curve is this: the price, that is, the vertical axis variable is equal to $4.50, which is the price at which Bob will buy no hamburgers, minus 0.50, times the quantity of hamburgers that Bob buys. That is, for every additional hamburger that we want Bob to buy in a week, we have to lower the price per hamburger by 0.50. This is the relationship between quantity and price for Bob, and that is the formula for this line.
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Graphs in Economics

**Plotting a Linear Relationship Between Two Variables**

Now, if that takes you by surprise, remember from your algebra class, that if we have a variable that’s measured on the y-axis and another one that’s measured on the x-axis, that the formula for any straight line is equal to this: the y-axis variable is equal to $a + bx$, where $y$ is the variable that we’re measuring here, in this case, price. $x$ is the variable that we’re measuring here, in this case, quantity. $a$ is the intercept or the height here on the vertical axis when the $x$ variable has a value of zero. In this case Bob is buying zero hamburgers when the price is $4.50 per hamburger. $a$ represents the intercept, and in our case the intercept is $4.50. $b$ represents the slope of the line, the rise over the run, and in this case the slope is -0.50. For each additional hamburger that we want Bob to buy, we have to lower the price by 0.50. So $b$, in this case, is -0.50.

Let’s take a moment and remind ourselves about the slope of a line. The slope of a line is equal to the rise over the run. And the rise over the run is the same thing as saying the change in the $y$ variable, that is, the rise, the upward movement in the graph, $\Delta y$, which in economics stands for the change in $y$, divided by the run, which is the horizontal movement, or the change in $x$. So if we want to know the slope of a line we look at the change in the vertical variable divided by the change in the horizontal variable, the rise over the run.

Let’s look at an example here. If we increase the price of hamburgers by 0.50, say from $2.00 up to $2.50, Bob’s behavior changes in the following way. Instead of buying five hamburgers now, he reduces his hamburger consumption to four. This tells us the slope of the line, the rise over the run. The rise, in this case, is the change in the y variable, which in this case is an increase in the price of the hamburger by 0.50, and the run is the change in the x variable, how does Bob’s behavior change? And in this case, he reduces his hamburger consumption from five to four, that is a change of -1.

So if we wanted to calculate the slope of this line we would divide the rise by the run. That is, in this particular case, the slope is going to be equal to 0.50 divided by -1 hamburgers, or -0.50. -0.50 is the slope of the line, and that’s what you see right here in the formula. So, for a straight line, the important terms are the vertical intercept, which shows up right here as this constant term, and the slope of the line, the rise over the run, which shows up as the coefficient on this variable. In this particular case it’s the coefficient on the quantity of hamburgers, -0.50.

Every straight line can be characterized by these two pieces of information, the intercept and the slope.
Changing the Intercept of a Linear Function

Let's look at what happens to the relationship between price and quantity when we change Bob's income. We've seen already that Bob has a relationship between the price of hamburgers and the quantity that he consumes per week. We looked at these tables last time, and we imagined, although I didn't say so, that Bob's income was $500 per week. Now, if Bob gets a bigger income, he's going to change his behavior. Let's suppose that Bob's income goes up to $600 per week. If it does, we might expect that Bob would spend more money on hamburgers than before. Let me replace the old set of numbers with a new set. This is Bob's behavior when the income that he earns goes up to $600 per week. In this case we see that although he still buys no hamburgers at a price of $5.00 apiece, he'll now buy one when the price drops to $4.50, and then each time the price drops by 0.50, he'll add one more hamburger to his weekly consumption, so that by the time we get down to $1.00 per hamburger, Bob's buying eight hamburgers a week. That is, some days he's eating more than one.

Let's now represent this new set of data in the graph that we originally drew. I'll go now back to my two-dimensional diagram with the quantity of hamburgers on the horizontal axis, and the price at which hamburgers are selling on the vertical axis. Let's look at this new relationship between price and quantity, the numbers that are now in the table beside me. Let me take my pen and chart these numbers. We can see that now at a price of $5.00, Bob buys no hamburgers, so the intercept of our term--that is, the lowest price at which Bob buys zero hamburgers, has moved up--the intercept has moved up to $5.00. At a price of $4.50, Bob now actually buys a hamburger, so we have a point like this, $4.50 and one hamburger. At a price of $4.00 Bob is now buying two hamburgers, so we have a point like this, a combination of the price of $4.00 and a quantity of two. At a price of $3.50 Bob is now buying three hamburgers, so I have the price of $3.50 and the quantity of three represented by this point, and so forth. Every time the price drops by 0.50 Bob buys one more hamburger than he bought before. As we keep moving down to lower prices, we get larger quantities. We still have the same negative relationship between price and quantity. That is, we have the negative slope, the same negative relationship, but the numbers are now different. Here down at a price of $1.00 Bob is buying eight hamburgers per week.

I can connect the dots now and form Bob's new demand curve, and let me do that with this new information. I'm going to use my straight edge here to try to draw things carefully. There's no point in being imprecise if I have all the information that I need to be precise. And here's Bob's new demand curve. The new demand curve, which I might label D', and the prime, or the apostrophe, just means a new relationship to compare to the old relationship. The new relationship between price and quantity has the same slope as the old curve. Notice, the curves are parallel for every 0.50 increase in the price, Bob still reduces the quantity of hamburgers that he buys by one, so the rise over the run is still -0.50. We've got the same slope, and sometimes we'll represent that by putting two marks on these curves, and the two marks means that they have the same slope; they are parallel.

The formula for this new curve is going to be given as follows: the price on the new curve is equal to the intercept, which is $5.00 minus the slope of 0.50 times the quantity of hamburgers that are consumed. The formula for the new line is going to be price is equal to $5.00, that's our intercept, minus 0.50, the slope, times the quantity of hamburgers consumed. This is the relationship if Bob's income increases to $600. We might think of this as the curve shifting outwards. If we wanted to represent our original demand curve like this, then with the increase in income we get a new set of points that moves the demand curve outwards. You can think of this as a shift in the curve.

Let's look at another set of numbers. Now, suppose that Bob's income drops from $600 a week back to a lower income of $400 a week. In that case, what's going to happen to Bob's consumption? Well, here's a table of numbers that represents the number of burgers that Bob consumes if his income is $400. Let's look at these numbers together. What we see is that an income of $400, Bob is not going to buy a hamburger until the price drops to $3.50. That's the price at which he is first willing to purchase burgers. Then, as the price falls by 0.50, he'll buy another one, and so forth and so forth. And when the price gets down to $1.00 per hamburger, Bob will buy six hamburgers per week. So, in this case, we can see that at a lower income Bob will buy fewer hamburgers at every price.

Let's represent this set of numbers, which I'll move over to the box, on the graph. Going back to our diagram with the price on the vertical axis and the quantity on the horizontal, if the number of burgers that Bob buys a week falls because of the decline in his income, we get a new set of points. Notice now that Bob will not buy any hamburgers when the price is $4.00 a week, so we can put a dot here at $4.00 and zero to represent Bob's behavior with the lower income. This is going to be the new intercept, the lowest price at which Bob buys no hamburgers. If the price drops down to $3.50 Bob will buy his first hamburger, so we get a dot like this. If the price drops down to $3.00 a hamburger, Bob will buy two hamburgers. We get a dot like this, and so forth. Just go through and fill in the numbers.
**Changing the Intercept of a Linear Function**

from the chart. $2.50 gets us three hamburgers, a price of $2.00 gets us four hamburgers, a price of $1.50 gets us five hamburgers, a price of $1.00 gets us six hamburgers per week, and so forth.

Now, if I want to connect these numbers I can form the new demand curve for Bob at the lower income. So let me connect these dots, and when I do I get a new demand curve, and this one we could represent by D'''. Again, the primes just remind us we have a new relationship or a new set of points. And again, it's going to have the same slope. All three of these lines are parallel. One of them represents Bob's behavior when income is high, one represents Bob's behavior when income is in the middle, $500, and finally, the third represents Bob's behavior when income is low. The slope in all three cases, that is, the rise over the run, is going to be the same. But the intercept is different, and that's what gives us these parallel shifts.

This third relationship can be summarized by the equation; the price is equal to $4.00, that is, the vertical intercept, minus the slope of 0.50 times the quantity of hamburgers that Bob consumes each week. In this case we have a lower intercept, the curve is closer to the origin, but it has the same slope as before. So notice the difference between the three curves is their intercepts. The first curve is the one that's in the middle with an intercept of 4.50. The second curve is this one right here with the higher intercept, and the third curve is the one with the lower intercept. Each of these three is a relationship between price and quantity for Bob. The difference is in the income, and when the income changes, we get a whole new relationship between price and quantity.
We've been looking at the relationship between two variables, price and quantity, for Bob, who's making a decision about how many hamburgers to buy each week as the price changes. And we looked at how Bob's behavior changed when his income changed. I want to look at something else now, and that is the sensitivity of Bob's demand for hamburgers to changes in the price. What happens to the number of hamburgers that Bob buys each week when the price changes? And I bring this up because I want to discuss how economists think about the slope of a line.

Let's look at the line that we were analyzing before, Bob's original demand curve for hamburgers. We saw that when the price of hamburgers fell by 0.50; that is, from $2.00 down to $1.50 per hamburger, that Bob's quantity demanded increased from five hamburgers per week up to six hamburgers per week. This was represented by the slope of the line. Let's show how we calculate the slope.

The slope, remember, is the rise over the run, the change in the vertical axis variable or the y-axis variable, in this case, the change in price, divided by the change in quantity demanded, the change in the x-axis variable, in this case, the x-axis variable was the quantity of hamburgers that Bob purchased each week as the price changed. Now, let's calculate the slope on this original curve. The slope of this curve is going to be given by the rise over the run or the change in the y-axis variable divided by the change in the x-axis variable, and in this case, that's going to given by the change in the price of hamburgers divided by the change in the quantity of hamburgers that Bob buys each week.

Now, let me plug in my numbers here. The change in price, in this case, is a movement from $2.00 per hamburger down to $1.50 per hamburger. So, let's plug that in. The new price is $1.50 and the old price was $2.00. The price has actually fallen, and the change in quantity is given here by the movement from Bob buying five hamburgers a week to Bob buying six hamburgers a week. So the new number of hamburgers is six minus the old number is five, and that gives us the change in quantity. Let's actually solve this equation, and we get -0.50 divided by one hamburger, and the slope, therefore, is -0.50.

So Bob is relatively sensitive; that is, when the price falls by 0.50, he'll buy an extra hamburger each week. Let's suppose now we have a different relationship between price and quantity for Bob. And let's suppose that in this different relationship, when the price falls from $2.00 to $1.50 per hamburger, Bob increases his quantity, not just by one hamburger, but by five, so in this case my change in quantity is much bigger, and I can call this $\Delta x'$, that is, a bigger change in the x-axis variable. So the slope is going to be the change in price divided by this new change in quantity. The change in price is still going to be 0.50, but the change in quantity is now much bigger. So let's plug in the numbers and calculate. The change in price, as before, is -0.50, the movement from $2.00 to $1.50. The change in quantity now is the new quantity is 10 minus the old quantity of 5, gives us a change in quantity equal to five hamburgers. So the new slope is -0.10. That is, when the price changes by 0.10 on average, Bob adds an extra hamburger to his weekly consumption. Bob's demand is more sensitive on the green line than it is on the red line, and that's why economists watch the slope of curves. It is the slope of curves that tells us something about the sensitivity of one variable to changes in another.

Now, one word of warning here. The slopes of curves depend entirely on how you are measuring the variables. Here, we're measuring the price of hamburgers in dollars, but if we were measuring the price of hamburgers in cents instead, the slope might change. That is, if this were instead of $1.00, one penny, then Bob wouldn't be buying any hamburgers until we were way, way up this axis. So if we change the way we measure the price, the slope is going to
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change. And if we change the hamburger measure from burgers to boxes of burgers or bags of burgers or half hamburgers, or parts of hamburgers, you can change this slope in all kinds of ways. The slope of a curve depends completely on the units in which you measure the variables. And that’s why economists like measures that are called “elasticities.” Elasticities don’t depend on the units in which you measure variables. Elasticities are based on percentage changes, and whether the price of a hamburger goes from $1.00 to $2.00, a doubling of the price, or whether it goes from 100 cents to 200 cents, it's all the same. Economists are interested in measures that don't depend on units, but depend instead on percentage changes, and when we get into our discussion of elasticity in a later lecture, you will see how economists put this measure to work.
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**Demand**

**Determining the Components of Demand**

What determines the price at which a good trades in the market? What determines the quantity of the good that's traded? To answer these questions we're going to need a model of how the market works, and this is one of the economist’s favorite models. In the coming lectures we will be developing this model of the market in stages. We'll begin by discussing the behavior of consumers or households. We call this demand.

Then we'll be looking at the behavior of producers, those who make and sell goods. We call this supply. Then we will put demand and supply together to see how they interact to determine prices and quantities in the market. Let's begin then with the discussion of the behavior of consumers and households, the determinants of demand.

Let's pick, for the sake of a concrete example, a product that we can all relate to - bread. And let's consider the factors that influence the quantity of bread that a household is willing and able to purchase in a given period of time. How much bread do they buy a week. We call this the household's demand for bread. What are the factors then that influence the amount of bread that a household is willing and able to purchase in a week? Let's make a list of those factors.

The first factor, and maybe the most obvious, is the price at which bread trades. This price could be 0.25 a loaf, $1.00 a loaf, $2.00 a loaf, $5.00 a loaf. As the price of bread rises, households are usually willing and able to purchase less bread. When the price of bread falls, households are willing and able to purchase more.

Another factor that influences the quantity of bread that's traded is the price of substitute goods. In my picture I have a bagel, which might be regarded as a substitute for bread. Also, potatoes might be a substitute for bread, or pasta, anything that households would buy instead of bread would be considered a substitute. When the price of substitutes rises, people will avoid the substitutes and buy bread instead. When the price of substitutes falls, substitutes look like a good alternative, and people will buy bagels or pasta instead, and avoid the bread.

Another factor that influences the quantity of bread that a household purchases is the price of complimentary goods. In my picture I have cheese. Cheese is something that people enjoy consuming along with bread. We might also have butter, jam, peanut butter, or any other products that people enjoy consuming along with bread, products that are complimentary, products that go with bread. When the price of a compliment increases, then we'll find that people are consuming less bread. Here's the logic. If peanut butter gets more expensive, and you enjoy peanut butter with bread, say a peanut butter sandwich, higher prices for peanut butter raise the overall price of your peanut butter sandwich. That means you want fewer peanut butter sandwiches, and thus less bread. When compliments get less expensive, then your peanut butter sandwich becomes a better bargain. You buy more peanut butter and more bread. So the price of complimentary goods also influences the amount of bread that a household buys.

Another factor that influences household behavior is the price of input goods. For instance, in my picture here I have two bottles of milk and some eggs. If the price of inputs is low, you may make your own bread. If the price of inputs goes up, then you prefer to buy your bread at the store. So the price of input goods can influence the amount of bread that a household chooses to buy.

Another factor that influences the amount of bread that you buy in a week is your income. Income will definitely play a role here. The most income you have, the more bread you can afford, and thus you may be likely to buy more bread in a given period of time. There are some goods, of course, for which more income would lead you to buy less of those goods, and we'll be discussing those later. But let's say for now that changes in your income are likely to influence your buying behavior, your demand for bread.

Finally, one more factor that we want to take into account is expectations of future prices. If you think that bread prices are going to go up next week, then you may go out and hoard bread today, buying it all off the shelves and putting it in your freezer. If you think bread prices are going to fall next week, you may put off your purchases of bread, choosing instead to wait until bread becomes less expensive. So if you have expectations of future prices, those can influence your behavior today. Now, all of these factors can play a role in determining the quantity of bread that a household is willing and able to purchase in a given period of time. We'd like now to write down a mathematical relationship that describes household behavior, and this mathematical relationship will be called a demand function.

The demand function will show us how the quantity of bread purchased is related to all of these other factors. Now, since we want to do this mathematically, we're going to need some symbols. Unfortunately, we won't be able to carry
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the pictures around with us when we’re doing careful, logical reasoning, so we’re going to use some mathematical symbols instead.

The quantity of bread demanded in a given period of time we’ll represent with this symbol, $Q_D$, quantity demanded. The price at which a loaf of bread sells, we’ll represent with the letter $P$, the price of bread. The price of substitute goods we’ll represent with this symbol, $P_s$. The price of complimentary goods we’ll represent with $P_c$, and the price of input goods would logically be $P_i$. Income, we’re going to use the letter $M$, simply because that’s a symbol that economists usually use to represent income, and finally, we’ll use $E_x$ to represent expectations of future prices.

If we know all of these variables, and if there is a well-established relationship between consumer behavior and these factors, we can form what we call a demand function. A demand function is a mathematical relationship that predicts the quantity of bread demanded as a function of each of these factors that influences consumer behavior. Here’s how we write down a demand function. The variable that we want to explain is the quantity of bread demanded, the quantity of bread that a household is willing and able to purchase in a week. We’re going to explain this as a function of several other variables, so to represent that we have a function we’ll use this letter $D$. It’s going to be called our demand function. I’ll use the letter $D$ to stand for demand, and the color red because I’m going to use red for demand throughout these lessons.

Now, I’m going to say that the quantity of bread demanded is equal to this function of several variables. That means if you know what the variables are, you can say exactly what the quantity of bread demanded is. So I put a parenthesis after $D$, and then I make a list of all of the factors that influence the quantity of bread demanded, and we know what those factors are. First, the price of bread itself, and then I put a comma to indicate that there’s something else on the list, and that’s going to be the price of substitute goods, like bagels, and then I put another comma to indicate there’s something else on the list, the price of complimentary goods, like cheese or jam. Then comes the price of input goods, like milk and eggs, and then the income, the consumer’s income, and finally, expectations of future prices. And then I close my parenthesis to indicate these are all of the variables that I’m going to be considering in this story.

So what we have is a demand function. If you know the values of all of these variables, the function tells you the quantity of bread demanded in a week as a function of the variables.

Well, this is a lot to consider, and any of these things could be changing at any time; changing the quantity of bread demanded. In order to build a model of the market, and in order to predict how the price of bread is determined by the actions of buyers and sellers, we want to focus on the one variable that becomes especially important, and that is the price of bread itself.

We’re now going to hold constant all of these other prices. We’re going to make an assumption that economists call “cederis paribus.” The assumption cederis paribus means all other things being equal. We want to look now at how the quantity of bread demanded in a week varies as the price of bread changes, and we’re going to do that by focusing on changes in the price of bread, holding constant all of the other factors that influence consumer behavior. We’re going to assume that the price of bagels, the price of cheese, the price of milk and eggs, the consumer’s income, and the expectations of future prices all remain constant. When we do that, we will be able to draw a graph representing the relationship between the price of bread and the quantity of bread demanded, and we call this relationship a demand curve.

So in the next lesson we’ll be developing a demand curve, which is the relationship between the price of bread and the quantity of bread demanded in a week, holding constant all of the other factors that influence consumer behavior.
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Understanding the Basics of a Demand Curve

In the last lesson we introduced the concept of the demand function. The demand function shows the relationship between the quantity of bread that a household is willing and able to purchase in a week, and all of the factors that influence household behavior. We showed that the quantity of bread demanded depends on the price of bread, the price of substitute goods, the price of complement goods, the price of inputs, household income, and the expectations of future prices. In this lesson we want to focus our attention on a particular variable, and that is the price of bread itself, and how the price of bread influences the quantity of bread demanded.

In order to focus on the relationship between the price of bread and the quantity of bread demanded, we'll want to hold constant all of the other variables that influence household behavior. There's an assumption that means holding all things constant. Do you remember the name of that assumption? The assumption is called ceteris paribus, and in this lesson we'll be deriving a demand curve. The demand curve shows the relationship between the price of bread and the quantity of bread demanded, ceteris paribus, or holding constant all other factors that influence consumer behavior.

Let's begin then, by looking at a demand schedule. A demand schedule shows a relationship between price and quantity demanded, holding constant all of the other variables that influence household behavior. Let's start with a list of bread prices. Here is a list of bread prices: $5.00 per loaf, $4.00 per loaf, $3.00 per loaf, and so forth, on down to 0.50 per loaf. Now, for each one of these prices, holding constant everything else, we'll find that household behavior changes when a different quantity of bread is purchased with each different price for bread.

Let's look now at a table that shows the quantities associated with each of these prices. Now, remember, behind this table of numbers there is the assumption that we are holding constant bagels at a particular price, we're holding constant cheese at a particular price, we're holding the price of milk and eggs constant, we're holding consumer income constant, we're holding expectations constant. The only things we are allowing to vary are the price of bread and the quantity of bread that the household will buy.

So, when the price of bread is $5.00 per loaf, this particular household will buy one loaf of bread per week. If the price falls to $4.00 per loaf, holding constant everything else, the household will now increase the quantity demanded to two loaves of bread per week. As the price falls to $3.00, this household will increase its quantity further, and so forth, so that if the price of bread falls all the way down to 0.50 per loaf, this household will buy nine loaves of bread per week. This is called a demand schedule, a relationship between the price of bread and the quantity of bread that the household is willing and able to buy, holding constant all other factors that influence household behavior.

In order to turn this table of numbers into a powerful, logical tool, we're going to introduce a graph with price and quantity, and turn these numbers into a demand curve. The demand curve we'll later use to describe how price and quantity are set in a market where buyers and sellers are interacting.

So let's move these numbers over to the board where we'll have access to them, and let's put up a graph where we can represent these numbers graphically. The first thing you want to do in economics anytime that you are drawing a graph, is carefully label the axes. In this case, we're going to put the price of bread on the vertical axis, and we're going to measure the price of bread in dollars. So here's $6.00 per loaf, $5.00 per loaf, $4.00 per loaf, and so forth. As the numbers get larger, the price of bread per loaf is increasing. As the numbers get larger, the price of bread per loaf is increasing. So the price of bread rises as we go further and further up the vertical axis.

On the horizontal axis we'll represent the quantity of bread that households are willing and able to buy. We’ll represent the quantity of bread demanded, measured in loaves purchased per week. So here’s the price of bread in dollars per loaf; here’s the quantity of bread purchased per week. Now, let's take the numbers over on the board from our table and represent them in the diagram as points on a curve.

So we'll start with the highest price of $5.00 per loaf, and the quantity of bread, one loaf demanded per week. So we go one loaf on the horizontal axis, up to a price of $5.00 per loaf, and we can put a dot here representing that when the price of bread is $5.00 per loaf, this particular household will buy one loaf per week. If the price falls to $4.00 per loaf, then according to the numbers in our table, the household will purchase two loaves per week, so we put a dot here at $4.00 per loaf and two loaves purchased per week. Here we now have three loaves purchased, and that happens if the price is as low as $3.00 per loaf. So here's another point that represents a combination of price and quantity that represents household behavior. Then we get four loaves purchased when the price drops as low as
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$2.50 per loaf, so here’s four at $2.50, and we just keep going, putting the points in. We get five loaves when the prices is $2.10 per loaf, so that’s that point. We get six loaves if the price is $1.80 per loaf, so put that point in right here. And we get seven loaves if the price is $1.50 per loaf, so that’s going to be this point here, and we get eight loaves if the price is $1.00 per loaf - $1.00 and eight loaves, and nine loaves if the price is 0.50 per loaf, so that’s this point here.

What I did was take each combination of price and quantity from my table and represent it as a red dot in this diagram. Red is going to be my official color for demand, so I’ve represented all of these combinations with red dots.

Here’s a question - are these the only imaginable quantities of bread? Are these the only imaginable prices? Absolutely not. We can imagine, first of all, that the price could vary continuously from zero, that is, free bread, all the way up to $10.00 per loaf and anything in between, any price imaginable. The price could be $1.01. It could be $1.05. It could be $1.74. All of the prices on the vertical axis are possible. Also, all the quantities are possible. Not just discreet quantities, like one loaf of bread for week or five loaves of bread per week, but we can also imagine two-and-a-half loaves of bread per week. What would that mean? That would mean that you buy five loaves of bread every two weeks, so that on average, each week, you’re buying two-and-a-half loaves. So we can imagine that bread could be divided up into very, very small fractions, and the price also varies continuously. If that’s the case, we can connect the dots and represent the consumer’s behavior with a smooth curve that shows a continuous relationship between price and quantity.

So let me connect those dots. And this gives us what we call in economics a demand curve, and I’m going to label this with a D to make it clear that I know that it’s a demand curve. Here’s the definition of the demand curve. The demand curve shows the relationship between the price of bread and the quantity that the consumer is willing and able to purchase in a given period of time, holding constant all other factors that influence consumer behavior, such as, the price of substitutes, the price of compliments, income, expectations, and so forth.

The first thing you want to notice about the demand curve is the demand curve is downward sloping. Now, what does that tell us? What does it tell us that economists almost always draw the demand curve downward sloping? Well, the downward sloping demand curve is a way of representing that as the price of the good rises, the quantity demanded falls. Economists call this relationship “the law of demand.” The law of demand states that when the price of a product increases, consumers are willing and able to purchase less of it.

Now, it’s not true, necessarily, that this is always the case. Some goods, people will actually buy more of them as they get more expensive. But in general we observe that when the price of goods and services increase, people are willing and able, and in fact, do buy less of them. Does this make sense? Well, in fact, it does make sense for two reasons. The first reason is what we call “the substitution effect.” When the price of a good rises, consumers, seeking to get the most satisfaction from their limited income, will stop buying this more expensive good, and switch to other substitutes instead. For example, when bread gets more expensive, consumers try to get their carbohydrate satisfaction by buying bagels or potatoes instead. The higher price for bread leads consumers to substitute away from bread and seek less expensive substitutes.

The second reason behind the law of demand is what we call the “income effect.” When the price of bread rises, then a consumer is able to purchase less. That is, if bread goes from $1.00 a loaf to $3.00 per loaf to $6.00 per loaf, meanwhile, I’m living on a limited income that’s not changing, a constant income. Now, my purchasing power, the purchasing power of my income, measured in bread, is shrinking. If I have $10 to spend on groceries each week, and the price of bread is $1.00 per loaf, I can afford ten loaves of bread. But if the price goes up to $5.00 per loaf, I can only afford to purchase two loaves of bread. This is the income effect. I buy less bread because my purchasing power is shrinking, measured in terms of bread.

So the substitution effect and the income effect are two rationales behind the law of demand. When the price of the good rises, we expect people to purchase less of it. Because they are willing to purchase less, they’re going to look for less expensive substitutes, and they are able to purchase less because the purchasing power of their income is shrinking.

In the next lesson I’m going to look at what happens to the demand curve when we allow those other factors, those factors that we held constant to change. Suppose now we allowed the price of bagels to change, or consumer income
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to change. How would that influence the relationship between the price of bread and the quantity that this particular household demands in a week?
Analyzing shifts in the Demand Curve

In the previous lesson we looked at the demand curve, the relationship between the price of bread and the quantity of bread that a household was willing and able to purchase in a week. When you draw a demand curve you hold constant all of the other factors that influence household behavior, factors like the price of substitutes, the price of compliments, household income, expectations, and so forth.

You might ask yourself, “How do we represent a change in one of those other factors?” After all, it’s very easy to show how the household responds to a change in the price of bread. You just move up or down the demand curve. But what if the price of bagels changes? Or what if consumer income changes? In that case, it turns out that we get an entirely new relationship between the price of bread and its quantity demanded, and once we have a new relationship, a new demand schedule, we have to draw a new demand curve. In this lesson we will show how the change in one of the factors that we usually hold constant will cause us to have to shift the demand curve; that is, to redraw it in a new position.

Let’s go back to the original demand schedule we used in our last story. Here’s a particular household, and this household has behavior that’s represented by these numbers. At a price of $5.00 per loaf they demand one loaf of bread per week, $4.00 a loaf means two loaves of bread per week for them, and so forth, these numbers representing the quantity of bread that they are willing and able to purchase at these different prices for bread. But suppose now we make a change in one of the factors that we held constant when we drew this schedule. That is, suppose now we change household income and make this household richer. Suppose their household income comes from $500 per week to $700 per week. The household is now wealthier, and one of the things that this household might choose to do with its newfound income is purchase more bread. This would be the case if bread is what economists call “a normal good.”

A normal good is a good that a household buys more of when the household income increases. Let’s suppose that bread is a normal good for this household, and in that case, we will get a new higher quantity of bread at every price after income has increased.

I'll write these numbers in. To show that this is a new demand schedule, I'll use the symbol prime, or apostrophe, by the D to represent that this is a new demand relationship. Prime usually means new. We've got something new so we're indicating it with this little mark. Well, here's our new demand schedule after the increase in household income. Now, at a price of $5.00 per loaf, this household wants two loaves of bread per week instead of one. At a price of $3.00 this household used to want three loaves of bread, now they want four, and so forth, all the way down the schedule. You will see that after an increase in income, this household wants to buy a larger quantity of bread at every price, and that's going to be important language for us as we look at how changes in variables influence the demand curve.

So let’s take this demand schedule and move it over to the board, and draw the new demand curve in the axes that we used to draw the old demand curve. So what I'll do now is move all this stuff over to the board so you'll have it for reference, and I'll go back to the diagram in which we graphed the demand curve. After the increase income, we'll see that there's a change then in the demand curve.

For example, now at a price of $5.00 per loaf, the household wants two loaves of bread per week instead of one. At a price of $4.00 per loaf we have a new quantity of three loaves demanded per week instead of two. At a price of $3.00 per loaf, the quantity demanded after the increase in income is going to be $4.00 per loaf [sic]. Notice, the quantity demanded is larger at every price after income increases. This household now wants five loaves of bread when the price of bread is $2.50 per loaf. This household wants seven loaves of bread when the price is $2.20. At a price of $1.80 the household wants eight loaves of bread. At a price of $1.50 the household wants nine loaves of bread, and at price of $1.00 per loaf the household wants 10 loaves of bread, and finally, the household wants 12 loaves of bread if the price of bread is down to 0.50 per loaf.

Now, are these the only imaginable prices and quantities for this household? Absolutely not. We can imagine price changing continuously. We can imagine quantity demanded changing continuously, and we can connect these dots to get a continuous, downward sloping demand curve just like before. Here's the demand curve that represents the relationship between price and quantity demanded after income is increased.
Analyzing shifts in the Demand Curve

Notice that the new demand curve lies further away from the axes. We might use the language that the demand curve has shifted outwards. That is, after the increase in income, since bread is a normal good, the household wants to buy more bread at every price than it was buying before. The outward shift in the demand curve came about because we changed one of the variables that we had previously held constant.

When we drew the old demand curve we allowed price to change to see how the household behavior would change, how quantity would change. But we held income and the price of other goods constant. Whenever we changed income, we get an entirely new relationship between price and quantity. At every price, this wealthier household now wants to buy a larger quantity of bread than they were buying before. The increase in consumer income leads the demand curve to shift outwards. They call this an outward shift in the demand curve; that is, the household buys a larger quantity of bread at every price.

Now, here’s some important language for you to know. Whenever there’s a change in the price of bread, the household changes its behavior by moving along the existing demand curve. When a household moves along an existing demand curve, that is, when the household responds to a change in the price of bread, we call this “a change in quantity demanded.” However, if we change one of the variables that we previously held constant - income, the price of other goods, expectations, this causes us to have to redraw the entire demand curve. It leads to an entirely new relationship between the price of bread and the quantity demanded. We call this shift in the demand curve “a change in demand.” The entire demand schedule has changed. We have a whole new relationship between price and quantity, and that’s what’s meant by a shift in the demand curve, or the language, a change in demand.

So, a movement along the demand curve is a response to a change in the price of bread itself, and that’s called “a change in quantity demanded.” A shift in the demand curve is caused by a change in one of the variables that we usually hold constant when we draw a demand curve, and the shift is called “a change in demand.”

In the next lesson we’ll do a complete inventory of all the things that can shift the demand curve, and we’ll discuss how those various factors that we usually hold constant influence consumer behavior.
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Demand

Understanding Changes in Other Demand Variables

In this lesson we’re going to do a summary of all of the factors that influence consumer demand, and we’re going to show how each of those factors appears in the demand curve diagram.

Let’s start with the easiest case. How do we show a change in consumer behavior in response to a change in the price of bread itself? This is easy. If the price of bread changes, the consumer moves along the existing demand curve. For instance, if the price of bread goes up, the consumer will be buying less bread than before. We see a decrease in the quantity of bread demanded. If the price of bread, on the other hand, falls, we’ll see the consumer buying a larger quantity. Here, we have the law of demand at work. The consumer is will and able to buy more bread when the price is lower, and that’s a movement down the demand curve, a lower price for bread corresponds to a larger quantity demanded.

Anytime you change the price of bread itself, you are moving along the demand curve. The demand curve never shifts in response to a change in the price of bread. You can never shift a curve when you’re changing one of the things that are measured on the axes, you just move along the curve.

Suppose now we change another one of the factors that influences consumer demand, one of the factors that we hold constant when we draw the original demand curve. Let’s consider first the case of the price of substitute goods. What happens if the price of bagels increases? Well, let’s think about the household’s decision. With bagels now being less attractive, this household would be more inclined to get their carbohydrates from bread instead. Now, at any given price of bread, the household is going to want to buy more bread than before and fewer bagels. Bagels are relatively unattractive; bread has become more attractive, so the household wants to buy more bread now at every price, and this shifts the demand curve outward. It changes the relationship between the price of bread and the quantity demanded, and it gives us this entirely new demand curve. With the price of substitutes going up, bread is more attractive and consumers want a larger quantity of bread at every price.

Suppose now that the price of bagels falls. If the price of bagels falls, bagels are not relatively attractive, consumers get more of their carbohydrates from bagels instead, and the quantity of bread demanded at every price shrinks. We represent this change by shifting the demand curve inwards. Now, at every price for bread, consumers demand a smaller quantity of bread than before, the demand curve shifts inward. We call this “a decrease in demand.”

So, in summary, when the price of substitute goods goes up, there’s an increase in demand, a larger quantity demanded at every price. If the price of substitute goods falls, we have a decrease in demand, a smaller demanded at every price.

Let’s consider another factor that influences consumer behavior, the price of complimentary goods. Suppose the price of cheese, a complimentary good, falls. In that case, consumers say, “Well, we like to eat bread with cheese; the price of a cheese sandwich has just decreased. That means we want more cheese sandwiches, and that means buying more bread.” When the price of a compliment good falls, consumers are going to want more of the original good at every price. Bread is now more attractive, and after the price of the compliment falls, households will want to buy more bread at every price than they were buying before. So here’s the new demand curve. A decrease in the price of a compliment good shifts the demand curve outward, a larger quantity of bread purchased at every price.

If, on the other hand, the price of cheese should increase, the demand curve would shift inwards. Now, with cheese more expensive, consumers say, “We don’t want cheese sandwiches; we’ll eat soup for lunch instead, and if we’re not buying cheese for cheese sandwiches, then we’re not going to buy the bread to go with it,” and that means a smaller quantity of bread purchased at every price, an inward shift of the demand curve. When the price of complimentary goods increases, the demand curve shifts inward, a smaller quantity of bread demanded at every price.

Here’s another thing that can change - consumer income. Now, I’ve saved this case for later in this lesson because it’s relatively subtle. There are two different cases that we want to consider with income. The first is the case of what we call a “normal good.” A normal good is defined as any good for which the demand increases when income increases. This would be the case with luxury goods, like jewelry or vacations. When you get wealthier, when your income increases, you’re inclined to want to buy more of these goods at every price.

So let’s consider first the case of normal goods. With normal goods, when your income increases, you want to buy more of the good at every price. This would be the case for the demand curve for jewelry or vacations. On the other
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hand, if we have a normal good and your income decreases, you’re going to buy less of that good at every price. The demand curve shifts inwards, because now with less purchasing power, you will spend less on those goods than before. So for a normal good, higher income means an increase in demand, and a smaller income means a reduction in demand. The demand curve shifts outwards when income rises, and inwards when it falls if the good is a normal good.

Now, the other case with income is what we call the case of inferior good. Inferior goods are those odd goods for which your demand actually decreases when your income increases. One example of an inferior good that’s often given is the case of beans for poor families. Poor families eat beans probably because they can’t afford higher protein alternatives like meat. If their income increases, we might see that these families buy less beans and more meat instead.

So here’s an example of an inferior good - as income increases, the demand for that good actually decreases. A family that gets a higher income is inclined to buy less beans and more meat. So we have the demand curve shifting inward representing a smaller quantity of beans demanded at every price when the income increases.

However, if the good is inferior, and your income decreases, then you’re inclined to actually buy more of the good. When you get poorer, you’re inclined to buy more beans at every price and less meat instead. So with an inferior good, you get exactly the opposite relationship between demand and income that you get with a normal good. With a normal good, higher income shifts the demand curve outwards, lower income shifts it inwards. With an inferior good, higher income shifts the demand curve inwards and lower income shifts the demand curve outwards.

Finally, one more thing we can consider is the expectation of future prices. If you think that the price of bread is going to be rising in the future, then you may go out and buy more bread today, stocking up, making sure your freezer is full before the price increase. A higher expected price in the future leads households to buy more bread today at every price. However, if you think the price of bread is going to go down in the future, you may delay your purchases and wait for a bargain. In that case, your demand curve actually shifts inwards. That is, at any given price for bread, you now want a smaller quantity than before. You’re saving up and waiting for the day when the price actually falls. So higher expected prices in the future lead to an increase in demand. Lower expected prices in the future lead to a decrease in current demand.

So there you have it, a catalog of things that can shift the demand curve. All of those factors that we hold constant when we draw the demand curve can change, and if they change, we have to redraw the demand curve. We get an entirely new relationship between price and quantity, and we represent that entirely new relationship by a shift in the demand curve.

Here’s the important language for you to remember. I’ve said it before, but I’ll summarize it, because it helps you to be very clear about these important concepts. When you have a change in the variable that’s measured on the axis, a change in the price of bread itself, you represent the change in the price of bread as a movement along the demand curve. We talk about a change in the price of bread, a movement along the demand curve, and a change in quantity demanded. They all mean the same thing. If you change one of the factors, on the other hand, that we usually hold constant, we represent that change as a shift in the demand curve.

We talk about an increase in income or a normal good, an increase in the price of substitutes, or a decrease in the price of complements, or an increase in expected future prices. We talk about these things leading to an increase in demand; that is, an outward shift in the demand curve. Shifting the curve as the same thing as a change in demand. An increase in the quantity demanded at every price.

So all of these phrases that I’ve used, all of these expressions are important for you to memorize so that you can use them carefully when you’re trying to describe the response of consumers to changes in their environment.

In the next lesson we’re going to take this logic that we’ve developed for a particular household and turn it into a market demand curve by adding up the demand curve’s of the individual households to get what we call a “market demand curve.”
We've been talking about the demand for bread, and we've been focusing on the behavior of a single household, showing how the relationship between price and quantity demanded varies with changes in income, the prices of substitutes and compliments, and other factors. But you may be wondering, “What about the overall demand for bread, the demand in the market as a whole?” In this lesson we will show how to take the individual demand curves of households and add them together to get the market demand curve for bread. It's a simple, straightforward matter.

Let's start with our schedule showing how much bread a particular household will demand at different prices. Let's say that we have Bob here, and these numbers represent the quantity of bread that Bob is willing and able to purchase as the price of bread varies. So at $5.00 a loaf Bob buys one loaf, at $4.00 a loaf he buys two loaves, and so forth. Suppose now Bob is not the only household in this market. Let's suppose that there is another household and that's Ann. Ann has a different demand schedule for bread. In fact, Ann buys more bread at every price than Bob does - perhaps she likes bread better. At $5.00 a loaf Ann buys two loaves of bread each week. At $4.00 a loaf, Ann buys four loaves, and so forth. So here's Ann's demand schedule for bread - the quantity of bread demanded as a function of the price of bread.

Suppose now that Bob and Ann are the only buyers in this market. In order to find the market demand for bread, we need to add together their individual demands. So to find the market demand for bread, take the quantity of bread that Bob demands at each price and add to it the quantity of bread that Ann demands at each price. That will give you the market demand for bread. So at a price of $5.00 Bob wants one loaf of bread per week, Ann wants two loaves of bread per week, for a total of three loaves of bread in the market. If we continue on down the schedule we will find the overall quantity demanded in the market is the sum of Bob’s demand and Ann’s demand, the sum of Bob’s quantity and Ann’s quantity at each price. So, at a price of $3.00 per loaf, Bob wants three loaves a week; Ann wants five, for a market total of eight. Now, we’ve added together Bob’s individual demand and Ann’s individual demand at each price. We found the quantity for each of the buyers, add them together, and wind up with the market demand curve. So there you have it. It's simply a matter of addition to go from the individual demand curves to the market demand curve.

Let's show now how the same process works in our graph. We'll move all these numbers over to the box where you can use them. I have here reproduced all of this information in a graph. So I have Bob’s information represented in this first diagram. I have Ann’s information represented in the middle graph, and over here on the far right, I’m going to sum the two together to get the market demand curve. Let me show you how that works. The process is called “horizontal summation,” because we are adding horizontal distances. Notice, in this first diagram we have Bob’s quantity written on the horizontal axis. At each price the red dot tells us the quantity of bread that Bob is willing and able to purchase at that price.

In the second diagram, the horizontal axis measures Ann’s quantity, the quantity of bread that Ann is willing and able to purchase at each price. So, for instance, suppose we wanted to know the market demand at a price of $5.00 per loaf of bread. We take Bob’s quantity, which is one loaf of bread and add to that Ann’s quantity, which is two loaves of bread, to get the market quantity of three loaves of bread.

We can also do that in a diagram. So, for example here, measure the distance from the axis to the red dot. That's one loaf of bread that Bob wants at a price of $5.00. Add that on to the amount that Ann wants to buy, which is two loaves of bread at $5.00, and we get this horizontal distance - 2 + 1 = 3. I go over there to $5.00 and there’s a point on my market demand curve. At a price of $5.00 per loaf, we have a total quantity demanded in this market of two loaves from Ann plus one loaf from Bob, for a total of three loaves of bread at a price of $5.00.

I can continue this process if I want. Bob wants two loaves at a price of $4.00, so let’s mark that on our ruler. And then go over here and add those two loaves to the four loaves that Ann wants at a price of $4.00. So we have two loaves plus four loaves is a total of six loaves, and go over here and put those six loaves as a dot in the market demand curve. So if Bob wants two loaves at $4.00 and Ann wants four loaves, two plus four is a total of six. Add them together and you get another point on the market demand curve.

I can keep doing this horizontal sum. At each price find the quantity that Bob wants, add it to the quantity that Ann wants to get the market quantity. I can keep doing this exercise, going and adding Bob’s distance on to Ann’s distance to get the total. But you know that we already have the market sum from over in the box, so I can go ahead and just plot the numbers; I've already done the addition.
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**Demand**

**Deriving a Market Demand Curve**

Three was the quantity demanded in the market at a price of $5.00. Six is the quantity demanded in the market at a price of $4.00. At a price of $3.00 I have a total of eight loaves of bread demanded. At a price of $2.50 my total quantity demanded is 10. At a price of $2.10 a loaf I have a total quantity demanded of 12. At a price of $1.80 per loaf my total quantity demanded is 14.

These are all the points in the market demand curve. Now, just as we can connect the dots to get the individual demand curve, we can connect the dots to get the market demand curve. If I go over and connect these dots I get the individual demand curve for Bob. If I go next door to this diagram and connect these dots, I get the individual demand curve for Ann. And if I connect the dots in the far diagram; that is, the sum of these two individual demand curves, I'll get the market demand curve, and I'll simply label it with a D, because it represents the sum of Bob and Ann and anyone else if we did this exercise more generally.

So the idea here is this: if you take Bob’s demand curve and add it to Ann’s demand curve, you get the total demand in the market. That is, for any price that we choose on the vertical axis, go over to Bob’s demand curve to get the horizontal distance, the quantity that Bob demands, and add that to the horizontal distance at the same price over in Ann’s demand curve, and that horizontal distance, the sum of Bob’s plus Ann’s quantity demanded will show up over here in the market demand curve at the same price.

So one more example. At a price of $2.10 per loaf, Bob wants five loaves of bread each week and Ann wants seven loaves of bread each week. Five plus seven gives us a total market demand of 12 loaves of bread at a price of $2.10.

Since the market demand curve is just a sum of the individual demand curves, anything that shifts the individual demand curves. Anything that shifts the individual demand curves will also shift the shift the market demand curve. That is, if household income changes, if the price of substitutes or compliments change, if tastes and preference change, if expectations change. Anything that shifts Bob’s individual demand curve or Ann’s individual demand curve will shift the market demand curve.

For instance, suppose we’re talking once again about the market for bread, and suppose that bread is a normal good. If Bob’s income increases, Bob’s demand curve for bread will shift outward. And when it shifts outwards, horizontal summation will lead to a market demand curve that’s further away from the axes. Anything that shifts out Bob’s curve or Ann’s curve will also shift out the market demand curve, since it is the sum of the individual demand curves.

Now that we’ve described the consumer side of the market, we’ll look now at the producer side of the market. We’ll look at the logic of the seller, as the sellers pursue their profits and try to maximize the money that they make from their businesses, their behavior will be summarized in a supply curve, and that’s where we’ll go next.
Introduction to Economics

Supply

Determining the Components of Supply

In the last lectures, we've been considering the consumer side of the economy, those factors that influence the demand for particular goods and services. Now we'll shift our attention to the supply side of the economy. We'll look at the determinants of the supply of a particular good or service. Let's think now about the agents we're studying, people who offer bread for sale. These are people like bakers and other stores that are trying to make a profit by selling bread. Profit is the difference between the revenue that a company earns and its costs of providing its good or service. So, any factor that influences profit; that is, any factors that influence revenue or costs are going to have an effect on the supply decisions of firms.

Let's look then at some of those factors, because they turn out to be the determinants of supply. Think about the market for bread. What are the determinants of the profitability of a company that might want to sell bread? What are the factors that are going to influence how much bread they are profitably able to offer for sale? Well, one important component of their decision will be the price at which they can offer bread for sale. If the price of bread is high, the prospects for profits are good, and it's more likely that there will be lots of companies offering lots of bread for sale. If prices of bread are low, on the other hand, it's unlikely that a lot of bakers will be able to make a profit and the quantity of bread offered for sale will be lower.

Well, that works on the revenue side of things. What about on the cost side of things? One important factor would be the cost of inputs, like milk and eggs, things that are used to make bread. So the input prices are important. The higher the input prices, the higher the company's costs, and the less profitable it will be for companies to offer bread for sale. When input prices are lower, it's more likely that a company can make a profit selling bread, and the amount of bread offered for sale is likely to be higher.

However, input prices are just one part of the cost side of the firm. Another side of this equation is going to be technology. How is this firm going to be able to combine inputs to produce bread? If you have good technology you can get by with very little milk and eggs to make the bread. If you have bad technology or are wasteful or unproductive, you're going to have to buy a lot more inputs and that raises your cost of production. So technology is important. The better the technology is for producing bread, the lower the cost to the company and the more likely it is that that company will offer lots of bread for sale. If technology is not as good, costs will be higher, and the bread supply will probably be a smaller quantity.

One more thing that influences the supply decision will be expectations, just like in the case of households. Producers are looking forward to the future, trying to figure out whether the prices of bread will go up or down, what will happen to the prices of their inputs. And as they change their expectations they may be changing the timing of production. If they think bread prices are going to rise next week, they may save bread on their shelves this week and try to sell it later. They may freeze bread in anticipation of being able to charge a higher price in the future.

So we have then four factors that influence the supply decision of firms - the price of bread, the price of inputs, technology for production, and expectations of future prices. Now, of course, I'm going to want to turn these into a supply function so I need mathematical symbols for all of these ideas. We'll let the quantity of bread supplied be represented by $Q_s$, and I'm using the color blue here, because blue will be my official color for supply. The price of bread we'll represent as before with $P$, the price of inputs with $P_i$. The technology of the firm we'll represent with the letter $T$, and the expectations of future prices with the letter $E_x$.

Now, we're ready to write down supply function. A supply function shows the amount of bread that a firm is willing and able to supply profitably as a function of all of the variables that influence its decision - the price of bread, the price of milk and eggs, the technology of production, and the expectation of future prices. So let me take my icons off the pad and I'll turn these symbols into a function. We want to now describe the quantity of bread supplied as a function and I'm going to use for my function the letter $S$, my blue $S$, to be supply. So I'm going to have a function called the supply function and the quantity of bread supplied depends on all of these variables - the price that we can charge for a loaf of bread, the price that we have to pay for milk and eggs and other inputs, the technology; that is, how effectively we can turn inputs into output, and finally, the expectation of future prices.

There you have it - the supply function for a particular firm. If you know the value of prices, input prices, the state of technology, and the expectations for the future, you'll be able to say how much bread a particular firm will offer for sale. And there you have it, the quantity of bread supplied expressed as a function of all of the variables that influence the supply risk behavior.
Supply

**Determining the Components of Supply**

Now what we'll do is look at a supply schedule, the behavior of a particular firm in response to different possible prices for a loaf of bread. Then we'll take the supply schedule and turn it into a supply curve.
Supply

Deriving a Supply Curve

In the last lecture we made a list of those factors that influenced the behavior of suppliers. In this lecture we’re going to look at a particular factor; that is, the price of bread and how the behavior of suppliers is related to the price that they can charge for the product. Remember that we said that the quantity of bread that was supplied was influenced by the price of bread, the technology of production, the price of inputs, and the producer’s expectations about future prices. What we’ll do now is look at the relationship between the quantity of bread supplied and the price of bread, holding constant all of these other factors. Once again we’ll be invoking the assumption “ceteris paribus” to look at how the quantity of bread supplied in the market is influenced by changes in the market price of bread, holding constant expectations, technology, and the price of inputs. This will give us a supply schedule, and we’ll begin by looking at the supply schedule for an individual firm.

Suppose we have a baker whose behavior can be summarized in this table; that is, the quantity of bread that our baker supplies is related to the price of bread. When I draw the supply schedule I am invoking ceteris paribus. I’m holding constant everything else that this baker cares about - technology, input prices, and expectations about the future. I’m looking only about how his behavior would change in response to a change in the market price of bread. So, for instance, our particular baker here will supply one loaf of bread per week. That is, he is willing and able to offer one loaf of bread per sale each week when the price of bread is 0.40 per loaf. If the price of bread goes up to 0.60 per loaf he is willing and able to offer two loaves of bread for sale a week, and so forth. At a price of $1.00, the quantity supplied is three loaves of bread. At a price of $1.50 the quantity supplied is four loaves, and so forth, all the way to the end of our chart. Again, this supply schedule represents a relationship between the market price of bread and the quantity of bread that our seller is willing and able to offer, holding constant all of the other factors that influence the supplier’s behavior.

The next step in this analysis is to take the information from this supply schedule and convert it into a supply curve. That is, a graph that represents the relationship between price and quantity supplied for our particular baker. So that’s what we’ll do next. I’ll move this information over onto the board and I’ll put up axes here that I can use to graph the relationship between price and quantity for this baker. So on the horizontal axis we will be measuring the quantity of bread; that is, supply, that is, how much bread our seller is willing and able to offer for sale. And on the vertical axis we will represent the price of bread, which again will be measured in dollars. Now, I’m going to take the information from the table and represent it in the graph.

So at a price of 0.40 per loaf we get a quantity of bread supplied of one loaf per week. So here’s a blue dot that represents that combination - 0.40 from the vertical axis and one loaf of bread from the horizontal axis. We get two loaves of bread when the price goes up to 0.60 per week, so let me go on into my diagram. Two loaves of bread at a price of 0.60 gives me a point like this one. I get three loaves when the price is up to $1.00, and this particular baker will offer four loaves for sale if the price of bread rises to $1.50. We get another loaf of bread at a price of $2.10 per week, so let me put that point on the diagram, and we get six loaves of bread when the price is all the way up to $2.50 per week. In each case I’m measuring price on the vertical axis and quantity on the horizontal axis. I get seven loaves of bread at a price of $3.00 per loaf. At a price of $4.00 per loaf, this particular baker is willing to offer eight loaves of bread for sale each week, so that gives me this point. And at a price of $5.00 this baker offers nine loaves of bread for sale each week, so that gives me this point.

Now, are these the only imaginable quantities of bread? No, you can imagine fractional quantities. The baker could offer two loaves for sale over the course of three weeks, which would average out to be 2/3 of a loaf a week. Or he could offer three loaves for sale every two weeks, which would average out to be 1-1/2 loaves per week. So it’s possible that there will be fractional loaves of bread sold. He could even bake a half a loaf if he was so inclined. And it’s also possible to imagine prices varying continually from zero all the way up to $6.00, $7.00, $10.00. So the continuous variation of prices and the continuous - the visibility of quantities of bread allows us to connect these dots and make a smooth supply curve representing this baker’s behavior.

So let me connect the dots, and when I connect the dots I have created a supply curve. The supply curve is a collection of points representing the quantity of bread that a baker is willing and able to offer for sale in a given period of time as a function of the price of bread per loaf. So it’s a relationship between price and quantity supplied for this particular baker. I’m going to label this curve with an S to indicate that it’s the supply curve.

Now, there’s something you need to notice immediately about the supply curve, and that is that the supply curve slopes upwards. This is a representation of what economists call “the law of supply.” The law of supply is a regularity
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Supply

**Deriving a Supply Curve**

that we notice in the economy that as the price of a good or service increases, the quantity that is offered for sale generally increases. Now, does this make sense? What’s the intuition behind the law of supply?

The intuition behind the law of supply is a concept that we’ve already considered in this series, and that’s the concept of increasing opportunity costs. That is, the more bread a particular baker offers for sale, the higher the cost of each additional loaf. The cost of each additional loaf tends to rise. Here’s an example that might make that clearer. Think about what the baker puts into this operation. Every time this baker bakes a loaf of bread, that’s taking extra time and extra resources. To bake one loaf of bread might take time away from watching television, time that’s not especially valuable. His opportunity cost for that hour is small. But if he spends more and more time in the kitchen baking bread, eventually he’s taking time away from fishing, he’s taking time away from spending with his family, he’s taking time away from pleasurable leisure activities like reading, he may also be taking time away from other opportunities to make money, and the more bread that he produces, the more he’s having to go to hours of time that are more and more valuable to him. Giving up his TV time is no big deal. Giving up his fishing time is a little more serious. Giving up his family time is more serious still, so we have to pay him larger and larger amounts of money to get him to produce larger and larger quantities of bread. Getting him to produce a small quantity of bread doesn’t take much of his time, so he’s willing to do that for a small amount of money. But getting him to produce a large quantity of bread begins to take away from time that’s more valuable. His opportunity cost of producing additional loaves of bread continually rises as we eat into more and more valuable time, as we take him away from more and more pleasurable activities. That’s why it takes higher and higher prices to get this baker to make more and more bread.

The supply curve is upward sloping because of increasing opportunity costs. We'll see later in this series how the upward sloping supply curve is related to increasing marginal costs associated with diminishing productivity of resources. But for now a good answer to the question, why does the supply curve slope upwards is this: the supply curve slopes upwards because the opportunity costs of production rise as the baker makes more and more bread.

In the next lesson we’ll look at those factors that shift the supply curve. That is, what if we allow those things to vary that we previously held constant? What if we relax the assumption of ceteris paribus and allow the price of inputs to change or technology to improve? How would that influence the relationship between the price of bread and the quantity that our baker is willing and able to offer for sale?
Understanding a Change in Supply vs. a Change in Quantity Supplied

The supply curve shows the relationship between the price of bread and the quantity of bread that a seller is willing and able to offer for sale, holding constant other factors that influence supply, such as, the price of inputs, technology, and expectations about future prices. What happens to the supply curve if we change some of those other variables? Of course, the supply curve shifts. In this lesson we'll be looking at a particular case of the shift in the supply curve. Then in the next lesson we'll be looking at a catalog of all of the factors that can shift the supply curve.

So let's start with a specific example. Remember, we're talking about a particular baker who has this relationship between price and quantity. This is the supply schedule that we used in the last lesson. Suppose now that we allow a change in one of the factors that we held constant when we wrote down this schedule. Suppose, in particular, that we allow the price of inputs to increase. An increase in the price of milk and eggs and other inputs used to produce bread is going to influence the profitability of this baker. In particular, with higher input prices, it's going to be less profitable to make bread, and the response of the baker will be to scale back his operation. With the higher prices for inputs we will see a smaller quantity of bread supplied at every price. So we can put these numbers in the table to represent the quantity supplied after the change in input prices. And as before I'm putting a little apostrophe after the S, a symbol we usually call “prime,” to indicate S' is a new supply schedule after the change in input prices.

So with the higher prices of inputs this baker is unwilling to offer any bread for sale at a price of 0.40 per loaf. We get the first loaf of bread on sale at a price of 0.60 per loaf. Two loaves offered at $1.00 per loaf, three loaves at $1.50 per loaf, three-and-a-half loaves per week sold at a price of $2.10 per loaf, and so forth. Notice that we have a smaller quantity supplied than before at every price, a change in one of the variables that we previously held constant required us to redraw the entire supply schedule.

Now, I'll move this information over to the board and we'll represent this change in supply as a shift in the supply curve that we drew. Here I go, moving information to the board, and I will go back to the diagrams we were looking at before. With a change in input prices, with an increase in the price of milk and eggs and other factors that go into producing bread, we're going to get a change in the supplier's behavior. Let me simply graph the numbers from the table over on the board. At a price of 0.40 now we have zero loaves of bread offered for sale, so the new dot for the new supply curve will be over at a quantity of zero and a price of 0.40, so it shifts over to the axis itself. At a price of 0.60 per loaf we now get one loaf of bread offered for sale per week, so here's a point on the new supply curve at 0.60 per loaf and one loaf per week. At a price of $1.00 per loaf now we get two loaves of bread for sale, so here's another point on the new supply curve, the price is $1.00 and the quantity that the baker is willing and able to sell is two loaves. Another point is three loaves offered for sale at a price of $1.50 per loaf, so here's a point on the new supply curve. We get three-and-a-half loaves offered per sale at a price of $2.10 per loaf, so here's another point - price, $2.10, quantity, three-and-a-half loaves. We get four loaves from this particular baker when the price is up to $2.50 per week [sic], so that's going to be this point, four loaves, $2.50. We get five loaves at a price of $3.00 per loaf. That's going to be this point in the diagram, and six loaves at a price of $4.00 per loaf. That'll be this point in the diagram. And finally, we get six-and-a-half loaves at a price of $5.00 per loaf, so that's going to be this point up here in the diagram - $5.00 on the vertical axis, and six-and-a-half loaves on the horizontal axis. I'm trying to be careful here and make sure that my numbers line up.

Now, I can connect these dots because all the prices and quantities in between are imaginable, and I'll label my new curve S’. It's a new relationship between price and quantity for this baker after the price of inputs increases. So, the supply curve has shifted inwards. The increase in the price of inputs made bread a less profitable business, and resulted in our supplier offering a smaller quantity of bread for sale at every price.

Now, let's go back and review something that we talked about when we introduced the concept of shifts back in our study of the demand curve. If the price of bread changes, you move along your given supply curve. A change in the price of bread leads to a change in the quantity of bread supplied, and that's represented as a movement along the given supply curve. But if you change one of those variables that we hold constant when we draw the supply curve, then you have to shift the supply curve, the entire relationship between price and quantity changes for that baker because input prices have increased. We call this change in one of those variables, and the shift in the supply curve "a change in supply." A change in quantity supplied is a response to the price of bread changing, and that's a movement along the supply curve. But if you change one of those other factors, like the price of inputs, technology, and so forth, then you have to redraw the entire supply curve, and we call that "a change in supply."
Introduction to Economics

Supply

**Understanding a Change in Supply vs. a Change in Quantity Supplied**

In the next lesson we'll go through an entire catalog of factors that can shift the supply curve. We will look at all of those things that can cause a change in supply, and I'll give you a chance to make some predictions about which way you think the supply curve will move in each case.
Analyzing Changes in Other Supply Variables

In this lesson we will show how the determinants of supply show up in the supply curve diagram. Let's start with a list of the factors that influence the amount of bread that the baker will offer for sale. They include expectations about future prices, technology, the price of inputs, and finally, the price of bread itself. Let's start here with the price of bread. How does a change in the price of bread show up in this diagram?

The answer is, a change in the price of bread leads to a movement along the supply curve, a change in the quantity supplied. When the price of bread increases, the baker is able to cover the rising opportunity costs associated with expanding his output, therefore, an increase in the price of bread leads to an increase in the quantity of bread supplied. We call this movement along the supply curve in response to a change in the price of bread a change in supply. When the price of bread falls, we move down the supply curve, the quantity supplied decreases.

Let's now look at another factor, and this is a factor that we usually hold constant when we draw the supply curve; that is, the price of inputs. What happens to the supply curve if the price of inputs, like milk and eggs, increases? What happens to the relationship between price and quantity? You answer. What happens to the supply curve when the price of inputs increases?

The answer is, with higher input prices, the profitability of bread decreases; that is, the baker can make less profit by baking bread, so the quantity supplied reduces or is reduced at every price. There is a smaller quantity of bread supplied at every price when the price of inputs increases. We call this "a decrease in the supply of bread."

What would happen, on the other hand, if the price of inputs were to decrease? Let's suppose that milk and eggs go on sale and the baker is able to buy them at a lower price. In that case, what would happen to the supply curve for bread?

The answer is, with lower input prices, the supply of bread increases; that is, a larger quantity of bread is supplied at every price. Again, we had a change in supply because we've changed one of the variables that we hold constant when we draw the supply curve. An increase in input prices leads to a decrease in supply. A decrease in input prices leads to an increase in supply.

Let's consider another factor that influences the supply of bread. This time we'll consider technology. Now, it's hard to talk about technology increasing or decreasing. Instead we talk about technology improving or worsening. Technology improves, meaning that the firm is now able to make more output with a given amount of input. You can stretch your inputs further; you can use them more productively, thereby increasing the amount of output you get from a given quantity of eggs and milk and flour. If technology, improves what will happen to the supply of bread? You decide.

If technology improves, the cost of production will fall. Making bread becomes more profitable, and the supply of bread increases. The supply curve shifts outwards, indicating that the baker is now willing and able to offer a larger quantity of bread for sale at every price. There is an increase in supply in response to an improvement in technology.

Now, we don't usually talk about a worsening of technology. I mean, that would require that you forget how to do things that you used to know how to do. But sometimes it becomes more difficult to organize your activities or something like that. There may be changes that influence your ability to use a particular technology. If technology should actually worsen due to some other kinds of administrative problems or perhaps you lose access to a technology that you used to be able to use because you had a license for a particular process, or something like that. If technology were to worsen or you were to lose access to a superior technology, what would happen to the supply curve for bread in that case?

The answer is, if technology worsens, the cost of production increases. You're not able to do things that used to lower your costs, and therefore the cost of production being higher makes the production of bread less profitable, so bakers will offer less bread for sale at every price. A worsening of technology leads to a decrease in supply, which is an inward shift of the supply curve.

Let's now consider one further factor. Suppose the expectation is that bread prices are going to be higher in the future. Maybe bakers believe that the price of bread is going to rise next week. How would that influence the amount
of bread that they offer for sale today at any given price? With the expectation of higher future bread prices, bakers will take the bread off the shelves today, put it in the freezer, and wait and sell it next week. That is, the supply of bread will shrink. Bakers will offer less bread for sale than they would if they expected prices to remain constant. Bakers will hold off on producing bread, or they will hold their existing inventory and wait to sell it after the price has increased. So the expectation of future prices being higher leads to a decrease in the supply of bread today.

What would happen, on the other hand, if the sellers expect that the price of bread is going to be lower next week? Would that cause an increase or a decrease in supply? The answer is, supply would increase. Bakers are trying to sell their bread before the price falls and that would lead to a larger quantity of bread supplied at every price. The supply increases when the expectation is for lower prices in the future.

So, there you have it, a catalog of things that can shift the supply curve. We formed this catalog by starting with a list of all of the factors that influence supply. Once we had the list we considered how each factor in the list would change the seller’s behavior. We showed, first of all, that a change in price causes a movement along the supply curve, a change in quantity supplied. Remember the rule - you never shift a curve when you are changing one of the variables that’s on the axis. If you’re changing price and quantity, you’re moving along the curve. However, if we change some of the other factors that are held constant when we draw the curve, we have to redraw the curve, or shift it. In the case of input prices, higher input prices reduce the profits of the baker and lead to a decrease in supply. Lower input prices increase the profitability of making bread and lead to a higher quantity supplied at every price.

Another factor that influences supply is technology. If technology improves, the cost of production will be lower. You can get more output from a given amount of input. That's going to lead to a larger quantity supplied at every price. We call that "an increase in supply." If technology worsens, the supply curve shifts inwards; that is, firms will supply less bread at every price, a decrease in supply.

Finally, expectations of higher future prices lead to withholding bread today, a reduction in supply, and expectations of lower future bread prices lead to a big increase in supply today, as sellers try to sell their bread before the price falls.

So there you have it. Any of the factors that change the behavior of sellers are going to be reflected either as a movement along the supply curve, or a shift in the supply curve. If it’s a change in price, we move along the curve, a change in quantity supplied. If it’s a change in any of the other factors that we usually hold constant, we reflect that by a shift in the supply curve, and we call that a change in supply.

Now we'll look at how we move from the individual firm’s supply curve, to the supply curve for the whole market.
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Supply

Deriving a Market Supply Curve

In this lesson we'll move from the individual firm supply curve to the supply curve for the market. And we'll use the same procedure we used when we derived the market demand curve. We'll be adding up the supply quantities of the individual firms at any given price to find the total market quantity supplied.

Let's look first at a particular bakery, and now we'll call this Jim's Bakery. Jim is willing and able to supply one loaf of bread per week when the price of bread is 0.40 per loaf. If the price is 0.60 per loaf, Jim is willing and able to supply two loaves per week, and so forth. The information in this table represents the quantity of bread that Jim is willing and able to supply at different prices, holding constant the price of inputs, technology, and expectations about future prices.

Now, let's look at the supply behavior of another firm. This is Dan's firm. Dan is willing and able to supply two loaves of bread per week when the price of bread is 0.40 per loaf. He's willing and able to supply three loaves of bread at a price of 0.60 per loaf, and so forth. As the price of bread increases, the quantity supplied from Dan's bakery increases.

Suppose that Dan and Jim have the only bakeries in town. What does the market supply curve for bread look like? The market supply curve for bread will be the sum of the individual supply curves of Dan's firm and Jim's firm. At any given price, to find the market quantity supplied, simply add the quantity supplied by Dan's firm to the quantity supplied by Jim's firm. For instance, at a price of $1.50 per loaf, Dan's firm supplies five loaves of bread per week. Jim's firm supplies four loaves of bread. The market quantity supplied, in that case, will be 5 + 4, or 9 loaves of bread each week. You can do the same for any given price. Find the quantity that Dan's firm is willing and able to sell, add it to the quantity that Jim's firm is willing and able to sell at the same price, and that gives you the market quantity supplied. Now, we can put Dan and Jim's information together and wind up with the market supply schedule for bread. At any given price this table tells you the quantity supplied from Dan's Bakery increases.

The next step in this lecture is to move this information over to the board and represent it in diagrams. Here is the supply curve for Dan's firm. I took the numbers from Dan's table and I put dots in this diagram to represent the price/quantity combinations that describe the relationship for Dan's Bakery. At a price of 0.40 per loaf we get two loaves a week from Dan; at a price of 0.60 per loaf we get three loaves, and so forth. Now, we know that these are not the only possible price/quantity combinations. Price and quantity can both vary continuously. So I can connect the dots and get Dan's supply curve for bread. I'll call that S_d. The same thing with Jim's information - I'll move it from the table into the diagram by plotting the combinations of price and quantity that describe the behavior of Jim's Bakery. And if I connect the dots, I get Jim's supply curve for bread. If I want the market supply curve I have to add together these two individual supply curves, and just like I did before, I'll be using horizontal summation. I will pick a particular price, take the quantity that I get from Dan, add it to the quantity that I get from Jim, and that will give me the market quantity supplied at that price.

Let's start by choosing a price of 0.40 per loaf. At a price of 0.40 per loaf we get two loaves from Dan and one loaf from Jim. Add Dan's two loaves to Jim's one loaf and that gives us a total market quantity supplied of three loaves at a price of 0.40 per loaf. So I put a dot here in the market supply curve with a quantity of three and a price of 0.40. That's the same thing if I took a ruler and I added two loaves from Dan's Bakery to one loaf from Jim's Bakery, and that gave me a total of three loaves, and I graphed it right here in this diagram, three loaves in the market a price of 0.40 per loaf. I could do the same for any price on the axis. Let's say a price of 0.60 per loaf. In that case I get three loaves from Dan, add that to two loaves from Jim, for a total of five loaves supplied when the price is 0.60 per loaf. Keep picking any price you want and add the quantity from Dan's firm to the quantity from Jim's firm to get a total quantity supplied in the market.

Alternatively, you can just go back to the table representing quantity supplied, that table that we got when we added Dan's output to Jim's output, and you can graph the numbers directly. At a price of $1.00 per loaf we get a quantity supplied of seven. At a price of $1.50 per loaf we get a quantity supplied of nine. At a price of $2.10 a loaf we get a total of 11 loaves supplied. At a price of $2.50 per loaf, the quantity supplied is up to 13 loaves per week. There's the market supply curve. I can connect the dots and label this with an S to indicate that this is the supply curve for the whole market. The supply curve is the horizontal summation of the supply curves of the individual firms in the market. To get this curve, pick a price and add the quantity from Dan's Bakery to the quantity from Jim's Bakery at that price to get the quantity for the market as a whole.
Supply

**Deriving a Market Supply Curve**

Now, what’s going to shift the market supply curve? The answer is, anything that shifts the individual supply curve will shift the market supply curve. After all, the market supply curve is simply the sum of the individual curves, so anything that moves Dan’s curve or Jim’s curve will shift the market supply curve as well. And what are those factors? They are all of the factors that we held constant when we originally drew the individual firm’s supply curves - the price of inputs, technology, and expectations about future prices. If any of those factors changes, we have to re-draw the individual firm’s curves, and consequently we have to shift the market supply curve as well.

Now, this wraps up our introduction to the behavior of suppliers and the behavior of buyers. Now we’re ready to put the two sides of the market together and find the conditions under which we have a stable situation. In the next lecture, we’ll be putting supply and demand together in one diagram to find the equilibrium price and quantity traded.
Competitive Equilibrium

Determining a Competitive Equilibrium

In this lecture we put together our previous analysis about supply and demand to come up with a model of the market, and the payoff is we have a way of predicting how factors in the environment will influence the price of a good and the quantity of that good traded. We’re going to be developing a tool that economists use called “the competitive equilibrium.” The competitive equilibrium is what happens when you get together a bunch of buyers and sellers, all of whom believe that they have no influence over the price. That is, all of the agents in our market are price takers. They accept the market price as given and do the best they can, subject to that price as a constraint. So the buyers take the prices given and choose their quantity demanded. The sellers take the prices given and choose their quantities supplied. When the price is such that the quantity supplied is equal to the quantity demanded, we say that we have competitive equilibrium. Now, first we should define the concept of equilibrium in economics. An equilibrium is a situation from which there is no tendency to change. And as we will see in our model of supply and demand, there is only one price at which there is no pressure for something to change.

Let’s go back to the analysis that we developed earlier. The red dots in this diagram represent quantities demanded at different prices. This information comes from the table that’s over on the board. At a price of $5.00 the quantity demanded is one loaf of bread per week. At a price of $4.00 per loaf, the quantity demanded is two loaves per week, and so forth, giving us this collection of red dots. We can connect these red dots and form the demand curve, but we’re going to wait to do that for just a moment, because I think that leaving this in the form of dots will help me make my arguments more clearly. The blue dots represent the supply curve; that is, at a price of 0.40 per loaf we get one loaf of bread supplied per week, two loaves at 0.60, three loaves at $1.00, and so forth. The blue dots represent the supply curve.

Now, we’ve got these price-taking buyers and price-taking sellers. All of them are doing the best they can subject to the price that they are given by the market. Let’s find now the price at which an equilibrium obtains. Suppose, first of all, that we consider a price of $1.00 a loaf for bread. What would happen in that case? Well, with a price of $1.00 per loaf for bread, there are three loaves that bakers are willing and able to supply each week. The quantity supplied is three at a price of $1.00. At a price of $1.00 the quantity demanded; however, is eight loaves per week. That is, buyers are willing and able to purchase eight loaves of bread at a price of $1.00. The fact that there are more buyers than sellers, or the quantity demanded is greater than the quantity supplied at a price of $1.00 means that we have excess demand. We have excess demand, which is the difference between the quantity demanded and the quantity supplied at the price of $1.00. I’ll label this with a little sign that says, “excess demand.”

Now, when there is excess demand, the bidding mechanism takes over. The bidding mechanism is the process by which unsatisfied buyers try to bid up the price of bread to guarantee that they get some. After all, we’ve got eight loaves of bread demanded here, and only three loaves of bread supplied. We’ve got five loaves of bread excess demand. That could be five people who aren’t able to buy their loaf of bread at a price of $1.00 per loaf. Those five people are now going to offer sellers a higher price. They’re going to bid the price of bread up to $1.10, or $1.20, or $1.50, or $2.00 a loaf. They’ll continue bidding until either it’s no longer worth it to get higher prices, or until enough bread becomes available that the shortage of bread is eliminated. Look, if the price of bread goes up to $1.50 per loaf, the quantity supplied increases to four loaves. Some baker has a reservation price of $1.50; that is, he offers his loaf of bread for sale as soon as the price goes up to $1.50. At the same time, when the price goes up to $1.50 we’ve had one of the buyers drop out. That is, there was one buyer who was willing to pay $1.00, but not $1.50. So the excess demand shrinks as the price rises, because additional sellers enter the market, and some of the buyers drop out of the market.

Finally, when the price of bread rises all the way up to $2.10 a loaf, the quantity supplied is equal to the quantity demanded. Enough buyers have left the market, and enough sellers have entered the market to give us an equality of quantity demanded and quantity supplied. At a price of $2.10 per loaf, the quantity demanded equals five loaves of bread per week, and the quantity supplied equals five loaves of bread per week. This means that we have a competitive equilibrium, taking prices as given the quantity demanded by buyers, and the quantity supplied by sellers are equal at a price of $2.10 per week, and we get there by the bidding mechanism. Buyers who can’t get bread at the lower price will bid up the price and the buyers and sellers respond to the rising price and equilibrium is established. The excess demand is eliminated as the quantity demanded falls and the quantity supplied increases with the rising price.

Now, you can see the same analysis working from the other direction. Suppose we start with a high price for bread; suppose $4.00 a loaf. What would happen in that case? At a price of $4.00 per loaf the quantity demanded is going to
Introduction to Economics

Competitive Equilibrium

Determining a Competitive Equilibrium

be smaller; that is, two loaves of bread per week. Because the price of bread is high, the quantity demanded will be
much smaller. However, bakers are very excited about this high price, and the quantity supplied is quite high,
because a lot of bakers can cover their opportunity costs at that higher price, and there’s a larger quantity supplied at
$4.00 per loaf. That quantity, in our example, is eight loaves of bread per week. Well, there you’ve got a problem,
because you’ve got an excess supply. That is, the quantity supplied is eight loaves at $4.00 per loaf, and the quantity
demanded is two loaves at $4.00 per loaf. We have an excess supply of six loaves of bread every week. Bread piles
up unpurchased on the shelves. What’s going to happen in that case?

The bidding mechanism will operate from the other direction. In this case, sellers who are unable to move bread from
their shelves will begin to put the bread on sale. They will lower their price. Some sellers will offer their bread for
$3.50 a loaf, or $3.00, or $2.75, and the price will begin to fall. As competition, through the bidding mechanism,
pushes down the price of bread, two things happen. First, additional buyers will enter the market. Notice, when the
price dropped to $3.00 a loaf, we can sell three loaves of bread because three people are willing and able to purchase
bread at that price, and as the price drops down to $2.50 a loaf, the quantity demanded increases to four loaves of
bread, and so forth. So additional buyers enter the market as the price falls.

As the price falls from the suppliers’ perspective, things are getting less attractive, so at a price of $3.00 per loaf we
find that a seller or two may have left the market, the quantity supplied is down to seven loaves of bread. At a price of
$2.50 per loaf the quantity supplied drops even further to six loaves of bread.

Finally, when the price is $2.10 per loaf, the quantity demanded is equal to the quantity supplied, and the excess
supply has been eliminated, partly by bringing additional buyers into the market, and partly by reducing some of the
over-supply by pushing some of the sellers out of the market, sellers who can’t cover their opportunity costs as the
price of bread falls.

Well, what’s the outcome? The outcome is we wind up with a stable situation. The price of bread is set at $2.10 per
loaf. We call that the equilibrium price. Since the quantity supplied and the quantity demanded are equal, and they
are both equal to five loaves at that price of $2.10, the bidding mechanism is going to just sit there and do nothing.
There’s no tendency for prices to change. There’s no excess demand, so prices don’t rise. There’s no excess supply,
so prices won’t fall. When quantities supplied and quantity demanded are equal, we’re in a stable situation, a
competitive equilibrium. So when the price is $2.10, the quantity of bread traded will be equal to five loaves of bread
per week. We can label this P*, $2.10. That’s the price at which supply and demand are equal, and we can label this
Q*, the quantity of bread that’s traded at a price of $2.10.

So there you have it, the stable outcome, the competitive equilibrium. The bidding mechanism takes us to the point
where the quantity supplied and the quantities demanded are equal, and once we reach that point, there’s no further
tendency to change.

In the next lecture we’ll look at factors that can shift the supply and demand curve, upset this equilibrium, and lead to
a new equilibrium. But first, let’s connect the dots and make this picture look like something that we might be more
familiar with. Connect these dots and they become the demand curve. Connect the blue dots; that is, allowing prices
and quantities to vary continuously, and you get a supply curve. The competitive equilibrium is found at the place
where the supply curve and the demand curve intersect. As in most economic graphs, the most interesting point is
where the curves cross, and it’s where the curves cross that we find the price and quantity where supply and demand
are equal, and when quantity supplied and quantity demanded are equal at a particular price, there is no further
tendency to change. This is what competitive equilibrium looks like, and usually we will mark the price and quantity
with lines down to the axis to show us the price and quantity at which the market has a stable outcome.
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Competitive Equilibrium

Defining Comparative Statics

What happens to the price of a good or service when something changes in the market? Can you predict how a change in the environment will influence the price of a good and the quantity traded? Well, you can, using the tool that we developed in the last lecture. Here’s what a competitive equilibrium looks like: The competitive equilibrium is the price and quantity where supply and demand are equal; that is, it’s the price at which the quantity demanded on the red curve is equal to the quantity supplied on the blue curve. Now, anytime we change anything that is held constant when we draw this picture, we have to redraw the picture. That means, if we change consumer income, the price of substitute goods, the price of complement goods, expectations, or if we change input prices, or technology, we have to shift the curves. And when the curves shift, we have to find a new equilibrium price and quantity.

Let’s take an example. Suppose we consider a case where in the market for bread there’s a change in the price of a substitute good. Let’s suppose that bagels become more expensive. If bagels become more expensive, what will happen to the price of bread, and the quantity of bread traded? Well, there is a series of steps that you should go through to answer a question like this, and this series of steps will help you anytime you try to solve one of these problems.

The first step is, identify which side of the market is affected. If the price of bagels goes up, who cares – buyers or sellers? The answer is buyers care, because bagels are a substitute for bread for consumers. That’s the first thing you need to resolve – who cares, buyers or sellers – because that tells you which curve you’re going to be shifting.

The second question, how will the change affect the curve? So, if the price of a substitute good increases, we know we’re going to be dealing with the demand curve, but will it shift in, or will it shift out? The answer in this case is the curve shifts outwards. When the price of a substitute good increases, the demand for bread increases as well; that is, customers are going to want to buy more bread at every price, so the demand curve for bread shifts outwards.

The third question you want to answer is, what happens to the equilibrium? That is, after you shift the curve, which direction will the bidding mechanism take the price of the good? Will it take it up, or will it take it down?

Let’s look at this example carefully. If the price of a substitute good increases, we know that the demand for bread is going to increase, so the demand curve is going to shift outwards, in this direction, and we’ll have a new demand curve, which we can label D Prime. Here it is, and this is the demand curve after the change in the price of bagels. Next thing you want to notice is, at the original price for bread, say $2.10 per loaf, the quantity of bread demanded is now larger than the quantity supplied. The quantity supplied hasn’t changed, because, at a price of $2.10, we would still be at this particular point on the blue curve, still with, say, five loaves of bread supplied each week. However, with the increase in the price of bagels, the quantity demanded has increased to a new point over here on this new red curve. The old red curve doesn’t apply anymore, because of a change in the environment. With an increase in the price of the substitute good, the quantity demanded is now over here, on this new red curve, even though the supply is still over here on the old blue curve. We’ve now got a gap between quantity demanded and quantity supplied at the original price of $2.10.

Well, you know what’s going to happen next, we have an excess demand for bread, and that’s going to cause the bidding mechanism to kick in. The price of bread is going to be bid up, and as the price of bread is bid up, some buyers will leave the market, and new sellers will enter the market. As the quantity demanded shrinks with the rise in price, and the quantity supplied increases, we will approach a new competitive equilibrium. We will approach a new equilibrium with a higher price, and a larger quantity of bread traded.

Let me go ahead and draw this curve in, and show you this adjustment process very carefully. We have a new demand curve. The new demand curve results from the increase in the price of a substitute good. With consumers wanting to buy a larger quantity of bread at every price, the demand curve has now shifted out here. Well, that gives us a problem, because at the original price, the quantity supplied – the point on the blue curve – is now less than the quantity demanded over here on the new red curve. So the distance between these two points is an excess demand at the original price. That causes the bidding mechanism to kick in; and as the price rises, buyers begin to buy less bread than they were buying before. We have a movement along our new demand curve. We have a decrease in quantity demanded as the price is bid up.
Introduction to Economics

Competitive Equilibrium

**Defining Comparative Statics**

Over here on the supply curve, the rising price leads new suppliers to enter the market, or existing suppliers to increase the quantity they supply. As the price rises, suppliers can cover rising opportunity costs associated with providing more bread to the market. Eventually, we reach this point at which the quantity demanded and quantity supplied are equal with the new demand curve and the original supply curve. This new price and new quantity are our new competitive equilibrium. So if I draw a dash line over to the price axis, I can call this P* Prime – the new higher price. And if I draw a dash line down to the quantity axis, I could label this Q* Prime – an increase in the quantity traded. So the market for bread has gotten a little bigger, because bagels – a substitute – are now less attractive.

More consumers buying more bread at every price leads to an increase in the price of bread and an increase in the quantity of bread traded. We got rid of our excess demand through the bidding mechanism, which pushed up the price. And as buyers and sellers adjusted to the new higher price, the quantity traded changed. This is just one example of how a change in the environment will shift one of the curves and create a new competitive equilibrium. In the next lesson, we’ll look at a whole catalog of factors that can shift the demand curve, or shift the supply curve, thereby changing the competitive equilibrium price and quantity traded.
Introduction to Economics

Classifying Comparative Statics

In this lesson we present a catalog of comparative statics. Comparative statics are thought experiments, where you change something and see what happens. We call them statics because it refers to comparing one state with another state – the state before the change with the state after the change. In our last lesson we did an example of comparative statics. We looked at what happens to a competitive equilibrium when we changed the price of a substitute good. We saw that the demand curve shifted and the price and quantity traded at competitive equilibrium changed.

Well, that was only one example. Now we're going to present all the examples that I can think of. The thing to remember is there are a limited number of comparative statics that you can do in a supply and demand diagram. That's because there are only two curves you can shift, and only two directions to shift each curve. So a complete catalog of comparative statics would look like the following: We would have one case where the demand curve shifts outwards, one case where the demand curve shifts inwards, one case where the supply curve shifts outwards, and one case where the supply curve shifts inwards. Each of those cases is going to lead to a different combination in changes of price and quantity, and each of those cases will correspond to a different set of stories about the real world. So what I'll do in this lesson is go through each of those cases one at a time, until I've done all four.

Let's start with case number 1, the case we considered in the last lesson. Here's the case where the demand curve shifts outwards. If the demand curve shifts outwards, then if you hold the price steady at the original level, you will have an excess demand. The new quantity demanded will be larger than the old quantity demanded; the quantity supplied will be the same as before, at that original price, and you've got excess demand, or shortage. The bidding mechanism will push up the price of the good. Some buyers will drop out and some new sellers will enter the market. The end result when the demand curve shifts outwards is the equilibrium price rises, and the equilibrium quantity traded increases.

Now, what are the stories that could cause that to happen? The first story would be an increase in the price of a substitute good. When the price of a substitute good increases, the demand for bread itself will increase as consumers consume bread instead of bagels.

The second case that would shift outwards the demand curve would be a decrease in the price of a complementary good. If the price of cheese falls, people want more bread and cheese sandwiches, so the demand for bread increases, pushing up the price and increasing the quantity traded in equilibrium.

The third case would be if there were change in consumer income, and here we have two possibilities. If bread is a normal good, then an increase in income will lead to an increase in demand for bread, and the higher price and larger quantity in equilibrium. If bread is an inferior good, on the other hand, then a decrease in consumer income would cause the demand curve to shift outward. If this were beans instead of bread, and beans were an inferior good, then lower consumer income would lead people to buy more beans at every price; and that would lead to a new higher price in equilibrium and a larger quantity of beans traded.

Another thing that would shift outward the demand curve would be expectations changing. If people expect the price of bread to be higher in the future, they're going to buy more bread today; and, quite ironically, that would push up the price of bread – it becomes a self-fulfilling prophecy. If people are hoarding bread today for fear of higher prices in the future, their actions have the result of fulfilling the prophecy – the price of bread indeed rises.

Finally, since this is the market demand curve for bread, an increase in the number of buyers in the market will shift the demand curve outwards. If the number of consumers grows in this market, or more people decide they like bread and enter the market for bread, that will push up the price and increase the quantity traded. So, that's case 1 – an outward shift in the demand curve – and we looked at what happens and the stories that could lead to it.

Let's consider now case number 2. Case number 2 is the case of an inward shift in the demand curve. If the demand curve shifts inwards, then at the original price, we have now an excess supply of bread. With the demand curve shifting inward, consumers want less bread at every price. So at the old price, the quantity of bread demanded is less than the quantity of bread supplied – the point on the blue curve. This causes the bidding mechanism to kick in – sellers put their bread on sale, and the price of bread falls. As the price of bread falls, some buyers come back into the market for bread, and some sellers drop out of the market. The bidding mechanism comes to rest when the quantity demanded is equal to the quantity supplied at the new equilibrium price. The new equilibrium price will be lower – it
had to fall to get rid of that excess supply. And the quantity of bread traded will shrink; since people want less bread, the quantity of bread actually traded in the market will be smaller.

Let’s look at the stories that could result in an inward shift in the demand curve. The first thing would be if the price of substitute goods falls. If bagels become less expensive, then people will buy less bread and more bagels instead. If the price of a complementary good increases – like cheese – if cheese gets more expensive, people want fewer cheese sandwiches, and that means they will buy less bread at every price. The demand curve shifts inwards because of the higher price for a complement.

The third case would be a change in income, and once again we have two cases. If bread is an inferior good, then the demand curve shifts inwards when income increases – consumers want less bread because now they’re better off, and they buy other things instead. But if bread is a normal good, then the inward shift corresponds to a decrease in income. When your income falls, you buy less bread at every price. Another thing that would shift inward the demand curve would be the expectation that the price of bread will fall. People delay their purchases of bread, and the demand for bread shifts inwards – it’s reduced. However, you can see that the expectation that future prices will be lower turns out to be a self-fulfilling prophecy. By reducing their demand for bread, people lead to a lowering of the price, the bidding mechanism kicks in, lowers the price of bread, and the expectation becomes self-fulfilling.

Finally, the last thing would be if there are fewer traders in this market. With fewer traders in the market, the demand will be less, and, therefore, the equilibrium price will fall. All of these are the same factors that shift the demand curve outwards, only now we’re considering the opposite cases. So there’s case 2, an inward shift in the demand curve. This will occur anytime something causes consumers to want to buy less bread at every price. And the result is a lower equilibrium price and a smaller quantity traded in equilibrium.

Let’s look now at case number 3, an inward shift in the supply curve. Now we have a different set of factors that leads to an inward shift in the supply curve, because we’re no longer talking about the behavior of consumers – now we’re talking about the behavior of sellers. In this case, when the supply curve shifts inwards, the immediate result is that we have an excess demand for the product. That is, at the original price, the original equilibrium – where the original demand curve and the original supply curve cross – we have $P^*$ as our equilibrium price, and $Q^*$ as our equilibrium quantity.

If we keep the price constant and the supply curve shifts inwards – that is, if we have a decrease in supply – we’re now going to have a small quantity supplied and a larger quantity demanded. So we have an excess demand for the product, given the new quantity supplied and the original quantity demanded. Well, this is going to cause the bidding mechanism to kick in, and, as usual, the bidding mechanism deals with an excess demand by causing the price to rise – the price is bid up. And as the price is bid up, some buyers leave the market, and some of those sellers who thought they were going to leave the market come back in, because the rise in price makes it worth their while to continue to offer bread for sale. The result is that the price of the good rises in equilibrium, the new equilibrium price is higher, and the equilibrium quantity traded is smaller. This will be the case anytime the supply curve shifts inwards, anytime there is a decrease in supply.

Well, what are the factors that lead to a decrease in supply? The first will be an increase in the price of inputs. If milk, eggs, or flour become more expensive, then our baker finds it less profitable to make bread, and bakers will bake less bread and sell less bread at every price. A second factor would be a change in technology. If technology worsens, or our baker loses access to a low-cost technology, then the cost of production will increase – it’s less profitable to make bread, and the quantity of bread offered for sale will be lower at every price.

Finally, there could be a decrease in the number of sellers in this market, for any number of reasons. Remember this is the market supply curve, and the market supply curve is the sum of the supply curves of the individual sellers. If we have fewer sellers in the market, the curve will shift inwards, because fewer curves are being added together.

Any of these factors will lead to an inward shift in the supply curve; and with that inward shift comes a higher equilibrium price and a smaller quantity traded. That’s case number 3.

Let’s go now to the final case, and that is an outward shift in the supply curve. The outward shift in the supply curve occurs if sellers are offering more bread for sale – at every price – than they were before. Originally, the equilibrium
price was \( P^* \), and the equilibrium quantity was \( Q^* \). However, something occurs that causes sellers to want to sell more bread at every price. At the original price, therefore, we now have excess supply of bread; the quantity supplied is greater than the quantity demanded at the original price.

The bidding mechanism once again takes over and leads sellers to cut the price of their bread; to make sure they can sell their product they lower the price. And as the price falls, some sellers decide that they’re going to drop out of the market – they can no longer cover their opportunity costs. Meanwhile, the falling price draws some buyers into the market. These buyers are now willing and able to purchase more bread than they were buying before. The result is a new equilibrium price that’s lower than the original. The equilibrium price falls in this market, and the equilibrium quantity traded increases.

What are the real world events that could lead to this outcome? The first would be if the price of input goods falls, making the production of bread more profitable. Sellers would make and sell more bread at every price than before. The second possibility would be an improvement in technology. With an improvement in technology, once again, production costs will fall, making it more attractive to offer bread for sale. Producers respond by offering more bread for sale at every price, an outward shift in the supply curve. And finally, if the number of sellers in this market increases, since it is the market supply curve, the supply curve shifts outwards. All of these factors shift the supply curve outwards, leading to a lower equilibrium price, and a larger equilibrium quantity traded.

So we have four cases, and each of these cases results in a different combination of changes of price and quantity. If the demand curve shifts outwards, the price increases, as does the quantity traded. If the demand curve shifts inwards, we have a decrease in the price, as well as a decrease in the quantity traded. If the supply curve shifts outwards, the price will fall, but the quantity traded will increase. And if the supply curve shifts inwards, then the price will increase, and the quantity traded will fall. Those are all the possibilities we have for comparative statics. So, now that you’ve got the catalog, you’re ready to try some experiments of your own.
Suppose you run an ice cream store. Right now you’re selling your ice cream cones for $2.00 apiece, and you’re selling 20 cones a day. Should you try to improve your business by putting your ice cream cones on sale for $1.00 apiece? In order to answer this question, you’d need to know how your customers would respond to a change in your price; and this brings up the question of the elasticity of demand. Elasticity means responsiveness. Suppose you have a piece of elastic. If you stretch it, it responds and changes shape. If it didn’t change shape, that is, if it were unresponsive to your pulling on it, it wouldn’t be elastic, would it? Elasticity means the extent to which the quantity demanded changes when there's a change in the price of the good. We define elasticity as the percentage change in quantity demanded that results from a percentage change in the price of a good.

Let’s look at those ice cream stores now. Suppose Angie runs an ice cream store where she charges $2.00 apiece for her ice cream cones, and right now she’s selling 20 cones a day. If Angie puts her cones on sale at $1.00 apiece, she discovers that her customers want to buy more cones; that is, as the price falls, the quantity demanded increases. But they only want to buy 10 additional cones daily, for a total of 30 cones per day, at a price of $1.00 apiece. Angie’s demand curve for ice cream cones looks something like this. Her customers want to buy a few extra cones when the price falls, but the demand curve is relatively steep. We’ll label this $D_A$ for the demand on the part of Angie’s customers.

Across town, Barney has an ice cream store. Barney starts, like Angie did, with a price of $2.00 apiece for his ice cream cones. He’s also selling 20 cones per day. Now, when Barney puts his cones on sale at $1.00 apiece, his customers get very excited, and come in and buy 50 cones a day; that is, Barney’s customers are much more responsive to a change in the price of cones than were Angie’s customers. If we connect these 2 dots for Barney, we see that Barney’s customers’ demand curve is flatter; that is, for a given change in the price of ice cream, Barney’s customers will buy many more additional cones than will Angie’s customers. When the price goes from $2.00 to $1.00 at the two stands, Angie’s customers respond a little, but Barney’s customers respond a lot. We say that Barney’s customers’ demand for ice cream is more elastic than Angie’s customers’ demand for ice cream.

Now, why should you care about this? See if you can answer this question: What happens to the total revenue that Angie raises when she changes the price of her ice cream cones from $2.00 apiece to $1.00 apiece? Does her total revenue increase, or does it decrease?

If you’ll look over on the white board, you can see my calculations. When the price of ice cream cones is $2.00 apiece, Angie sells 20 cones, for a total revenue of 20 cones times $2.00 apiece, or $40.00 in total sales. When she drops her price to $1.00 per cone, she sells 30 cones. That means each day she earns 30 cones times $1.00 apiece, or $30.00 in total revenue. When Angie drops the price of her ice cream cones from $2.00 apiece to $1.00 apiece, Angie’s total revenue actually falls. Now, what happens to Barney’s total revenue whenever he drops his price?

You can see my calculations. Whenever Barney is charging $2.00 apiece for ice cream cones, he’s also selling 20 cones. His total revenue is 20 cones times $2.00 apiece, or $40. When Barney drops the price of his cones to $1.00 apiece, he sells a total of 50 ice cream cones – 50 times $1.00 apiece gives total revenue of $50.00 a day. Barney’s total revenue increases when he drops his price—that is, when he has a sale on ice cream cones. You can see it’s very important to know whether the demand for your product is elastic or inelastic – that is, by how much the quantity will respond to a change in the price of the good. If the quantity demanded is very responsive, your total revenue will increase when you reduce the price of your product. If, however, the quantity demanded is unresponsive, or relatively inelastic, then, when you reduce the price of the good, your total revenue will actually fall.
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Elasticity

Calculating Elasticity

We’re looking for a measure of the elasticity of demand that would be useful to a firm that’s trying to decide whether to raise its price, lower its price, or keep the price of its product the same. We’re going to use Barney’s demand curve for ice cream as an example. Recall that when the price of ice cream is $2.00 at Barney’s store, he sells 20 cones a day. If he lowers his price to $1.00 per cone, he sells 50 cones a day. We would like now to calculate a measure of the elasticity of demand that could be useful to Barney.

First of all, we want a measure of elasticity that doesn’t depend on the way in which we measure the units of the price or the quantity; that is, it shouldn’t matter whether we measure the price of Barney’s ice cream in dollars or pennies or nickels or French francs. It also shouldn’t matter whether we measure the quantity in terms of cones or dozens of cones or cases of ice cream; we’re looking for a unitless measure of the responsiveness of the quantity demanded to a change in price; and this is where we get our elasticity measure. An economist defines elasticity as “the percentage change in quantity demanded that results from the percentage change in price.”

Let’s say a couple of things about this measure. The first thing is, you’ll notice that we write it as a fraction. Anytime we have a fraction in economics, we can read the fraction bar with these words: “that results from” – The percentage change in quantity demanded “that results from” a percentage change in price. The next thing to notice about the way we’ve written the elasticity measure is we’ve put it between two bars, to indicate absolute value. Remember, price and quantity vary inversely. As the price increases, the quantity demanded falls; that is, price and quantity are inversely related. This means that the fraction that compares price and quantity will always have a negative value. So we put the absolute value bars around this fraction to get rid of the negative sign. That way, the elasticity measure is always a positive number.

Finally, the third thing to notice about this measure is that it is a unitless measure. When we calculate percentage changes, we get rid of the units; that is, it doesn’t matter whether we’re measuring the price in dollars or pennies; the percentage change will be the same in either case. Elasticity is a unitless measure of the responsiveness of quantity demanded to a change in price.

Now, let’s do a quick reminder of how you calculate a percentage change. To calculate a percentage change, take, for example, the new quantity demanded, subtract the old quantity demanded, and that gives you the absolute change in quantity. To turn this into a percentage change, you divide it by some base quantity, usually, the original quantity, or the old quantity. So, for example, in the case of Barney’s ice cream store, the percentage change in quantity demanded as we move from $2.00 to $1.00 per cone will be: The new quantity is 50 cones, subtract the old quantity of 20 cones, and divide by the original quantity of 20 cones, to get a percentage change of 30 divided by 20, or 1.5. So there’s a 150 percentage change in the quantity demanded.

Divide that now by the percentage change in price. To calculate percentage change in price, take the original price of $2.00 per cone, and subtract that from the new price of $1.00 per cone – $1.00 minus $2.00 is negative $1.00. Divide that again by the original price of $2.00 per cone, and you’ll get a percentage change of -1 over 2, or -1/2, or -50%.

Now, to calculate the elasticity of demand, as we move from point A – the original price and quantity, to point B – the new price and quantity. We take the percentage change in quantity demanded – which is 1.5, or 150% – and divide that by the percentage change in price – which is -0.5, or -50%. That gives us -3 for our fraction. Now, apply the absolute value bars, and you get the elasticity of demand calculated for Barney’s ice cream, as we move from point A to point B, is 3; that is, for a 1% change in the price of ice cream, we’re getting a 3% change in the quantity demanded.

Now, let’s do, as a calculation, the same exercise going from point B to point A; that is, let’s suppose Barney starts with a price of $1.00 and a quantity demanded of 50 cones, and he moves to a new price of $2.00 and a quantity demanded of 20 cones per day. See if you can calculate the elasticity demanded as we move from point B to point A.

The elasticity of demand is calculated as follows: Take the new quantity of 20, subtract the old quantity of 50, and divide by the base quantity of 50 – the original quantity demanded. That gives you 20 minus 50 – or -30 – divided by 50, for -0.6, or -60%. The percentage change in price can be calculated as follows: The new price is $2.00, subtract the original price of $1.00, and divide by that original price of $1.00, for a fraction of 1 over 1, which gives us a percentage change of 1, or 100%.
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The elasticity in this case is -60%, divided by 100%, or -0.6. Apply the absolute value sign, and the elasticity measure, as we move from point B to point A, is 0.6. Now, wait a minute, something’s wrong here, isn’t it? We’re getting one elasticity measure, as we move from point A to B, and we’re getting a different elasticity measure, as we move back from B to A. Somehow that seems confusing. We’d like to have a measure of responsiveness that doesn’t depend on whether we start at A and move to B, or start at B and move back to A; that is, we’d like to have one number that represents the responsiveness of quantity to a change in price that would be constant, whether we’re going this direction or back in the other direction.

Well, the problem here stems from using different bases to calculate percentage. When we move in this direction, this price and quantity are the base of our fractions; and when we move back from B to A, then this price and quantity are the base of our fractions. That’s what gives us the inconsistency. So in order to have a consistent measure of elasticity over this range of prices and quantities, we’re going to use as the base of our percentage calculations the price and quantity that’s halfway between A and B. We’ll call this point M to represent the midpoint. When we calculate the elasticity moving along a demand curve, we use the midpoint as the basis of our percentage calculations; and that gives us a consistent measure.

Why don’t you try now, for Barney’s ice cream store, to calculate the elasticity of demand, this time using as the basis of your percentage calculations – the midpoint – that is, the point halfway between the original price and the new price, or the point halfway between the original quantity and the new quantity. That is, calculate those elasticity numbers again, and this time use $1.50 for the basis of your percentage calculations. Then, whenever you go to calculate the change in quantity demanded, use 35 as the basis of your quantity calculations. See what you get.

So, what do we have? Negative $1.00 divided by $1.50 is $-\frac{2}{3}$. Now, to calculate the elasticity of demand, take the percentage change in quantity demanded, which is $\frac{6}{7}$, and divide that by the percentage change in price, which is $-\frac{2}{3}$. And what do you get? Let’s solve this problem together. The percentage change in quantity demanded is $\frac{6}{7}$. The percentage change in the price of the product is $-\frac{2}{3}$; so the elasticity will be $\frac{6}{7}$ divided by $|\frac{2}{3}|$. Well, let’s calculate that: $\frac{6}{7}$ – and remember, in order to divide by a fraction, you invert the fraction and multiply – multiply by $-\frac{3}{2}$, and we get – the 6 will cancel with the 2, to turn that into a 3 – and we get as our fraction, $\frac{9}{7}$. The absolute value sign gets rid of the minus sign, and $\frac{9}{7}$ is $1\frac{2}{7}$. The elasticity of demand, moving from point A to point B for Barney, is $1\frac{2}{7}$.

Now, you calculate the elasticity going in the other direction. Go from point B back to point A, again, using the midpoint for the bases for your percentages. In this case, the original quantity will be 50 and the new quantity will be 20. So, if you take 20 minus 50 and divide by 35, this time you get $-\frac{6}{7}$. In this case, the new price is $2.00 a cone and the old price is $1.00 a cone – 2 minus 1 is 1, divided by 1.5, gives us $\frac{2}{3}$. This time we’ve got $\frac{6}{7}$ divided by $\frac{2}{3}$, the absolute value sign gets rid of the minus sign, and, once again, we have $1\frac{2}{7}$. The great thing about using the midpoint formula for calculating elasticity of demand, is you get the same answer whether you’re going from point A to B or back from B to A. This is how we calculate elasticity of demand in economics.
Applying the Concept of Elasticity

We’re still studying the calculation of elasticity. For more practice now, let’s consider the case of Angie’s ice cream store. Remember when Angie lowers her price from $2.00 per cone down to $1.00 per cone, the quantity demanded at Angie’s store increases from 20 cones a day to 30 cones a day. What I want you to do first is forget about the midpoint formula; forget about what I told you was the right way to solve the problem. Why don’t you go back to that old way and find Angie’s elasticity of demand when she lowers the price of her product from $2.00 per cone to $1.00 per cone. But start by using point A as the base point for calculating percentages; that is, use $2.00 as your base price, and use 20 cones as your base quantity. See what you get when you calculate elasticity of demand, moving from this point to this point.

Now let’s do those calculations together. The new quantity is 30; subtract from that the old quantity of 20; that gives you a change in quantity of 10 cones. You want to divide now by the original quantity, which was 20; and that gives you a total change of 10 over 20, or \( \frac{1}{2} \) – a 50% change in quantity demanded. Now divide by the percentage change in price. The price goes from $2.00 to $1.00; take the new price of 1, subtract the old price of 2 – that gives you -1 – and divide by the old price of 2. Now we have -\( \frac{1}{2} \), or -50%. If we take -\( \frac{1}{2} \) – the percentage change in quantity – and divide by -\( \frac{1}{2} \) – the percentage change in price – we get 1.

Then, apply the absolute value sign to get rid of the minus, and the elasticity measure, calculated moving from point A to point B, using point A as the base point, is equal to 1. We call this unitary elasticity – or unit elastic.

Now go from point B back to point A – that is, calculate the elasticity of demand as we move from a price of $1.00 up to a price of $2.00, and the quantity falls from 30 to 20. Only this time, use point B as the base points for your percentage calculations; that is, use $1.00 as your base price, and use 30 cones as your base quantity. See what you get.

The new quantity is 30, the old quantity is 20; 30 minus 20 is 10, divided by the midpoint quantity, which is 25, gives you 10 over 25, or \( \frac{2}{5} \); \( \frac{2}{5} \) – or 0.4 – is the percentage change in quantity demanded. The percentage change in price now would be the new price of $1.00 minus the old price of $2.00 – that is, -1 – divided by the midpoint price, which is $1.50; and that gives you -1 over $1.50 – or \( -\frac{2}{3} \). So what we have here is \( \frac{2}{5} \) divided by \( -\frac{2}{3} \); apply the absolute value sign and multiply out, and you get \( \frac{3}{5} \); \( \frac{3}{5} \) is Angie’s elasticity of demand, moving from A to B, using the midpoint as the basis of your percentages.

Now, just as a check, find the elasticity of demand as you move from B back to A, again, using the midpoint as the basis for your percentages. In this case, the new quantity is 20, minus the old quantity of 30, divided by 25 is \( -\frac{2}{5} \). In this case, the percentage change in price will be the new price of $2.00, minus the old price of $1.00, divided by $1.50, for a percentage change of \( \frac{2}{3} \). Once again, applying the absolute value sign and multiplying out those fractions, we get the elasticity of demand for Angie’s ice cream is \( \frac{3}{5} \) – or 0.6.

Notice, then, it doesn’t matter whether you’re going from A to B, or B to A. Once you’re using the midpoint formula, you get a consistent measure of the elasticity of demand in either direction.

Notice that in Angie’s case, the measure of the elasticity of demand is 0.6; that is, it is less than 1. If the elasticity of demand for your product has an elasticity number of less than 1, we say that the demand for your product is inelastic; That is, a given change in the price of your product results in a relatively small change in the quantity demanded. You can lower your price by a fair bit, and not get a significant increase in the sales of your product. In this case, what happens is, the smaller price has a big impact on your sales revenue; you’re making less money on each unit of the good that you sell. And since you’re not bringing in a lot of extra customers, your total revenue suffers. Anytime the
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Applying the Concept of Elasticity

demand for your product is inelastic, anytime your customers are relatively unresponsive to a change in the price of your product, total revenue will fall when the price of your good is decreased.

If we go back to Barney’s store, we'll see that his measure of elasticity was greater than 1; in fact, it was $1 \frac{2}{7}$. What that means is, a given change in the price of Barney’s product, or in Barney’s market, results in a relatively large response of customers. When Barney cuts his price by $1.00, he brings in a lot of new customers. And even though he’s making less money on each ice cream cone than he was before, he’s bringing in so many additional customers, that his total revenue actually increases.

Anytime the demand for your product has an elasticity measure greater than 1, we say that the demand for your good is elastic. And in that case a reduction in the price of your good generates a big response from your customers, and total revenue increases.

So to summarize, if the demand for your product is inelastic, a reduction in the price of your good results in less total revenue. If the demand for your product is elastic, then reducing your price will increase your total revenue. If elasticity of demand for your product is exactly equal to 1, then the change in price and the change in quantity demanded exactly offset each other, and there is no change in total revenue.
The first question that any economic system must answer is this: What goods will be produced – that is, what combination of the possible goods and services will be produced in this economy? In order to summarize the possible combinations of goods and services that can be produced, the economist needs a tool, and the tool that we use is called the “production possibilities frontier.” Production possibilities – what it’s possible to produce. The production possibilities frontier shows all combinations of goods and services that it’s possible to produce in this economy, given its resource endowment – that is, the amount of capital, labor, and raw materials available – and given its technology – that is, its know-how for transforming raw materials into final goods and services.

The production possibilities frontier will show you the maximum amount of one good that the economy can produce, given the amount of other goods that it’s already producing, and given its resource and technological constraints. I’m going to draw now a production possibilities frontier for a sample economy. And because this is macroeconomics, instead of using two goods like apples and oranges, we’re going to use aggregate goods – that is, goods that are actually a broad class of a type of good. The two types of goods that we’ll use are consumption goods and investment goods.

Let me first define, a consumption good is a good or service that provides immediate satisfaction, for its own sake. For instance, an example of a consumption good is clothing, or food, or perhaps entertainment, or medical care – things that provide you with satisfaction right now; these are the consumption goods. And on the horizontal axis of my production possibilities graph, I’m going to measure the quantity of consumption goods that are produced in this economy.

Now, you’re asking, “Well, what is this? Is this shirts? Is this medical care? Is this food? What is it?” Well, what it actually is, is an aggregate. We’ve made up some kind of measure of consumption goods in general. Think of this as the number of baskets of consumption goods, and in each basket, there’s a little bit of food, a little bit of clothing, a little bit of medical care. And the numbers here on the horizontal axis represent the number of those baskets – an aggregate measure of consumer goods available in this economy.

On the vertical axis, we’re going to measure the quantity of investment goods. Investment goods are sometimes called capital, or tools. These are goods that produce other goods. An example is a sewing machine; another example might be a drill press; another example might be a factory – anything that actually is valuable because it produces other things is a capital good, or a tool, or an investment good.

I’m going to use here the letter “I” to stand for investment goods; and something you’ll learn very quickly in macroeconomics is that when we say “investment,” we’re talking about the spending – the purchases – of businesses. Investment is business spending. And on the vertical axis here, I’ve calibrated numbers that represent the overall quantity of investment goods produced in our economy. So, once again, we’re thinking of this as baskets – representative measures of tools, so there’s a little bit of sewing machine, a little bit of drill press, a little bit of factory, in each of these baskets; and we’re going to produce 25, 50, 75, 100, or so forth.

So, on my two axes, I am measuring the quantities of things that are valuable in our economy. On the horizontal, we have consumption goods represented by the letter “C”; and on the vertical axis, we have investment goods, or capital, or tools, represented by the letter “I.”

Now, what are our production possibilities? That depends; it depends on the quantity of resources we have – land, labor, tools – to use; and it depends also on our technology – our know-how, or our ability – to translate these raw materials into final goods and services. I’m going to represent these possibilities first with a table of numbers. We can call this table the production possibilities schedule.

As you look at these numbers, you’ll see the maximum quantity of consumer goods that can be produced for any given quantity of investment goods produced. So, for instance, whenever we are producing 100 bundles of investment goods, we’re using up all of the resources in our economy, and we have nothing left to produce consumer goods with. We can take that piece of information, and move over into our graph and find a point that shows us our output when we devote all of our resources to the production of investment goods. And that’s this point right here – 100 bundles of investment goods, and no consumer goods at all. That’s a point, then, on the vertical axis.
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The next combination listed in the table has 75 investment goods and 100 consumer goods. Let’s think about what this means. If we are willing to give up 25 bundles of investment goods, we will free up land, labor, and capital. We will free up resources that will allow us to produce 100 units of consumer goods; that is, these resources that were being used to produce tools have an opportunity cost. You can either have 25 extra tools, or you can have 100 new consumer goods. The opportunity cost of these 100 units of consumer goods is the 25 tools that we must give up in order to produce them. We stop producing the tools – that frees resources that are then diverted into the production of consumer goods. And we can show that as this new point on the production possibilities frontier. The combination here is 75 tools, and 100 bundles of consumer goods.

Let’s continue this line of thinking as we look at the next combination on the schedule – 50 units of investment goods, and 150 units of consumer goods. Now, the opportunity costs of getting an additional 50 units of consumer goods is 25 tools. Give up 25 tools and now you can get an additional 50 units of consumer goods for a combination of 150 consumer goods and 50 investment goods.

Well, notice what’s happened here. The first 25 tools we were willing to do without bought us 100 consumer goods. The next time we give up 25 tools, we only get an additional output of 50 consumer goods. What’s going on? Well, this is a matter of increasing opportunity cost; that is, the first time we cut back our production of sewing machines and other tools, we did so by freeing the resources that are best suited for the production of clothing. That is, we took the resources that could most easily be transformed into consumer goods, and we let them go first, as we reduced our output of tools.

Now, if we want to reduce the output of tools further, we’re taking resources that aren’t quite as well suited for the production of consumer goods as the first set. So maybe the first time we let go of cloth, we let go of labor that was talented in the production of clothing, and we sent them over to produce consumer goods instead. Now we’ve got workers that know a lot more about tools and not quite as much about producing clothing; and whenever we moved them from the tool sector into the consumption sector, they don’t add as much additional output as the workers that we first transferred.

So you can see we have an increasing opportunity cost, because some resources are better suited to the production of tools, and other resources are better suited to the production of consumer goods.

Let’s continue this logic by looking at the next point in the schedule – 25 units of tools, and 170 units of consumer goods. Now, whenever we let go of another 25 units of tools – that is, whenever we cut back the production – our output of consumer goods only increases by 20 units. This is because the resources that are being freed are less well suited to the production of consumer goods than the resources that were freed in the earlier stages.

And finally, whenever we reduce our output by that final 25 bundles of tools – that is, when we cut our investment output to zero – we increase our output of consumer goods only 10 more units – up to 180. This is the quantity of consumer goods that we can produce when all of the resources of our economy are diverted into the production of consumer goods. This last set of resources is quite well suited to the production of sewing machines, and not very well suited to the production of clothing. That’s why we got only a small increase in consumption for a relatively large reduction in investment.

So, here are five possible combinations of consumer and investment output. This is our production possibilities frontier. But, of course, you can imagine that we could produce lots of combinations in between. Instead of reducing output by 25 tools, we could reduce it by 10, or 5, or 1, or .5. Therefore, if we connect these dots, we get all the possible combinations of tools, and consumer goods – that is, all the possible combinations of investment goods and consumption that are possible to produce in our economy, given its resource endowment, and its technology.

So, another way of thinking about this is, if we want to produce 80 units of clothing – that is, 80 bundles of consumer goods – then, given our resources and our technology, the most we can produce in investment goods is going to be – it looks like from this picture – about 80 units of investment goods. That is, go up to the production possibilities frontier, and see the maximum quantity of investment that you can produce for a given quantity of consumption.

Now, this production possibilities frontier tells us several things about economics. That is, we can see many of the basic concepts of economics in this picture. The first thing we can see is the reality of scarcity; that is, there are some
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combinations of investment and consumption that we’d like to have in our economy that simply aren’t possible. For instance, 120 units of consumption goods and 100 units of investment – that’s a point up here that lies outside the production possibilities frontier. This would be a very nice point to achieve, but it’s simply not achievable, given the resources and the technology that our economy has to work with. So points outside the production possibility frontier indicate the reality of scarcity.

Points inside the production possibility frontier – like this one, 40 units of consumption and 50 units of investment – represent the possibility of unemployment, or underemployment. If we’re not using all of our resources, or we’re using them in uses for which they are not especially well suited, then we’re not going to be producing the maximum amount of investment goods that can be produced for a given amount of consumption. So points within the production possibility frontier represent unemployment, or underemployment.

The downward slope of the production possibility frontier reminds us of opportunity cost. If you want more consumer goods – that is, if you want to move outward on the horizontal axis, you have to move downward on the vertical axis. To get more consumer goods, you have to give up investment goods; there is a tradeoff – more of one good means necessarily less of another.

And finally, notice that the curve gets steeper as we move down it. That’s because the slope of the curve represents opportunity cost. Remember from slope – rise over run – in this case, the rise is the reduction in investment goods that’s necessary to give you the run, or the increase, in consumer goods; 25 investment goods given up may buy you 100 consumer goods at one point on the curve, but only 10 consumer goods at another point on the curve. As the curve gets steeper, the opportunity cost of additional consumption is getting larger. That’s because not all resources are equally well suited to the production of tools and consumer goods. Some resources are better at tools, and we keep them in the production of tools until the very end. Others are better suited for the production of consumer goods, and we move them into the consumer good production as quickly as possible, as we start increasing output in that sector.

So the bowed shape – the outward bowed shape of the production possibility frontier – indicates increasing opportunity cost. Now what happens if we change the things we held constant at the beginning of this story? When I drew this production possibility frontier, I held constant the resources of this economy, and its technology. What happens if we change one or both of those factors?

Well, when you draw this curve, remember, you’re holding those things constant; you’re saying what happens to our production of investment goods if we increase our production of consumer goods? Ceteris paribus – that is, holding constant resources and technology. But if you’re going to change resources and technology – that is, if you’re going to change the original assumptions that were made when you drew the curve, you’ve got to draw the whole curve over again. When you change those basic assumptions, you’ve got to go back and redraw the relationship.

So let’s start with an example. Suppose we have an improvement in technology that allows us to produce a lot more tools for a given quantity of consumer goods? That is, suppose there’s a technological change that allows us to make tools more simply – maybe some advance in computer know-how, or the discovery of a new mineral that’s useful in making tools. And let’s suppose that this technological advance applies to the production of tools but not to the production of clothing? That is, if we use all of our resources in clothing, we can still produce the same quantity of clothing as before. But if we produce tools now, we’re going to get more tools than before; that is, the production possibility frontier is going to lie outside the original. Our possibilities have increased, and these increased possibilities favor the production of tools; that is, with these new possibilities, you can make tools more easily than before.

Notice the way the curve shifted – the shift is biased in the direction of tools. That’s because this technological progress favored the production of tools. The same picture would apply if we got new resources that were useful in the production of investment goods, but not particularly useful in the production of consumer goods.

Let’s consider another case. What happens to this curve over time? Because, see, this is a dynamic story. If you make the decision to devote some of your society’s resource to the production of tools, you’re increasing your resource base. If you don’t eat everything now, and you plant some of it, you’re going to be able to grow more food tomorrow. So whenever you make a choice to be at a point like this on the curve – at a point that involves a balance between the production of goods for consumption today, and goods that can be used as tools to make more goods
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tomorrow – then your production possibilities frontier is going to shift outwards over time. And we call this outward shift economic growth; that is, as you accumulate tools, you increase your ability to produce output in your economy. And this accumulation of tools advances the production possibilities; it means you can make more of everything over time. This is called economic growth. And we imagine that economic growth is probably no more likely to favor consumption as it is to favor investment. That is, the tools you make will help you make clothing as well as sewing machines tomorrow. So the whole curve shifts outwards. Some economic growth is biased in one direction or another; but in general, there’s no reason to assume that the investment in tools doesn’t increase your production possibilities broadly – that is, increase your ability to make output in both sectors in the next period.

Suppose there is a war that affects this economy. How would the production possibilities change? Looking at the diagram, we can imagine that the output in both sectors would be reduced; that is, if war occupied or destroyed some of the resources in this economy, the quantity of consuming and investing goods that can be produced is going to be reduced. So the curve would shift inward, like this.

How would immigration affect the production possibilities frontier? Suppose talented labor were to find its way into this economy? What would happen? We can show that as an outward shift in the production possibilities frontier – the ability to produce more of all goods than before.

What would happen now if a technological change occurred that increased the ability to produce consumption goods, but didn’t change the ability to produce investment goods? We would show that as a biased shift in the production possibility frontier – that increased the possibilities only in one dimension.

The production possibilities frontier, then, summarizes the capability of this economy to produce goods and services. And one interesting thing to notice is that it’s possible to talk about the production possibilities frontier in terms of these aggregates – the tradeoff between enjoying consumption today, and using your resources to make tools so that you can enjoy even more consumption tomorrow.
So I was just at the grocery store and I got this dollar bill in change, and it says “Lucy” on it. And you have to wonder where is Lucy now? And why did she write her name on this dollar bill? And you can’t help but wonder where all this has been and how many people have touched it besides Lucy who chose not to write their name on it.

If you think about money, you start to be drawn into the way it circulates in our economy, that it's been in so many other people’s hands, and the next time I spend it, it’s going to go into someone else's hands who’s going to wonder about Lucy. Every time you spend money, you're creating income for someone else. At the grocer just now, when I paid for my groceries, my spending became his income. Of course, some of it was his, but some of it went to pay for the foods that he had stocked his shelf with, some of it went to pay his workers, but some of it was his income; my spending became his income.

And when you add up the aggregates in the economy, it must be true that in a given period of time, the total amount of spending is equal to the total amount of income. This is one of the most basic, fundamental concepts in macroeconomics. And to understand this concept better, we’re going to build a circular flow diagram to show the way that money circulates through the economy and the complementary circle – the circle of resources – through the economy. Because money moves in one direction to pay for stuff which is moving in the other direction; and you can see this more clearly when you put it all down at once in a picture.

So let’s build a circular flow diagram, and we’ll start with households. Household purchases of goods and services is called consumption, and the households purchase goods and services with money. They acquire the money by selling their resources – land, labor, capital – and they sell these resources in the market for factors – the factors of production, or the resource markets. The second set of players in our circular flow diagram are the firms or businesses. Firms or businesses hire the factors of production, and transform this land, labor, and capital into the goods and services that households purchase. Firms pay for the factors of production with money. This money becomes the income of the household, which they then use to purchase the goods and services that the factories make.

We’re going to look now at the interaction of households and firms in these two distinct markets. First, we'll look at the markets for the factors of production. Households supply resources, and I’ll use red to indicate the flow of resources. Land, labor, and capital flows into the factor markets from the households. Over in the factor markets, this land, labor, and capital is hired by firms who then put these resources to work producing goods and services.

Now, the complementary flow to this flow of resources from households through the factor markets into firms is the flow of money. Businesses pay for these resources with money; and this payment takes the form of wages, interest payments, rental payments for property, and profits that are returned to households who own stock in the companies.

So in the factor markets we see resources flowing in one direction and money payments for the use of those resources flowing in the other direction. The other market in which firms and households interact is the market for goods and services. In this market, goods and services are provided by the firms, and purchased and enjoyed by the households. So the resource flow in this direction is clockwise. The money flow is in the other direction – households pay money for goods and services, and that money winds up as the revenue of businesses; and out of this revenue, businesses pay wages, interest, etc., over in the factor markets.

You see now that we’ve got a complete circle. Money begins as the factories pay wages and interest payments to the households, their income. And this income, then, is used when the households buy goods and services in this market. Then it becomes the revenue of factories. So money flows around the circle counterclockwise. Resources flow the other direction – households supply land, labor, and capital to businesses that transform them using their technology into goods and services that wind up back in the households. That’s the circular flow – resources in one direction, money in the other direction. And looking at this picture, it should be clear that spending and income are equal, and have to be, because this is a closed system.

Now, we can add other players to our story, and see how that complicates the circular flow. The first candidate for being added to the model is the government. And the government interacts in this circular flow in several directions. First of all, the government buys goods and services from the goods and services markets, and the government hires factors of production, like land, labor, and capital, in order to run the government, hires them from the resource
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The Circular Flow Model

markets. The government pays money to its employees and other people who sell it factors of production, and the government pays money for the goods and services that it purchases to run the government.

Households pay money to the government in the form of net taxes. I say net taxes because the government also gives some money back to households in the form of welfare payments, unemployment insurance, medical payments, and so forth. But on net, households pay taxes into the government in the form of cash. In the other direction, the government supplies services to households in the form of schools and roads and bridges and national defense and other public goods.

Over here on this side we have the same story. Firms pay taxes to the government on net, although some firms get subsidies from the government. On net, however, the flow of money is from firms into the government in the form of taxes. The flow the other direction is the government providing goods and services to firms. Not only do firms use roads and bridges, but firms also profit from the court system and laws and contracts and such things that are enforced by the government. So national defense, security services, all of the things that are provided publicly, flow back from the government in the form of resources, goods, and services, to the business sector.

So we put the government here in the middle. Notice the government has a nice interaction and integration into this system with money and resources flowing as you might expect.

We can also introduce one other player into this story, and that is the rest of the world. The rest of the world means people in other countries who want to buy and sell goods and services to people in the United States; that is, companies in the U.S. and private households buy goods from abroad – imports – and businesses here in the U.S. sell products – exports – to people in other countries. So for the rest of the world, notice that we have two ways of thinking about the interaction. We’ve got imports coming into our goods markets from abroad, and we’ve got goods going back out as experts. So the top arrow here represents the imports into the economy; the bottom resource arrow represents exports out. Money flows in the opposite direction. Whenever we import goods, we send money abroad to pay for it. And when we export goods, money comes back in.

And there you have it, a complete circular flow diagram that shows how all of the players in the macroeconomy interact with one another. The main insight you get from studying this picture is that spending equals income. It’s a closed system, it’s like a set of plumbing pipes and all the water sloshes around, but eventually there’s only a certain amount of water in the whole system. And anytime you go to the store and you pay for something, when you’re spending, money is going into the hands of a merchant to become his or her income. It’s that simple. And in the aggregate, when you add up everything that people are spending, and everything that people are receiving as income, the two numbers are necessarily always equal. Spending equals income – we’ll be building on this concept throughout our study of macroeconomics.
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Real GDP

When you read the newspaper or listen to the radio, you’ll come across terms like gross domestic product and gross national product and real GDP. What do these terms mean and how important are they?

Let’s start with the definition of gross domestic product, and I’m going to say this definition very carefully, because each phrase in the definition is important. The gross domestic product is the market value of all final goods and services produced in a country in a given period of time. Let’s look at each phrase.

We start with the market value. Market value means that gross domestic product is measured in terms of money, what people have paid for the goods and services that they have purchased. Market price means that we use, for this calculation, the actual price at which these transactions occur. So if I buy an apple for 50 cents, I’ve added 50 cents to gross domestic product.

The next phrase “of all”, and here you have to wonder, “Where does the government get all of these statistics?” Well, these statistics come from reports of businesses, most of who are paying taxes. So the gross domestic product is going to rely on reports, which means that activities that are being hidden from the government are probably not showing up in measures of the gross domestic product. So “of all” refers to legally transacted trades.

The third phrase “final.” “Final” means goods and services that are purchased by households for their enjoyment. So, for instance, when I buy this apple at the store, this is a final good and goes into the calculation of GDP. On the other hand, if I’m producing auto frames and I sell an auto frame to General Motors, that’s not a final good, because that auto frame is then incorporated into a new car body and sold to a household by General Motors as part of an automobile. So the car frame that I sold the General Motors was not a final good, it was an intermediate good. It became part of their production process. The car frame doesn’t go into gross domestic product until the car is sold and the car’s sales price is added to GDP. And that included the frame that I sold to General Motors. This “final” goods and services avoids double counting.

The next phrase is “goods and services”. That is all goods and services are part of GDP. Haircuts, apples, bananas, massages, films, vacations, all goods and services that are provided, everywhere there is money changing hands in exchange for value, that becomes part of the calculation of the value of output in our economy.

The next phrase “produced” and this means that we’re trying to record only what is being produced this year. For instance, if I buy your used car, that doesn’t figure into GDP, because that car was part of GDP years ago, when it was a new car. If I go to an antique store and buy a table, that table is not part of GDP, because it’s an old piece of furniture. But the antique dealer, who I’m paying for his appraisal skills and his retail sales effort, that is part of GDP, because it’s a service that’s being provided to me as I purchase an old piece of furniture. So only that stuff that’s produced this year is what we’re trying to count when we measure GDP.

“Within a country” – now we come to the distinction between gross domestic product and gross national product. Suppose we have two countries, the United States and the rest of the world. Here we have the nationals of the United States. All of these people are Americans. And here we have the foreign nationals, people whose nationality is citizenship in the foreign country. Now, suppose we have some US nationals who go to work in the foreign country and some foreigners who come to work in the United States. Everyone here is producing goods and services. The difference is that the output that is produced physically within the borders of the United States is called gross domestic product. That’s the output that’s produced domestically, even though some of the workers who are contributing to its production are not American nationals. Gross national product, on the other hand, for the United States refers to the output of all US nationals, wherever they are, either in the United States or in foreign countries. So gross national product is the output of all US nationals, wherever in the world they happen to be. The difference then between gross domestic product and gross national product is the difference between the output of US nationals working abroad and the output of foreign nationals working in the United States.

Finally, “in a give period of time.” When we measure the output of an economy, we focus on a given period of time, usually one year. The gross domestic product of the United States is right now about 8 trillion dollars, which means that over the course of the years, we produce new final goods and services that are traded in legal markets for an amount of about 8 trillion dollars.
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Real GDP

Now, that's gross domestic product. The next thing that we want to distinguish is the difference between nominal gross domestic product and real gross domestic product. Nominal gross domestic product refers to the dollar value of all of these transactions that are occurring right now out there in the economy. So if I go and I pay a dollar for a pizza, that's contributing $1.00 to gross domestic product. However, next year that same pizza might cost $2.00. Well, there's no more pizza produced, we're just spending more money, because the price is higher. And it would seem misleading to say that, in some sense, there's more stuff, just because more money is being spent. This is where the concept of real GDP comes from. Real GDP attempts to measure the output of the economy in terms of physical goods and services. That's the actual physical output of the economy, the amount of stuff that we're actually making.

Real gross domestic product seeks to hold constant the effect of changing prices, to give us a sense of how much additional stuff, how much additional real goods and services the economy is producing. Remember the term "nominal" refers to measures that are calculated in money. The term "real" refers to measures that are calculated in physical goods and services.

So let's do an example then that distinguishes between the real and the nominal GDP. Let's consider an economy that produces only two goods; apples and bananas. And in this economy let's calculate the gross domestic product, as well as the real gross domestic product, in three different years. Let's suppose that in the first year, the year 2000, that there are two apples produced and that the price of an apple is $1.00. Let's suppose that there are three bananas produced and the price of a banana is $2.00 per banana. So the gross domestic product in the year 2000 is $1.00 times two apples, or $2.00, plus $2.00 a banana times $3.00 is $6.00. Six plus two is a gross domestic product of $8.00. Now let's look at the year 2001. The gross domestic product here has changed, because the quantities of apples, the quantities of bananas produced have changed, and the prices of both goods are now different than before. So to calculate the gross domestic product, $1.50 per apple times four apples gives us a total of $6.00 spent on apples, and $2.50 per banana times four bananas purchased gives us a total of $10.00 on bananas. Ten plus six is $16.00. That's the gross domestic product in the year 2001. And finally, the gross domestic product in the year 2002 is $2.00 an apple times five apples, or $10.00, times $3.00 a banana times five bananas, or $15.00. Fifteen dollars and $10.00 together are $25.00 for the gross domestic product. Now, how do we compare the output of our economy in those successive years? Output is changing, but so are prices. How do we get a measure of the increased physical output of our economy, the increased real output? Well, we get that measure by holding constant the prices. And we pick a base year and we use that year's prices in the calculation of GDP for the successive years. That's how we come up with a measure of GDP that holds prices constant. Watch closely.

Let's choose the year 2000 as our base year and let's circle the prices of apples and bananas in those two years, because I'm going to use these as the prices as I calculate gross domestic product in the years 2001 and 2002. The real gross domestic product in the year 2001 is now $1.00, the base year price of apples, times four apples, the quantity actually produced in 2001. That gives me a total of $4.00 on apples spent in 2001, using the base year price. Next, let's go to bananas; $2.00 is our base year price times four bananas actually produced in 2001. So we have $8.00 worth of bananas produced, using the base year price. $8.00 plus $4.00 is a total real gross domestic product of $12.00 in the year 2001. See, before, when we used the actual numbers for the year 2001, we got $16.00. But that overstated the increase in physical output, because part of that increase number came from higher prices. Using the base year prices, it appears that gross domestic product, real gross domestic product, has increased by only 50%, from 8 to 12, rather doubling, from 8 to 16.

Next, let's calculate real gross domestic product for the year 2002. Start with the base year prices, once again, $1.00 times five actual apples in 2002 is $5.00. $2.00, the base year price, times five bananas is $10.00 worth of bananas in 2002 at the base year price. Ten plus $5.00 together gives us $15.00. That's the real gross domestic product, using the base year prices.

So there you have it, a simple method for calculating real gross domestic product. Hold prices constant at some base year and use those constant prices whenever you multiply by the actual physical output to calculate real GDP. Real GDP's changes are a measure of the increase in the actual physical output of the economy.

Now, this gives rise to a number that we call the GDP deflator. The GDP deflator is the ratio of a year's actual GDP, that is, the GDP measured in terms of current year prices, to the GDP measured in terms of base year prices. This gives a notion of how the price level has changed. And the change in the price level is weighted according to the physical output of the different goods produced. So, for instance, if we wanted to calculate the GDP deflator for the year 2001, we take the actual GDP for that year, which is calculated using 2001 prices. And that GDP, as we...
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calculated earlier, is $1.50 times 4, or $6.00 plus $2.00 and 50 times 4, $10.00, $16.00 is the gross domestic product for 2001. But, using the base year prices, we calculated that the real GDP for that year is $12.00. Now, the ratio of $16.00, the GDP, to $12.00, the real GDP using base year prices, that ratio is 16 divided by 12, or 1.333, one and a third. Multiply that number by 100 and you have the GDP deflator. The GDP deflator is the ratio of the nominal GDP to the real GDP, multiplied by 100. So, in this case, it's 133 1/3. That tells you how much prices have increased relative to the base year. They've gone up about 33%.

Let's now look at the GDP deflator for the year 2002. Take the actual GDP, which is 25, divide it by the real GDP calculated with the base year prices, which is 15, and you get 5/3, or 1.666, 1 2/3, or about 1.67. Multiply by 100 and you get the GDP deflator, 167, which tells you that prices have risen now about 67% since the year 2000. The GDP deflator is a change in prices. It's a kind of average change in prices across the economy, where the average is calculated using as weights the amount of physical goods. That is, the importance of the change in apple prices depends on how many apples are produced. The importance of the change in banana prices in influencing the GDP deflator depends on the quantity of bananas actually produced. But if you look at the GDP deflator’s change over time, it gives you one measure of inflation in the economy. How fast are prices rising, or are prices even falling?

Recall that the formula for the GDP deflator is the nominal GDP for a given year divided by the real GDP for that same year, multiplied by the number 100. Well, since this is true, we can do a little algebraic manipulation and come up with another formula for calculating the real GDP. If we know the GDP deflator for a given year, we can take the nominal GDP for that year, divide by the year’s GDP deflator, multiply by 100 and that will give us the real GDP. For instance, if the nominal GDP for a given year is 8 trillion dollars and the GDP deflator for that year is 200, then taking 200 and dividing into 8 trillion, multiplying by 100, gives us 4 trillion dollars for the real GDP, or the real GDP output measured in terms of base year prices. A little algebra gives us another expression for real GDP.

So next time you hear these terms, GDP, real GDP, gross national product, you'll know what the newspaper is talking about. It's discussing the output of the economy within a given period of time, the total market value of all final goods and services produced in a country in a given year. And that may or may not be related to the standard of living of the people who live in that country. That's an interesting question to consider.
A country’s gross domestic product is defined as the market value of all final goods and services produced in that country in a given period of time. And the real gross domestic product seeks to hold constant the effect of changing prices, as we look at how a country’s output changes from one year to another. That is, when gross domestic products change, part of the change is due to a change in market values – that’s prices – and part of the change is due to a change in the physical output of goods and services in that economy. So we invent the concept of real gross domestic product, which tries to isolate the effect of increasing output, and hold constant the effect of prices. Let’s look at an example to remind ourselves of how real gross domestic product works. And as we work through this example, we’ll see a problem that arises in the course of calculating the change in real gross domestic product from one year to another.

Let’s start with year one. In year one, let’s suppose that we have two goods produced in our economy – apples and oranges – and the price of apples is $1.00 apiece, and ten apples are produced, for a total market value of $10.00 from apples. Let’s suppose that the price of oranges is $2.00 apiece, and the quantity produced is ten oranges, for a total market value of $20.00 from oranges. Ten dollars in apples plus $20.00 in oranges gives us a gross domestic product for this economy of $30.00 in year one.

Now consider year two. In year two, let’s suppose that there is a big increase in orange production, perhaps due to some new technological advance that allows oranges to be produced at lower cost. What happens in this case is that the quantity of oranges produced increases to 20 oranges, and the price falls through the interaction of supply and demand; that is, the surplus of oranges pushes down the price so that oranges now sell for $1.00 apiece. Twenty oranges at $1.00 apiece gives us a market value of $20.00 from oranges. Over here in apples, let’s suppose we still have $1.00 per apple and 10 apples produced, for a total market value of $1.00 from apples. Ten dollars plus $20.00 means that our gross domestic product for year two is $30.00.

Now, we know that our economy became more productive because there are more oranges being produced because of this technological advance that I described. But what is the actual increase in real gross domestic product? By what percentage did the physical output of our economy expand? How much better off are we in terms of the quantity of goods and services available to meet our wants and needs?

Well, the percentage number that we wind up with depends on the base year that we select for our price weights. Let me see if I can give you the intuition of this problem. Suppose you work for a company that moves furniture, and your boss pays you $50.00 a day. The next day, you come to work and the boss says, “Good news, I’m giving you a raise to $100.00.” The percentage increase in your wage is 100, the new wage, minus 50, the old wage, divided by 50, the old wage, for a percentage increase of 100%. Now, suppose the next day you come back to work and the boss says, “Sorry, I’ve got bad news; that is, your wage is going to be cut to $40.00.” You do a quick calculation – $40.00, if this is your new wage, minus 100, your wage from the previous day, divided by that 100.00 base rate, gives you a percentage decrease of 60%. You complain to your boss, “I was making 50, then you gave me 100, now I’m cut back to 40; I’m worse off than I was before. And the boss counters, “No, I gave you a 100% increase, and only a 60% decrease; you shouldn’t complain.” Well, this is ridiculous, isn’t it? And it points out a problem with the calculation of percentage changes. Percentage changes depend entirely on where you start; that is, the base with which you calculate that percentage determines the amount of the percentage change. We’re going to see this problem now as we look at a change in real gross domestic product. The percentage change that we wind up calculating depends on where we start – that is, which year we choose for our base.

Suppose we want to calculate the percentage change using the year one prices as our weights. Well, look at this. In this case, we keep the year one prices of $1.00 for an apple, and $2.00 for an orange, and we use the year two quantities of 10 apples and 20 oranges. If we do this, multiplying $1.00 times 10 and $2.00 times 20, we get a real gross domestic product using year one prices as our base rates of $50.00. Compare $50.00 with the original gross domestic product of 30, and that’s going to be a percentage increase of 66.7% – 50 minus 30, divided by 30 is a percentage increase of $\frac{2}{3}$, or 66$\frac{2}{3}$ %.

However, if we do the same calculation from year one to year two, and we use the year two prices as our base rates, we wind up with a different percentage altogether. Let’s go back and look at the year one quantities of 10 apples and 10 oranges, and now let’s use the year two prices as our base rates – $1.00 per apple, and $1.00 per orange. That is, if we go back and look at the original year’s output of apples and oranges and weight those outputs by the year two prices, we get a different calculation.
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prices, we wind up with a real GDP of $20.00. That is, in terms of year two prices, the gross domestic product – the output of this country – was worth $20.00 in year one, measured in year two prices.

So the change in real gross domestic product is from $20.00 – the year one output – to $30.00 – the year two output. Notice you’re comparing two years for which you’re using the same prices – $1.00 per apple, $1.00 per orange. And using those weights, the real GDP increased from $20.00 to $30.00; that’s a 50% increase. See you got a bigger percentage when you used the price of $2.00 per orange, because the higher price put a heavier weight on the change in output of oranges.

Well, there’s something kind of messy about this. We don’t like the idea that you get a different answer, depending on whether you start in year one or year two. This is confusing, and it makes the concept of real gross domestic product less useful. So what the Bureau of Economic Analysis has done since 1995 is to try to correct for the percentage oddity problem. By using neither $2.00 – the year one price – or $1.00 – the year two price, but using some number in between – that is, a weighted average of the two-year prices – that makes the percentage change more consistent. That is, it gives you the same percentage change whether you use the year one prices or the year two prices. You don’t use either price; you use something in between. So whether you’re moving forward or backwards, you get the same percentage change, and that’s definitely an improvement, and it avoids the problem with percentages that we described earlier.

This problem comes up frequently in economics. Percentages are sometimes a messy thing to deal with, especially whenever you’re looking at different base years as possible candidates for calculating the percentage. But here’s a simple explanation of how you wind up with a problem with percentage changes, depending on which year you select as your base.
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The gross domestic product is the market value of all final goods and services produced in a country in a given period of time, usually one year. Let's look at some gross domestic product figures from 1998. These numbers measure the real GDP in each of the countries — "real" meaning that the prices used are those from 1996, and the quantities and output used are from 1998. Using these numbers, the United States had a real GDP of about $8.75 trillion in 1998; Japan's real GDP is about $3.8 trillion; France's about $1.4 trillion; and so forth.

Looking at these numbers, you might ask, "Well, what should I make of these? What do they mean?" One thing you can do with these numbers is look at how they change from year to year, and that's the information that's reflected in the growth rate of real GDP. The growth rates are now shown in the table, and as you look them over, you immediately notice that Mexico has a more rapid growth rate than does the United States. Well, what does that tell you? What it really tells you is that Mexico's growth rate is more rapid because Mexico is starting from a smaller base. A given absolute change in output in Mexico translates into a larger percentage change because Mexico's starting point is a smaller real GDP than the GDP in the United States. The given change in the United States translates into a smaller percentage.

Whenever you hear people in the press talking about economic growth, they're usually talking about the change in real GDP, or the percentage growth rate of real GDP. Again though, what do you make of this? When you hear that a country has a rapid growth rate, does that mean that the standard of living of its citizens is improving? Or that Mexicans are getting better off three or four times as fast as are people who live in the United States? Well, this depends on how you interpret the numbers. Let's divide all of the numbers in this column by the populations of the respective countries. That gives us per capita GDP — per capita real GDP in 1998. First thing you notice is that two countries – Switzerland and Japan – have higher per capita real gross domestic products than does the United States. Well, what does this tell us? Would you rather live in Japan, or Switzerland? Is the typical Swiss or Japanese better off than the typical American? This, once again, depends on what the numbers are telling us.

Gross domestic product numbers began to be compiled in the middle of the last century — that is, around the time of World War II — when countries were concerned in measuring their productive capacity; that is, how many machines — how much output — could be brought to bear quickly on the war effort — what was the productive capacity of our economy. Nowadays, however, these numbers are used to represent the ability of goods and services to provide satisfaction to the citizens of an economy. That is, there's usually an implicit link made in the press, when we're talking about these numbers, between the gross domestic product of a country and its standard of living, or its quality of life. But is that an obvious link? Does the gross domestic product really tell us whether people in a country are better off or not?

Let's consider several qualifications to the gross domestic product that will occur to us on reflection. That is, why might the gross domestic product not tell us what we want to know about quality of life in a country? The first problem with the gross domestic product is that there are things that are important to our standard of living that are left out of its number. The first is leisure. Does it matter if the gross domestic product has increased by 20% if we're all working so hard that we're tired and unhappy? That is, one of the things that we value is our vacation time, our time to sit and read a book; and yet leisure time does not show up in any form in the gross domestic product. In fact, on the contrary, you can argue that when gross domestic product increases, it could be because people are working harder, or working longer hours, and that has to be traded off against their lost leisure. So leisure activities don't show up in the number.

A second qualification is environmental quality. We're all concerned about clean water, breathable air, and beautiful landscapes, and yet none of these have market values that show up in the gross domestic product. Therefore, whenever business activity increases the final value of goods and services traded in markets but at the same time diminishes the quality of air and water, we get an increase in the gross domestic product, but perhaps a reduction in our standard of life.

The third question is about goods that are not traded in markets. What about child care? What about production in the household? What about meals put on the table, and redecoration of houses, and things like that, through effort that occurs at home? Well, all of these things make our life better, and yet they don't show up directly in the gross domestic product, because they're not traded in markets.
Another concern is the quality of products. Think about television sets today compared to television sets 40 years ago. Not only are the television sets of today of higher quality and more fun to watch and providing better and clearer pictures, but their prices are also lower, because technological progress has made it easier to produce these goods than back in the 1950s. Television sets are better and less expensive, but this doesn't show up in the gross domestic product, because the gross domestic product doesn't provide explicitly for changes in the quality of products.

Finally, there's this whole question of goods and services that are traded but never show up in official statistics at all, because people are doing them through barter or other informal transactions, but they are trying to avoid paying taxes. The underground economy may be as much as 10% of our gross domestic product – that is, people engaged in informal activity on which taxes are not paid and records are not kept.

So, all considered, there's a lot of activity that's increasing our standard of life that never shows up in official statistics. Therefore, the gross domestic product may understate our true quality of life. On the other hand, it may overstate our true quality of life, because there's a lot of expenditure that gives us no satisfaction. Consider one example – a lock and key. I bought this at the store to lock my locker at the gym so that no one would steal my clothes. Well, did this make me better off? Well, given that there's crime, I'm now protected, so I worry less. But do I want to live in a world where I have to spend a lot of money on locks and keys and security systems and car alarms? Also, because of the stress of modern life, we may spend more money on medication. Also, because of the difficulty of maintaining relationships in a stressful business world, there may be more divorce lawyers. All of these expenditures wind up increasing gross domestic product, but they don't necessarily make us happier. Therefore, our quality of life may be lower even as our total spending increases.

Another concern with per capita real GDP as a measure of quality of life is that it doesn't include other things that make for a good society, such as the distribution of income. If one person has a whole lot of money and everybody else has nothing, you might get a high average – that is, a high per capita GDP – and yet the income distribution is all messed up. One person has everything; and, therefore, there are a lot of people who may be living in misery and poverty. Not only are we concerned about the people who are miserable and poor, but we are also concerned about what kind of society that makes for. Do you want to live in a society where a very small number of people are very rich, while most people are discontent because they can't meet their basic needs? Some measure of the income distribution might be important to a real measure of quality of life, but we don't get any of that from our gross domestic product statistics.

Another concern is infant mortality – how many children are living out of childhood? What about adult literacy? What about life expectancy? All of these measures are important. What about the status of women in this society? What about educational opportunities? All of the things that we think make for a good society, none of them show up in this one-dimensional number that we call gross domestic product. Therefore, there are a lot of efforts now on the part of other groups to conduct measures of quality of life that are taking as their point of departure the gross domestic product, but trying to adjust it for the things that it leaves out, and other things that it should include, or things that should be omitted. One of these is the United Nations Quality of Life Index, which looks at educational opportunities, infant mortality, adult literacy. And what it does, it reorders the countries – the United States slips down in the list, and other countries that might surprise you rise up higher.

Another interesting effort is on the part of a group in San Francisco called Redefining Progress. Redefining Progress has conducted what it calls a Genuine Progress Index. The Genuine Progress Index includes non-market production; that is, it tries to estimate the amount of value that's created from child care and production in the household. It also treats the depletion of natural resources as a reduction in our capital. It tries to take explicit account of the amount of pollution that's created, and it knocks out of the GDP expenditures that are simply trying to clean up messes that we created in the process of production. Other things that it does is to take account of the income distribution and adjust the GDP downwards when the income distribution becomes more skewed. And it considers the drawback of living on foreign assets – are we becoming more dependent on foreigners lending us money.

The Genuine Progress Indicator has actually been declining since the mid-1970s. That is, if you take out the money that we're spending on locks and keys and security systems and divorce lawyers, and if you adjust for the amount of pollution that we're creating, according to redefining progress, our real standard of living has been falling since the mid-1970s.
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Well, there you have it – a concern about how to measure quality of life and standard of living. And it turns out that the gross domestic product, which was created to measure your capacity for conducting war, not surprisingly, doesn’t always do a great job of telling you whether your people are better off.
Here’s a riddle: When is dishwashing not a productive activity? The answer is: When your criterion for productivity is what shows up in the gross domestic product, and when you wash your dishes yourself. I just spent the last half-hour washing my dishes, and it’s as if the government statisticians don’t even care. I do a lot of work at home – sweeping the floor, caring for children, caring for aged parents – and the government doesn’t take any notice, because it’s not activity that’s been transacted in markets; therefore, it’s not included in the gross domestic product.

Now 70% of all housework is done by women therefore, feminist economics – a growing branch of economics – seeks to bring about more accurate measures of the value created in the economy by including the value that’s created in housework – the value created at home. Suppose I had someone come in and wash my dishes for me and I had to pay them at market rates, or I had someone come in and clean my house. What would this do to the gross domestic product if we imputed some kind of value to housework?

Well, according to one economist, Robert Eisner, if you look at housework done in the United States in the 1940s, ’50s, ’60s, ’70s, and ’80s, and if you value that housework at the market price of cleaning services, then housework probably would add about 20% to gross domestic product. That means about one-fifth of all of the value that’s created in our economy isn’t showing up in government statistics at all, because it’s not being transacted in markets.

According to the United Nations Human Development report, worldwide, probably about 40% of all value that’s created in the world economy is created in housework – work being done at home not measured in government statistics.

Two economists, Kathleen Cloud and Nancy Garrett, estimate that if you impute market values to housework, that Guatemala’s GDP would instantly increase by 75%, and Pakistan’s by 80%, and the United States by almost 30%. Now think about what this means. In the 1960s, only about 35 to 40% of the women in the United States had jobs outside their homes for which they received paychecks. In 1999, about 60% of all women are receiving paychecks for work in the market. So by how much has gross domestic product increased because of this change in labor force participation by women? Well, women are, say for example, software engineers. A woman who has a job now creating software is getting a paycheck because of the value added by her work. And yet, if she was working at home previously, caring for children and cleaning dishes, this work is now being done by someone else, say a cleaning service that’s receiving a check.

Now, hold on, there’s a double counting here, because that cleaning service is now in the gross domestic market because it’s a market transaction, whereas her cleaning before wasn’t showing up. Therefore, the change in gross domestic product is overstated, because work that she was previously doing is now showing up in GDP because it’s being done by someone else who’s paid. If you take this into account, according to some measures, then Norway’s gross domestic product has been way overstated; that is, the growth in GDP may have been overstated by as much as 20% because of this double counting.

It’s also difficult to measure the way in which the quality of this work may have changed. I mean, after all, who would you rather have at home taking care of the house – the person who lives there, or someone who comes in from outside who may not do as good a job? Changes in quality wouldn’t show up at all.

Now how do we make this situation better? How do we get measures of the value created in our economy that put the proper weight on housework? Well, this is the agenda of feminist economics – accurate measures of value. If, for example, we impute value to housework based on what you’d have to pay someone to come in and do it, that’s a first step. We already do that in the national income accounts by imputing the value of the service you get by living in your house. Impute that at an approximate rental rate, and that helps us to have an accurate measure of how much value people get from all of the homes that are in the economy that aren’t being traded on the market right now.

So why hasn’t this change already occurred? And the answer is that before now there hasn’t really been a constituency. People have been pleased, or basically pleased, with the way gross domestic product has been measured. But because feminist economics has raised our awareness of the way in which gross domestic product doesn’t accurately measure value that’s created, we’ve started thinking about ways of doing that more. So as the constituency arises for change in the way we keep our records, we’re more likely to change the way we keep our records. And that suits me fine, because I know that my housework is valuable. I just assume that the government recognized that and showed me in total how much value is being created by the work that we do at home as well as the work that we do in the market.
Given how much I hate to mow my lawn, I think I just got a good deal, but I feel a little bit guilty. I mean, is she going to report that income to the Internal Revenue Service and pay taxes on it? Most likely, she’s a participant in what economists call the underground economy. The term “underground economy” refers to any economic activity that takes place outside of government supervision; and usually this activity is undertaken by its participants to avoid the law or to avoid paying taxes.

One example of an underground economy is the activities that surround illegal trade – traffic in narcotics, or people who drive illegal immigrants across international boundaries. Another set of underground transactions are those undertaken expressly to avoid paying taxes. So when people get paid in cash like she is, chances are, she’s not going to report that income to the government, and if she doesn’t, she’s part of the underground economy.

Another example of underground economic transaction is barter. If my neighbor comes over and rakes my leaves and I go over and paint his living room, our trade involves value for both of us. But if don’t report this value to the Internal Revenue Service and pay tax on this in-kind income, then we’re avoiding taxes, and are part of the underground economy.

Now, is this something that we should be worried about? The underground economy may account for a relatively large chunk of the economic output of the United States. Some economists estimate that somewhere between 3% and 20% of gross domestic products comes from this kind of underground transaction. In the United States, this is even a
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relatively small amount of our economy. A country like Italy, we might be talking about upwards of one-third of GDP coming from underground activities.

So is it a problem? Well, first of all, anytime a transaction like this occurs, taxes are being avoided. Consider then that in 1992 the Internal Revenue Service estimated that about $100 billion worth of tax revenue was lost because people didn’t pay taxes on activities like this one. By 1998 the amount lost in taxes was estimated to be as high as $200 billion, and that amount will probably increase as the underground economy grows. So not only is tax revenue lost, but also, there are resources tied up in the enforcement of tax laws. And the more people turn to underground activities, the harder police and the taxmen have to work to make sure that we get the money to fund government programs, and pay for public goods like streets, and street lights, and schools, and so forth.

So as people avoid their taxes, there’s less revenue to provide the goods and services that government provides for us. Then, there’s all of the wasteful activity that people do to try to avoid the police, like hiding their lawn mowers and doing this activity after dark and so forth. Next thing you know, however, she’s going to need protection for her property rights, or someone’s going to find out that she’s doing this activity on the sly, and threaten to blackmail her and turn her in. Then we’ve got organized crime surrounding this activity – people who are tough, people who are strong – forming kind of their own law around underground activities. That’s happened around alcohol in the U.S., around the turn of the last century, and it happens around narcotics today, so we get that kind of stuff. In the end, there’s a lot of waste that surrounds underground economic activity.

On the other hand, there’s a lot of innovation that surrounds it as well. People who don’t yet have the resources to go and apply for a license and deal with all the government regulation can start their own simple job by getting a lawn mower and going out and mowing lawns for people. Of course, they’re putting themselves in a position of risk and liability, but at the same time, they are making a living, and she’s probably going to be discovering some new things about mowing lawns that she can share with other people. Innovation is likely to occur as well. So while the underground economic activity may create a greater dispersion of wealth – meaning that some people pay taxes and other people don’t – this kind of activity can also level the playing field by giving anybody a chance to get in and try to make their way.

So what can we do about the underground economy? If we’re concerned, and, in fact, we’re losing too much money in taxes, we really have two alternatives. One is to increase enforcement, and go after people like her and her lawn business and make them pay their taxes. That involves a big expenditure of resources. The second thing is simply to legalize activities and bring them under the auspices of the government so that they can be taxed more thoroughly, as happened with alcohol around the turn of the last century.

Now legalization isn’t going to change her lawn business. Maybe we should have more enforcement to make people like her pay taxes. On the other hand, if she weren’t here, I’d have to mow the lawn myself. So you see, I’m in a quandary – the underground economy has costs for society, but it also has benefits.
Suppose it’s your job to calculate the gross domestic product for the United States. How would you do it? Start with the definition: The gross domestic product is the market value of all final goods and services produced in the United States in a given period of time, say one year. That is, it’s the total value of all of the economic transactions that occur in the United States. Now, think about an economic transaction. Every one of them involves two parties – there’s a buyer, and there’s a seller – and, what’s happening in every one of these transactions is the buyer is spending money, and receiving in exchange for this expenditure goods and services.

You can think of any transaction that occurs either as a spending decision by a buyer or as the receipt of income or money by seller – that is, spending and income. It’s one transaction, but it can be viewed from either of two perspectives. That is, every time something is bought or sold in our economy, a seller gets income that is equivalent to the amount of money that a buyer has spent to get a good and service. So you can either add up all the buyer’s activity – that is, all the spending in the economy – or you can add up all of the seller’s receipts – that is, all of the income in the economy. But these two are equal in every case; spending equals income by the nature of an economic transaction.

So there are two ways to calculate GDP. We can add up all the spending – that’s called the expenditures approach – or we can add up all of the income that’s received by sellers – that’s called the income approach. In this lecture, what we’re going to do is look at the expenditures approach – that is, who are the agents in the economy who are spending money, and how do economists think about expenditures. And when you add up all of this spending and get real gross domestic products, what have you learned about the economy.

So let’s start by making a list of all of those agents who act as buyers – that is, all of the agents who are spending on goods and services produced in our economy. Let’s start with households. Households purchase goods and services – that is, they purchase goods and services that they enjoy consuming, and we call this spending consumption spending, or consumer spending. Now in 1999 the gross domestic product of the United States was $9.2978 trillion. Of this amount, $6.3037 trillion was consumer spending – that is, consumer spending accounted for 68% of the total gross domestic product of our economy. Consumers buy typically two-thirds of what the economy produces. That’s consumer spending – anything that a household buys except for a new home.

The second category of spending in our economy is that spending that’s associated with businesses, and we call this spending “investment spending.” Now this is a bit confusing if you are used to using the word “investment” to refer to money you put in the bank or money that you put in stocks. But an economist calls that “savings.” Whenever you decide to put money aside and save it rather than spend it, then, you are saving. But when a business, a factory, a firm, buys a new drill press or a computer, or builds a new plant, or acquires equipment, we call that “business spending,” or “investment.”

Now we want to make a distinction here between gross investment and net investment. Gross investment is the total amount of real spending that a business does in a year – all the plant, all the equipment, all the computers. However, some of that spending goes to replace goods and services that have worn out – that is, some of the capital goods that you purchased earlier have now deteriorated, or depreciated, and some of the spending that you do goes to replace those depreciated goods. What’s leftover is net investment, and net investment is an increase in the capital stock. That is, after you’ve subtracted from gross investment the amount that has depreciated in the capital stock, you then have leftover the net increase in capital stock, which is available to make more goods and services. So net investment measures the rate at which an economy’s capital stock is increasing.

The third component of gross domestic product spending is government spending. This is the spending of state, local governments, county governments, and school boards. Anytime that a governmental entity buys goods and services, we call that “government spending.” And government spending is more autonomous than the other components; that is, the government can increase its spending or decrease it in order to influence the economy. That is, government spending often acts as a policy variable – the government will spend more money to try to stimulate the economy, or reduce spending to slow down the economy.

The final component of gross domestic product from the point of view of expenditures is net exports. Now this term might be a bit confusing, let me see if I can make it clearer. Whenever foreigners buy products that are produced in our economy – that is, when we send goods abroad in exchange for their money – we call that “exports.” Whenever
businesses, households, and the government buy goods that are produced abroad, sending money overseas and bringing goods into our country, we call that “imports.”

Now remember our concern is to figure out the total amount of money that is spent on goods and services made in our economy, in this country. Therefore, we take the total amount that foreigners spend on our goods – that is, our exports – and we subtract from it the total amount that consumers, businesses, and the government spend on goods that are produced abroad – that is, our imports. Our exports minus our imports gives us net exports, or the total amount of goods and services produced in our economy that we’re selling to foreigners.

Now add up the components and you get total spending in the economy; the spending of consumers, businesses, the government, and foreigners adds up to total spending, which we usually represent with the letter “Y.” Now we can look at some numbers in the economy to see how these factors actually figure in the real world. As I’ve already said, in 1999 the nominal gross domestic product was $9.2 trillion, of which 68%, or $6.3 trillion, was consumer spending. About 17% was spending by businesses, and about the same percentage – 17% – was the spending of government; and net exports was actually -3%, because the United States right now is actually importing a fair bit more than it exports. So this component of gross domestic product right now is negative. If you add all these together, you get about 9.2 or $9.3 trillion for our gross domestic product in 1999. These are the nominal gross domestic product numbers. The economist is going to be more interested, however, in real gross domestic product. So to convert these gross domestic product numbers into real terms – to measure the actual amount of stuff that households and businesses and the government buy, to measure the changes in the amount of output in the economy over time – we’re going to want to hold constant the effective change in prices.

So the first thing we do is we find a gross domestic product deflator for 1999, and that means choosing a base year, which the government has done for us in its statistics. 1996 is the base year, and the gross domestic product deflator for 1999 is 104.46; that is, the average price level increased by about 4.5% between the base year and 1999. Now, divide the nominal gross domestic product of $9.2978 trillion by 104.46, and you get the real gross domestic product for 1999, using 1996 prices – and that number is $8.9008 trillion. This is the number that we’ll be using to look at how output and spending are changing over time.

So here you have it, the expenditures approach to calculating gross domestic product. Add up the spending of all the different sectors of the economy – the real spending of these sectors – and you get real gross domestic product for the country. Let me write down an equation that you’ll see a lot in microeconomics: Total spending equals consumer spending, plus business spending, plus the government spending, plus the net spending by foreigners – net exports. Add them together and you get the expenditures approach to calculating real GDP.
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Income Approach

We've said before that the gross domestic product can be calculated by two different methods. The method that we looked at carefully before was the expenditure method, adding up the spending plans of all the sectors of the economy to calculate the total output of the economy. But there's another way to calculate the output of the economy, and that's looking at all of the income that's created when sellers do these transactions with buyers who are spending money. This is called the "income approach," and income is just as good a way of calculating gross domestic product as looking at spending. Suppose now it's your job to figure out the relationship between income and our economy and the gross domestic product. How would you add up all the income that's received, and what adjustments would you have to make to make the connection between what we commonly call "income" and the total market value of all final goods and services produced in our economy in a year?

Well, let's start with the money that's available for you to spend – the money that's available for households to spend. What do we have to do to get from our disposable income to some broader notion of our personal income? What you have to do first is take your disposable income and add back in all of the money that you've paid in personal income taxes. Now you've got personal income – the money before taxes that's available to spend. Well, how do you get from here to a broader measure of national income? What are the other factors that influence the money that's available for people when they make spending decisions? The first thing that you're going to want to do is to subtract out transfer payments – any money that the government has given you. And you're going to want to add back in all of the things you gave the government. That is, add back in social security contributions; the taxes that businesses paid – corporate income taxes; add back in undistributed corporate profits – that is, money that business kept for itself – and this gives you what we call "national income." This is the total amount of money that was received in the United States by the factors of production.

Let's divide that into its various categories – that is, who actually received this income. The biggest category was employee compensation – that adds up to about $7.4 trillion – money that was paid to labor. The second component is proprietors' income – that is, profits – and that adds up to about $654 billion. Rent on land adds up to about $142 billion, and interest payments to people who have lent capital adds up to about $476 billion. Finally, corporate profits add up to $879 billion. Those are the components of our national income; those are the payments that the factors of production received as a result of the transactions that are done when goods and services are trading hands. That's where the gross domestic product winds up.

But we still aren't all the way back to a connection between income and gross domestic product. There are other factors that we have to add back in before we've accounted for all the value that was created in our economy. The next thing we have to do is we have to add back in the indirect business taxes that businesses paid in the course of doing these transactions. Sales and excise taxes, tariffs, and other taxes that were levied on the transactions. That money was paid off to the government; it was siphoned out of the circular flow, we've got to put it back in, in order to make a connection between income and gross domestic product.

The second thing that we have to account for is depreciation. That is, some of the goods and services that we produced in our economy simply went to replace other goods and services that had worn out – in particular, plant, equipment, other things that businesses used – tools that wore out with use had to be replaced. And if we add that depreciation back in, then we get a more accurate measure of the total output of the economy.

And finally, net foreign factor income – that is, the money that we paid to foreign factors operating in the United States that helped produce the GDP, but weren't counted in national income when we added up the receipts of American labor, capital, entrepreneurs, and landowners.

So let's see now if we can show this very clearly. If you take gross domestic product – that is, the total output of the economy – "Y" – and you subtract from that the capital that depreciated, then what you're left with is a measure called "net domestic product." This is the output of your economy after you've set aside some of it to account for depreciation. If you take net domestic product and you subtract from that the income that was paid to foreign factors, as well as indirect business taxes that were paid – the sales taxes, excise taxes, customs duties, and other things – then what you have left is national income; and national income means the receipts of American entrepreneurs – that is, business owners, labor, capital, and landowners. Then if you take national income and you subtract from it social security contributions, corporate profits, taxes, undistributed corporate profits, and you add back in transfer payments, then what you have is personal income – that is, what people are able to spend on goods and services, but you still
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**Income Approach**

have to subtract personal income taxes before you get to the final measure of disposable personal income — that is, what people are able to spend whenever they go to the grocery store.

So you can see it’s a complicated matter, getting between income and output. But if you’re careful, and you are consistent in taking account of all the ways in which income leaks into and out of the circular flow, you can see that there is a connection between income — that is, what you receive — and spending — that is, what you buy at the store. Both of these are valid methods for calculating gross domestic product.

Now, as we go forward, we’re going to be thinking more often about the expenditures approach, because we’re going to be interested in how these different components of spending are related to employment, output, prices, interest rates, and other variables in the macroeconomy. But keep in mind that anytime I show you the letter “Y,” I am referring to output, which is someone’s income, and someone else’s spending. “Y” can be used interchangeably to mean these three things: the output of an economy, the total spending on output, and the income received by factors of production in that economy.
I've just come home from a hard day of work, and I'm hungry, but the cupboard is bare. Now, ordinarily, I'd go out to my car, drive to the grocery store, and do my shopping. But today in the mail I got this flyer that says that I can now do all of my grocery shopping online, through a new service. Why not sit here, in the comfort of my favorite chair, with the laptop in front of me, and do my shopping virtually? Let's see, I need milk, and why not cookies, and if I'm going to eat cookies, I'd better get some broccoli too.

Now, ordinarily, I'd get to the grocery store, get my shopping cart, and start loading it with the things of which I'm going to make my meals in the coming week. But here, I enter the grocery list, and someone at the store bags the groceries for me, drives up in a delivery van, and brings them to my front porch. This is an example of what economists call electronic commerce, or E-commerce – commerce that originates online.

This is a growing chunk of the United States economy. About 1% of all retail transactions in the year 1999 occurred online. By the year 2000 it's estimated that at least 2% of all retail transactions will occur in this way, and the percentage is just going to keep growing. In 1998 only about 24% of all businesses sold goods online – that is, were participating in E-commerce. Nowadays it's estimated that that number may be as high as 57%. You can see that electronic commerce is a bit of a sensation; it's rapidly becoming part of our life.

So how do I decide whether I'm going to go to the grocery store in person, or whether I'm going to sit here and do my shopping online? What are the advantages to be derived from either choice? Well, if I do my shopping online, I can first of all save the hassle of driving to the store, I can save the time of walking down the aisles. If I really want low-price groceries, too, I can sit here and look among several different grocery stores competing with one another, and buy my goods from whichever offers the lower prices. So E-commerce offers me competition, it offers me convenience, it saves me time. On the other hand, if I want to thump the melons and squeeze the bread and carefully read the labels, if I want the help from the guy at the meat counter, if I want my usual friendly chat with the checkout guy Joe, who I see every week, then I have to show up at the store in person, and actually inspect the goods for myself. If I want the experience of shopping, if I want to be involved, then I still have to go to the bricks-and-mortar facility.

Think about how E-commerce is changing the way in which we do our shopping – books, for instance. People buy more and more books online, looking for the lowest prices, looking for recommendations – all those things that E-commerce does well. So what's happening at bookstores these days? You don't see people there just picking up a copy of a book at the lowest price. Instead, you see people who like to feel of books, who like to thumb through the books, who want to browse and meet other people who hang out at bookstores. The main thing you get at bookstores nowadays is coffee. The experience of shopping for books now has been divided into two different experiences – the virtual experience, where you get the lowest prices online, and the experience of a bookstore, with all of its smells and associations.

This is probably going to happen increasingly, as electronic commerce insinuates itself into our lives. If what you really want is commodities, you can get them cheaper and more conveniently online. If what you really want is experiences, you get them in person. Also taxes – nowadays we’re living in a kind of wonderland, where transactions are not taxed; whereas if you go to the grocery store, you have to pay a sales tax, and most states and counties depend on this sales tax to fund schools and provide public goods. It probably is only a matter of time before Internet transactions are taxed as well. Although this is being bitterly debated in Congress, there are some people who believe that the Internet should remain a tax-free zone to encourage its growth, while others say that if you let the Internet be tax-free, that regular bricks-and-mortar businesses will just set up kiosks and fake that they’re E-commerce so they can evade taxes. This issue is yet to be decided.

Meanwhile, almost 90% of college students are looking for jobs this summer online. E-commerce is beginning to include the labor market as well as the market for goods and services. Transactions costs are falling, and that means it's cheaper and more convenient to get all the things that you want – except the experience of going to the grocery store, and walking the aisles, and talking with your friends and the help, and experiencing the goods firsthand. There are some kinds of experiences that are still best had in the real world.

So what am I going to do? I love going to the grocery store. But, anymore, I'll be thinking of going to the grocery store like going to the bookstore, going to the movies, or taking a walk – something that I do when I want the experience, or need to interact with my shopping in a particular way. This evening, I'm a bit rushed, so I'm going to pay for the
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**Hot Topic: The Impact of E-commerce on the Economy**

service of having someone else pick out the goods for me, and I’m going to trust their judgment and their reputation for picking good quality and matching my wants precisely. And then they’ll do the driving for me, and bring the groceries to the door, and, who knows, they may even smile and we have a friendly transaction on the porch, instead of at the checkout counter. E-commerce is becoming part of our lives, and our commerce is going to become community in some cases, and commodities in others. But we, as individuals, will do what economists believe we always do – make rational decisions about which method of shopping is most satisfying in which case.
Macroeconomic Measurements

Cost of Living

Changes in the Cost of Living and the CPI

When you read the newspaper and listen to the radio, you'll hear a lot about inflation – the inflation rate is 2.5%, or inflation is rising, or bond traders are afraid of inflation. The government has a lot of different measures of inflation. Inflation means the general increase in the price level in the economy – the rate at which all prices are rising. But how does inflation affect me? Why should I care about it? When I went to the grocery store, I bought some bread, and my favorite loaf of bread now costs $1.25. Well, that's a big increase in price over last year – I know because I kept the tag. Last year this bread only cost $1.00 – this is a 25% increase in the price of my favorite sandwich bread in one year. This is a lot faster than the rate of inflation as I'm reading it in the newspaper right now.

My question is, at what rate are the prices rising that I care about? I don't especially care about the price of aluminum, or the price of electricity. I care about what's happening to the prices of the goods and services that I purchase on a regular basis. So the government has constructed an index that focuses its attention on the prices that I care about – the prices that households pay for the goods and services that they most frequently buy. This is an index that answers the question, “At what rate is the cost of living rising?” And it's called the “consumer price index.” The consumer price index is interesting to consumers because it's made up of the prices that are most important to us – that is, the stuff that we typically spend most of our money on.

Let's look at how the consumer price index is constructed. We begin with a basket of goods and service that represents what the typical household spends its money on each month. This basket has several things in it. The most important thing in this basket is housing. The typical household spends a fair bit of its income on housing, so we are looking at the prices of all things that go into making up housing – your rent, your insurance, maintenance on your house, utilities, and stuff like that. So, because this is such an important consumer expenditure, the consumer price index weights housing very heavily – that is, about 41% of all the CPI is made up of housing price changes – that's the most important component.

The second most important component is food and beverages – that is, what does the typical household spend to eat and drink each month. Food and beverages account for about 17% of the total of the CPI, and that shows its relative importance, as the government perceives it, in household spending.

The third component is transportation – that is, fuel, insurance, and maintenance, and depreciation on vehicles. So transportation costs, which add up also to about 17% of the total because they're important to households, get a large weight in the consumer price index. Whenever transportation prices change, that feeds into the government's measure of the households' cost of living.

The next component is medical care, and medical care accounts for about 7% of the total. This is the money that people are spending on doctors and medication and such like. So we'll mark 7% here to represent medical expenditures. Then we've got clothing – what are you paying to keep yourself warm and stylish – and clothing prices, also important in this index, get a weight of about 5 or 6%.

And, finally, entertainment – the government looks at how much you're spending on vacations, recreation, movies, and the like – and that adds up to about 4% of the total. That leaves a residual that the government calls “other goods and services”; and other goods and services adds up to a total of about 7%, to give us an nice round 100.

So if you want to know what makes up the consumer price index, here we color-coded it for you: housing, food and beverages, transportation, medical care, clothing, entertainment, and other – all the things that I care about – that is, what I spend money on as a household each month. When the consumer price index changes, you're spending more, or less, depending on the direction of the change. A rise in the consumer price index means that the cost of the goods and services that you're typically buying is rising; that is, the cost of living is increasing. And the rate at which the cost of living increases tells the rate at which your salary has to increase if you're going to maintain your lifestyle.

Now, how do we use the cost-of-living index? How do we use the CPI? Who is paying attention to it? Well, there are a couple of reasons why the CPI is important. The first is, the CPI is actually figured into labor contracts. There are a lot of unions who negotiate their wages for two or three years out, using the consumer price index as a measure of the cost of living. These contracts have cost-of-living adjustments built into them; so the union, the employees, and the employers all agree that they'll use the government CPI as the official measure of the cost of living – and when it rises, wages, by contract, rise along with it. Also, the consumer price index determines the rate at which social security payments increase; that is, the cost-of-living adjustments built into social security payments look at the CPI as
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the official measure of the increase in the cost of living. So the CPI is something that people watch and actually build into their contracts as a measure of the cost of living. When it goes up, a lot of people’s wages and social security payments go up automatically with it.

Another reason you should pay attention to the CPI is the increase in the CPI is often used to measure what we call the “real interest rate.” The real interest rate is the return on your savings measured in terms of purchasing power. That is, how much extra purchasing power will you have next year if you put a certain amount away in the bank this year? If you put $100 in the bank this year, next year you’ll have $110 if the interest rate is 10%. But how much of that is actually spendable money, and how much of it is just holding you even for the effects of inflation? Say the inflation rate is 4%. That means your savings has to grow at a rate of 4% just to keep your purchasing power constant, just to account for the increase in the cost of living. If the nominal interest rate is 10%, and the inflation rate is 4%, that means 6% is the real interest rate. Beyond inflation, you’re getting a 6% rate of return on your money that’s actually coming out in terms of real goods and services that you can buy that you couldn’t afford last year.

So take the nominal interest rate, subtract the rate of inflation, perhaps measured by the CPI, and what’s leftover is the real interest rate. The real interest rate is what households pay attention to when they decide whether they’re going to save money or not. When the inflation rate is high and the nominal interest rate isn’t high enough to compensate for it, I’m not going to save my money. Why let it sit and rot in the bank? Why let it sit, and my purchasing power shrink? No, I’m going to spend money today. But when the real interest rate is high, I see that it’s worth my while to delay consumption, and I put the money in the bank, and I enjoy more purchasing power in the future.

Now there are all kinds of price indices. We focused in this discussion on the consumer price index. The consumer price index looks only at a subset of all the goods and services available in the economy. But it’s the subset that a consumer cares most about – food, clothing, housing, entertainment, medical care. Another index that we could consider is the producer price index. It’s a broader index – it includes a lot of other stuff, and it includes the prices that are important to producers, and their profits. It includes the price of aluminum, the price of electricity, the price of all kinds of raw materials, and other inputs that go into the production of the goods and services that consumers buy.

The producer price index includes a lot more stuff, and it should be important to you if you’re trying to make predictions about what’s going to happen to your own cost of living in the future. That is, if producer prices are rising today, it won’t be long before producers – trying to protect their profits – have to pass those rising costs on to you, in the form of higher consumer prices. That’s why we call the producer price index a “leading economic indicator” – it points toward what’s going to happen to your own cost of living in the future. Each of these cost indices – whether it’s the consumer price index, whether it’s the producer price index, whether it’s the GDP deflator – each of them is designed to answer a particular question. We’ve talked about the consumer price index. It’s trying to answer the question, “What’s happening to the cost of living, as households perceive it?” The producer price index answers the question, “What’s happening to production costs? And what might happen to consumer prices down the road?” Every index has its own question to answer. All told, they’re indicators of inflation – the general rate at which prices are rising across the economy.
Cost of Living

**Case Study: The Index of Leading Economic Indicators**

You want to know where interest rates are headed. You’re concerned about whether now is a good time to start a business. Perhaps you’re wondering what the economy is going to be like when you graduate from college. Well, short of a crystal ball, your best source for information about where the economy is headed is published by the Conference Board. The Conference Board is a nonprofit group of research and business enthusiasts who collect information and make it available to financial markets, people running businesses, the government, and others who are interested in knowing where the economy is headed.

The most famous indicator published by the Conference Board is the index of leading economic indicators. This index is a single number that averages together information from all corners of the economy to point us to whether the economy is likely to continue to boom, or perhaps to slip into a recession. It’s a weighted average of information about expectations and behavior across the economy. And it functions sort of as an early warning; that is, when a storm is coming, often you’ll notice that animals are anxious or nervous, and they’re behavior gives you a signal about what the weather is going to be like in a couple of hours. In the same way, the index of leading economic indicators tells you where the economy is likely to be headed six to nine months from now. The difference between the weather and the economy is that the economy is actually made up by the decisions and choices of the people who are part of it. So to find out where the economy is headed, the Conference Board tries to figure out what people are thinking and doing right now that’s likely to influence what the economy will be doing in terms of employment, output, interest rates, and prices six months from now.

So let’s look then at where in the economy we’re most likely to get reliable data about what’s coming up in the months ahead – that is, which kinds of behaviors and actions and expectations are most likely to have predictive power. The index of leading economic indicators averages together information from manufacturers, from employers, from financial markets, from consumers in the construction industry – and there are ten components that are averaged together to wind up with the final number that’s actually published. This number, by the way, is published every month. Here is a list, then, of the ten factors that make up the index of leading economic indicators.

The first is the average weekly hour’s work in manufacturing. When that number is increasing, it could be because labor demand is especially strong, and factories are working their workers longer hours to meet increased demand. When that number is bigger, it’s likely that the economy will continue to expand.

The second thing is the average weekly initial claims for unemployment insurance. When that number is rising, it could be because people have lost their jobs, or having trouble finding another one, and that could be a signal that a recession is coming.

The third component is manufacturers’ new orders for consumer goods and materials. Whenever businesses feel like they can sell more goods and services, they’re going to be ordering them to put them on the shelves, or put them in inventory. Whenever those orders slow down, that could be a signal that a recession is coming.

The fourth component is vendor performance – how long does it actually take for you to get delivery of these goods that you’ve ordered? Whenever it takes longer, that’s usually because there’s very strong demand, and businesses are having trouble keeping things in stock. That’s usually a good sign for continued growth of the economy.

The fifth component is manufacturers’ new orders for capital goods – are factories installing new tools, new equipment? If they are, it’s because they’re planning to increase production, and that usually presages continued expansion of the economy.

The sixth component is new building permits – are companies building new office space, new factories? If they are, that’s a sign that the expansion will continue.

The seventh component is the stock prices – that is, what’s happening in financial markets right now? Is the prospect of companies strong in the minds of investors? If so, they’re going to be bidding up stock prices.

The eighth component is the money supply itself. Is the Federal Reserve increasing the money supply, making credit easier to get so that businesses can borrow and expand their operations? Or is the money supply getting tight, perhaps signaling that interest rates are going to go up, and slowing down the expansion of business activity?
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The ninth component is the interest rate spread between long-term securities and short-term securities. When short-term securities have higher interest rates, it’s usually because the Fed is tightening short-term credit, and that usually will lead to credit crunches and a slow-down in the economy down the road.

The final, the tenth component of the index, is the index of consumer expectations – that is, a survey among consumers about what they think the prospects are for jobs, higher wages, and a good standard of living a few months from now. When consumers are confident, it usually means that the economy is headed towards more output, more jobs, and growth.

So what happens, then, when we take these numbers, average them together, and get that index? Well, the index typically will peak and turn downwards about six to nine months before employment and output in the economy peak and turn downwards. That is, the index is a predictor of when the recession is coming. The last time that the index showed a protracted downturn was in 1990. By December of 1990, the index of leading economic indicators had shown five consecutive months of decline. And sure enough, the following year a recession hit the economy hard. Now the economy has been booming throughout the 1990s; but here, in February of the year 2000, the index of leading economic indicators has shown the first downturn in many, many months.

So the question is, does this mean that we’re about to head into a recession? Is the longest boom in U.S. economic history about to end? Or is this just one month’s aberration? You know the answer because you’re in the future. But sitting here, we can only wonder as to whether these economic indicators are still going to have the predictive power they’ve always had, meaning that bad news may be ahead for our economy, or whether they’re just off one month. No crystal ball is perfect, but the index of leading economic indicators has a venerable record, and is relied upon by people in finance, government, and economic planning to give an insight into what’s ahead.
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Calculating the Rate of Inflation

Now here’s a mystery: On page 1 of *The Wall Street Journal*, the inflation rate is reported at 2.5%. And on page 14 of the same day’s *Journal*, it says we’ve had 0% inflation for the last year. Now how can both of these numbers be correct? Is there an error, or is there something I’m missing? Hold on – on page 1 it says that the 2.5% inflation rate is based on the GDP deflator; whereas on page 14 it says that the 0% inflation rate is based on the consumer price index. Now I know that these two indexes are different, and maybe that accounts for the difference in their measures of inflation. After all, the consumer price index measures only the prices of a subset of goods – goods that are purchased regularly by households, things like food and clothing – whereas the GDP deflator includes all of the goods and services produced in the economy.

So, since the consumer price index is based on the prices of fewer goods, maybe that’s why the number is different than the inflation rate measured by the GDP deflator. However, it turns out that there’s something else going on. What’s going on is that even if the GDP deflator and the consumer price index were based on exactly the same set of goods, you could get different numbers because of differences in the way in which the two indexes are calculated. I think I can make this point very clear with a simple example.

Consider an economy that produces only two goods: food and clothing. We’re choosing food and clothing because these are goods that consumers purchase, so the consumer price index is based on the price of these goods. And since these are the only goods produced in the economy, the GDP deflator depends also only on the price of these two goods.

Now let’s look at the gross domestic product data for two consecutive years – the year 2000 and the year 2001. In the year 2000, 10 units of food are produced, and the price per unit is $10.00 for food. So $10.00 times 10 units is $100.00 worth of food production. Clothing – $20.00 per unit times 10 units is $200.00 from clothing production. $200 plus $100 gives us a gross domestic product of $300.00 in the year 2000.

Now, as we move to the year 2001, notice that two things have changed. First, the prices of goods have changed; food is now selling for $20 a unit, and clothing for $35.00 a unit. The next thing that’s changed is that quantities have changed; there’s more food produced and more clothing produced. So the gross domestic product is going to be larger, because prices are bigger and quantities are bigger.

Let’s go ahead and calculate the gross domestic product for the year 2001. $20.00 per unit of food times 15 units of food gives us a GDP from food of $300.00. Over here under clothing we’ve got $35.00 a unit times 15 units, for $525.00 worth of clothing produced. $525 plus $300 gives us a gross domestic product for the year 2001 of $825.

Now I’m interested in what’s happening to prices between the year 2000 and the year 2001. Now, since there are two different goods being produced, our overall measure of prices has got to be some kind of weighted average of the change in prices. And the way in which that weighted average is calculated is what distinguishes the consumer price index from the GDP deflator.

Let’s look first at the method used in calculating the consumer price index. The intuition behind the consumer price index is: How much would you have to pay to get the same goods you got last year at this year’s prices? So we’re using the quantities from last year, but the prices from this year. Let’s look, then, at how the consumer price index is calculated. The question is what would it cost you to buy last year’s goods at this year’s prices? So let’s look first, then, at that amount of money that you’d have to spend. What I’m going to do is take the quantities from the year 2000 and move them forward to the year 2001, and calculate the spending I would have to do at 2001 prices in order to buy the year 2000 quantities.

So in the year 2001 food is now $20.00 a unit; $20.00 a unit times the original 10 units of food that we were buying last year is $200.00 you’re going to have to spend to get the same food that you were buying last year. What about clothing? Last year we had 10 units of clothing; so this year, when you have to pay $35.00 a unit for clothing, you’re going to have to spend $350.00 to get the same amount of clothing that you had last year. So $350.00 on clothing, $200.00 on food, gives us a grand total of $550.00 that you have to spend in the year 2001, when prices are higher, to get the same goods that you were buying back in the year 2000.

Now let’s calculate the consumer price index. The consumer price index is a ratio; it’s a ratio of the amount of money that you’d have to spend this year to get that basket, relative to how much you have to spend in the base year – the
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Calculating the Rate of Inflation

year whose quantities you’re considering. So let’s calculate: 550 – the amount we’d have to spend in the year 2001 – divided by 300 – the amount we had to spend in our base year, the year 200 – multiply that by 100, and you get the consumer price index, which, in this case, is 183.

So the consumer price index for the year 2001 is 183; that’s the amount by which prices have increased from one year to the next. But we’re interested in a percentage increase – the amount by which prices have increased in percentage terms, because that’s the inflation rate. So what we do to calculate the inflation rate using this method, is we take the consumer price index for the year 2001 and we subtract from it the consumer price index from the year 2000.

Now the year 2000 is our base year, remember, where it cost $300 to buy that basket of goods and services. So divide 300, which is the amount you have to spend in the year 2000, by 300, which is the amount you have to spend in the base year, and you get 100. The CPI for the base year, by definition, is always 100%; it’s equal to itself. So subtract 100 from 183 – this is the CPI for the year 2001 minus the CPI for the year 2000 – the base year – and divide by the base year amount, which is 100, and that’s going to give us the rate of inflation; 183 minus 100 is 83, divided by 100 is equal to 83%. The rate of inflation, measured according to the method of the CPI, is 83%. The CPI has increased by 83% from the year 2000 to the year 2001. The price of that market basket of goods and services has gone up by 83% – that’s the inflation rate measured with this method.

Now let’s look at the other method for calculating the inflation rate. This one is based on the GDP deflator. Remember the GDP deflator is the ratio between the nominal GDP in a particular year and the real GDP for that same year. The way you calculate the real GDP, you’ll remember, is to find the value of the goods and services produced in a particular year, using the market prices from the base year. So the nominal GDP for the year 2001 is $550.00, but the real GDP is calculated using the year 2000 prices. So let’s go ahead and put the year 2000 prices into our equation, and use the year 2001 quantities. So this means that the real GDP for the year 2001 is $10.00 times 15 units of food, or 150, plus $20.00 times 15 units of clothing, or $300; $300 plus $150 gives us a real gross domestic product of $450.00.

Now, to find the GDP deflator, take the nominal GDP, and divide by the real GDP, and this should give us, then, after we multiply by 100, some notion of, on average, how much prices have risen between the year 2000 and the year 2001. And the answer is 122. So 122 is the GDP deflator for the year 2001. To calculate the inflation rate now, we have to see how the GDP deflator has changed between the two years; so we now want to do a percentage change calculation. So let’s do that: 122 is the GDP deflator for the year 2001. What’s the year 2000 GDP deflator? Well, it’s the base year; so in the base year the GDP deflator is going to be 100%, because you’re comparing that year with itself. So subtract 100 from 122, and divide by 100, and that’s going to give us an inflation rate of 22%.

So, using the GDP deflator method, we get an inflation rate of 22%. Now, why the difference? The difference is because the consumer price index looks at the change in the cost of a particular bundle of goods and services; that is, it uses the current production at the new prices The GDP deflator, on the other hand, uses the new production at the old prices. And because you’re using a different method to calculate the two indexes, it shouldn’t be surprising that we wind up with different numbers for the rate of inflation.

Now, notice here, we’ve done a very, very, very simple example with only two particular goods, both of them being consumer goods, and with some pretty extreme changes in prices and quantity. I mean, in the U.S. economy right now our inflation rate is much, much lower than 22%, or 83%. So this is an entirely hypothetical example. The point of this hypothetical example is to show you that you get a different inflation rate when you are holding prices constant and changing quantities, than when you’re holding quantities constant and changing prices. The method of the CPI gives you a different inflation rate than the method of the GDP deflator.

Now typically these methods will yield numbers that are not so far apart. And if we look at some actual data from history, you can see that the GDP deflator method of calculating the inflation rate has given numbers that were pretty close to the CPI method for calculating the inflation rate. Some years the CPI is going to give you a bigger inflation rate than the GDP deflator; and some years the GDP deflator method is going to give you a higher rate of inflation. It all depends on how the base numbers – the quantities – are changing, relative to the prices. Mathematically, we could go into when this number’s going to be a bigger change, and when this number’s going to be a bigger change, but that’s not as important as your understanding the basic method of calculating the inflation rate using these two distinct
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methods. Both of them are trying to answer the same question: How fast are prices rising? But because they use different approaches to answer that question, they sometimes wind up with different numbers as their answer.
Comparing the CPI and the GDP Deflator

If you want to measure inflation, which measure should you use? It depends on the question you want to answer. If you want to know what’s happening to your own cost of living, the consumer price index probably tells you what you want to know. If you want to know what’s happening to inflation more broadly in the economy, however, you should probably pay more attention to the GDP deflator. The consumer price index overstates the overall rate of inflation for several reasons.

Let’s consider for a moment some of the things that cause the consumer price index not to be representative of the general rate of inflation in the economy. The first problem with the consumer price index is that it’s not a comprehensive measure of price changes. That is, it considers only the bundle of goods and services that households typically buy. The GDP deflator, on the other hand, is a broader measure that includes all kinds of goods and services produced in the economy, and is therefore probably a better measure when you really want to know about inflation.

A second problem is the substitution bias of the consumer price index. The consumer price index assumes that people continue to buy the same basket of goods and services as prices change. For instance, suppose the price of red meat goes up; the cost of living, as reflected by the consumer price index, will be rising, because the consumer price index assumes that people continue to buy the same basket. However, in reality, when the price of red meat goes up, people seek substitutes instead. And if they buy the substitute goods, the actual cost of living may remain changed relatively little. However, the consumer price index doesn’t take this substitution into account; it ignores it, and imagines that people continue to buy the same goods and services. We call this problem the “substitution bias,” and because of the substitution bias, the consumer price index overstates changes in the cost of living. The GDP deflator, on the other hand, is a broad measure, and includes all goods and services, and therefore allows some room for substitution. Remember the quantities are changing as we move from one year to the next in calculating the GDP deflator, and that can reflect a change in the consumption of red meat relative to chicken.

Another problem with the consumer price index is people are always enjoying new goods and services. For example, I don’t see any cellular telephones in here, I don’t see any of the latest model computer – these are all things that make our life better. And yet, what is in here are goods that people were consuming five and six years ago; there’s not a lot of scope here for the inclusion of new products. And not only are the new products making our life better, but these new products’ price changes may be an important part of our economic life. I mean, remember when computers first became available, they were pretty expensive; but their prices have fallen steadily over time. The same with cellular telephones, and all the other new gadgets that we enjoy. So one problem with the consumer price index is it neglects the effect of new products – the latest stuff that people are spending money on.

Another problem is the consumer price index doesn’t take into account quality changes. For instance, although there is some air transportation in the consumer bundle, air transportation is much safer today than it was 30 years ago. So if you’re paying the same price for an airline ticket today as you were in 1970, you’re getting a much better deal today, because the quality of that product has improved. The cellular telephones, the computers, the toys, the automobiles – everything is increasing in quality as technological progress becomes part of our goods and services. However, this technological progress and these changes in quality are not reflected in the CPI. That is, if we’re paying the same price and getting higher quality, our standard of living is actually rising, although this measure of the cost of living would be staying constant.

Also, we have to take into account that people’s shopping patterns change. If we measure the cost of goods and services as purchased at a supermarket, for instance, then we’re neglecting the reality that many people now are buying things online, or in large superstores, where the prices may be lower. That is, people change their purchasing patterns in response to new shopping opportunities created by the Internet, or by mega-malls, or things like that. As shopping opportunities change, then the cost of living, as measured by this bundle, if we’re pricing it at traditional stores – the cost of living would actually be overstated by the consumer price index, because people are finding less expensive alternatives in new shopping opportunities.

So the consumer price index as measured by the price of this particular bundle of goods and services may overstate inflation. And some researchers say that the actual degree of overstatement may be as much as 1 percentage point to 1.5 percentage points. That is, if the measured inflation rate is 3%, it may be that the cost of living is actually only rising by about 1.5 or 2% a year. The consumer price index tends to overstate, because of the substitution bias, the neglect of new products, the neglect of quality improvements, and the neglect of changing shopping opportunities.
For this reason, the Federal Reserve, which makes monetary policy for the United States, tends to focus more of its attention on changes in the GDP deflator, rather than the changes in the consumer price index. The changes in the GDP deflator are probably a more reliable measure of the overall inflation rate in the country. The CPI is still useful because it does tell you something about the cost of living; and especially if you understand its limitations, you can read the newspaper with an eye towards filtering and translating the numbers that are reported.
In macroeconomics, the economy is an organism. Rather than the micro approach, where we analyze the cells, in macro we’re looking at the whole animal. And if the economy is an organism, then these are its vital signs. Look here at a graph of the business cycle. On the horizontal axis we measure the flow of time. On the vertical axis we look at changes in real GDP around the trend – that is the rate of change of real GDP. And look what you see: expansion and bust – boom and recession. And here, like riding on a roller coaster, the economy expands and contracts, going up and down over time. Well, immediately, you’ve got lots of questions. Why do we have these sharp spikes, then boom; and why do we have these very large declines? What causes the business cycle? And what causes it to be very severe in some periods of history, and more muted in others?

In order to discuss the business cycle in detail, we have to have common vocabulary, and that’s where we’ll begin. How do you describe a business cycle? Let’s begin with a graph. On the horizontal axis, we’ll put – the flow of time; and on the vertical axis, we’ll put real gross domestic product – the actual goods and services produced by the economy in a year. Now one of the things that happens over time is that technological progress and the growth of the labor force and the capital stock make an economy more productive. That is, what an economy is capable of producing tends to increase over time through the natural processes of growth. So we can begin by putting a trend line in this picture; that is, over time, if left to itself, the economy would tend to expand; that is, its capacity for production would grow larger and larger. So here’s a trend line – this is what would happen if the economy were just growing on its own smoothly.

But the economy never grows smoothly. Things happen. An oil price shock feeds into the mix. Businesses, facing higher fuel costs, lay off workers and produce less. And those workers, with less income to spend, stop buying things so that other stores are unable to fill their products, and other factories shut down. Then when people start saving money, businesses are able to buy capital at lower interest rates, businesses begin to expand again, and the economy starts to grow, like any organism – there’s this kind of fluctuation, or breathing, or pulsing. The economy does not grow in the nice, smooth expansion of the trend line. Rather, it fluctuates around the trend line, sometimes growing faster than the trend line in what we call a boom, or an expansion. Then, after a peak is reached, some event causes the economy to turn downward, growing less rapidly, or actually contracting in a recession. And then a trough is reached, and the economy begins to expand again. Expansion, peak, recession, trough, expansion – and the business cycle unfolds, snaking around the trend line.

Let’s make sure that we’re clear on the definitions of the terms that we’ll use throughout our discussion of business cycles. An expansion is a period where gross domestic product is rising more rapidly than the trend. An expansion is usually a period where business is booming and where employment is increasing. Maybe the unemployment rate itself is shrinking, or the number of jobs being created is rising rapidly. An expansion is called a boom if it’s especially strong – that is, if the slope of the curve is especially steep. An expansion or a boom ends at its peak. At this point, the economy is now turning downwards. What causes it to turn downwards? Sometimes the economy is simply overheated; it’s grown so rapidly that the price of some raw materials is beginning to rise – there is inflation in producer prices. The Federal Reserve, trying to prevent general inflation, will then tighten the money supply, making credit harder to get, and making businesses unable to keep up the pace of expansion.

So we reach this peak at which the economy is now going to begin to deflate. When the economy begins to expand less rapidly, or actually to contract, we slip into a recession. A recession used to be defined as two consecutive quarters of negative real GDP growth. But now in general a recession just means a period of significantly slower growth. And especially if that period of slower growth lasts six months or more, everyone agrees that we are in a recession. A recession is a period where unemployment may be rising, or certainly the rate at which new jobs are created has slowed. Sometimes during the recession, prices will actually fall; but usually a recessionary period is one where inflation is much, much less of a problem. Price pressure is off, because businesses are not expanding rapidly.

The recession ends at its lowest point, which is a trough. A trough is a point where the curve has hit bottom, and now we’re ready to begin another expansion. And the process just goes on and on – expansion, peak, recession, trough, expansion, and so forth.

Right now, as we are planning this particular lesson, the United States economy has entered its 108th month of continuous expansion – the longest in U.S. history. This is being driven by a lot of factors, particularly rapid technological change, and general boom in the world economy. A depression, like the U.S. suffered in the 1930s, is a recession that is especially long and deep. There’s no good scientific definition for what a depression is, but
everybody seems to know when we're in one. And the 1930s was the last real depression that we've suffered. But a depression could come again anytime the economy contracted for a long period of time into an especially low trough.

So we have a cyclical nature of our economy. As the economy, we tend to see diminishing unemployment, rapid job creation, rising prices, rising interest rates, until finally we reach a peak. At this point, the economy slips into a contract, or a recession; price pressure is off; there are not as many jobs created and unemployment begins to rise. Then we reach the trough, and the economy begins it expand again, sometimes with the help of government policy.

So why should we care, then, about this business cycle? Well, in periods of recession, there are severe costs imposed on our economy. Recessions have social costs, like increases in alcoholism, increases in domestic violence and divorce. Many social problems are exacerbated when the economy is having trouble. However, there are some good things that actually come from the recession. During periods of recession when people are laid off of work, it gives them an incentive and an opportunity to seek work elsewhere. Usually businesses lay off their least productive workers whose skills are least well suited to their particular industry in a period of downturn. This then frees those workers to look for more productive employment in other sectors. So there’s an efficiency gain during recessions to having people reallocated to other jobs.

Another thing that happens is a recession is good for your trade balance. People don’t tend to import as many goods when the economy is slipping into recession, because household incomes are lower, and people are buying less of everything, including imported goods. It also tends to reduce the inflation rate whenever there is a recession. And those firms that are less efficient get pushed out of the market, and their capital can be re-employed in other industries.

Let’s look one more time at the historical diagram that we began with. In this historical diagram we can see the business cycle over the last 140 years. We see periods like the Civil War where the mobilization of the economy for wartime created a rapid rise in the real gross domestic product – around 6% annual growth rate. We see the recovery of 1895, which followed the panic of 1893. The panic itself created a recession, but then the economy boomed during 1895. World War I was an occasion for rapid economic growth, as the economy mobilized for war. And the Great Depression, which followed the crash of the stock market and tightened money in the United States, was a period of extraordinarily low GDP growth – in fact, large negative numbers. But the economy largely recovered during World War II whenever all of our resources were brought to bear on the war effort. The Vietnam War was a period of boom when prices and employment rose rapidly in the United States.

But ever since the Great Depression and World War II, government policy has tended to create a less severe business cycle than we experienced in the years before very active policy. That is one of the things we’re going to study in macroeconomics is how government policy can mute the business cycle, leading to lower highs and less severe lows. That is, fiscal policy – government spending – and monetary policy – the action of the Federal Reserve – can give us a business cycle that’s a little bit less like a roller coaster, and a little bit more like the ordinary country roads that we’d rather drive on.

So, as we continue our study of macroeconomics, we’ll be looking at recessions and booms, troughs and peaks, and the trend of the economy in response to technological progress and growth. In more detail, we’ll be looking at the historical picture; we’ll be looking at the story of the U.S. economy under a microscope, to try to understand what causes highs and lows, ups and downs.
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The Business Cycle

Theoretical Explanations for Cycles

We are left with the task of explaining this animal. How does an economy manage to expand, peak, contract, trough, and do so over and over, snaking upwards over time? What causes the economy to cycle like it does? Why doesn’t it grow smoothly, and in an orderly fashion? Well, this is a matter of explaining the business cycle. Why does a business cycle occur? And, you know, there are almost as many different explanations for the business cycle as there are schools of thought about the economy. Let’s look at some of the ways in which different economists have explained this process of boom and contraction.

We can start with Karl Marx, who believed that a lot of what happened in the economy was about conflict between labor and capital – that is, the wealthy people who owned the machines and the factors of the production, and the unempowered workers who were at their mercy. Marx believed that what happened with capital tended towards overproducing goods, creating glut, then having to put the products on sale in order to get anyone to buy them, and that there were these lurches in the economy as we had periods of oversupply, followed by periods of shortage. And then of course it was always the workers who ended up being taken advantage of, because they suffered the brunt of these gluts through unemployment and other consequences. So in Marx’s view of things, it was really about class conflict between capital and labor; and, unfortunately, the fact that the economy is unplanned, and is a wild organism, instead of an orderly garden, caused these cycles to be relatively severe. So Marx’s prescription for the business cycle was: more planning – control this animal, restrain it, and make it follow an orderly path.

A second explanation for the business cycle is due to Joseph Schumpeter. Schumpeter’s view of the world focuses on technology; and Schumpeter believed that the economy was driven by a process of creative destruction. That is, people came along with a new way of doing things, better products, better production methods, and anytime a new technology developed, it changed everything, and there was a period of disorder and chaos at the economy got used to the new methods of production. So we’re doing fine with horses and buggies; along come automobiles, and with automobiles, new methods of mass production, which everyone then begins to imitate, no matter what kinds of goods they’re producing. So the whole economy has to re-gear itself to mass production and factories; and with that, there is dislocation – there are booms, the boom eventually hits some kind of peak, and then there’s a period of recession. So in Schumpeter’s view, the long story is driven by technology, and the short story is the lurches – the starts, the stops – that result when people are trying to incorporate new technology into their own businesses, expand their operations with the new technology, or create new products whose opportunity is created by the new technology. So Schumpeter’s view is that the business cycle is really driven by innovation; it is the byproduct of people’s innovative, creativity destructive impulses.

Another explanation is Keynes’s. Keynes believed that the business cycle could be muted by government spending; that is, people tended to save too much whenever they got scared, and their fear led them to save and not spend, which caused the economy to slow down and tip into a depression, or a recession. And the antidote, Keynes said, was for the government to spend on public goods like roads and bridges and schools. And if government spending increased to counteract the decrease in consumer spending, the business cycle could be evened out. Keynes’s ideas were very influential in this country until the 1970s, whenever we wound up with a situation in which we had unemployment and inflation occurring simultaneously. Keynes doesn’t do a very good job of explaining so-called stagflation, because in Keynes’s view of the world, there’s almost a tradeoff between unemployment and inflation. That is, whenever all the resources in the economy are employed, prices tend to rise through competition. But whenever there’s unemployment, at least we had the advantage, then, of inflation being relatively less severe, because there’s less demand for goods and services, and their prices are not pushed up so rapidly. But the important thing about Keynes’s view of the world is that the economy is driven by demand. And if consumers don’t demand enough stuff, then the government should step in and meet the gap. And if the government will do so, then the business cycle can be smoothed out.

Another explanation is what we call the new classical version. The new classical economists believe that the business cycle really is no problem at all; it’s just the natural interplay of supply and demand. Sometimes the economy is going to boom, sometimes the economy is going to bust, but, well, that’s just the way it is, that’s the economy doing it’s own thing. And, therefore, there’s no need to mess with it. The prescription of the new classical economist is: Let the economic business cycle happen the way it wants to; that is, let’s let the law of the jungle rule – that any effort to govern this mechanism usually creates more trouble than it solves. So the new classical version says, keep your hands off; let nature take its course; let the interplay of supply and demand determine interest rates and prices and employment. The economy is going to evolve on its own; and maybe the best thing for the government to do is to focus its effort on the market failures – that is, providing public goods, providing education, providing infrastructure –
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Things that are going to make economic agents more productive. But don’t get in and try to run the business of the economy, because no one is strong enough to rule the jungle.

Another view of the business cycle is what we call so-called “real business cycles.” With real business cycles, the economy is being driven by certain real factors – like the price of oil, like technology – and as these things change, their effects feed through the economy like shock waves. So if oil prices go up, that raises producer prices, which eventually raises consumer prices, which creates inflation, which causes the Fed to tighten the money supply, which leads to a recession. But it’s real business cycles that the real effect is not due to any kind of mistake that people are making, it’s just the natural course of things in the economy that occasionally pebbles will drop into the water, and shock waves will propagate across it. Real business cycles are driven by the fundamentals of the economy, and this is probably a helpful way for us to understand the economy as kind of a tightly strung instrument, and anything that touches it is going to create a resonance throughout the economy.

The final explanation that we’ll consider is the monetarist explanation. And the monetarist explanation says that business cycles are caused, or at least worsened, by problems with the money supply, that the government makes credit easy to get, or the Central Bank lowers the interest rate by pumping a bunch of money into the banking system. Now we’ve got a boom – everybody wants to start a business, everybody wants to start a stock portfolio. They bid up the price of assets; then the Fed gets scared, tightens the money supply, interest rates go up, people sell their stocks. And the next thing you know, you’ve got prices falling again – that the booms and busts in the economy are due in large measure to poor management of monetary policy. And the view of strict monetarists is that if money is allowed to grow smoothly and not used as a very active policy instrument, but if money is allowed to be used smoothly, or to grow only in line with increases in the demand of money, than the business cycle will be less severe. But any effort to use money to actively manage the economy ends up accumulating problems that result in more severe booms and busts.

So which one of these explanations is right? Class conflict? Technology drive? Government spending? The law of the jungle? Oil prices and other real shocks? Or the management of the money supply? Well, of course, the truth is that every one of these elements probably plays some role in the booms and busts in our economy. The more common sense version, the conventional wisdom version of the business cycle that you read in the business press, has elements of all of these. And as you think about the most recent boom in the U.S., some of the things that are cited are: Technology has improved, which is changing what we produce and how we produce it; that labor unions have been held at bay by the fact that capital is in ascendancy right now because of the importance of information technology; we have this reduction in the national debt because we are running a relatively small deficit, or in recent years even a surplus in the government budget; and the fact that the economy is growing very, very rapidly – we’ve got a kind of free-feeling entrepreneurial culture right now that encourages business development and new job creation. The money supply has been growing pretty rapidly if you actually look at the numbers, but economic activity has been increasing; so perhaps the increased money supply is justified by the increase in money demand. And finally, oil prices and other commodity prices have been low until recently. And now the increase in those commodity prices is causing some analysts to be concerned that we may be headed for the peak.

Who knows? Stay tuned, and find out what happens to the most recent expansion in the U.S. economy. But, in the meantime, understand that there are a lot of different explanations to account for the business cycle, and we’ll hear elements of them in many of the studies that we do as we try to unpack the business and make predictions about what happens next.
In January of 2000 the Conference Board did a survey of households in the United States, and found consumer confidence at record highs. In particular, if you ask people, “Are jobs easy to get?” about 60% of the people surveyed gave a resounding yes. The labor market is tight, and workers, everywhere they go, are seeing these signs. If you want a job nowadays, it’s pretty easy to get one. In fact, companies are so eager to get good help that they are bidding workers away from their rivals, and there’s upward pressure on wages, which is leaving the Federal Reserve to be concerned that inflation may be about to break out again.

Now I've heard of some cases in which companies pay their employees bonuses by bringing other people to work for them, and that new employees may actually get a car as part of the deal. Workers have it really good; and those of you who are going to be graduating from college in the spring of 2000 can look forward to a lot of opportunities.

Now contrast the situation of college students in 2000 to the situation of college students in 1991. Students who graduated in May of 1991 may have had to wait several months to get job. Jobs were hard to get, and instead of “help wanted” signs, we had students and other people walking around with “job wanted” signs; they were handing out their résumé, knocking on doors, and looking for opportunities. The market was very, very slack; that is, people had trouble finding good jobs and jobs that paid wages that they were expecting. People had more trouble making ends meet, and there were other people who were simply unemployed, and dropped out of the labor force because they were discouraged.

Now what numbers would we look at to gauge the status of the labor market? That is, what statistics tell us whether the labor market is tight or slack? The Bureau of Labor Statistics publishes an unemployment rate every month. And what we’re going to do now is look at how that unemployment rate is calculated, so that next time you hear it mentioned on the radio or see it in the paper, you’ll know the story behind it.

The unemployment rate is based on a survey conducted each month by the Bureau of Labor Statistics. The Bureau of Labor Statistics surveys about 60,000 households each month, and asks two questions: How many people in your household are employed, and how many people have been looking for work in the last month? The population of the survey is all of the adult, non-institutionalized population of the U.S. – that is all other people 16 years of age or older who are not in prison, in the military, or in some other institution.

By the way, an institution of higher learning counts as an institution, so if you’re a college student, you are, from the point of the BLS, institutionalized. Here’s our population: The labor force is calculated as the sum of two smaller groups. First are all of the people who answer yes to the question “Do you have a job?” – that is, the employed; and next, the people who are actively looking for work, but haven’t yet found a job – that is, the unemployed.

If we add the total number of people that are employed to those who are looking for work but not yet employed, we get the labor force, and that number is 137,673,000 and these data are from 1998. Now once you’ve got the labor force calculated, you are able then to calculate the unemployment rate. The unemployment rate is going to be those people who are unemployed as a percentage of the total number of people who are in the labor force. That is, the unemployment rate doesn’t include all the people who are potential workers – that is, this population up here – but only those who are actively choosing to work, or are trying to get a job because they’re looking for work.

Let’s do a calculation now, to get this. The unemployment rate itself will be calculated as the number of people who are unemployed – 6,210,000 – divided by the total labor force, which is 137,673,000; and if we take that fraction and multiply it by 100, we get the unemployment rate, which in this case will be equal to 4.5%. So the unemployment rate is the number of workers who are looking for work and not finding it, as a fraction of the total labor force.

The next thing we can calculate is the labor force participation rate; that is, how many people are in the labor force of the total potential population that could work? So to calculate that, take the number of people in the labor force, which is 137,673,000 divide that by the adult population that’s not in institutions, multiply by 100, and you get a labor force participation rate of 66.5%; or about two-thirds of the people who could work are either working or are looking for work.

So that’s how to interpret these numbers. When you hear the labor force participation rate is rising, that’s because people are being drawn into the labor market, perhaps by the prospect of higher wages. When you hear that the labor
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force participation rate is declining, it may be because people are discouraged, and are dropping out, and no longer looking for work.

When you hear the unemployment rate is low, that tells you that of all the people who would like a job, only a very small fraction is unable to find one right now, probably because firms are so eagerly looking for help, and, therefore, getting a job is easier.

Now, whenever we know these numbers, we can then think about them critically and ask, “Is this really telling us the whole story about the way the labor market works?” There are three things to know about the Bureau of Labor Statistics measure of the unemployment rate. The first problem is that it treats part-time workers exactly the same as full-time workers. So there may be people who would like to work full-time, but only have part-time jobs – what an economist would call an underemployed person. Underemployed people don’t show up in these numbers, because if you answer the question, “Have you had a job this month?” the answer is yes; you don’t have to have worked full-time to answer the question yes. Therefore, the numbers don’t distinguish between full-time and part-time employment.

The second qualification is that there are discouraged workers – workers who dropped out of the labor force and therefore don’t count in the unemployment rate. The unemployment rate could actually be falling, with the labor force participation rate falling at the same time, and we have a problem in the economy; that is, people are not looking for work, they’ve stopped looking because they’re discouraged. And, therefore, that fraction of the population that’s in the labor market is shrinking. But, if the people who are looking for work are finding jobs, the unemployment rate will not be rising; it could actually be falling, even though fewer people are working. So the discouraged worker effect is ignored by the unemployment rate.

The third problem is that research has found most spells of unemployment are short – that is, people moving between jobs, someone who loses a job or leaves a job and finds another one relatively quickly. We would like to have some measures that distinguish between longer spells of unemployment, which point to more intractable problems – people who’d like to have a job, but after several months have still been unable to find one, as compared to people who are only out of work for a couple of weeks. So the unemployment rate does not tell us the fraction of workers who are unemployed who have been so for several years, and, therefore, are part of a more serious problem than those people who are only in a short stay between jobs.

Now let’s look, then, at how the numbers work one more time to remind ourselves about the calculation. Whenever the Bureau of Labor Statistics does its calculating, it looks first of all at the overall adult population in the United States – 16 years and older and not in an institution – and it divides all of those 207,000,000 people into three categories: those who are presently employed, those who are looking for work but presently unemployed, and those who are not in the labor force. If you’re not in the labor force, we take this red chunk out of our circle, and the blue and yellow that are left constitute the labor force: some of its members are working, others are unemployed. If you divide the yellow area by the sum of the yellow and the blue area, you get the unemployment rate. It is the fraction of those unemployed divided by the fraction of those people who are in the labor force in total.

So if you look at all of the adults in the United States, 63% are employed, 3% are unemployed, and 34% are not in the labor force. Divide 3 by the sum of 63 and 3, so 3 divided by 66 gives you 4.5% – the unemployment rate.

We’ll be thinking a lot about what unemployment means to our economy and how it’s correlated with the business cycle. But now you know what the vocabulary is, so when we have these discussions, you’ll know the pictures behind the words.
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Measuring Unemployment

Differences in Unemployment

Most people experiencing unemployment are not so obvious; but I’m trying to make a point. If you’re unemployed, you’re likely to be handing out your résumé, knocking on doors, making telephone calls, trying to connect with people who will offer you a job. But why not stand outside with a sign? The point is, you’re looking for work, and you haven’t yet found it. And one of the questions that we’re going to be asking is, what causes unemployment? That is – looks like I’ve just found a job – but what’s the story behind an individual instance of unemployment? Why does the person not have a job? Because answering that question helps us to figure out whether the economy is working properly or not, and whether there might be a role for the government.

When the Bureau of Labor Statistics publishes an unemployment rate, it doesn’t tell us the story behind the numbers. But they go to some effort to try to distinguish the different reasons why people may be looking for work without finding it. One reason people are looking for work without finding it is because they are between jobs; that is, there is some instance of frictional unemployment – people have left a job and are now looking for a better job. Perhaps they left their last job voluntarily; maybe they were fired. But the point is, they’re probably going to end up with a job for which they are better suited. That’s why frictional unemployment, which probably amounts to about 2% of the labor force, is viewed by economists as a good thing. See, the labor market doesn’t quickly and naturally get everyone to the job for which they’re best suited; sometimes that occurs through trial and error. And frictional unemployment is people moving around, looking for a job that’s going to be satisfying and rewarding employment for their particular gifts and talents.

One form of frictional unemployment is seasonal unemployment. Construction workers don’t typically work during the icy months, and agricultural workers are more likely to be working during planting and harvest season. So seasonal unemployment is people who are between jobs, waiting for the next opportunity to employ their talents.

Another instance of unemployment is structural unemployment. Structural unemployment results when there is a change in the structure of the economy. For instance, suppose the United States lowered its tariff and quota protection of the textile industry. The plants in the southeast United States would suddenly be competing with textile imports from southeast Asia, and many of them would likely go out of business. The workers who were previously textile workers in these mills would find themselves unemployed. And the Bureau of Labor Statistics and economists would regard them as structurally unemployed; that is, their unemployment resulted from a change in the structure, the industrial structure, of the U.S. economy.

Structural unemployment typically results from some major change in technology, or a change in international trade protection, and we might consider structural unemployment whenever there’s a change from agricultural-based economy to manufacturing-based economy. People who were previously farmers are out of work, and look for jobs in factories instead. Another example of structural unemployment is the movement from a manufacturing economy to a service- or information-oriented economy. Workers have to retrain in order to get these new jobs. While they’re training, in fact, they may be considered frictionally unemployed, because they’re between jobs, but they are tooling up their skills and getting ready for work in another industry.

Another kind of unemployment is cyclical unemployment. Cyclical unemployment is the kind of unemployment that we are typically most concerned about, because it tells us what’s happening in our economy. When the economy in a period of expansion, jobs are pretty easy to get. People go out and distribute their résumé, and before too long they’re employed. But whenever the economy goes over a peak and into a recession, then people find themselves out of work. This is because of reduced demand for goods and services, which leads factories to cut back their production. And when the factories cut back their production in order to manage their costs, they often lay off their workers. This is cyclical unemployment, unemployment that owes its genesis to a downturn in the economy. Cyclical unemployment is the kind of unemployment that is frequently addressed by government policy. When there are a lot of workers out of a job because of a downturn in the business cycle, then frequently the government will try to stimulate the economy by increasing government spending.

So we’ve got these different kinds of unemployment. Frictional unemployment is people who are between jobs, whether they’re moving from one city to another, or going and taking a class at a vo-tech school – generally viewed as good because it gets people into more productive employment. Seasonal unemployment is a special case. Structural unemployment owes its name to changes in the structure of the U.S. economy, or the structure of any economy. Whenever the economy changes structure, some people are moved from one sector to another, maybe because of
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changes in technology, changes in trade agreements, deregulation of particular industries, or closings of military bases. And finally cyclical unemployment, which owes itself to the ups and downs in the business cycle.

Let's look for a moment at cyclical unemployment, and see the correlation between the unemployment rate and real gross domestic product. In the top graph, we show the movement of real GDP between the years of 1970 and 1998. Real GDP is increasing in a trend, but notice it goes up and down; that is, there are periods of increasing real GDP and periods of decrease. These are the contractions, or the recessions in the economy, and I have highlighted these areas in yellow. Downstairs we look at what happens to the unemployment rate during these downturns. That is, during the recession of 1974-75, the unemployment rate shot up from 5% to around 9%. During the recession of 1980-83, the unemployment rate went from 6% up to 8%, down, and then shot up to 11%. And finally, during this odd little recession in 1991, we had a big increase in unemployment. The thing that was odd about this particular increase in unemployment was that unemployment kept increasing even after real GDP had begun to rise again. President Bush presided over a recovery without jobs, in the language of the business press. It was peculiar to the business press that output had begun increasing, and yet people were still out of work.

In general, there is a correlation, a positive correlation, between the unemployment rate and downturns in the economy. That is, when the economy turns downward, the unemployment rate tends to rise; jobs are harder to get during a period of recession. During the Great Depression – which is not on this chart – back in the 1930s, the unemployment rate was probably as high as 25%; that is, 25% of the people in the labor force were looking for work and were unable to find it. This is a case with severe social costs in terms of alcoholism, domestic violence, and suicide that occur when people are unable to get jobs over prolonged periods of time.

So one more thing to notice about the unemployment rate is it’s a single number that’s trying to tell a big story. Even though the unemployment rate may be low – that is, we might have an overall unemployment rate of 5.5% in 1998 – if you look at the different demographic groups, they’re all faring quite differently. White males and white females are doing quite well; their unemployment rates are very, very low at 3.2% and 3.4%, respectively. Black males and black females have a higher unemployment rate of 8.9%, and Hispanics have an unemployment rate of 7.2%. But if you look over here at the teenagers, you see a potential problem; that is, 12.5% of white teenagers looking for work are unable to find it in 1998. And among black teenagers, 27.6% of those who are looking for work are not finding it. Therefore, these unemployment rates are widely diverse; a single number isn’t going to tell you this whole story. The same thing is true of regional differences. When oil prices go up, that might be good for Texas; an expansion of the oil industry to make profit off the higher prices employs people. Whereas in the northeast – where oil is not produce – oil is merely a fuel, a cost of production; businesses seeing rising costs may cut back production and lay off workers. The unemployment rate goes up in the northeast, and down in Texas. And these regional differences are masked by the single number that’s published by the Bureau of Labor Statistics.

So, what to know about the unemployment rate – unemployment is a complicated story. There are lots of different reasons why people are looking for work and not finding it – frictional, structural, seasonal, cyclical. Of the cyclically unemployment, there are likely to be more when the economy is in a recession or a downturn; that is, unemployment rises during recessions. And finally the single number that the Bureau of Labor Statistics publishes doesn’t tell us about regional and demographic differences. If you really want to know how a particular group or region is faring during a particular economic boom or a particular recession, you’ve got to look at more detailed numbers than simply the one unemployment rate.
Almost everyone who visits New York City these days remarks on how clean and safe the place seems. Of course some credit is due the mayor and the police force, and its coordination with neighborhoods; but economists are always looking behind efforts to underlying factors that may be influencing the crime rate. Is there an economic explanation for why crime is down in New York and other major cities around the country? Well, consider this, a person who is trying to decide whether to engage in a crime or whether to go get a legitimate job makes the same kind of cost benefit choices that anybody else makes when they're buying a house or going to school or ordering dinner. In a period when the economy is booming and wages are up, you find that it's more profitable to go and work for a company; in fact, you have more to lose if you get arrested and lose the opportunity to participate in the labor force. However, during a period where the economy is headed into recession, you have less to lose; wages are lower, and the opportunity cost of turning to crime is lower.

Well, in fact, this simple story about costs and benefits is borne out by the data. A study published by the National Bureau of Economic Research showed that during the years around 1980 that a 10% increase in wages was correlated with a 6-9% decrease in crime in youths aged 14 to 21 years old. Also, a 20% decrease in wages led to a 12-18% increase in crime during the same period. There you have it – the inverse relationship. When wages are up, crime is down; when wages are down, crime is up.

During the years from the late 1970s through the 1980s, real wages were falling in most cities across the United States. During this same period, there was a steady increase in the arrest rates for youth. Young people were turning to crime because of the lack of economic opportunities, and they were being arrested and this was showing up in statistics.

Since 1992, as our economy has endured the longest expansion in history, crime rate has steadily fallen in all of our major cities; it seems like economic advance is leading to less crime. Well, there's also another reason, and that's demographic – the population is aging, and most crimes are committed by younger people; that is, as you get older, some circumstances change in your life.

First of all, economically, you're more valuable to the workforce, because your experience and skills mean you can go earn a higher wage, because you can make a bigger contribution to a business somewhere. Also whenever you’re older you tend to just have less of that restless energy that in your twenties might incline you toward mischief. In general, as the economy ages – as the population ages – more people find themselves in a situation where they're less inclined to crime, because they have more to lose, because their opportunities can be constructively and productively employed in a legitimate business, and they're just not of the mentality to turn to crime anyway.

So why is it that New York is so safe and clean these days? Why are most of our cities experiencing a big decrease in crime? The answer is because the economy is doing really well, and the opportunity costs of crime have increased; therefore, fewer people turn to crime. Also, as the labor force ages, as the population shifts in the direction of older people, and there are fewer young people, then, in general, there are going to be fewer people who are inclined to turn to crime, even whenever the economy gets just a little bit worse.

So there you have it, an economist’s explanation for why there's less crime – opportunity costs – the same way economists explain just about everything.
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Measuring Unemployment

Hot Topic: Too Old to Work: Are We Discarding Valuable Workers?

It's the year 2000 and the U.S. economy is booming. Real GDP is growing at annual rates of 5% and 6%, and consumers are flush with wealth and stock market gains. It's a great time to be selling stuff. The problem for businesses is they're having trouble finding workers. The unemployment rate is around 4%, and wages are starting to inch up, which is triggering fears of inflation. Maybe the Federal Reserve is going to tighten the money supply, waiving interest rates, and taking the punch bowl away from the party.

This raises a big question: How do we find the labor to keep the economy booming? Where are the workers going to come from that's going to keep the U.S. economy growing into the new millennium? Consider the last time the U.S. economy was booming anything like this – the 1950s and 1960s. During those years business drew on a previously untapped source of labor, as women were recruited into the labor force in record numbers. So maybe that's the solution now; maybe in the year 2000 businesses will turn to previously untapped pools of labor. We're already seeing this happen as disabled Americans are recruited into the labor force in record numbers. Perhaps also immigration laws will be relaxed, allowing workers from abroad to come in and fill the gaps. Another source of labor that is untapped and perhaps ready to be recruited is older Americans – workers that are retired.

If you think about this, the demographics suggest that, as we move further and further into the 21st century, this group of workers is going to have to supply a larger amount of labor. Think about the statistics. According to the Census Bureau, if you look at Americans aged 18 to 44, that segment of the population is going to increase by only about 4% between 1995 and the year 2020. During those same years Americans over 65 as a group is going to be growing by about 60%. So maybe that's what's going to happen; maybe older Americans and retired workers will be recruited back into the workforce to help ease labor shortages.

Well, this raises a question. If these workers are there, and if, as surveys show, the vast majority of them would like to work, why aren't they working? What would have to change in order to bring older workers back into the workforce? After all, they're healthy, they want to work, and they are experienced and talented. Well, consider some of the institutional barriers to those workers working.

The first concerns social security, which began back in the 1930s, which involved a retirement age of 65, and regular, paid benefits after that date. Workers who were working were losing benefits because of caps on earnings outside the social security system. Turns out that if you work and earn an extra dollar whenever you're earning social security, the amount of social security that you lose, as well as other tax consequences, mean that your effective tax rate on an extra dollar of income is around 67-68%. There's very little incentive for older workers to work when they're going to lose their social security payments.

A second concern is imposed by the private sector. Many older workers are earning much more than younger workers because of seniority wage systems. That is, workers’ annual salaries rise consistently during their years of service to a company. That means the older workers are the ones that are most expensive to a company; and, therefore, they're the ones that the company is most eager to lay off – no matter that they're experienced, they're just very, very costly. So also what they find is, the longer you keep a worker around, the higher your long-term obligations to that worker are going to be, because of what’s called a “defined benefit pension system.” That is, workers who are earning high wages at the time of their retirement are going to have to get high retirement benefit packages, because they’re usually tied to the last wage you’re earning before you retire. So there’s a strong incentive on the part of the private sector in systems that are run on seniority to retire their workers before they become too costly.

A third problem with having workers in the industry after they're 65 is that there's now a huge industry that's arisen to entertain and distract our older and retired workers. There are cruises, there are retirement communities, there’s lots of stuff to do with your time, and there’s a whole industry out there that’s competing for the attention of senior Americans to sell them things. Now, never mind the fact that they say that they'd rather work; there's lots of things competing for their time and attention, and that makes it more difficult to attract them back to the workforce.

But things are changing. Wages are rising because of the labor shortages; there are changes in the way work is organized, with new respect for senior workers returning to the workforce; and social security is itself being overhauled. One big change is that the earnings caps have been repealed so that workers are now able to earn money and not worry about losing their social security benefits.
Another change is that workers at private firms are now able to negotiate age-specific compensation plans with their employers so they can get out of the seniority system and still continue to be productive contributors without costing their firms too much. So all of these changes are at work, and you can bet the changes are being hastened by these labor shortages that make companies more and more eager to attract and retain talented workers, whether they're old or young. So changes in the system would make it easier for older workers to not be retired but to work part-time or full-time back in industry – those changes are finding it's easier to easier to make them in an environment where labor is scarcer and scarcer.
Economic Fluctuations: Unemployment and Inflation

The Natural Rate of Unemployment

Understanding the Natural Rate of Unemployment

Lately the U.S. economy has been growing at a very rapid rate – 5% and 6% a year? And some people are starting to get worried. I mean, isn’t there some kind of speed limit? If the economy grows too rapidly, won’t prices begin to rise? If businesses are popping up everywhere to provide goods and services for consumers that are excited about buying things, next thing you know, businesses have to hire workers, they have to get raw materials, and all that stuff is in limited supply, at least in the short run. So they’re just competing it away from each other until prices go up and you’ve got inflation; and the next thing you know, the Fed holds up the stop sign by tightening the money supply, pushing up interest rates and the party is over; the punch bowl is gone.

So, should you be concerned when the economy is growing rapidly? Let’s think about this for a moment. Whenever the economy is growing rapidly, the concern is that a shortage of workers or resources will develop that creates pressure for inflation. So the trick here is how fast is too fast? Or, asking the question a different way, how low can unemployment get before the labor market is so tight that we need to worry about rising wages and prices? How much unemployment is stable, or natural?

You may have heard the term “the natural rate of unemployment.” The natural rate of unemployment is the rate of unemployment at which the economy is functioning properly. You might consider it to be the sum of the frictional unemployment – workers moving between jobs – and the structural unemployment – that is, the unemployment that results from the economy reorganizing itself to take advantage of new trading and technological opportunities.

So the natural rate could be the sum of the frictional and the structural components of unemployment. But there’s another way of describing the stable rate of unemployment that refers directly to prices. It’s called the NAIRU – the non-accelerating inflation rate of unemployment. The acronym “NAIRU” is called, or pronounced “nay-roo.”

What is the rate of unemployment below which we cannot push the economy without pushing up wages and creating the fear of inflation? What is it? Well, this rate of unemployment is associated with the potential output of the economy – how rapidly is real GDP growing? There’s a rate of growth for real GDP that is stable – it doesn’t push the economy down to too low a rate of unemployment. When I was in school, the rate of growth of the economy that was considered to be the speed limit was 2.5%. Nowadays there are economists who suggest that our economy may be able to grow at rates of 3% or 3.5% without creating too little unemployment, or too much potential for inflation. That’s because of changes in labor productivity, changes in technology, changes in the way business is organized. And these are all topics that we’ll find ourselves talking about throughout this study of macroeconomics.

For right now, let’s focus specifically on the unemployment rate. What’s the rate of unemployment that is non-accelerating inflation-associated? That is, what’s the rate of unemployment that we can maintain without putting upward pressure on wages and prices? Well, it’s a good question, and the answer is going to vary. When I was in school – how long ago was that, 20 years? – I was told that the natural rate of unemployment, or the non-accelerating inflation rate of unemployment, was about 6%. Well, in January of the year 2000, we had an unemployment rate of 4%, and still no inflation. So what’s going on? Have these technological changes and changes in the way business is organized changed the economy to such a degree that we can have a lower rate of unemployment – that is, a tighter labor market – without rising wages, and the associated inflation?

Let’s look historically at the data. Here we see that the rate of unemployment at 6% is being called “natural” in this picture. So I’ve got a rate here on the vertical axis, and I’ve got time here on the horizontal axis. And as time unfolds, we see the actual unemployment rate here in green veering above and below the lines. These are going to be periods of recession, and these are going to be periods of boom, when the unemployment rate is especially low.

Well, what does this tell us? It tells us that we get some fluctuation around the natural rate, and this fluctuation is due to cyclical unemployment – the economy expanding, and the economy contracting. But if you extended this line further out, and you went beyond ’95, to ’96, ’97, and on to the year 2000, you’d see the green line getting lower and lower, down around 4%. We haven’t seen unemployment rates that low in 30 years. What’s going on? Well, maybe it’s because the blue line itself has shifted downwards. Maybe changes in the way the economy is organized make it possible for labor to move more quickly between jobs. Maybe job opportunities are created more rapidly these days, and communicated more effectively through the Internet. Maybe people can advertise themselves more effectively. Maybe people are just more productive in the labor market. Maybe the non-accelerating inflation rate of unemployment has just slipped lower.
Economic Fluctuations: Unemployment and Inflation

The Natural Rate of Unemployment

Understanding the Natural Rate of Unemployment

Well, it’s important to know what the natural rate of unemployment is, because around the national rate, we’re going to have the potential for a tradeoff. If we are willing to tolerate a lot of unemployment, then that’s going to keep wages stable. That is, workers are not going to be able to ask for raises, and employers are not going to bid up the price of labor, competing with one another for a strictly limited workforce. But, if we want a lower rate of unemployment – that is, if we want more output in the economy – then it’s going to be more likely that there’s going to be competition for workers. The labor market gets tighter, workers are in shorter supply, and wages are likely to rise; and as wages rise, employers pass those higher wages onto you customers in the form of higher prices for goods and services.

You can keep pushing, make more output, push unemployment lower, but that competition for workers is going to cause wages to begin to rise more and more rapidly, and those rapid increases in wages feed into a higher inflation rate. This curve is called the “Philips curve.” We can study it in more detail later, but right now let’s just look at this basic relationship between the inflation rate and the unemployment rate. It’s as if there’s a tradeoff – if you want less unemployment, you’ve got to be willing to tolerate a tighter labor market, rising wages, and the risk of inflation.

But nowadays people wonder, Is there really even a Philips curve left? Maybe the Philips curve is gone. Here we’ve got unemployment way down, no inflation, and a lot of economists are just stumped, and kind of fearful, because we don’t know when the Fed is going to call an end to the party. But maybe it’s time to reexamine the non-accelerating rate of unemployment; maybe it’s really much lower than what I was taught it was because of ways in which the economy has changed fundamentally. The natural rate was believed to be about 4% in World War II. In the 1960s it was believed to be as high as 6% – that persisted through the eighties. Today it may be 5.5%, 5%, or even lower. The longer we persist with unemployment around 4% and no inflation, the more the higher estimates of NAIRU are called into question.

So why might the NAIRU be lower? Structural changes in the economy, expanded immigration, demographic changes with fewer younger, less productive workers, more people in their middle years of peak productivity, and all of these things would cause us then to be able to produce more output with less pressure on the labor markets. So next time you hear about the natural rate of unemployment, or the NAIRU, you’ll know what they’re talking about. They’re talking about the rate of unemployment that can be maintained without fear of inflation, without the fear of pushing prices and wages up. But the controversy is, what exactly is that rate – 6%, 5%, 4%, or lower? It’s the rate of unemployment that’s associated with the growth rate of the economy, without inflation, and it depends on several factors that have to be looked at empirically. And right now we’re in a period of some confusion about exactly what the number is. But it seems to be working in our favor, because it seems to be lower than we thought.
Economic Fluctuations: Unemployment and Inflation

Causes of Unemployment

**Minimum Wage Laws**

If you're concerned about the predicament of working poor people, it might seem a good idea to impose a minimum wage; that is, guarantee that everyone who works earns at least a certain amount of money per hour that they work – enough to pay for food, clothing, and other necessities. There's a lot of discussion these days about what a living wage is; and many cities across the United States are establishing living wages that must be paid by people who have contracts with the cities. The question is, does a living wage – does a minimum wage law – actually help the people that it's designed to help? And there's a fair bit of controversy about this proposition. Do minimum wages play a role in creating unemployment? Let's see how this would work.

Let's begin with an analysis of the market for labor. Here's the demand curve for labor, which represents the behavior of firms. As the wage increases, firms hire fewer workers and substitute instead with machines, or else they simply don't do the business at all. So the downward slope in demand curve means that if the wage rises, firms demand less labor. As the wage falls, the demand for labor increases. The supply curve for labor shows the behavior of households. When wages are higher, households will supply a larger quantity of labor in the market, because it's more rewarding to work when the wage is higher. Whenever the wage is lower the quantity of labor supply falls.

The interaction of supply and demand would automatically determine an equilibrium wage in the market, and an equilibrium level of employment. So at this wage – $W^*$ – we get $L^*$ jobs. However, $W^*$ might be too low in the view of people who are in favor of a living wage; and, therefore, they mandate that the wage must be higher – $W_L$ – at this legally restricted level, the minimum wage. But the wage is not allowed to fall below $W_L$ down to this point of equilibrium. Instead what we get is a quantity supply that's greater than the quantity demanded. That is, the number of people who are willing and able to work at $W_L$ is larger than the number of jobs that firms are offering.

The difference between the number of people who want to find work at $W_L$ and the number of jobs offered is a surplus of labor – or unemployment. So we get unemployment from the minimum wage, because more people are willing to work at this high wage than there are jobs for them. After all, if the minimum wage were taken away, we would have an equilibrium in the labor market; there would be fewer people looking for work, but firms would want to hire more of them, so the job market would clear. But because the price mechanism is not allowed to operate and the wage is held above its equilibrium level, we get this unemployment. And this is the argument of people who are opposed to the minimum wage as a tool for helping the working poor. They believe, in fact, that it hurts them by limiting the number of jobs.

Well, there's another argument that can be made about the minimum wage, and that is that the minimum wage is especially harmful to workers who have lower productivity – unskilled workers. Suppose that a company can produce its product by hiring either one highly skilled worker or two less skilled workers; these less skilled, or unskilled, workers would typically earn a lower wage. And let's suppose that the wage that's paid to the unskilled workers is $5.00 an hour. If each of these workers earns $5.00 an hour, and it takes two of them to make your product, that's $10.00 worth of labor costs. Suppose now the skilled worker wants to take the job away from these unskilled workers. He's got to offer to work for $10.00 an hour or less. However, if this skilled worker wants to earn a higher wage, then he can cause these workers to become uncompetitive by urging the imposition of a minimum wage. That is, if the minimum wage were $8.00 an hour, these two workers would cause you $16.00. That means that our skilled worker is now competitive at a wage of $13.00, or $14.00, or $15.00.

Look at it another way. If this worker continued to earn $10.00 an hour, and the minimum wage goes up to $6.00 an hour – 6 times 2 is 12 – these workers are no longer going to be hired. The skilled worker will be hired instead, because his $10.00 labor charge is less than the $12.00 labor charge that results when the unskilled workers are subjected to a minimum wage. Therefore, the argument is that politically the unskilled workers find themselves doing less well when a minimum wage is imposed, because they can't offer themselves willing to work at a wage that makes their labor competitive with the labor of more skilled workers.

Now there's a fair bit of research about the minimum wage, and it's mixed; that is, there's no clear indication that the minimum wage actually hurts the working poor. For one thing, of all those workers 30 years old and older, less than 3% of them are working at the minimum wage. Those people who are most frequently profiting from the minimum wage are teenage workers, and teenage workers in middle-class households. Therefore, increases in the minimum
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**Minimum Wage Laws**

wage may create unemployment, but largely among middle-class teenagers, the argument goes, not among the people that we are really concerned about helping – that is, workers who are breadwinners for families.

During an expansion, the minimum wage probably causes minimal problems. One recent piece of research showed that the 1997 minimum wage law, the increase in the minimum wage probably resulted in only about 200,000 jobs being lost, and these predominantly for teenagers. The conclusion that we come up with is that although the minimum wage probably does cause employers to hire less labor, and although the workers that they don’t hire are younger workers, as they switch to machines instead, or as they cut back their business activities, that, for the most part, the working poor are not hurt by an increase in the minimum wage. It is middle-class teenagers whose jobs are probably the first to go whenever minimum-wage hikes are enacted.

So here’s a little bit of microeconomics applied to macroeconomics. The minimum wage law shows you how an imposition of a price floor on wages can create unemployment. But that’s not a reason to scrap the minimum wage altogether. We need to look deeper into the story and ask who’s benefited and who’s hurt, because there is no one single labor market; there are all kinds of players in the labor market, and it turns out that the minimum wage influences them differently. But probably the minimum wage does create some unemployment. The only question is what is the real cost to society of the particular kind of unemployment that it creates.
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Analysis of Labor Unions and Unemployment

The headline on this lesson is “How Labor Unions Cause Unemployment.” And before we can talk about that, we really have to talk about what labor unions are, and why they do what they do. Suppose you live in a town where there’s one employer, and this employer is a monopoly supplier of jobs. This employer can choose what wage it wants to pay, and because all the workers in this town depend on this company for employment, they don’t have a lot of say. You either take the wage or you don’t get a job. But suppose the workers get fed up with this exploitation and decide to meet power with power. That is, they form a cartel of labor, and they say, as a group, “We will not supply any labor to this company unless it pays us a decent wage, and gives us decent working conditions.” This is the idea behind a labor union.

A labor union forms a monopoly of labor in some particular industry so that it can meet power with power; it can bargain with the more powerful employers. Since there are fewer employers and they are better organized into firms, the workers have to also get organized, or they’re going to be at the mercy of these monopoly suppliers of jobs. However, whenever workers form labor unions, one of the consequences may be unemployment.

Some quick terminology: First of all, a labor union is an organization of workers in a particular industry that bargains collectively with firms about wages and working conditions. Second definition, collective bargaining: Collective bargaining is when a representative of the labor union sits down with the representative of the firm or the management to negotiate about wages and working conditions. And the result is usually a contract that’s enforced for one, two, or three years. Collective bargaining recurs on a regular cycle. Finally, a strike is a stoppage of work. Workers go on strike whenever their terms are not met. This is part of their bargaining power; they can withdraw labor from the firms until the firm meets their demands for higher wages or better working conditions.

Now what do labor unions have to do with unemployment? In the free market, the supply of labor reflects the passive response of workers to higher or lower wages. The demand curve for labor reflects the firm’s profit-maximizing choices – At different wages, how much labor are we going to choose to hire? In a free market, the interplay of supply and demand determines an equilibrium wage in an equilibrium quantity of labor hired – say this is $10.00 an hour, and 100 workers hired in this industry. The labor union says to itself, “This total amount of wages that we’re receiving – $10.00 times 100 workers, or $1,000 an hour – that’s not good enough, we can do better.” So what they do is they hold out for a higher wage – and this is the union wage – that is, they say, “If you don’t pay us $12.00 an hour, we’re going to go on strike.” And the company is faced with a choice: Pay the higher wages, or don’t get any workers at all.

So at the higher wage, the company wants to employ fewer workers, say only 90 workers instead of 100. But all in all, the labor union is in better shape; $12.00 an hour times 90 workers is $1,080, and that’s an improvement over the original situation. So I can shade in this area, this rectangle, which is the total wages received by the union workers, and see that they’re better off.

But here’s where unemployment comes in, because at this higher union wage, there are a lot of people who would like to get a job. And the gap between the number of people who would seek work at the union wage, and the number of jobs that are offered by companies – well, that’s unemployment. So what do we do about that? Well, first of all, what does the union do about that? The union may require, as one of its terms of supplying labor, that the firm not only pay the high wage, but actually employ more workers. This is an outward shift in the demand curve for labor that’s imposed on the company as a term of the contract; it’s worked out in collective bargaining. So $12.00 an hour, and maybe you still have to hire all 100 workers, or maybe you have to hire more.

Well, an economist starts getting very uncomfortable at this point, because now the firm is not allowed to make a profit-maximizing choice. They’re saying to themselves, “Oh, man, we’ve got to hire all these workers, and it would be to our advantage to use machines instead, or even cut back our production at this higher wage. It’s just not working for our bottom line.” On the other hand, the economist can’t totally support the company in this bargain, because, after all, to begin with, the company may have had some monopoly power of its own. That is, it was throwing its weight around to force wagers lower, and impose terms of work on the employees that may not have been in their best interest.

So it’s kind of hard to take sides in this dogfight. However, it is easy to say that once the union gains control in this bargaining power, once they can force the company to hire more workers, we may wind up with an inefficiency. However, the ironic flip side of that is, when you hire more workers, you’ve got less unemployment. So there’s kind of a tradeoff here, the point being that, until the union requires the company to hire more workers – a practice that’s
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sometimes called featherbedding, more workers being hired at the higher union wage – then we've got unemployment – a gap between the workers who want to work and the jobs the company wants to offer.

Unions have the right by law to form; workers can organize into unions, and their activity is overseen by the National Labor Relations Board, which guarantees that workers everywhere are allowed by their companies to organize. However, remember we’ve talked before about how unskilled workers may be at a disadvantage in this environment, because the unionized workers are usually the skilled workers. The unskilled workers then find themselves at a disadvantage when the unions get out and agitate for high minimum wages. These high minimum wages mean that you have to pay an unskilled worker a lot of money. That causes you to be less attracted to unskilled workers, and want to use skilled labor instead. The minimum wages make the unskilled workers uncompetitive and incline companies to hire the skilled unionized labor instead.

Sometimes unions go so far as to push companies to say that, "You must be a union member to work in this industry.” Some companies then have to accede to the demands of labor. But then unskilled workers who may choose not to join the labor union, because they’re not skilled enough to be hired at this high wage, they then are at a disadvantage; they can’t go out and offer to work at a lower wage and be competitive. That's why in many cases, states have right-to-work laws that protect unskilled workers. Right-to-work laws rule that it is illegal for companies to require union membership as a condition of employment. Unions don’t like these laws, because they make unskilled workers more competitive. But unskilled workers appreciate them, because they allow them access to jobs and make them more competitive. So labor unions are kind of a cartel, and like a cartel, they have advantages and disadvantages. The advantage of a cartel is it gives you power to meet power with; workers get a better deal when they can organize and bargain collectively. The disadvantage is, at the higher wages that we have with the union, we get unemployment, and maybe inefficiency. Also, union activity puts unskilled workers at a disadvantage.
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Case Study: “La Causa”: The United Farm Workers

If you would have been a farm worker in California in the early 1960s, you probably lived in miserable conditions – overheated trailers infested with rats and mosquitoes, being paid miserable wages, and being mistreated by the owners of the large agribusiness firms on which grapes were grown. There have been many efforts to organize these workers into a union so that they could voice their concerns collectively. And yet these efforts have failed, largely because of the Bracero program, which had been in force since World War II. This program allowed farms to bring in immigrant workers to fill any slots left vacant by striking domestic workers, and, therefore, made it very, very difficult for domestic workers to get any leverage over the large businesses.

This situation began to change in 1964, when the Bracero program was ended in Congress, largely under pressure from lobbyists who had been influenced by a charismatic farm worker named Cesar Chavez, who had begun to organize a group of farm workers into the National Farm workers Association. Chavez and his colleague Delores Huerta, who had also helped to organize a union organizing committee of her own, the Agricultural Workers Association, then set out to try to get a better life for the farm workers in California. The first efforts were a couple of strikes in early 1965. At the request of the workers on a couple of farms in California, Huerta and Chavez organized a series of strikes that resulted in the workers being given higher wages.

Now this was great for the workers for the time being, but in the long run what the workers really wanted was a union that would represent their concerns consistently, regarding wages, medical care, pensions, and all of the other things that they needed for protection. However, it became very clear that the time was right for some kind of more concerted effort on the part of farm workers to form a union. And what happened was this: As the harvest season approached in 1965, the growers were especially vulnerable to a strike. Grapes have to be harvested quickly or they spoil. What happened was that a group of workers on farms around the town of Delano in California asked Chavez and Huerta to help them organize a strike. The strike began, and, as usual, the growers wanted to bring in scab workers, or workers who would violate their growing union’s wishes by working anyway under the existing conditions. Chavez and Huerta and their associates organized a series of pickets. And, since these strikes involved 30 farms scattered several miles apart, they had to have trucks taking workers from one picket to another, to try to keep up the pressure and prevent new workers from coming in and helping the growers at a time whenever the existing farm workers were trying to place them under pressure.

Eventually, the farms got the point that they would then have to do something to accede to the workers’ demands, and they did in fact raise their wages. But this time the workers sensed their advantage, and they pressed. What happened next was that Chavez and the United Farm Workers began to connect with a network of churches, and people concerned about civil rights and workers’ rights across the country, to organize consumer effort to help with this strike. And this was the boycott of grapes that began in 1965. Chavez called for a boycott of all grapes produced in California that were not harvested by unionized workers. Therefore, this used all of the power of the consumer dollar to help the workers exert the leverage on the companies that they needed to get them to accede to their demands and allow the union to form.

Well, things got nasty next. Some of the growers sprayed the workers actually with poisonous pesticides; there was a large civil rights march to Sacramento to ask for the governor’s help; and what ended up happening was that the growers allowed a union. But rather than being chartered as union, they raised a union under the auspices of the Teamsters, that was in fact friendly to the growers and owners of the farms. So at Chavez and his union’s request, the workers themselves actually continued with the strike until finally Chavez’s union, with mediation from the governor, got the attention of the growers and, after another election, was given official representation of the farm workers.

Eventually what happened was the union formed, Chavez’s group gained the voice that it had been seeking, and conditions for the farm workers began to improve. The life of the farm workers is still difficult, and it’s been difficult to organize workers under these conditions. The farms are scattered out over hundreds of miles; the workers themselves are subject to competition from other unskilled labor. But eventually what Chavez and his group showed was that through creative efforts and persistence, and a lot of very, very hard work, the organization occurred that gave these workers the collective bargaining power they had been seeking.
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**Theory of Efficiency Wages**

By now you’re really clear on this point: When the wage is above its equilibrium level, you’ve got unemployment. And you’ve got it because firms are offering fewer jobs at that higher wage level, and more workers want to get jobs at that higher wage level. And when workers are seeking jobs and not finding them, we call that unemployment. We’ve looked at a couple of things that can stick the wage above its equilibrium level. One is the government requirement that firms pay a minimum wage above the equilibrium level; and when that occurs, you can get unemployment. Another thing that can happen is workers organize into labor unions, and demand a wage that’s above the equilibrium level; and at that higher wage firms want to offer fewer jobs, and therefore unemployment results.

We’re going to now look at a third reason why the wage may stick above its equilibrium level, and this is called the “efficiency wage.” The efficiency wage is a wage that firms voluntarily choose to pay in order to increase their profits. The idea of the efficiency wage is this: The wage has two effects. First of all, the wage determines the quantity of labor that’s traded in the market. But there’s a second effect: Wages influence the quality of labor that a firm actually hires. When a firm pays a higher wage, it may actually get a higher quality of labor; and the quality of labor, and the labor’s productivity may be so much higher that it actually makes it profitable for the firm to pay a wage that’s above the equilibrium level. It may actually increase the firm’s profits.

What I’m going to do now is make a list of the reasons why the wage may influence the quality of labor that a firm hires; and that’s why firms would voluntary choose to pay a wage above the equilibrium level. However, anytime a firm is paying a wage above the equilibrium level, there are going to be a lot of people applying for jobs, even as the firm wants to hire less labor. And that causes unemployment, which is the point of this discussion.

So, what are the reasons why a firm might choose to pay a higher wage than the equilibrium? Reason number one: A firm would choose to pay a wage above the equilibrium so as to give its workers an especially good deal. And the point here is, if you’ve got a job that’s an especially good deal, you’re afraid to lose it, so you’re going to work really hard to make your boss happy. This was Henry Ford’s idea; if you pay a wage that’s above the equilibrium level, workers know that the next best thing is a much lower wage, and they want to work hard to keep the job they’ve got. This is an efficiency wage based on motivating workers. When Henry Ford paid a higher wage, he was the most desirable job in town; and therefore workers who were under his direction were highly motivated. So one idea of efficiency wages is paying your workers a wage above the market level motivates them, and therefore goes directly to the company’s bottom line. The company voluntarily chooses to do this, because the wage above the market provides so much motivation that they get a higher quality, more productive worker.

The second reason why you would want to pay a wage above the equilibrium is that a happy, healthy worker is more productive. That is, a firm that gives its workers more money than they can earn in another job is able to give its workers the ability to feed themselves, clothe themselves, give themselves better continuing education, more rest and recreation. That is, you pay your workers more so as to make them healthier and happier. That is, workers who can afford better health care, better food, are going to come to work rested, healthy, and productive. Another idea, then, that gives us a wage above the equilibrium is companies know that if they pay their workers better, the workers will take better care of themselves, and therefore the workers will be more productive.

A third reason why a company pays a wage that is above the equilibrium is that at higher wages a company is able to attract the more productive, more talented, more skilled workers. This is a rather subtle idea, and I want to explain it carefully with an example. This principle of an efficiency wage to attract high quality workers is based on a problem in economics that we call the problem of asymmetric information. Suppose you’re running an assembly line where all of the workers work together, and it’s very difficult to tell by looking how productive an individual worker is. All you can tell is how much output the team is producing together. However, you know, as an employer, that some of the workers are especially productive, and other workers are less productive. But the particular information about the productivity of an individual worker is that worker’s private information. The employer cannot observe it directly. The employer can only observe the average productivity of workers as seen in the output of the team, and this creates a problem called adverse selection.

Look here at five workers who are working together on a team to produce hamburgers. And let’s suppose the hamburgers sell for $1.00 apiece. On the top row of these numbers I’ve written the number of hamburgers that each employee is contributing to the team’s production. Here’s a worker who’s adding 8 hamburgers, here’s a worker who’s adding 10, a worker that’s adding 12, a worker that’s adding 14, and our most productive worker, adding 16...
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hamburgers. Again, we can’t tell which worker is which, but we know as a group that they’re producing on average 12 hamburgers per worker an hour.

Down below in green, I’ve written the opportunity cost of these workers to work for this hamburger restaurant. That is, these are the wages that each of these employees could earn if they went and worked somewhere else. Notice the most productive worker has the highest opportunity cost. If he left the hamburger restaurant and went and worked for someone else, his next best opportunity is to earn $13.00 an hour. Notice he’s better employed at the hamburger restaurant where he’s contributing $16.00 an hour to that company’s profit, but if he went somewhere else, he could earn $13.00 an hour. Our $14.00 hamburger man could earn $12.00 if he went and worked somewhere else. The $12.00 guy could earn $11.00, the $10.00 guy could earn $9.00, and our $8.00 guy could earn $7.00.

The point of the green numbers is that the opportunity costs are positively related to the productivity of these workers at this particular hamburger restaurant. And there’s where the problem comes in. Watch this example: The hamburger restaurant manager looks at this team’s productivity, and it says, “Well, I’ve got here five workers that are producing $60.00 worth of benefit. That means I can afford to pay them a wage of $12.00 an hour; $12.00 is their total output – $60.00 worth of hamburgers divided by the five workers; $12.00 is their average productivity. So when we give each of these workers a paycheck for $12.00, some of them are very, very happy. But one guy says to himself, “You know, I could earn $13.00 somewhere else,” and he quits the company. When he quits the company, 16 hamburgers are not produced, because he’s taken his efforts away from this team, and he goes and he earns $13.00 at another employment opportunity.

Well, when he leaves, the average productivity of our workers falls. Now their total output averages to only 11 hamburgers per worker; that is, the company can only afford to pay them $11.00 an hour and break even. Well, at $11.00 an hour, this worker takes his talent and goes to another company where he can earn $12.00 an hour. Notice what’s happening. As the wage falls, who’s leaving? The most productive workers. This is not in the interest of the hamburger restaurant. They pay all the workers the same, but your most productive workers are going to seek opportunities elsewhere.

Well, now this guy is the most productive person, and the average productivity of our team has dropped from 11 to 10, and at 11 to 10, we then have this worker leaving. At $10.00 an hour now, we have these two guys left employed. The wage is $10.00, and the average productivity has dropped to 9, and finally we’ve got an equilibrium; nobody wants to leave. The output of our workers is $18.00 worth of hamburgers, $9.00 apiece, which meets their opportunity costs. But see who’s left – the least productive workers in the pool. That’s why a company would voluntarily choose to pay a higher wage in order to attract the more productive workers. If this company paid a higher wage, like $13.00 an hour, all five of these workers would show up for work. Then what the company would do is invest some effort in screening the workers – trying to get at their private information, figuring out who can produce a lot of hamburgers, and who can produce a few – because at the high wage, you’ll attract a lot of workers, but you don’t want all of them. What you then do is you engage in non-price rationing; the company begins to screen and select, so that it can keep these higher workers at the higher wage, and find some way of distinguishing the low-productivity workers and not hire them at all. That is, you cannot let the wage alone attract your work pool if you’re concerned about the quality of the workers. But you’ve got to pay a high wage, a wage above market equilibrium, if you want to attract the very best workers. That’s the idea behind an efficiency wage.

A fourth reason for paying an extra high wage is to reduce employee turnover. If your employees are churning all the time, leaving, hiring new ones, you’ve got a lot of costs associated with identifying new employees, attracting, and training them. But if you can keep your workers happy, and they don’t leave, that lowers the overall cost of managing labor.

Once again, then, we’ve come up with a story for why the wage winds up above its equilibrium level. And when the wage is above the equilibrium level, the quantity of labor supplied exceeds the quantity of labor demanded, and you’ve got unemployment. The interesting thing about this third story is that it’s based on voluntary choices by firms. It’s firms voluntarily choosing to pay a wage above the market level so as to increase their profits. Whether it is attracting unusually qualified workers, making your workers especially happy and productive, or making your workers afraid of losing the job so that they’re highly motivated. In whatever sense you tell the story, the point is that the extra high wage changes the quality of your workers, and therefore makes your company more profitable. However, the downside is, you have unemployment to deal with. And when you’ve got unemployment, then you have to use some
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kind of rationing mechanism that’s not strictly based on price – some scheme for choosing which worker to hire and which worker not to hire, when they both show up for a job at a given wage.
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Unemployment Insurance

You know, we’ve been talking about unemployment as if it were the weather, as if it were just some natural force that descends upon you and you passively respond to it. And yet, unemployment persists, depending on choices that people make. If I want to go to work faster, I’m going to work harder to go out and find a job. I’m going to read the newspaper, I’m going to distribute my résumé, I’m going to make phone calls; I’m going to try to persuade people to hire me. And the amount of effort that I expend to try to get a job is influenced by how badly I want one. And how badly I want a job is influenced by the difference between the money I earn without a job and the money that I earn with a job. So choices that individuals make can either cause unemployment to be more protracted, or it can cause it to last less long.

Most people are unemployed for short periods of time, but sometimes people are unemployed for longer periods. In any case, we want people to have an incentive to go out and find a good job as soon as possible, so that they can once again be productively contributing to society and the economy.

Now, your decision about whether to go out and look for a job right now or not is in some measure influenced by how well you’re doing without a job. And one of the things that supports you in a period of unemployment is unemployment insurance. Most people who are unemployed are entitled to collect up to 50% of their previous salary for up to 26 weeks. That is, when you’re unemployed, you’re not suddenly desperate. You may not have to go out and immediately get another job just to pay the rent or feed yourself, because you have this reserve that you can only collect in the event that you’re fired from your job, or your company closes, and you’re out of work.

So people who are involuntarily unemployed are eligible for unemployment insurance, and unemployment insurance makes their life better; it keeps them from being desperate. On the other hand, it influences their incentives, and may cause them to delay their job search, because they don’t have to get a job right away. This is a general problem with all kinds of insurance, a problem we call moral hazard. Anytime a person is insured, they are going to exert less effort to mitigate the risks for which they originally bought the insurance.

Let me give you an example. I have insurance on my house; therefore, since my house and all of the possessions in it are insured by the insurance company, I’m less inclined to close my windows when I leave the house to go to work for the day. That’s because if a burglar breaks into the house, the insurance company is just going to replace anything that the burglar takes. You see, because the risk is mitigated, because the risk and the cost of managing the risk is borne by the insurance company, I don’t work as hard to control the risk.

Now, about unemployment insurance – people who are unemployed begin a search process to find a new job. And a search process is costly. It means I’ve got to get up in the morning, I’ve got to get cleaned up, I’ve got to go distribute my résumé, I’ve got to knock on doors, I’ve got to make phone calls. All of that takes time and effort, and as long as I’m drawing a check, I have less incentive – that is, I’m less fearful – of winding up in a desperate situation; I may not work quite as hard.

Now, states that have done experiments – paying workers to find work quickly – find that, in fact, those workers are more rapidly employed than workers who are collecting unemployment insurance with no incentive to get employed quickly. And, if you think about it, that makes sense; people usually do respond to monetary incentives, and do whatever they get paid more to do.

The natural rate of unemployment grows to about 6% in the 1960s and ’70s, at about the same time as unemployment insurance was extended to cover more and more people in the economy. Once again, people are responding rationally to the incentives created by unemployment insurance. Once you don’t have to worry so much about losing your job, and once you’re protected and cared for by the insurance payment during the period of unemployment, you’re going to be a little bit less desperate and not work quite so hard to find employment.

So how can we design a system that gives us the benefits of the protection of unemployment insurance without the negative incentive consequences that cause people to stay in unemployment longer than they otherwise would? How can we protect people without creating a whole lot of moral hazard? Well, a couple of proposals are that, first of all, we create a two-tiered system to distinguish between short-term unemployment and long-term unemployment. Short-term unemployment, we can allow this insurance program to give workers time to find a job and reemploy their skills somewhere else. But don’t make it last so long that they don’t have the incentive to go out and find new work.
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For workers that are structurally unemployed – who lose their job in a factory and now are going to have to acquire new skills – we might need a different kind of unemployment insurance, one that only pays workers who go and are involved in training programs, or vo-technical education, or something that retools their skills to prepare them for a new job. That is, we want the unemployment insurance system to continue to provide good incentives to people to go out and search for a job.

In some cases, we might only pay unemployment insurance to those people who are actively engaged in the search process. That’s going to be hard to monitor though, isn’t it? I mean, how do we tell who’s looking for a job and who’s not? But unemployment insurance programs that provide coverage for shorter periods of time, although they are probably going to produce more stress among us workers when we get unemployed, are going to increase our incentives to stay unemployed for shorter periods of time, and work harder to find a job quickly.

But those workers who find themselves unemployed for longer periods of time because of events beyond their control – such as an industry becomes uncompetitive, or new technology puts them out of a job – those workers need a different kind of insurance program that directs their efforts towards creating new human capital, new skills that are going to make them more employable in the long term. Unemployment insurance, like any insurance program, creates moral hazard, and probably a fair bit of the persistence of unemployment is due to people not moving really fast to find a new job, because they’re not especially worried, because they’re insured. We could redesign an insurance scheme that provides a high level of protection, but also rewards employees whenever they work harder to search to find new productive employment, instead of succumbing to moral hazard.
Inflation, Deflation, Stagflation, and Hyperinflation

When I was a kid, my grandmother would take me for a hotdog at Harry’s Hotdogs. The hotdogs cost 5 cents apiece and I could usually eat two. When we didn’t eat hotdogs, we’d go across town to Joanne’s Burgers. Joanne sold her burgers for 10 cents apiece. I could usually only eat one of those. Nowadays I still eat burgers and I still eat hotdogs, and I still go to Harry’s and Joanne’s. Everything’s the same – same burger, same hotdog – but the prices have changed. Harry’s Hotdogs now sell for $2.00 apiece, and Joanne sells her burgers for $4.00 apiece.

So what’s going on? What’s changed? The quality of the products is unchanged. Even more remarkably, it still costs the equivalent of two hotdogs to buy one hamburger; there’s been no change in the relative prices of the two products. Prices have nonetheless increased substantially since I was a kid. What gives? The answer is the change in prices is not about the value of the products, and certainly not about the relative value of hotdogs and hamburgers. It’s about the relationship between products and money. When there is a general increase in the level of prices in an economy, we say that that economy is experiencing inflation. And inflation means that, in general, it takes more of this to get one of these than before. That is, inflation is a general increase in all prices across the economy.

Let’s talk about inflation – what causes it, and why you should care about it. This first discussion is going to focus on definitions. First, inflation: Inflation is a general increase in the price level across an economy. Deflation, by contrast, is a general decrease in prices across an economy. Deflation is much rarer, but nonetheless happens from time to time. Hyperinflation is a very rapid increase in prices, in fact, so rapid as to be remarkable. People’s response to hyperinflation is very dramatic. And finally, stagflation: Stagflation is a period in which prices are increasing at the same time as output, or real GDP, is actually stagnant, or decreasing. Stagflation is also rare, and requires some explanation. We’ll get to those explanations after we talk a little bit about the history of prices in the United States. And those explanations are going to take us deeper into the modeling of macroeconomics. What is the relationship between money, prices, and output in the economy?

But first, let’s talk about inflation. In the United States, over the last 25 years, the general rate of inflation has been about 6%; that’s been the average. The United States is not unusual; most of the industrialized countries of the world experience a low inflation rate most of the time. That is, prices are generally increasing. Some periods in the United States have been well outside of this average. For example, in 1980, the inflation rate was between 13% and 14%, on an annual basis. That was, prices were rising relatively rapidly for a U.S. experience. Recently in the United States, since the mid-1990s, into the year 2000, the rate of inflation has been below 3%. These are very, very low inflation rates for the United States, and we haven’t seen prices rising this slowly since the 1960s. In general though, there is some rate of inflation in most countries most of the time.

Deflation is much rarer. Deflation occurs typically during periods of economic stagnation, or depression. In the 1890s, when the United States was in a deep recession, which was actually a depression, the price level fell during that decade by about 23%. In the 1930s, during the Great Depression, the GDP deflator fell by about 14% during the course of several years. In Japan, in recent years, that is, in the early 1990s, there was a period of deflation that the Japanese called price destruction. That is, prices were falling, and because prices were falling, consumers began to change their behavior.

When you see prices falling, you reason to yourself, “Well, this computer will cost less next week than it cost today, so I’ll wait to buy it.” And when everyone waits to buy, stores can’t move their merchandise, and therefore they lower prices further. When prices begin to fall faster, people wait longer to buy things, looking for bargains; and, therefore, the economy can stagnate. With stores unable to sell products, factories stop producing them; then people are laid off of their work; they can’t afford to buy products, and there’s even less stuff bought and sold.

Now, you might have experienced the same thing in the computer industry. That is, you see how rapidly computer prices are falling with the advance of technology, and you keep saying to yourself, “Why should I buy a computer this week? If I wait till next week, or six months from now, or next year, I’ll get a better computer at a lower price.” And, therefore, you never get around to buying a computer at all. Well, that’s the way things work in an economy that’s characterized by deflation. Falling prices can cause great problems for an economy.

Hyperinflation is a very weird animal, and when it occurs, it usually makes the headlines. The Wall Street Journal reported in Bolivia in 1985 that there was an inflation rate at about 38,000% over the course of six months. Look at this: In January of 1985, you paid $1.00 for a loaf of bread. Well, in June of that same year, you were paying $38,000 to buy the same loaf of bread. No change in the product – it wasn’t suddenly super bread, it was the same product –
Economic Fluctuations: Unemployment and Inflation

Inflation

and yet you’re paying all this extra money, because the prices are rising so rapidly. Why did that happen? Well, it
happened to a large extent because the government was just printing a lot of money to pay its bills, and the economy
was awash in “trash cash” – money that really had no value, it was just paper. And because the money was so
plentiful and so cheap, merchants required bucket loads of it for you to buy anything.

During a period of hyperinflation, you can sit down in a restaurant, order from a menu, and before the waiter brings
your food, the price of your meal may have doubled or tripled. Now what do people do when they’re in a
hyperinflationary economy like this? They become very suspicious of money. They are unwilling to accept money in
exchange for goods and services, and frequently, the economy will revert to barter. During some periods of
hyperinflation, say in Germany after the world wars, nobody would accept these wheelbarrows full of worthless
German marks in exchange for anything. People instead bartered, trading the overalls they had produced at the
factory, and insisted on being paid by their boss for chickens that they went home then and slaughtered themselves.
The economy moves away from the efficient kind of transaction that we get when everything can be paid for with cash
towards the more primitive and costly form of exchanges that barter implies.

So hyperinflation usually causes people to be afraid to accept money, afraid that it’s losing its purchasing power too
rapidly; and, therefore, they revert to barter, which implies all kinds of costs for the economy. Other instances of
hyperinflation: In Serbia in 1993, the inflation rate was 10% a day, which over a period of time compounds into an
astronomical rate of increase in prices. Also, in the Ukraine in 1993, after the collapse of the Soviet Union, the inflation
rate for the year was 4,735%. When prices are rising that rapidly, everyone becomes very, very concerned about
money losing its value; and, therefore, people are afraid to accept it.

Finally, stagflation: Stagflation is this weird combination of rising prices and declining output. In the United States, two
remarkable examples of stagflation coincided with increases in the price of oil. In the early 1970s – in 1974 – real
gross domestic product growth actually was negative; that is, output fell by about .6 of 1%, at the same time that
prices were rising at an annual rate of 11%. This was in large measure due to the oil price supply shop. Prices going
up, and at the same time, because the cost of doing business was rising, companies produced less. In 1980 real
gross domestic product growth was -.3 of 1% in the same year that inflation was about 13.5%. Same story – an oil
price shock affected the economy, reducing output at the same time that it increased prices.

So this is what we mean when we talk about inflation: deflation, hyperinflation, and stagflation. Well, consider now
how inflation actually affects your prospects in the market, and your behavior.
Inflation and Purchasing Power

We have been talking about inflation as if it just falls from the sky, as if it appears by magic. And, I hope you have been wondering about the causes of inflation. What is it that happens in the economy that lights the spark that becomes a general pervasive rate of increase in the price level? In this discussion, we are going to look at two stories about where inflation comes from. In one story we are going to focus on the demand side. And, we find that when inflation is pulled along by increases in demand it is associated usually with a booming economy. That is, an increase in the real gross domestic product. In the second story we will see inflation that begins by activity on the supply side, the so-called, cost-push inflation. And, in these cases what we will find is that rising prices are correlated with a shrinking economy. That is, prices are going up while the real gross domestic product is probably actually going down. So, we will begin with explanation number one, demand-pull inflation.

Demand-pull inflation begins when consumers, businesses, the government, and/or foreigners suddenly decide, for whatever reason, that they want to do more shopping. Maybe it is because the stock market is booming robustly and people are anticipating more wealth down the road. Therefore, they decide, why wait. Why not go spend some of this newfound wealth now? So, they show up at the store and they want more of the goods and services that money will buy. And, people want to enjoy their anticipation of prosperity by shopping today for goods and services.

And, with this increase in shopping, what we find happening is that factories have to increase their output to keep up with all the stuff that consumers, businesses, and foreigners want to buy. So, the increase in demand leads to an increase in production. But, to increase the production, especially in the short run, you have to go get lots more stuff. You have to get more workers. You have to get more raw materials, etc. And, in order to get more workers you wouldn't have to draw down the labor pool.

Now, if the economy was already doing well, before this increase in demand, then we might have been very close to the Nauru. The non-accelerating inflation rate of unemployment, which means that if you want to increase output further to meet the extra demand for goods and services, you have to coax people to work who weren't working before. Or, you have to hire workers away from less lucrative opportunities. Anytime you hire more labor you are going to have to pay more for that labor. That is, the paychecks that you have to give workers to get them to come and work for you.

However, if you are in an economy that is really booming along, you may discover that not only do you have to pay your workers, not only do you have to increase the number of paychecks that you are paying out to produce these goods and services, but you may have to increase the paychecks. That is, you may have to give workers raises and bonuses and other things just to get them out of other employment into your factories to produce the goods and services that people want to buy.

So, what we see then is that demand-pull leads to increased hiring. The increased hiring draws down the labor pool and forces employers to pay higher wages. It increases their cost of production. Now, when the costs of production increase then businesses have to pass these higher costs of production on in the form of higher prices for goods and services. These rising prices may cause the employees then to say that they need adjustments in their salary to keep them up with the cost of living. These cost of living increases then allow them to continue to buy the goods and services that they were enjoying buying.

So, here we now have a wage price spiral working. That is, once demand-pull has begun to increase labor costs for the firm, because they had to pull down the ranks of the unemployed and begin to hire people away from other productive employment. Once labor costs have started to go up, the companies, in order to remain profitable, have to pass these higher labor costs on to the customers in the form of higher prices. Once the prices of goods and services are rising then the workers demand cost of living adjustments to keep them up-to-date with inflation so that their purchasing power of their salaries won’t shrink. As we add on more cost of living increases for workers, the company has to continue to raise prices, and, before too long we’ve got an inflationary spiral. Higher prices lead to higher wages, which are passed on in the form of higher prices, which cause workers to demand higher wages.

Now, the thing about demand-pull inflation and the wage price spiral that is associated with it is that typically this kind of inflation is associated with a boom in the economy. I mean, look, people are buying stuff and therefore, factories are producing stuff, and people have jobs and the economy is expanding. So demand-pull inflation is typically inflation in an expansionary economy.
Inflation

**Inflation and Purchasing Power**

Now, the alternative to demand-pull inflation is what we call cost-push inflation. Cost-push inflation doesn't begin with people doing more shopping, in fact, what happens is something quite exogenous. That is, we are clipping along here with workers getting their salaries, buying stuff, and maybe the economy starts in a position of price stability. Then what happens is what we call a supply shock. Say the price of oil suddenly shoots up because of conflict in the middle East of the oil producing and exporting countries forming a cartel and raising the price they charge to export oil to the United States and other oil imported countries.

If we have a supply shock, what happens then is the cost of doing business increases. When the cost of doing business increases businesses say, well, look, we already have to pay our workers, now we have to pay this extra high price for oil, what are we going to do. And, they find then that it is not profitable to continue to produce as much stuff as they were producing now that their cost of production has gone up. Therefore, what happens is the companies may actually layoff some of their workers and produce fewer goods and services so that the economy contracts. That is, with less production the workers who don’t get paychecks do less shopping and factories produce fewer goods and services. The prices may still be rising in this economy, because the factories have to pass on to consumers the oil price increase that they have found themselves subject to. That is, higher oil prices mean higher prices at the checkout counter. But, because companies are now going to be doing less overall production because the higher oil prices have made some businesses unprofitable production is cut back. The companies don't produce as much as before. They don’t employ as much labor as before. Therefore, workers have less to spend.

This is what we call stagflation, higher prices that are created by a cost-push. But, we may also get a contraction in the economy as businesses find that they can’t profitably produce the same output that they were producing before. We had this stagflation in 1974; we had it again in 1980.

Now, demand-pull and cost-push inflation are two different stories about where inflation comes from. One begins with people deciding they are going shopping. The other begins with companies deciding they have to raise prices to account for higher input prices like higher oil prices. Both of them wind up with higher prices at the checkout stand. But, demand-pull winds up with more shopping and more output overall pushing up against the speed limit of the economy. Cost-push winds up with less output because the higher prices are reflecting the hardships that companies find themselves under because they are having trouble making a profit because of the oil prices.

One more thing to say about inflation is that the wage price spiral, that sometimes develops in an inflationary environment is locked in by certain contractual instruments like cost of living adjustments that are in contracts that are negotiated by labor unions, and social security payments, and things like that. When there are cost of living adjustments then people’s wages go up automatically with the consumer price index or some other agreed upon measure of the rate of inflation. This makes the wage price spiral harder to break.

In an inflationary environment, whenever people’s wages are not going up at the same rate as prices then people find themselves inclined to spend more money now. Because they are afraid that if they don’t spend their money now and were to put it in the bank then it won’t buy as much when they take it out later. This concern about the real return on savings sometimes makes an inflationary environment worse. That is, when prices are going up people say to themselves, I better spend my money now rather then save it. But, when everyone spends now that exacerbates the demand-pull. By spending people are pushing up prices further.

Two stories about inflation, with two different implications for output. But, both of them account for the observation that prices may rise across the economy under certain circumstances.
Inflation

Short-Run Causes: Demand-Pull and Cost-Push

We've been talking about inflation as if it just falls from the sky, as if it appears by magic. And I hope you've been wondering about the causes of inflation. What is it that happens in the economy that lights the spark that becomes a general, pervasive rate of increase in the price level?

In this discussion, we're going to look at two stories about where inflation comes from. In one story, we're going to focus on the demand side, and we find that when inflation is pulled along by increases in demand, it's associated usually with a booming economy – that is, an increase in the real gross domestic product. In the second story, we'll see inflation that begins by activity on the supply side, the so-called cost-push inflation. And in these cases, what we'll find is that rising prices are correlated with a shrinking economy; that is, prices are going up while the real gross domestic product is probably actually going down.

So we'll begin with explanation number one – demand-pull inflation. Demand-pull inflation begins when consumers, businesses, the government, and/or foreigners suddenly decide for whatever reason that they want to do more shopping. Maybe it's because the stock market is booming robustly, and people are anticipating more wealth down the road. Therefore, they decide, "Why wait? Why not go spend some of this newfound wealth now?" So they show up at the store, and they want more of the goods and services that money will buy, and people want to enjoy their anticipation of prosperity by shopping today for goods and services.

So with this increase in shopping, what we find happening is that factories have to increase their output to keep up with all the stuff that consumers, businesses, and foreigners want to buy. So the increase in demand leads to an increase in production. But to increase the production, especially in the short-run, you've got to go get lots more stuff – you've got to get more workers, you have to get more raw materials, etc. And in order to get more workers, you're going to have to draw down the labor pool.

Now, if the economy was already doing well before this increase in demand, then we might have been very close to the NAIRU – the non-accelerating inflation rate of unemployment – which means that if you want to increase output further to meet the extra demand for goods and services, you've got to coax people to work who weren't working before, or you've got to hire workers away from less lucrative opportunities. Anytime you hire more labor, you're going to have to pay more for that labor. That is, you may have to give workers raises and bonuses and other things, just to get them out of other employment, into your factories, to produce the goods and services that people want to buy.

However, if you're in an economy that's really booming along, you may discover that not only do you have to pay your workers, not only do you have to increase the number of paychecks that you're paying out to produce these goods and services, but you may have to increase the paychecks. That is, you may have to give workers raises and bonuses and other things, just to get them out of other employment, into your factories, to produce the goods and services that people want to buy.

So what we see then is that demand-pull leads to increased hiring. The increased hiring draws down the labor pool, and forces employers to pay higher wages; it increases their cost of production. Now when the costs of production increase, then businesses have to pass these higher costs of production on in the form of higher prices for goods and services. These goods and service rising prices may cause the employees then to say that they need adjustments in their salary to keep them up with the cost of living. These cost-of-living adjustments then allow them to continue to buy the goods and services that they were enjoying buying.

So here we now have a wage-price spiral working. That is, once demand-pull has begun to increase labor costs for the firm, because they had to pull down the ranks of the unemployed and begin to hire people away from other productive employment, once labor costs have started to go up, the companies, in order to remain profitable, have to pass these higher labor costs on to the customers in the form of higher prices. Once the prices of goods and services are rising, then the workers demand cost-of-living adjustments to keep them up to date with inflation, so that their purchasing power of their salaries won't shrink. As we add on more cost-of-living increases for workers, the company has to continue to raise prices, and before too long, we've got an inflationary spiral. Higher prices lead to higher wages, which are passed on in the form of higher prices, which cause workers to demand higher wages.

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If we have a supply shock, what happens then is the cost of doing business increases. When the cost of doing business increases, businesses say, "Well, look, we already have to pay our workers. Now we’ve got to pay this extra high price for oil. What are we going to do?" And they find then that it’s not profitable to continue to produce as much stuff as they were producing now that their costs of production have gone up. Therefore, what happens is the companies may actually lay off some of their workers, and produce fewer goods and services so that the economy contracts. That is, with less production, the workers who don’t get paychecks do less shopping, and factories produce fewer goods and services.

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One more thing to say about inflation is that the wage-price spiral that sometimes develops in an inflationary environment is locked in by certain contractual instruments like cost-of-living adjustments that are in contracts that are negotiated by labor unions, and social security payments, and things like that. When there are cost-of-living adjustments, then people's wages go up automatically with the consumer price index, or some other agreed-upon measure of the rate of inflation. This makes the wage-price spiral harder to break. In an inflationary environment, whenever people's wages are not going up at the same rate as prices, then people find themselves inclined to spend more money now, because they're afraid that if they don't spend their money now, if they were to put it in the bank, that it won’t buy as much when they take it out later. This concern about the real return on savings sometimes makes an inflationary environment worse. That is, when prices are going up, people say to themselves, “I’d better spend my money now rather than save it.” But when everyone spends now, that exacerbates the demand-pull; by spending, people are pushing up prices further.

Two stories about inflation, with two different implications for output. But both of them account for the observation that prices may rise across the economy under certain circumstances.
Economic Fluctuations: Unemployment and Inflation

The Quantity Theory of Money

We’ve talked about output, we’ve talked about unemployment, and we’ve talked about inflation. Now it’s time to construct a story that begins to fit together all of these variables in the macroeconomy. In this discussion, we’re going to be building what I think is the simplest model in macroeconomics. It’s great though because it shows a simple relationship between money, output, and prices – three of the most important variables in describing the macroeconomy.

The model is called the quantity theory of money, and it begins with a very simple insight. That is, all the shopping that people are doing in our economy has to be paid for somehow. Anytime you’re doing shopping, you are either handing someone cash or writing a check. Even if you’re paying with a credit card, you’re eventually settling that account with cash or a check. So the shopping that’s done in the economy depends critically on the amount of money there is available to make that shopping happen. This is the insight behind the quantity theory of money.

Let me build an equation that shows the quantity theory’s story. Let’s start with the gross domestic product of the economy. The gross domestic product has two components – the prices people pay for the output, real goods and services that they buy. If you multiply prices times quantity, and add them up, you get the total shopping bill for the economy, the real gross domestic product – the market price of all final goods and services that are produced in the economy in a year.

Now, how do people pay for this stuff? Whenever they go and they buy these goods and services, what are they using to settle the transaction? They’re using money, and by money, we mean currency and checks. These are what are called transactions instruments, or the payment system. If we take all the cash and checks that are out there in the economy, then we’ve got the money supply. The money supply is what people use for shopping. If you want to know whether something’s money or not, answer this question: Could you use it to pay the pizza delivery guy when he brings your pizza? Checks, yes; cash, yes; usually not credit cards; certainly not shares of stock. I mean, that other stuff isn’t money, but all cash and currency is.

Then, there’s this other matter of velocity; that is, in the United States right now, the gross domestic product is close to $9 trillion. The money supply, however, is only $1 trillion. What does that tell you? It tells you that there’s about nine times as much value in shopping being done as there is money to make that shopping possible. That means that the money has to be circulating in the economy. A given dollar bill is spent again and again and again, on average nine times a year. That nine times is what we call the velocity of money. The velocity of money is defined as the average number of times that a dollar bill in our economy is spent and re-spent in the course of a year.

So this equation that I’ve written down, which is sometimes called the quantity equation, is really just a matter of accounting. All the shopping that’s done in the economy has to be paid for with money. And since there’s a limited stock of money, a given dollar bill is spent again and again and again, on average nine times a year. In the U.S. economy, $9 trillion worth of shopping, $1 trillion worth of money – a given dollar bill spent again and again, nine times.

Now, to turn this into a theory about the way the economy works, let’s make an assumption about velocity. Let’s suppose that people spend and re-spend money at a constant rate. That’s not exactly realistic. When interest rates are high, people want to get by with less money, because they want to put more of their wealth in bonds and stocks and mutual funds and savings accounts, and other forms that aren’t money. However, let’s suppose for the sake of simplicity that people spend money at a constant rate – anytime you get money, you typically spend it within a certain amount of time. Well, if that’s true, if the velocity of money is constant – and I’ll hold it constant by putting a bar over the top of it, this red bar means that velocity doesn’t change – if that’s the case, then any change in the money supply has to show up as a change in gross domestic product – which means either a change in the price level, a change in output, or a change in both.

Let me take a very simple numerical example in which the economy produces one product – cars, and that’s our gross domestic product is the amount of money that’s spent in our economy on cars in a year. Suppose there’s $1.00 in the economy, so the money supply is $1.00. And let’s suppose that the velocity of money is 2 – and you’ll see where that comes from in just a moment. Well, if the price of a car is $2.00, and we have one car produced in our economy, then the gross domestic product is $2.00, which means that our dollar bill has to be spent on average two times in a year to pay for this shopping.
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Let’s start with those numbers, and let’s ask the question, What would happen in this economy if we increased the money supply? Now, with Gary’s help, we’re going to print a little bit of extra money, and we’re going to find out what happens to the variables we care about, what happens to prices and output when money increases. So Gary, let’s put a little bit of paper in our printing press, and see if we can’t get some money out. Great, thank you very much. So now we’ve doubled our money supply; we’ve gone from $1.00 to $2.00 worth of money. And now that we have $2.00 in the money supply, with a velocity of 2, something’s got to give over here. There are two things that could happen.

Well, one thing that could happen is that the extra money makes credit easier to get. Since we’ve pumped more money into our economy, banks may be more likely to make you a loan, because the money isn’t as scarce as it was before. If credit is easier to get, businesses are likely to expand and produce more output, and real GDP – that is why the output of the economy could increase. That’s possibility number one.

So we have two cars, at $2.00 apiece equals $4.00 of gross domestic product, which is our $2.00 money supply multiplied by the velocity of 2. These $2.00 circulate to create this gross domestic product. So one possibility is an increase in the money supply working through the banking system, through the credit markets, lowered the interest rate, makes credit easier to get, encourages businesses to expand, and gives us a higher real output.

The alternative is that output doesn’t change at all, and the price level simply increases from $2.00 to $4.00. That is, with more money in the economy, people are spending a higher quantity of nominal money on one car, which is going to drive up its price. That is, the price of the car is bid up, there is no more real output, and therefore the increase in the money supply is purely inflationary. All it does is result in an increase in the price level.

So, two possibilities: an increase in the money supply if velocity is constant can either increase real output, or it can increase the price level. At this point, you’ve got a very good question, and that is, How do we know which one is going to happen? How do we know whether an increase in the money supply is going to lead to an expansion in the real economy, or simply create inflation? The answer depends on where we start. That is, when we increase the money supply, are we at a point in the economy where there’s slack, where there are unemployed workers, where there is unemployment among raw materials, where there’s stuff that’s not being used. If we’ve got slack, if we’re in a place of unemployment in the economy, an increase in the money supply is more likely through its effect on the credit markets, to increase real output, and give us this outcome. That is, an increase in the money supply is likely to provoke an expansion in the real economy.

However, again, this depends on the fact that we’d be starting in a recession, or in a period of unemployment. This is what happened in the United States in the early 1990s. We were in a recession, and the Federal Reserve, through its cooperation with the banking systems, increased the money supply, encouraged banks to lend more freely, businesses expanded, and the economy grew, and real output increased.

On the other hand, if we’re already at full employment, and we can’t produce anymore output – that is, if unemployment is low, if raw materials are already fully employed, if we’re right up against the speed limit of the economy, if we’re at the non-accelerating inflationary rate of unemployment – if we’re at that point, then pumping more money in isn’t going to get you any more stuff, because there’s no more stuff to make. We’re right at the capacity of the economy; therefore, the increase in the money supply only increases the price level. This is the case frequently. In fact, the Fed is afraid – the Federal Reserve system is concerned that the U.S. economy might be at that place right now, and that the growth rate of the money supply, if it were to increase, would not give us extra output, but only spark inflation.

Now the classical economists focused on the capacity of the economy. They believe that output was in the long run fixed and that it couldn’t increase. Therefore, in the long run, if output can’t increase, then any change in the money supply, in the long run, is purely going to affect prices; there’s going to be no change in output. So a reduction in the money supply is going to lower prices; an increase in the money supply is going to increase prices.

In the classical view of the economy, money doesn’t affect real variables. It affects only nominal variables. That is, the money supply, which is measured in money, a nominal variable, influences prices, the other nominal variable, without any affect on output, the real variable. So in the classical view of the quantity theory of money, velocity is stable, output is fixed, and increases in the money supply affect only the price level. Nominal variables influence only nominal variables.
Economic Fluctuations: Unemployment and Inflation

Inflation

The Quantity Theory of Money

Now a minute ago Gary came in and printed money for us, and this is what happens in a lot of governments that don't have alternatives for financing public goods. That is, if the only way you can finance public goods is by printing more money, you're likely to provoke inflation in your economy. This is called the inflation tax, where people throughout the economy pay for the government's spending in the form of higher prices for all goods and services, because the government is spending by printing money; and printing money, in the long run, is going to be purely inflationary.

So, see, with this quantity theory of money, we're able to come up with a simple relationship among some very important macroeconomic variables – money, the price level, and the real economy. We'll be building some more complicated models as our discussion of macroeconomics progresses, but it's great to have a simple model to start with, because it does explain a lot.
Economic Fluctuations: Unemployment and Inflation

Inflation

The Costs of Inflation

We've said a lot about inflation, what it is and what causes it, and by now, you're wondering, "Well, who cares? Why should I care that prices are rising rapidly in the economy? Especially since my paycheck tends to rise at about the same percentage rate as the price of the goods and services that I buy. Does it really matter?" The answer is, yes, it does. There are several costs to rising prices in the economy.

First, let's talk about how inflation redistributes wealth. Whenever the inflation rate rises, whenever prices are increasing at an unexpectedly rapid rate, people who lent you money at 10% interest, say, are suddenly finding themselves getting back in repayment less purchasing power than they originally lent you. I lent you money at 10% interest because I expected the inflation rate to be 5%. If the inflation rate actually turns out to be 15% instead of 5%, that 10% interest that you pay me doesn't compensate me for my loss of purchasing power. As a lender, I'm worse off when there's unexpectedly high inflation. On the other hand, you as a borrower are better off when there's unexpectedly high inflation, because it's easier to earn money. Your paycheck is probably higher, and the goods and services that you're giving up in order to repay your loan are less; you're giving up less because money is cheaper.

So when there's unexpectedly high inflation rates, income, or wealth, is redistributed away from lenders and in the direction of borrowers. Lenders hate unanticipated inflation, because it shrinks the purchasing power of the money they get repaid. Borrowers like it, because it makes it less painful for them to repay loans.

A second kind of redistribution is away from people who live on fixed incomes. People who are on fixed incomes that don’t rise at the rate of inflation find the purchasing power of their fixed incomes shrinking. Some people who live on fixed incomes are living on the interest on bonds that they hold. Well, they're lenders – right? – like the story I just told; so the money they're getting has less purchasing power than they expected, because prices rose unexpectedly rapidly. Other people who live on fixed incomes are pensioners, or other people who have annuities of some kind. And all in all, you can think about people living on fixed incomes as lenders, or else as recipients of government transfer payments. People who live on social security or other kinds of public assistance are often on fixed incomes.

However, in recent years, more and more public assistance programs are indexed for inflation. So, as we've said before, social security payments rise with the consumer price index, so that there's less pain for people who are living on social security payments, because social security payments aren't anymore strictly fixed; they rise with the inflation rate.

But anyone who is living on a fixed income – whether they're living on the income from bonds they bought a long time ago, or their retirement account from their company, which was a form of loan that they made to their company which is being repaid to them in retirement – their fixed incomes are going to shrink in purchasing power when prices rise.

One more thing that inflation does: Inflation provides an occasion for the government to impose an extra tax on its citizens. By printing extra money, the government can take the cash that it prints and go buy stuff – roads, bridges, missiles, schools – and the cost of those goods is passed on to customers – or to taxpayers – in a kind of broad inflation tax. Notice the government isn’t taxing you directly to get money to buy these things; the government is printing the money. So at first it seems painless, but when the government goes out and starts competing in markets, spending its stuff, directing labor into the construction of roads and bridges, it’s driving up the price of raw materials and labor for everybody else. So the inflation becomes a kind of tax; it’s a way that the public at large pays for government spending when the government finances the spending by printing more money.

Now, what are the other costs to the economy? Redistribution isn't really a cost. Redistribution is just taking something out of your pocket and putting it into mine. But there are ways in which inflation shrinks the overall amount of wealth created. There are ways in which inflation makes the total pie smaller. Let's make a list of those factors.

First, inflation involves what we call menu costs. That is, whenever I go to a restaurant and I look at a menu, I see what there is to buy, and how much I have to pay for each item. So if there's inflation, that means that this restaurant is going to have to print its menu more often, or it's going to have to put it on a computer or a television screen or something, so it can update its prices more frequently.

Whenever people have to get information about prices in order to make decisions, and when prices are changing rapidly in an inflationary environment, there are menu costs which are a kind of transaction, or information cost, the cost of communicating the changing prices to individuals in the market. So stores have to go through with their pricing
Economic Fluctuations: Unemployment and Inflation

**Inflation**

**The Costs of Inflation**

gun and put new tags on all the things that are on the shelves, and, they have to print new menus, and newspapers have to come out with daily updates of prices. And all of this is costly.

The next kind of cost is the cost of unproductive activity that people undertake in order to protect themselves from inflation – so-called shoe leather costs. In an inflationary environment, the last thing you want to do is carry a bunch of cash around in your pocket, because if you’ve got money in your pocket, the value of it is rotting, even as it’s sitting in your pocket, because prices are going up, and its purchasing power is shrinking. Therefore, what you’ll tend to do is leave your money in the bank longer, earn more interest on it – which at least helps you keep up partly with the cost of inflation – and just go to the bank more often to withdraw cash, which means you’re wasting time that you could spend taking care of your children, or hooking rugs, or programming your computer, and you’re wearing out your tires and your shoe leather. The extra time and resources that are burned up while people undertake unproductive activities to defend themselves from the effects of inflation, we can call those “shoe leather costs,” or “unproductive defensive expenditures.”

A third cost of inflation is the misallocation of resources. People are confused about whether prices are rising generally, or about whether relative prices are changing. I go to the store and I notice the price of milk has gone up, and I don’t know whether that’s because of inflation, or whether it’s because of some kind of disease that wiped out a big chunk of the dairy herd; I don’t know. I don’t know whether I should buy more milk now, because the price of it’s about to go up further, in an inflationary environment, or whether I should substitute away from milk and go by orange juice instead, because milk has become more costly relative to other products.

Consumers and businesses are confused about what to do in an inflationary environment. And remember, if inflation is variable – which it typically is whenever it’s at a high rate – when the inflation rate is unpredictable, then borrowers and lenders find themselves in a weird situation – “I’m lending you money, and I’m going to charge you an extra high interest rate to protect myself from the possibility that an unexpectedly high inflation rate is going to shrink the purchasing power of this loan before you repay it.” See that’s a kind of defensive action that lenders are afraid to make loans except at very, very high, protected insurance rates. So these interest rates that lenders charge, the decision about whether to buy milk or not, perhaps I put my money into real estate or art or something that rises with the price level rather than lending it to a business that might use it for capital and making a profit – all of these are distortions of resource allocation that result when inflation confuses people. People don’t know whether relative prices are changing, or whether the general price level is changing. And therefore, they don’t know what to do. Do they save money, do they invest in this, do they invest in that.

So with inflation, we get risk for lenders, we get higher interest rates to try to cover the cost of inflation, and we get the difficulty that all investors have in trying to figure out whether they can earn a return that’s going to be worth giving up purchasing power today. All in all, inflation is costly for the economy, not just because it redistributes wealth from one group; to another – economists aren’t quite as concerned about that – but because it causes menu costs, shoe leather costs, and confusion about whether relative prices are changing or general prices are changing. And that leads to a misallocation of resources, and inefficiency.
Economic Fluctuations: Unemployment and Inflation

Inflation

Case Study: Behavior During Hyperinflations

I’ve come to the grocery store to do my shopping during a period of hyperinflation. Hyperinflation is a time in the economy when prices are rising very, very rapidly. In fact, one of the hallmarks of hyperinflation is that prices are changing practically before your very eyes. This happens occasionally in history that an economy will find itself in a period where prices seem to be out of control. Well, how do prices get out of control? How does inflation turn hyper? Usually inflation becomes hyperinflation when the government is printing money like crazy; and the government will be printing money because it’s its only way of paying its bills.

Consider a government that can’t borrow money by issuing bonds, and therefore must print money to cover any deficit spending. That means if the government’s in a bind and has to make payments to its poor people so they can buy bread, or to pay its army to keep peace in the streets, and yet the government is in a situation where it can’t raise taxes because the tax system has broken down, or was never in place to begin with, then the deficit has to be financed by the printing of money. And once money starts to be printed like crazy to finance government deficits, next thing you know, the money becomes worthless and prices are out of control, because it takes a larger and larger and larger amount of this increasingly worthless paper to buy anything you might be interested in. I mean, when I walked into this store, this pineapple only cost $2.00, and now look, it’s $8,000.00. I’d better get it up to the register fast, before I find out that even the money that I brought with me isn’t enough to pay.

There are several examples of hyperinflation in history – Germany after the world wars, or Israel in the 1980s. One notorious example of hyperinflation was Bolivia – around 1985 prices rising at an annual rate of 30,000% a year, prices changing practically before your eyes. When you’re in a period of hyperinflation, what would happen would be Bolivia would be trying to get rid of their devaluing pesos as quickly as they were handed to them. A worker would take his peso paycheck, go and buy a month’s worth of rice and noodles, and then as quickly as possibly convert all the remainder to dollars on the black market. And if he got down to the dollar market too late in the day, he might find that the remaining pesos – maybe almost a million pesos – would only buy $20.00 instead of $30.00 that it would have bought in the morning.

So during a period of hyperinflation, people are obsessed with getting rid of money, even if it’s becoming worthless. People will also ask to be paid in the goods they’re producing. When you work at an overall factory, you don’t want pesos, you want overalls, because, then, you can at least barter them for chickens, and the stuff that you need. Everybody finds that changing money can earn a higher return than other forms of productive activity, and that’s exactly what happened in Bolivia. A lot of people left their original occupation making soup, making clothing, and instead wanted to become money changers, because the economy was so overheated with people trying to trade their pesos.

What also happened was Bolivian tin was exploited through Peru, because nobody wanted to hold the Bolivian peso that they would get whenever they traded their tin for money. Therefore, the Bolivian economy began to revert to barter, and the peso was something no one wanted to hold. When people don’t want to hold money in the economy anymore, then they’re subject to transactions costs, and small menu costs; that is, the prices have to be changed several times a day. And all the effort that people will go to, to avoid the money – going to the black market, buying and hoarding goods instead of holding the paper stuff.

Another famous example of hyperinflation occurred in the American colonies and then the new United States around 1776. The U.S. is fighting a war against Britain, and George Washington needs to raise money for his army. The Continental Congress, at that point, had no authority to borrow money. So it paid for its deficit spending by printing Continental dollars, which very quickly became worthless, because there were so many of them printed because of the needs of the army that they were depreciated, and prices in terms of those dollars rose very rapidly. And before long, no one would accept them in payment.

So hyperinflation occurs at a point when government deficits have created so much rapid rise in the price level that people simply don’t want to hold the money anymore, and the economy reverts to barter, as if there were no money at all.

A situation in Serbia occurred also when the war there caused the government to have to spend money to raise an army. They couldn’t raise taxes in this war-torn country, so they printed the money they needed to pay for the army, and what happened as a result was that prices began to rise at a rate of 10% a day. Now 10% a day means that
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prices double every seven days, so that's an inflation rate in the quadrillions – a practically astronomical inflation rate – so that by the end of the year, prices had become practically meaningless.

How does a country get out of hyperinflation? It gets out of hyperinflation by bringing government spending under control so that the government printing presses no longer have to run to produce the money that’s used to pay the government’s bills. Until the government can get its deficit spending under control, it can’t stop printing money. Then what typically happens, like in Germany after the world wars, is that the government will step in and say, “All right, deficit spending has ended. We’re going to replace this old worthless currency with a new currency.” And if the public has confidence in it, then prices can be reestablished in the new currency, and people can have confidence that there will be price stability.

As for me, prices are rising so rapidly in my economy that it turns out that even the money I brought in with me isn’t enough to buy the pineapples I came to get. This money is worthless. So what am I going to do? I’m not going to take the money anymore. I’m going to revert to barter, and I’m going to ask to be paid in overalls, so I can bring them in and trade them out the back door for the pineapples that I want. This economy, because of its hyperinflation, has reached the inefficient point that I’m ready to revert to bartering. When my government gets its deficit spending under control, and stops printing money, then maybe I’ll be willing to accept it again.
We’re ready to build a model of a macroeconomy – a model that shows us how prices, output, and the money supply are related to one another. What would a model of a macroeconomy look like? We know what a model of an individual market looks like. Say this is the market for onions – there’s the demand curve that explains the behavior of people who buy onions; there’s the supply curve that explains the behavior of people who sell onions. The buyers and the sellers get together in a market, and through the bidding mechanism, they establish an equilibrium price and quantity – that is, a price at which the quantity of onions demanded is equal to the quantity supplied. The market clears, the outcome is stable, and, according to analysis in microeconomics, gains from trade are maximized under certain circumstances, and we can be very happy about the outcome.

What does equilibrium look like in the market as a whole? That is, is the macroeconomy like the market for onions? Or is it different in some fundamental way? The classical economists – that is, the disciples of Adam Smith – believe that the macroeconomy works just like the market for onions – it is like one big supply and demand apparatus interacting with prices and wages constantly adjusting to keep us in equilibrium. The way the classical economists saw the problem of the business cycle was as follows; that is, there’s some wage that’s established – and you can think of the wage as the price of labor – and at the going wage, there’s a demand for labor, which represents the behavior of businesses, and there’s a supply of labor, which represents the behavior of households. And if the wage is above the equilibrium wage, then what you wind up with is a larger quantity of labor supplied than the quantity demanded. And we call that excess supply of labor unemployment.

Now according to the classical economists, this period of unemployment is going to set in motion a bidding mechanism. That is, the workers who can’t find employment at this wage will be willing to work for a slightly lower wage, and a bidding mechanism will kick in. Meanwhile, over here, as the wage begins to drop through this adjustment process, some businesses decide they want to hire labor that they weren’t previously planning to hire. Whether they’re using machines or simply not producing at all, they will hire the workers as the wage falls. As the quantity demanded increases, and the quantity of labor supplied decreases, we head for the point where quantity supplied and quantity demanded are equal. That is, the wage adjusts downward to eliminate unemployment.

In the classical view of the world, unemployment was a dis-equilibrium phenomenon that would signal wages to drop; and as wages fall, unemployment would be resolved automatically, kind of like the way any excess supply is resolved in any well-functioning market.

The classical economists also had a view of the way the macroeconomy worked. That is, anytime a business is producing output, by selling that output they are creating income for the workers of that business, who can then use their income to buy the stuff that businesses are producing. You might say that supply creates its own demand. In fact, Jean Baptiste Say said exactly this – this is Say’s law, a kind of idea about equilibrium in the macroeconomy. That is, when businesses produce stuff, the stuff they produce and sell becomes the income of the workers, who then turn around and buy the stuff. Everything that’s produced automatically creates a market, by generating income to the people who are the customers in the store.

So if you take Say’s law, and you take the classical view of the way prices adjust to give us equilibrium, you can be pretty optimistic that the macroeconomy is going to adjust to a period of stability. That is, the macroeconomy is self-adjusting – wages and prices adjust to clear up problems like unemployment. Well, the classical view of the world was threatened, and eventually laid waste to, by the most important economic news of the first half of the 20th century, and that was the Great Depression. Here we have ten years in the 1930s where output falls by about 40%, and unemployment hovers around 25% for many years; and wages don’t adjust to resolve the problem – that is, wages simply don’t fall. Now why don’t wages fall? There are several explanations. Employers may decide to pay their workers a very high wage to motivate them out of fear of losing their job. The wage may be above equilibrium, so that workers get enough to provide healthy meals and health care. It may be that workers get paid more than the equilibrium wage so that the employers can attract highly qualified workers.

There are several explanations for the so-called efficiency wage. It may also be that there’s a minimum wage law that puts a floor on how far wages can drop. It may also be that labor unions, through their strengths, keep wages above equilibrium. But as long as wages don’t adjust, as long as they are sticky downwards – that is, as long as wages are pushed up in periods of strong labor demand more easily than they are pulled down during a period of slack demand, this adjustment mechanism doesn’t work as rapidly as the classical economists imagine. In fact, it may not really work at all.
John Maynard Keynes thought about where the depression came from. And whenever the classical economists argued with Keynes, when the classical economists said that eventually falling wages would eliminate the depression, Keynes came back with the quip, “Yes, in the long run, falling wages will solve the problem; but in the long run, you are all dead.” Keynes said the problem is that wages are sticky, and once wages are sticky, unemployment can persist for long periods of time. “The solution,” Keynes said, “is to stimulate demand.” That is, if people would just spend more money, businesses would have to hire more labor to produce the goods and services, and thereby reduce unemployment – that is, provide more jobs.

Keynes said that in an environment where wages were sticky downwards, unemployment could persist. And once unemployment was persisting in the face of sticky wages, once the bidding mechanism was failing to do the job that the classical economists imagined it would do, then it becomes all about demand. When demand is stronger, whenever people will buy more goods and services, then firms have to hire more labor to produce those goods and services. Then people wind up with more income, and they spend more money. So for Keynes, the solution to the problem was increasing demand. And if households wouldn’t buy goods and services – that is, if a household were afraid to spend money, never knowing whether they were going to have a job tomorrow, trying to hold money out of fear of their situation getting worse – if the households kept their savings high, and wouldn’t spend, then the government would have to step in and fill the gap.

It is Keynes’s prescription that increased government spending could increase demand, stimulate the economy, and reduce unemployment – that is, put the economy back to work. This was Keynes’s view. Now Keynes’s view ignores several things that are going to be important to us in the study of macroeconomics. For example, it ignores adjustment in the overall price level in the economy – there’s not really anything Keynes can say about inflation – and he ignores the supply side of the economy – supply shocks – what happens to the economy if oil prices increase? But we’re going to be able to learn a lot about the way the macroeconomy works by focusing on Keynes’s simple idea – that is, if wages are sticky, and prices are not adjusting, then the outcome in this macroeconomy – the amount of employment, the amount of output, and everything else – depends on demand. It’s all about demand – if the government spends more, the economy is stimulated; if consumers spend more, the economy is stimulated; if businesses spend less, the economy contracts. In Keynes’s view of the macroeconomy, demand drives it all.

Now we’re going to take this insight and build a model carefully around it, using graphs and a little bit of algebra, to show how a demand-driven macroeconomy works.
Historical Background

Case Study: John Maynard Keynes

Seventy years ago the world economy was mired in a deep depression, and the question in the minds of policymakers and academics alike was, “Why doesn’t this situation correct itself?” The classical economists had taught the faith that wages and prices would adjust to restore the equilibrium between supply and demand, and if there was a lot of slack demand for labor, then wages would fall until businesses wanted to hire the workers and unemployment was reduced. However, this didn’t happen. Wages and prices didn’t fall in the 1930s by very much, and instead there were unemployment rates of 25% and higher in some countries of the world.

Enter John Maynard Keynes, an economist with an original idea. John Maynard Keynes was trained in mathematics, and became an economic professor at Cambridge University in England. His original idea was that if wages and prices are fixed, or sticky, because of some other problems with adjustment in the economy, then what would happen in a period of slack demand would be unemployment, depression, and the misery that the world was witnessing in the 1930s. Keynes’s policy prescription was that businesses and consumers should increase their spending so as to lift the economy out of this depression. But if businesses and consumers were gloomy and wouldn’t increase their own demand, the government should step in and make up for the demands that consumers and businesses weren’t exerting. So government policy could lift the economy out of depression by stimulating demand.

Keynes’s thought was at odds with the thought of classical economists who worked in the tradition of Adam Smith. The belief of the classical economists was that wages and prices adjusted to clear the market. But Keynes’s idea was very radical, because it questioned the central tenet of economics — that is, the adjustment of wages and prices.

Now, what began to happen quite quickly could be described as a Keynesian revolution. In 1936 Keynes published his general theory of employment, interest, and money. In it he laid out the ideas of demand driving the economy in a situation where prices and wages were sticky. Keynes died in 1946, shortly before his ideas had achieved general worldwide currency. Academics in the late 40s and 1950s came to agree that Keynes understood the economy correctly. And they had the evidence of the 1930s and 40s to back them up; that is, the New Deal spending in the United States under the Roosevelt administration did wonders for the economy, but not as much wonder as World War II did. When the economy geared up for wartime production, people were put back to work, and the increase in income led to an increase in consumption, and vigorous economic health.

By the 1950s academics understood that Keynes’s ideas had merit, and by the 1960s, they had thoroughly infiltrated governments around the world. Fiscal policy was understood to be a great way to stimulate your economy out of a recession, and to slow your economy down when it was booming too vigorously. By the 1960s economists and government policymakers could say, “We’re all Keynesians now!” Keynes’s view had come to dominate the economic scene.

The 1970s, however, put Keynes’s thought on bad times. We observed in the 1970s high oil prices at the same time as the economy slipped into recession. That is, the efforts of the government to stimulate the economy to increase government spending seemed to lead only to inflation, and not to increases in employment and output. So the 1970s tested faith in Keynes’s theories.

In the 1980s, however, economists came to reformulate Keynes’s ideas, putting them on sure microeconomic foundations; that is, many of the reasons for which wages and prices were presumed to be sticky were reexamined, and made more sophisticated. And in light of these new theories, Keynes’s ideas were rehabilitated and restored to popularity.

In the 1990s, and as we enter the 21st century, there’s a whole group of people who trace their economic roots to John Maynard Keynes. The new Keynesians look for ways of explaining why wages and prices might be sticky, and why demand does indeed drive the economy.

Keynes was an enigmatic personality, and someone who was obviously greatly respected by his students and quite influential at the highest levels of government. He was someone who believed in the power of ideas. One of his most famous quotations is this: “The ideas of economists and political philosophers, both when they are right and when they are wrong, are more powerful than is commonly understood. Indeed the world is ruled by little else. Practical men, who believe themselves to be quite exempt from any intellectual influence, are usually the slaves of some defunct economist. Madmen in authority, who hear voices in the air, are distilling their frenzy from some academic scribbler of a few years back. Sooner or later it is ideas, not vested interests, which are dangerous for good or evil.”
Aggregate Expenditures Model

Historical Background

**Case Study: John Maynard Keynes**

Keynes’s ideas are very much with us today, and, in fact, they are still in dialogue with the classical economist whose own ideas have been made more sophisticated. This is what the excitement in macroeconomics is all about. Keynes, who can rightfully be called the Father of Modern Macroeconomics, founded macroeconomics on a radical idea that was at odds with the classical economists. The classical economists have come back with their own formulation of why the Great Depression happened, and how government policy may or may not be able to help. There is debate between the Keynesians and the monetarists – two changing forms – as both sides make their arguments more sophisticated, and more rigorous. But it is Keynes’s influence that is still felt in economics today, because his original idea changed the way people thought about what caused depressions, and how to get out of them.
In Keynes' model of the macroeconomy, everything revolves around demand, and demand means spending. So the first task in building a Keynesian model of the macroeconomy is to carefully describe the spending plan of the different sectors of the economy. So let's begin by listening to sectors of the economy and looking at how to describe their spending plan. There are households, there are businesses, there's the government, and there are foreigners; and each of these sectors has its own spending plan. Households are consumers, and their spending is called consumption spending; business spending on plant, equipment, and tools is called investment; government spending on roads, bridges, public goods, and other things, and net exports is the net spending of foreigners on our goods less what we spend on theirs.

Each of these components of aggregate spending is measured in real terms. Although we may refer to total dollars spent on consumption, when we're talking about real spending, those dollars are inflation adjusted. And rather than referring to money, they refer to baskets of consumer goods – they refer to stuff that consumers actually buy.

Now if you look at what consumers are planning to spend, what businesses are planning to spend, the government, and foreigners, and you add them together, you get a measure that we call aggregate expenditure, and aggregate expenditure depends on other variables in the environment. For example, consumer spending is heavily influenced by income and wealth; business spending is heavily influenced by the interest rate; foreign spending is influenced by the exchange rate. And if we add together the combined spending plans of households, businesses, government, and foreigners, we get what Keynes might call “aggregate expenditure,” or “aggregate plan spending.” Aggregate plan spending is the sum of the spending plans of all of the individual sectors in the economy.

So now we have it – aggregate expenditure – what the economy is planning to spend. Looking ahead, what we're going to imagine happening next is a comparison between what people in the economy are planning to spend and how much stuff there is actually in the economy to buy. Because if there's a discrepancy between what people are planning to spend, and what has actually been produced, businesses are going to find all of the goods don't leave the shelves; that is, some stuff is left behind. And what businesses have to do in that case is make an unplanned investment. We call this “unintended inventory accumulation.” An unintended inventory accumulation is the difference between the output of the economy and the combined spending plans of all of the players in the economy. Looking forward, then, you can imagine that the equilibrium in Keynes's model is going to be a situation in which all spending is planned spending – that is, in which the income that's actually created in the economy is just enough to promote the spending on those goods, so that all the goods that are produced are actually intended – intentionally purchased by the people in the economy.

What we're going to do now in order to get to a more thorough understanding of this equilibrium is look at each of these components of aggregate expenditure in turn, and explain them. We're going to start with consumer spending, because it's the most important and largest component of spending, and understanding it is going to help us understand basically the structure of this model.

So let's start with consumer spending. Consumer spending is a function of other variables in the environment. And to understand this better, think about what influences your own decision to buy stuff; that is, what does your planned spending depend upon? Well, here down below I've written a consumption function that summarizes the variables that influence consumer spending – that is, the amount of stuff that households buy in a year. It's going to be a function first of all of autonomous spending. This is the stuff that you have to buy no matter what else is going on in the economy; this is food, clothing, shelter – your basic necessities. This is stuff you would go into debt to buy even if you had no income.

The second component is your wealth. When your savings is bigger, you have more money in your mutual funds, you're more likely to consume. Next, income; the higher your income, the more you have to spend. And income is especially important when you are liquidity constrained – that is, whenever you have less ability to borrow at the bank, then what you're able to spend in a given year is more tightly tied to your paycheck. The availability of credit would increase the amount that you would buy in a year. Taxes also have an effect; the higher your taxes, the less money is leftover for consumer spending. The price level is important, but not in the way that might seem immediately obvious. That is, when you go to the store, if prices are higher on the shelf, it's not that you really care, because your income is higher also. That is, if your paycheck is increasing at the same rate as consumer prices, then the prices are irrelevant; you still buy the same amount of stuff – your real consumer spending is unchanged.
Aggregate Expenditures Model
Components of Aggregate Expenditures

The Aggregate Expenditures Identity

The problem comes in when the price rises relative to your savings account, because, typically, your savings, your mutual funds – other wealth – is denominated in nominal terms – that is, in fixed dollar amounts – so that when the price level rises, the purchasing power of your savings shrinks, and that inclines you to spend less – to buy less stuff.

So the consumption function can be very complex. It can depend on a lot of other variables, like demographic factors. Your age may influence how much you spend – the part of the country, the weather – all of this stuff. But in order to build a simple model to explain the Keynesian notion that demand drives the economy, we’re going to look at consumption dependent primarily on two factors – first of all, a notion of autonomous consumption – what you’d spend in the absence of any income, and next, income as a driver of consumption. All of these other variables we’re going to hold constant. They’re either going to be subsumed into this autonomous component – that is, we could change them by changing the amount of autonomous spending we do – or they’re going to be just held constant – zapped with ceders paribus.

So now that we’ve got a consumption function – a notion of a consumption function – let me show you how we represent that more thoroughly in the Keynesian model. Let me start with a consumption schedule. Suppose this is a description of a particular consumer’s behavior. We show here that consumption spending depends on income. As income increases, consumer spending increases. With an income of 40, this consumer spends 42; with an income of 50, the consumer spends 50 – exactly what he or she is earning; and finally, with an income of 80, the consumer spending is 74, with some leftover for savings.

Now, these numbers show a positive relationship between income and consumption; and if I wanted to look at lots of other income levels and lots of other consumption numbers associated with them, I could do so, and summarize them in a simple algebraic equation. The simple algebraic equation is a linear consumption function – a simple linear Keynesian consumption function that’s going to look like this – Y as the consumer income. What we’re going to do is we’re going to multiply that consumer income with the letter, b. \( b \), in this case is the marginal propensity to consume – or the MPC. What \( b \) tells you is the fraction of each additional dollar of income that the consumer spends. That is, for example, if \( b \) is .5, or $.50, the consumer spends $.50 out of each additional dollar that is added to his or her income. So \( B \) is the marginal propensity to consume, and \( Y \) is income – the amount of extra spending that’s added to the consumer’s plan by an increase in income.

Now, if we take that and we add to it an autonomous component, \( A \), then we get consumer spending, a linear consumption function. The spending looks like this: A plus marginal propensity to consume times income is equal to consumption – \( C = a + bY \). This is a nice, simple linear consumption function.

Now let’s draw a graph of this function; but if we’re going to draw a graph, we need to plug in some real numbers to make it a bit more concrete. Suppose I take an algebraic formula that generates the numbers that we just looked at in the previous table. Let’s suppose that the autonomous spending is 10; that is, no matter what your income is, you’re going to spend at least $10.00 on food, clothing, and shelter. And let’s suppose further that the marginal propensity to consume is equal to .8; that is, out of each additional dollar that the consumer earns, the consumer is going to spend $.80 on consumption. So here’s the consumption function: Real consumer spending is equal to 10 plus .8 times real income.

So let’s draw a graph of that formula now. First thing we’re going to do is use red to represent consuming – the consumption function – and take an intercept here of 10, because if income is zero – that is, if we’re right here in the graph with consumption on the vertical axis and income on the horizontal axis – zero income is represented by the vertical intercept of this curve. So let’s put here the vertical intercept of 10, because if income is zero, consumption will be equal to 10.

Then the slope of the line will be equal to the marginal propensity to consume. That is, for every additional dollar that the consumer gets in income – that is, for an increase in income of $1.00, or a horizontal increase of 1 – there’s going to be a vertical increase of .8; .8 is the additional consumption that results whenever the consumer gets one additional dollar of income. So here we have the slope of this curve is going to be the rise, or the change in consumption, divided by the run, or the change in income. So if we have the change in consumption divided by the change in income, the rise over the run, that’s simply going to be the marginal propensity to consume – the extra consumption you do when your income increases by $1.00. If \( Y \) increases by 1, consumption increases by $.80. So that’s the slope, then, of this curve.
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Now let me put in another curve, and this curve represents income. That is, the black dotted line that I’m now drawing in the diagram represents all of those points where C is equal to Y – all of those points where the amount of money that people are spending is equal exactly to the income that they’ve earned. So this black dotted line represents all the points where consumption is equal to income.

Now let’s see what we noticed here in this picture. Here’s a point right here where consumption and income are equal. This is a point where say these would be equal to zero, and this is a point where consumers don’t have to either save or dis-save – they have to do neither. That is, they simply spend their paycheck as they get it. But if you take an income that’s lower – so let’s take this income level right here – we’ll call this $Y_1$ – at this lower level of income, then the amount of money that consumers are planning to spend exceeds the amount of income that they’ve received. And the gap between the red line – the planned spending – and the black dotted line – the income received – that gap is going to have to be made up for by drawing down your savings. We call that “dis-saving.”

In all of these points in here, the consumer is dis-saving, because the red line is above the black dotted line; that is, consumer spending – what consumers are planning to do – exceeds the income they’ve received. If we go beyond the break-even point, say to a point like this one – I can call this level of income $Y_2$. And at $Y_2$, if I follow $Y_2$ all the way up to my graph, I get a consumption plan that involves a lower amount of spending than the consumer income. Up here consumer income exceeds planned consumer spending.

So what are you going to do with the rest of the money? The consumer is going to put it into savings. So the difference between actual income received and the consumption that’s carried out, that’s going to be savings in this case – the gap between the red line and the black dotted line. So in this region down here, we have dis-savings; that is, savings – the amount of money that’s saved – is going to be less than zero for any income below this break-even point. Now I could call this $Y_B$ where consumption is breaking even with income. And if I go beyond this point up here, then savings is going to be positive in this region, because consumption is going to be less than income received.

So there you have it. In certain instances, we’re going to have income less than consumption. In this case, the consumer is going to be dis-saving. In other cases, the consumer will be breaking even with his income by his planned spending; and in other cases, income is going to be greater than consumption, so the consumer can actually do some saving.

We’re going to look next at the relationship between consumption and saving. But keep in mind that what we’re doing here is we’re building a model that explains the macroeconomy based on demand, and the first step that we’re taking is to describe the behavior of consumers, to show how their demand, their consumer spending, depends on their income, and other factors. And we summarize their behavior in this diagram, which shows that as income increases, consumers spend more money.
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Average and Marginal Propensities to Consume and Save

We’re building Keynes’s model of the macroeconomy. It’s a model that’s driven by demand. If people won’t buy stuff, then it accumulates on store shelves; and when factories cut back their production, people are laid off work. The economy keeps adjusting until we find an equilibrium. In this equilibrium, the spending plans of consumers, businesses, the government, and foreigners add up to create an income on which those spending plans are based. That is, we get a stable circular flow between what people are planning to spend, and the goods and services that are actually produced by factories to meet the demand. That’s macroeconomic equilibrium.

To understand macroeconomic equilibrium, we have to look at the plans that consumers, businesses, the government, and foreigners make. Those plans are based on, for example, consumer income, interest rates, and other environmental factors in the economy. We’ve been thinking about the consumption function, and now we’re going to discuss another way of describing consumer behavior, because it turns out that you can just as easily describe consumer behavior in terms of savings as you can describe it in terms of spending. That’s because consumer income can be used in one of three ways. When you get a paycheck, there are only three things you can do with it. You can either spend it, in which case we call it consumption; you can put it in a mutual fund, or in the bank, in which case we call it savings; or the government can take it, in which case we call it taxes. These three components add up to consumer income; consumers spend, they save, and they pay taxes.

Now for the time being we’re going to assume that consumers are not paying taxes; that is, taxes are equal to zero. And, in that case, consumer spending and consumer saving add up to the total of consumer income. Well, once you’ve seen this relationship, a kind of complementarity becomes obvious. That is, consumer savings is just as accurate a description of consumer behavior, and just as complete, as is consumer spending.

Let’s go back to the numbers that we considered in the consumption schedule in a previous exercise. Here we have income equal to 40, and consumer spending equal to 42. That means that the consumer’s spending $2.00 more than his income in this period, which means that he’s drawing down his savings by $2.00 – that is, dis-savings is enabling the consumer to spend more than his income. If income is 50 and consumer spending is 50, then savings is equal to zero – a kind of break-even point. And if consumer income is equal to 80 and consumer spending is equal to 74, then that means the savings is equal to 6 – the consumer is putting some money into the bank. Here you see this complementary relation between consumption and savings.

Now, before, we described consumer spending in a function, an algebraic equation that we called the consumption function. Now what we’re going to do is look at a relationship between the consumption function and the savings function. That is, once you know how the consumer behaves, you can describe also the savings function. Let’s look now at this relationship. Output, which is consumer income, is equal to consumption plus savings. We also know that consumption is equal to A, autonomous consumption – plus B, which is the marginal propensity to consume – multiplied by Y, which is income.

Well, both of these things are true; therefore, if we plug this description of consumption into the previous equation, we can get this: Y is equal to A plus B times Y plus S. And if we solve this equation for S, let’s see what we get: -A – I get that by moving A to the other side of the equation; I move BY to the other side of the equation, and I get 1 minus B times Y is equal to S. If I move everything over to the left-hand side except for savings, this is the equation that I get: Savings is equal to -A plus 1 minus B times Y.

Let’s take a moment and see if there isn’t some intuition in all of these symbols. Well, think about it. Anything that the consumers are going to be spending at zero income – that is, the autonomous component of consumption is going to be equal to dis-savings. That is, if income is equal to zero, and the consumers have to have food, clothing, and other necessary expenditures equal to A, the only way they can get that is to draw down their savings. So autonomous consumption is going to be equal to autonomous dis-savings. This is what you have to take out of your savings account when income is zero to meet your basic needs.

The next to think about is this slope. Up here, B represents the fraction of each additional dollar that you spend on consumption goods and services. That means that what you’re doing with the rest must be savings. So if B is the fraction that you are consuming, then 1 minus B is the fraction of an additional dollar that you are saving. So you see here that B – the marginal propensity to consume – plus 1 minus B – the marginal propensity to save – is equal to 1. Every additional dollar that you get is broken into its two possible uses; one fraction of it you’re going to consume, and one fraction of it you’re going to save.
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In the example we looked at previously, the fraction that was consumed of each additional dollar was $0.80, so a $0.8. That means that the marginal propensity to save in this case is $0.2. For every additional dollar you receive, you’re going to save $0.20. The marginal propensity to consume is 1 minus the marginal propensity to save. The marginal propensity to save is 1 minus the marginal propensity to consume. Every dollar is divided into the part that’s spent and the part that’s saved, and the two propensities – the two fractions – add up to 1.

Now since that’s the case, we’re able to do some calculations based on the numbers that we used in our previous example. So if it’s true that consumption is equal to 10 plus 0.8 times Y, then savings is going to be equal to -10 plus 0.2 times Y. You can see where I got this; if you take this amount of consumption and you subtract this formula from Y – S equals Y minus C equals Y minus this formula for consumption – and if you go ahead and do the algebra here, you get Y – take the minus sign into the parenthesis – Y minus. 8(Y) is 0.2(Y), and there’s no constant outside, so your constant is going to be left at -10; savings is -10 plus 0.2 times Y – there’s the savings formula.

Now let’s take this algebra and carry it back over to the graphs that we’ve seen earlier, because we’re going to see now a graphical complementarity between savings and consumption. Previously, we wrote consumption on the vertical axis as a function of income on the horizontal axis, and we drew it out, graphing it as this linear function. Here’s my intercept of 10 – my autonomous consumption, what you spend even at zero income – and the slope of my consumption curve is going to be rise over the run. The rise here is the change in consumption, the run is the change in income, and the change in consumption that results from the change in income is equal to the marginal propensity to consume, which we’ve labeled with the letter B – the slope in our consumption diagram.

Now the savings curve is going to look like the complement of that picture. Down here we have the intercept, which is -10, because if income is zero and you’re spending 10, that means when income is zero, you must be saving -10. So if we represent savings as a vertical coordinate, as a function of income, the horizontal coordinate – when income is zero, savings is -10.

Let’s find another point on the savings curve. Well, look at this point right here. When consumption is equal to income – that is, when the red line crosses the black dotted line – savings is equal to zero. The black dotted line indicates all of those points here where consumption is equal to income; those are all the points that are on that line. So if consumption – the planned consumer spending – is equal to the income that consumers receive, planned savings will be equal to zero. Therefore, since this curve is linear and has a slope of 1 minus C, we can go ahead and draw the savings function. Here’s savings as a function of income – just like up here, we have consumption as a function of income – we now have a slope of the change in savings that results from a change in income. The slope of this curve is equal to the marginal propensity to save. The change in savings that results from the change in income is the marginal propensity to save. And in this case the marginal propensity to save is going to be 1 minus B.

Look, there’s a nice, complementary relationship between these two curves. For any given income level – now let’s pick an income level, say Y0 – if we go up the diagram, the amount by which consumption – the red curve – exceeds income – the black curve – is going to be equal to the amount of dis-savings. This gap upstairs is equal to this same vertical gap downstairs. For any given income level, the difference between consumption – the red curve – and income – the black dotted curve – is going to be the amount of savings, which is seen in the downstairs diagram. Where consumption crosses income in the upstairs diagram, savings is equal to zero.

Over on this side of the break-even point, in this region up here, savings is going to be less than zero. That is, consumers are dis-saving in order to finance the excess of consumption over income. And if we’re on this side of the dotted line, savings is going to be positive. That is, since consumers are spending less than their total income, there’s actually money, as we can see down here, being put into the bank. So it’s pretty easy to see here the complementary relationship between consumption and savings.

There’s one more term that I want to define, and that is “average propensity to consume.” Average propensity to consume is your total consumption divided by your total income. The average propensity to consume is the fraction of the their total income that consumers are spending. Remember marginal propensity to consume is how much you spend out of each additional dollar. But the average propensity to consume is your total overall spending as a fraction of your total overall income.
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**Average and Marginal Propensities to Consume and Save**

We can say the same thing about savings – S over Y is the average propensity to save – the fraction of your income that you’re saving; whereas the change in saving that results from a change in income is called the marginal propensity to save. Just as the marginal propensity to consume and the marginal propensity to save add up to 1, the average propensity to consume and the average propensity to save also add up to 1. Out of every dollar you get, part of it is going to be spent, part of it is going to be saved. Whether you’re talking about your total income, or whether you’re talking about a marginal dollar that you get, you make a decision about what fraction to spend and what fraction to save. In the United States right now, our average propensity to consume is about .95; that is, on average, we’re saving only about $.05 out of every dollar. And in recent months, it’s been even lower than that. The complementary relationship between consumption and savings helps us then, to begin to build a model of how macroeconomic forces interact.
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We’re building a model of the macroeconomy, and this model that we’re building is based on the idea of John Maynard Keynes that the economy is at its heart driven by demand. The model that we’re building is called the “aggregate expenditure model.” “Aggregate expenditure” means demand – what people are planning spend. I want to begin with a circular flow diagram, and connect this familiar picture with the graphs that we’ve been drawing to represent aggregate expenditure in the macroeconomy. We’re working towards the notion of equilibrium that’s going to help you understand how the macroeconomy works, and to predict how the macroeconomy will change when the economic environment changes around it.

So let’s go back to the circular flow diagram and look at its heart. The heart of the circular flow of resources in the economy is the relationship between consumers – that is, households – and businesses, or firms. Resources flow in this direction: Consumers put labor, capital, raw materials, into the factor markets where they are hired by firms who use them to produce goods and services; these goods and services are then purchased by households. This purchase is called “consumer spending.” So as resources are flowing clockwise around this diagram, money is flowing counterclockwise. That is, the money that consumers pay in goods and services markets, for goods and services, is called consumer spending; and here’s the real consumer spending – the real goods and services – going into the household.

This money then winds up in firms, and firms use this money to pay for the land, labor, and capital – that is, the factors of production – that they’ve used to make the goods and services; and that money winds back up in the hands of households as income.

So what we have here is consumer spending on goods and services that winds up in the firms, who use this money to pay for the resources that created the goods and services – a nice, tight, balanced circular flow. If consumer spending is the only element of demand, then it must be true that, in equilibrium, what consumers are spending – that is, what they are paying for goods and services – winds up exactly right back in their hands as income – that is, as wages, interest payments, rent, and profits from business. So there’s a balance here – spending equals income.

Now you can imagine that we could introduce another factor into this story that would disrupt this balance. Let’s suppose that there’s money that flows out of this circle – that is, a leakage out of the circular flow in the form of taxes. That is, consumers have their income reduced, because they have to pay money to the government in the form of taxes. So let’s put another green arrow here that indicates money flowing into the government.

Well, how is this going to affect the overall flow of resources? If consumers have to divert some of their income into the government in the form of tax payments, that reduces the amount that they can spend on goods and services. Firms, in turn, will respond to this reduced demand by producing less output, which means they’re going to be hiring fewer resources in the factor markets, which, in turn, is going to reduce consumer income. So this leakage out of the system causes everything to be upset; the balance is upset, and everything has to adjust until a new equilibrium is established. We’re going to see that process more clearly, I believe, over in the aggregate expenditure diagram.

So let’s take the idea from the circular flow and now translate it into a picture over here in this aggregate expenditure diagram. Here we have it, the aggregate expenditure curve that we’ve been drawing before. The black dotted line represents points where income is equal to aggregate expenditure, or total spending. These are the points that equilibrium, or balance, in the macroeconomy, where people are buying everything that the factories are producing, and they’re paying for it with the income that they get when the factories pay them their paychecks. The red line represents the consumption function that we’ve developed before – this intercept representing autonomous consumption, and the slope representing the marginal propensity to consume – that fraction of each additional dollar of income that consumers spend on goods and services rather than saving.

Think now about the consumption function. We’ve talked about it before. The consumption function is what we’ve drawn in this picture, and in order to draw this line in this graph, we have to hold things constant. Consumption spending plans depend on autonomous consumption – that is, what you have to buy regardless of what your income and other factors are – your bare necessities. It also is going to depend on your wealth – how much do you have in your mutual funds and your savings accounts. It will also depend on your income; and that’s what the diagram is all about – as income increases, you will do more consuming, especially if you are credit constrained – that is, if you have to have a paycheck in order to do any shopping. However, if you can get credit, you’re more likely to do shopping; that is, the easier it is to borrow money, the more likely it is that you’ll be spending on goods and services.
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Another factor is taxes; that is, the more the government takes out of your paycheck in the form of taxes, the less you have to spend – the smaller is your disposable income. There’s also the matter of prices; as prices increase, even though we’ve adjusted for the effect on your income – that is, we’re measuring real consumption as a function of real income – when prices increase, your savings account then seems to be smaller. That is, your $100,000 savings has a smaller purchasing power when the price level rises, and that can cause you to do less consumption. There are other factors that influence your behavior, like expectation – what do you think the future holds? Are you expecting a raise next year? You might spend some of it now.

But we hold all of those other factors constant. Whenever we draw this picture, we assume that the only thing changing is your consumer income. If we allow something else to change, we have to draw this consumption function all over again. That is, suppose we imagine that consumer wealth increases, perhaps due to a boom in the stock market. If the stock market booms and people feel wealthier, then the consumption function shifts upwards. This indicates that at any given level of income that you choose, consumers, rather than planning to spend this much on goods and services, are now spending a larger amount; spending plans have increased due to a sense of increased wealth. If consumers are planning to spend more money at any given income level then you have to shift the consumption function upwards.

On the other hand, if taxes were to increase – that is, if the government takes a bigger chunk of consumer income – then the consumption function shifts downward, showing at any given income level now, consumers are planning to spend less than they were planning to spend before, because their disposable income has shrunk. We could show the effect of taxes in our mathematical expression for the consumption function. We could do it this way: Consumption is equal to autonomous consumption plus the marginal propensity to consume times this quantity – income minus taxes. You might call this thing in parentheses your disposable income; and when taxes increase, consumption is going to be reduced. Notice, however, that consumption is not going to be reduced by the full amount of any tax burden.

Why is that? Because the increase in taxes effectively reduces your income, but not all of that is going to feed directly into a reduction in consumption. Some of that additional tax payment is going to come out of your savings account, right? Because anytime you get extra money, you save some of it, and you spend the rest. Well, when your income is pulled down by taxes, some of that comes from a reduction in your consumption, but the rest of it comes from a reduction in your savings. That’s why an increase in taxes does not have a one-to-one effect on reducing your consumption. Part of the increase in taxes is paid for by a reduction in your savings.

Well, let’s go back now to the circular flow diagram, because consumption is only one part of the circular flow. It’s probably the most important part, and as I said before, it’s the heart of this circular flow story; but there are other leakages and injections that modify the diagram. We’ve already talked about the leakage of taxes; taxes flow out of the system, reducing consumption. But there are other spending that goes into the system that increases the overall level of economic activity. One of these is government spending; the government spends on goods and services, and goods and services flow out of the goods market into the government, where the government uses them to provide for public assistance, to provide for public goods, and other things. So government money goes into the goods and services market, and goods and services flow into the government. This little exchange is called government spending.

Another injection of demand into the system is businesses spending; that is, goods and services flow into businesses in the form of investment spending – plant, equipment, capital goods – that businesses acquire – and businesses pay for them by spending money in the goods and services market. So here we have investment spending; this is the spending on drill presses, plant, factories, and, importantly, inventory. When businesses acquire inventories and build them up in their warehouses, this is a form of investment spending.

Another injection into the system is the spending of foreigners. So whenever foreigners import our products into their countries, then we experience that as net exports; that is, the flow of goods and services abroad – which is foreigners buying our goods less the goods we buy from them – we call this exchange net exports. So net exports, government spending, and investment spending are all injections of demand into the system, just like taxes were a leakage out of the circular flow.

So we can go through and label all of these with their names. This exchange right here is called consumption; this exchange right here, this one-way leakage, is called taxes; right here we have the government buying goods and
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services – we call that government spending; this exchange is called business spending, or investment; and up here we have net exports. We use these symbols over and over in our analysis of aggregate expenditure. And the flow down here from firms out of what’s leftover, into the households is, income. In the end, income is going to be everything that households are spending less the leakages – like taxes – plus the injections – government spending, business spending, and the spending of foreigners.

Now let’s go over and represent this into our aggregate expenditure diagram. You see? Because what we’re doing now is we’re adding other spending. The red line that we’ve drawn before represented the behavior of consumers. This was consumption as a function of income. Now, however, we want to add in the spending of everybody else; so I put in another red line, and notice I’ve made this horizontal because these choices are autonomous. That is, the government, businesses, all of that spending, for the moment, we are imagining does not depend on income; it’s independent of income, so it enters our model as a constant – also called “exogenous” – determined outside the model.

Well, if you add government, business, and foreign spending onto the spending of consumers, then you have to do this horizontal addition. If this is 10 right here, you’ve got to add it onto this line at every point – shift it up by the amount of 10. This is called a vertical summation; just add it on vertically, and the line shifts up.

So now what we have is aggregate expenditure is equal to consumption plus investment plus government spending plus net exports – that’s what aggregate expenditure is all about, and here’s how you show it in the picture. Take the consumption function – consumer spending as a function of income – and add on all of these other spending plans – the spending plan of business, government, and foreigners – and that now gives you a line that we can call the aggregate expenditure line. The aggregate expenditure is a function, so I’m using parentheses here – I need to note that – is a function of income, because consumer spending increases as income increases according to the marginal propensity to consume. But, for the moment, all of those other factors – all of those other leakages and injections – we are taking as constants; they don’t depend directly on income, and, therefore, they can be represented by this horizontal line and added onto vertically the consumption function to give us the new aggregate expenditure line.

So now we’re headed towards an equilibrium. The equilibrium is going to have the same idea as that circular flow – that when you consider leakages and injection, everything has to balance; and we’ve got this cast of characters – consumers, businesses, the government, and foreigners – whose spending plans have to in equilibrium balance the output of factories.
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Case Study: The Paradox of Thrift

I'm here at the bank making a deposit in my savings account and feeling very virtuous, because our culture regards saving as a virtue. However, what makes sense for one person, that is what’s good for me to do may be bad if everyone tries to do it at once. This was an insight of John Maynard Keynes’. He says, “Think about it. When you’re saving, you’re not spending. And if everyone reduces their spending at once, they may create a recession.” This is what he called the paradox of thrift. That is, when I come to the bank and put my money in the vault, I am, at that same moment, making a decision not to spend it. And when I don’t spend, I am reducing aggregate demand. And when I reduce aggregate demand, I am reducing income for someone else down the line. That is, my decision to put money in the bank is a decision not to buy a compact disc, which means that the record storeowner won’t be buying ice cream, which means that the ice cream vendor won’t be buying a T-shirt. And the multiplier effect works in reverse, causing the economy to contract.

Think about this: savings has two components; there’s autonomous savings, the amount that you're going to save regardless of what your income is, and then there’s that amount of savings that depends on your income. For each additional dollar in income that you get, you're going to be saving a fraction of it, called the marginal propensity to save. So here’s what happens; savings is a leakage out of the flow of goods and services. If everyone increases their autonomous savings, what they're doing is reducing demand, which means that businesses are going to cut back production and income is going to be falling. Eventually, what happens is that savings has to be equal to investment. That’s our condition for macroeconomic equilibrium. So if investment is autonomous, that means, if it’s a fixed amount, then what has to happen is the amount by which we have increased autonomous savings has to be the amount by which the economy reduces savings based on income. Income is going to shrink until savings falls to be exactly equal to the level that it was before everyone tried to save more. This means that since savings equals income, our efforts to try to increase our aggregate savings are fruitless and the only thing that’s accomplished is a reduction in gross domestic product. People stop spending, businesses stop creating goods and services, and the economy shrinks. This may be what happened during the Great Depression. People were fearful for the future and tried to save more money. But, when they did, they didn’t spend and therefore stores closed down, and people didn’t have jobs and income fell further and the economy contracted. The same thing may have happened in Japan. The Japanese have a reputation for saving a lot. This was great during the 50’s and 60’s when there was a lot of productive capital investment to be undertaken. However, in the 80’s and 90’s, it worked against Japan, because their economy was in a recession and everyone was trying to save. And when the foreign sectors stopped keeping the economy afloat, the Japanese economy contracted further. They were saving too much and it wasn’t until the government started spending for the economy that the economy began to grow again.

My brother and I have this argument; he says that I should spend more and do my part to create jobs and help the economy grow. I believe, however, that I am doing my part for the economy whenever I put money in the bank. That’s because there’s a component to the story of the paradox of thrift that I think is oversimplified, and that’s the idea that investment is autonomous. In fact, investment spending depends on the interest rate. And when the interest rate is lower, businesses are likely to come to the bank, borrow more money and build more factories and install more equipment. So what happens when I bring my money into the bank is that I increase the supply of loanable funds, pushing down the interest rate and encouraging businesses to borrow more. Once you allow the interest rate to vary and businesses to respond to lower interest rates, than savings can equal investment at a higher level. That is more savings means more investment in equilibrium. And my savings actually doesn’t deter the economy from growth. In fact, I’m encouraging businesses to install capital stock that’s going to help the economy grow faster in the long run.

So the paradox of thrift depends on a very simple view of the economy, one in which investment spending is autonomous. But if you introduce the interest rate and allow increased savings to push the interest rate down, then you can reason your way out of the paradox. Keynes was smart to come up with this idea, the idea that savings is the opposite of spending, therefore the more you save, the less you spend, and you may cause the economy to shrink. On the other hand, once you reintroduce the variable interest rate and see how savings is linked to the interest rate, you can see that putting your money in the bank is usually a very good idea, because it makes credit easier to get for businesses and, in the long run, increases our standard of living.
We're building a Keynesian model of the macro economy, and that means we're talking about demand right now we are going to focus on one particular component of demand and that's the behavior of businesses; so called investment spending. We're going to look at how businesses make the decision about how much to spend on capital goods, plants, equipment, and inventories. And we're going to look at how investment spending influences the circular flow.

I want to start though, by clearing up a misconception that many people bring to macroeconomics. When you hear the term, investment, you probably think first about money you put in the bank, or money you put in a mutual fund, making an investment in a company. Well, when macro-economists talk about that kind of activity, they use the term savings. So I am going to use the term, savings, to refer to any form in which you save money, whether it's in a bank, in a mutual fund buying stocks or bonds, anything like that, we're going to call that savings. When I use the term, investment, on the other hand, I'm referring to this little interaction right here, when businesses buy goods and services in order to increase their productivity. The purchase of capital equipment by businesses, that's what we mean when we say investment. It also includes the accumulation of inventories, and I'm going to have something to say about inventories towards the end of this discussion. So now, let's go to a representation of investment behavior that is, let's go to a picture of how businesses choose to spend money on capital equipment.

What is it that influences the amount of investment spending that businesses are doing? Well, there are several things. First of all, there is the unpredictability of life of capital goods. That is, you buy a piece of equipment, it could break tomorrow and you have to go replace it. So there is a certain amount of spending on tools and plant and equipment that businesses have to do just to replace stuff that's worn out and broken, that is just to cover the depreciation. Depreciation is sometimes unpredictable, and therefore, businesses will spend sometimes on goods and services when they hadn't planned on doing so.

Another thing that influences the decision to buy plant and equipment is new innovations. Whenever new tools, better tools are created by inventors, businesses then have an incentive to go out and acquire those. We've seen a lot of that in our economy in the last decade as firms and businesses have gone out and purchased lots and lots of computers, which they are now trying to figure out how to use to increase their productivity in business.

Another thing that influences business expenditure is the expectation of profits. If you have new business opportunities, say new markets open up, or free trade agreements give you access to a market that was previously closed, or the cost of productions falls due to diminished prices of some key resource, anything that improves your business opportunities and makes it look like there is more profit down the road, is going to lead to invest now, to expand your business and take advantage of those opportunities. So, the more profits you see, the more profitable your business opportunity is, the more likely you are to build factories, buy equipment and engage in investment spending to increase the size of your operation and make the profits that you see coming.

Well then, there is also the issue of interest rates. Interest rates are a very, very big factor in both the amount of investment spending businesses do and the timing of investment spending. Let’s think about how this works. You’re a business, or an entrepreneur, and you’ve got a certain amount of capital, lets say you have $100,000, and you have a decision, should you put this money in the bank where you can earn an interest rate of five percent, or should you invest it in your own business where you can make profits; and maybe $100,000 put in a business today returns you $150,000 next year. Well, $150,000, after you put in $100,000, that’s a 50 percent rate of return. That’s much better than the five percent you could have earned in the bank. Now certainly, you’ve got to adjust that for risk, and you’ve got to adjust that for any taxes that you pay on your profits, but all in all it looks like the investment spending and the business opportunity are giving you a better return on your money than the bank is. Now the bank return tells you what other people are willing to pay to get your money and the interest rate that others are willing to pay is a signal of the profitability of their own business opportunities. So it’s kind of you deciding, can I make more money with this investment if I do my own business or could I do better by lending it to someone else and getting a share of their profits.

Another way of thinking about this is, suppose you’re in business and you want to expand your warehouse or add a wing onto your factory or buy some new machines, it is likely you will have to borrow the money to do that transaction. And if you borrow the money the cost of getting the money will be the interest rate. If you are borrowing money at a rate of interest at 10 percent and you are able to earn 20 percent return on that money than that still leaves you 20 percent minus the 10 percent interest, a 10 percent profit after you paid for the cost of your money. The higher the
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Components of Aggregate Expenditures

**Autonomous Investment**

interest rate, the less of your profit is left for you and the more of it goes to the bank and, if the interest rate is too high, then even after you’ve made a profit, there’s not enough left to pay the interest. It’s not worth it to go into business because you can’t earn a return that’s high enough to cover the cost of the money that you would have to borrow to acquire the buildings and the equipment to do the business. So as interest rates go up, fewer and fewer projects are profitable for a business to undertake. When interest rates go down and the cost of money is lower, more and more business opportunities appear profitable.

Let’s show that in a diagram, on the vertical axis let’s put the interest rate, and I’ll indicate the interest rate by the letter “i” on the vertical axis or on the horizontal axis we’ll put a capital “I” to represent the total amount of investment spending that a business undertakes. So let’s now order the projects that a business could undertake in order of their decreasing rate of return. So for instance, say project number one involves spending 10 on goods, capital goods, and let’s say the rate of return on that is going to be 20 percent, so maybe this is buying new computers for your business and the rate of return is 20 percent. So at a 20 percent rate of return you’re just indifferent between buying those computers and not. Say when the interest rate falls down to 15 percent then another project becomes profitable. Maybe this is building a new warehouse and adding inventories, so at a rate of 15 percent you can afford to borrow money and break even on this investment project. At a lower interest rate, say at 10 percent some other investment project might become profitable and that would then add to the total amount of investment spending this business would like to do, and so forth.

So you can imagine at every interest rate along the way it might be that some project that was previously unprofitable, some project whose rate of return was not high enough to cover the interest, becomes profitable or at least breaks even as the interest rate falls. If the interest rate continues to fall that project becomes more and more and more profitable. So, as the interest rate falls, more and more investment projects that a business could undertake become profitable, that is more and more of them have rates of return that are high enough to cover the interest rate. So at a very high interest, the business will undertake very few projects. At a medium interest, the business will undertake a larger quantity of projects and as the interest falls still further, the amount of investment spending a business will plan to do increases. So we could call this the investment demand curve, that is, how much money do businesses want to spend on capital goods, and investment, I’m using parenthesis here to indicate that investment spending is a function in this picture of the rate of interest. High interest rates make investments unprofitable for business, at low interest rates investments seem like good business and a larger quantity is invested.

Now anytime that I draw a curve in economics you should ask two questions, why does it slope the way that is does, and what would cause it to shift? The slope here is due to the inverse relationship between interest rate and the profitability of business investment. So when the interest rate falls businesses will undertake more projects because they become profitable. The curve would shift any time businesses find it profitable to do more investment spending at any given rate of interest. So what would cause businesses to decide they wanted to invest in more projects at any given rate of interest? What would cause projects that weren’t previously profitable at 20 percent to suddenly make sense for the business, and suddenly be profitable. Well that would include things such as technological change that allow the business to get more mileage out of an investment: maybe taxes are lower, maybe increases overall in the profitability of the business. Anything that would cause the business to be able to make more money from a given investment would cause that business to be willing to pay higher interest to acquire the money to undertake that investment. So, any factors that make business more desirable, changes in expectations, and the like will shift out the investment demand curve.

Now, the last thing we want to do is take this analysis over to our aggregate expenditure picture and show how changes in investment spending are going to influence aggregate expenditure. Here’s the picture we’ve looked at before with consumption spending represented by this red line, the slope being the marginal propensity to consume. If we add on investment spending to this picture, we have to add it onto consumption so that aggregate expenditure is the sum of consumer spending and business spending. So here we have it, a red curve that represents “c” plus “i”. Consumption Spending plus Business Spending. The slope is the same as the slope of the consumption curve. That’s because in our story investment spending does not depend on income. It is independent of income, it’s influenced by the interest rate, it’s influenced by expectations, it’s influenced by lots of things: taxes, free trade agreements, but none of those things are in this picture. Therefore, if we were to draw the investment curve itself, it would simply be a flat horizontal line; it’s independent of the level of income. When we add that horizontal line onto consumption, we get aggregate expenditure, a curve with the same slope as the consumption function, and a difference between these two that’s equal to the amount of investment. So if we add investments onto consumption we aggregate expenditure: and there you have it.
Now I want to make one more point before I look at some historical data as a way of wrapping up this discussion, and that is that there are two kinds of business spending, there is planned spending and there is actual spending. The difference between actual business spending and planned business spending is unplanned spending. And in our story about the macro-economy, unplanned business spending is the unintended accumulation of inventories. A business’ plan to purchase a certain number of computers and equipment, and build factories; but they don’t plan short fall and demand that leaves them stranded with a bunch of products. Whenever they find themselves stranded with these products, they put them in their warehouses as inventory, but this is unintended inventory. A certain amount of inventory accumulation may be planned upon, but when there is a shortfall in demand, businesses are stuck with unintended inventory investment. And this concept is going to come back as we look in detail at the way equilibrium is calculated.

But finally, let’s look at this picture of some real data from the economy. Let’s look at what happens to investment spending over the business cycle; and it’s interesting because gross investment spending, the total amount of money that businesses spend on capital equipment, is much more volatile than changes in gross domestic product. That is when gross domestic product changes, inventory usually changes in a much more erratic way. Why would that be? It’s because that, during a downturn, or contraction, businesses are very quick to cut back investment spending. They say there is no market there; they say people won’t buy the products so why should we be building a wing onto our factory? But in a boom, when good times are coming and the market is looking strong, businesses are very quick to ramp up by going out and acquiring plant and equipment to take advantage of the strong economy.

So something to notice here as we are seeking to explain the business cycle is that inventory and plant and equipment investment spending, the spending of businesses is much more volatile, much more erratic than the business cycle as a whole. Gross domestic product varies, but not by as much as business spending.
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Equilibrium GDP

The Expenditures Approach and the Saving Approach

Now we are ready to analyze the equilibrium in the Keynesian model of the macro-economy. Pay close attention because once you have mastered this, you will have a very powerful tool for understanding and explaining how the economy works. Remember that Keynes’ view is based on demand, and at the heart of the circular flow of goods and services in the economy, is the relationship between consumers and businesses. So, we’re going to start by thinking about the balance between consumers and businesses, between consumption and income. Here’s the flow of resources: consumers send their labor and capital to the factory markets, where firms buy them and transform them into goods and services that flow back to the households as consumption spending. Households then pay for these goods and services, providing revenue to businesses that allows the businesses to hire for the factor of production, putting income in the pockets of consumers. So if this is the only flow in the economy; if we start with this simplest possible model of the macro economy, it must be true that the top half of this flow has exactly the same magnitude, the same size, the same number as the bottom half of this flow.

Where do businesses get the money that they pay consumers as income? They get it when consumers buy goods and services. So in this simple model, the equilibrium—the stable outcome, the balance—is when consumption spending is exactly equal to real income. That’s the notion here that gives us balance. If that’s the case, then the economy is stable. If that’s not the case, if consumption spending is greater than income; if consumers are trying to buy more stuff than the factories are actually creating, it’s because what the factories are actually creating determines this. It’s the goods and services that the companies have produced that allow them to earn the money that they are paying to the households as income. So if consumers are trying to spend more than they are getting in income, the economy is out of balance, factories are not producing enough and they might have to scramble to produce more. In the short run their inventories are going to be drawn down, and they are going to be forced into a position of unintended inventory reduction. So the only way we have a stable or balanced outcome is when consumer spending is equal to real income.

Let’s look at a numerical example now, and see how this would work. Let’s go back to our consumption function. This tells you what consumers are planning to spend as a function of their real income. At any given level of real income, consumers are going to spend A, the autonomous consumption plus B, the marginal propensity to consume multiplied by real income. So in our example, let’s suppose that autonomous consumption is equal to 10, and let’s further suppose that the marginal propensity to consume is equal to 0.8, or 8/10; consumers spend 80 cents out of each additional dollar that they are paid in income. Well if that’s the case—if income is 40, and autonomous consumption is 10—then consumers are going to spend eight-tenths times 40, or 32 plus 10. The autonomous consumption (10) plus 32 gives total consumer spending of 42. In that case, consumers are spending more than their income so savings is going to be negative, we could go ahead and put that in our table.

Suppose now that income is higher, at 50. In this case, autonomous consumption plus the marginal propensity to consume multiplied by 50 (.8 times 50) is 40; plus 10 gives us total consumer spending of 50—which in this case, is exactly equal to income, so savings is equal to zero. If income were higher—say 90—90 multiplied by .8 is 72; plus 10 is total consumer spending of 82. In this case, since income is greater than consumption we find that total savings is going to be equal to 8, a positive number, and finally if income is 100, 100 multiplied by .8 is equal to 80; plus autonomous consumption of 10 gives total consumption of 90, leaving savings to total 10.

Now, right now there is nowhere for savings to go in this economy. That is, if consumers put money in the bank, if they take some of their income and don’t spend it, then there will be goods left on the store shelves that are not purchased, so that can’t be an equilibrium. Businesses are accumulating inventory against their will, unplanned inventory investment. So in this simple model where our only circular flow is with household spending and income coming in, it must be true that consumption and income are equal in equilibrium. Therefore, our stable outcome is going to involve an income of 50 and a consumption of 50 and a savings of zero—that’s the outcome that gives us stability.

Let’s go and look at that outcome now in the picture that we have drawn, called the Aggregate Expenditure Diagram. In this case, we are going to have a consumption function with an intercept of A, (which in our case is 10) and a marginal propensity to consume of B (which in our case is .8), so here is the consumption function C as a function of Y, income. Now look at this point where the consumption function crosses the aggregate expenditures equal income line right here. Here we have microeconomic equilibrium. That is, at this level of output, Y, which in our story we have calculated to be 50, something very interesting happens. At this level of output we have consumers getting an income of 50, planning to do consumption of 50, so that total consumer spending—which, in this story, is the very sum of aggregate expenditures since consumers are the only people we have got in our model so far—aggregate
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Expenditure is equal to income. Consumers are planning to spend an amount of money (50) that generates an income (50) on which these spending plans are based. That’s the notion of macroeconomic equilibrium: when people are planning to spend an amount of money that generates the income on which the spending plans are based. The top of the circular flow balances the bottom of the circular flow; consumption expenditures are equal to income. If income were higher, say income were up here at some higher level like 100, then we would have the situation of consumption spending only being 90, as we calculated in our table, but income is 100, so we have unintended inventory investment. Businesses are producing more goods and services than consumers are planning to buy at an income of 100. Therefore, we don’t have equilibrium, inventories accumulate, and businesses are going to cut back production in response to this excess supply of goods and services until finally we get back to an equilibrium, at which planned investment is equal to zero, in this case in which planned spending, consumer spending is equal to income.

On the other hand if income were lower, say it were somewhere down here, at 40, then consumers are planning to spend 42, but income is only 40, there is not enough stuff to satisfy consumer demand. In that case inventories are being drawn down; and businesses have to produce more goods and services to satisfy consumer demand, and as they increase their production of goods and services, income will increase until we will return to 50, the stable income, the equilibrium in this model.

Now that’s an approach that focuses on consumer spending, one way of describing macroeconomic equilibrium is consumer spending equals income: consumers are planning to spend an amount of money that creates the income on which the plans are created. Now there is another way of explaining this, we have seen that when you have a consumption function, you can also draw a savings function. And the savings function has an intercept that has the same magnitude but the opposite sign. So the intercept of the savings function is negative 10, and the slope of our savings function is one minus the marginal propensity to consume, or the marginal propensity to save. Which in this case—as we have seen before—is 0.2. Now the savings function in this case has an intercept right here, savings is to equal to zero when income is equal to 50. That is—as we saw from the table a moment ago—when income is 50, people are planning to spend all of their income on consumer goods and services, leaving savings equal to zero. So, one way of explaining equilibrium in this case, is if there is nowhere for savings to go, if businesses don’t want to borrow it, the government doesn’t want to borrow it, if there is no one else in the model who might use your savings, then at equilibrium savings has to be zero. Consumers have to be spending all of the income that they get; otherwise either stuff is piling up on the shelves at the stores, or businesses have to take stuff out of their inventories to satisfy extra consumer demand. So one way of seeing the equilibrium here, is saying that if consumers are the only players in the market, savings has to be equal to zero; because there is no one else to use the savings.

Well let’s now introduce savings more deliberately into the model and think about how savings really work in the macro-economy. We will go back to our circular flow diagram and introduce savings into the picture, so here is my icon for savings. Savings are a leakage out of the system; that is money that consumers could be spending on goods and services, but instead they are choosing to put this into the bank as savings. Now who is going to use this savings? See, if the savings were here, if there were a positive amount of savings, as we saw in our table a minute ago and no one to use it, then we will have dis-equilibrium because consumers are getting income, but they are not spending on goods and services in our wheel: our circular flow is out of balance. But suppose we introduce businesses, and suppose businesses acquire consumer savings, and then spend it on plant and equipment, that is so called investment spending. If businesses acquire savings and then use them to buy the stuff in the market that consumers aren’t buying, that can restore balance to the circular flow. Here is how it works: savings are a leakage out of the circular flow; but business spending, investment spending, is an injection back into the circular flow. So we label this investment spending and the way it works in our model is: investment spending balances the reduction and consumption that created the savings. So if there is 10 worth of savings and business spending is equal to 10, then the circular flow balances once again. The stuff that consumers don’t buy when they divert some of their income into their savings account is purchased by businesses when they borrow that savings and use it to acquire plant, equipment and other capital goods. So, one way of thinking about an equilibrium condition when you have savings--when you have this leakage—is that in equilibrium, it must be true that what leaks out, flows back in. In equilibrium, savings has to equal investment. Well, there you have it, another way of describing macroeconomic equilibrium. In our simple story, we had zero savings: that is everything was spent; therefore, in equilibrium since savings was zero, investment spending would have to be equal to zero for everything to balance.

Let’s go back to our numbers now, and suppose that we have savings in the economy. If we have savings in the economy, then we have something for businesses to borrow, to conduct their investment purchases. So let’s suppose that businesses want to spend 10. That is the investment spending that they are planning to do is 10 at any level of
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income. If that is the case, the only equilibrium that we can have is one where consumers are willing to reduce their consumption spending relative to their income by enough to create savings for businesses to use. If the businesses want 10 worth of investment spending, there has to be 10 worth of savings to give us balance. Now our equilibrium is going to be 100. An equilibrium income level of 100, because only when equilibrium income is 100 is there enough of a gap between planned consumption and income to create the savings that satisfy businesses' demand for investment spending. That is when businesses increase their investment spending by 10; they will generate enough income so that consumers will do the savings that will satisfy their need for capital.

Here’s another way of seeing the equilibrium condition: if you take investment spending and add it to consumer spending, 90 plus 10 is 100. Aggregate expenditure is equal to income; or equivalently, we can say we have equilibrium because the amount of money that people are saving is equal to the amount of investment spending that businesses want to do. Let’s go over and look at that in the diagram. Here we have it in the diagram. Right now we only have consumption spending, but now we are going to add on investment spending, so suppose we increase aggregate expenditure by the amount of investment—and in this case that is equal to 10—so I shift my line upwards by 10 and now I have aggregate expenditure as a function out of income and it is 10 higher than my consumption function, same slope because investment spending is independent of the level of income. Well look, now my equilibrium point, the point at which the red line crosses the black dotted line has shifted way up here. That is, now, we have a balance between total planned spending and total income at an income level of 100, much higher than our original equilibrium income level.

Another way to see this is if we look in the diagram downstairs and I put investment spending in this picture, investors—that is, businesses buying capital goods—are planning to spend a total of 10. Well, that means that at an income level of 100, we get enough savings generated by this high-income level to satisfy businesses' need to borrow money. That is only when the income level is 100, are consumers willing to save enough money, that gap between the dotted black line and the consumption function. Only when that gap has risen to a level of 10 is there enough extra money being saved by people so that businesses can go to the bank, borrow it, and do the 10 worth of investment spending that they are planning to do. Only whenever savings equals investment do we have macroeconomic equilibrium.

See, it is kind of interesting there are two ways of describing equilibrium in that circular flow, one is to say that spending equals income—that is, the sum of consumer spending plus business spending is equal to the total income that is created. A second way, and equally good way, is to say that what leaks out, has to flow back in, that is savings is equal to investment spending. Notice, as you look at this picture that both pictures are telling the same story, just from different perspectives.

Let me summarize by writing this out in an equation, and I think this equation will help make it clear how the spending approach is exactly equal to the savings approach in explaining macroeconomic equilibrium. In our simplest model, it must be true that output is equal to consumption. Well you know that income is equal to what you save plus what you spend. Remember that there are only two uses of your income: and that is consumption and savings; and what it is you don’t spend; you must be saving. Well if that is the case, then in the simplest version, if we set income equal to each other in these two equations, we get consumptions equals S plus C, or savings must equal zero. If your only spenders are households then it must be in equilibrium that savings is equal to zero.

Now if we add another set of spenders, that is if we add business spenders to our equation then aggregate expenditure and equilibrium has to equal income. So consumption plus investment spending—our aggregate expenditure—set that equal to income, that is your condition for equilibrium. But it still has to be true that the total income that is received in the economy is equal to savings plus consumption. So if you set Y equal to Y you get C+I is equal to C+S or savings equals investment. They have to be equal in equilibrium. You heard the story intuitively and have seen it in the circular flow diagram; I’ve given you a simple numerical example; and then I drew diagrams to show you how the spending approach is equal to the savings approach; and finally we used this simple algebra. The idea here is: there are two ways of describing macroeconomic equilibrium. In one, you focus on the flow of spending and you say, what consumers are spending has to be equal to their income. In the second approach, you focus on what is leaking out of that wheel, and you say that everything that leaks out has to go back in at some point. The spending approach the savings approach: two ways of talking about when the economy is in balance.
Aggregate Expenditures Model

The Multipliers

Applications of the Multipliers

Here’s a question: How will a change in autonomous spending affect equilibrium output in the economy? That is, suppose you go out, and for no good reason, increase your autonomous consumption spending by $16.00—just on a whim. Maybe the stock market had boomed, maybe your animal spirits move you, and you just go out and buy a compact disc for $16.00. If we follow through the consequences of that choice, what will be the effect on gross domestic product of that purchase? Well, think about it for a moment, you go to the record store and you spend $16.00. Now the guy who runs the record store has $16.00 in income that he didn’t have before; he spends part of it and he saves the rest. The part that he spends, maybe on ice cream, becomes the income of the proprietor of the ice cream store. She saves part of it and spends the rest. What she spends becomes the income of someone, maybe at a T-shirt stand. He spends part of it and spends the rest. So your one act of spending sets in motion a process that creates income and motivates spending for a lot of other people.

This is what we call the Multiplier Effect. When there is an increase in autonomous spending, real gross domestic product, equilibrium income increases by much more than the original increase in spending. A small increase in spending can catalyze a large increase in equilibrium income, equilibrium output. Let’s see how it works.

Let’s go through our example carefully. You go to the record store and you spend $16.00, so your increase in consumption creates an increase in income of $16.00 for the person who owns the record store. So that is going to influence his consumption. And let’s suppose—for the sake of making this example really simple—we take a marginal propensity to consume equal to 50 percent. That is, everybody is going to spend one-half of any new income they get. So, the guy who runs the record store gets $16.00 worth of income and let’s suppose that he puts half of it immediately into the bank and spends the rest. So what he is going to do? Having put half of this into the bank, he is going to spend half of this amount, or $8.00, let’s say at the ice cream store. So he has now increased the income of the ice cream store proprietor by $8.00. (The rest of this went into the bank.) So now that this $8.00 has been spent at the ice cream store, it becomes the income of the ice cream proprietor. She takes this money and thinks, “I just got $8.00. Well, my marginal propensity to consume is 50 percent, so I am going to put half of it into the bank and save it, the other 50 percent I am going to spend.” So she goes and buys a T-shirt that costs $4.00 and that $4.00 becomes the income of the guy that runs the T-shirt stand. So he now has $4.00 in income and he thinks to himself, “Well, I better put $2.00 of it into the bank, and the other $2.00 I can spend.” So he spends $2.00 and saves $2.00. And the process continues. That becomes someone else’s income who saves half, and increases spending by $1.00, which becomes someone else’s income and so forth, until finally, we’ve got down to little increases of income that are so small that they hardly matter.

Well, what has been the total increase in income that resulted from that original expenditure of $16.00? You created $16.00 worth of income for the record salesman, $8.00 for the ice cream salesman, $4.00 for the T-shirt salesman, $2.00 for somebody else, $1.00 for somebody else, one-half, one-quarter, and so forth, until the pieces are so small that you can’t even pick them up anymore.

Let’s add it all up: $16.00 + $8.00 + $4.00 + $2.00 + $1.00 + ½ + 1/4 + 1/8, and so forth, until the pieces are so small that you just can’t even handle them anymore, and it adds up to a bar that is exactly twice as big as the original expenditure. That is, the total amount of income that is created if we add up all of these incremental increases of income equal to $16.00 + $8.00 + $4.00 + $2.00 + $1.00, and eventually, if we keep on adding up those smaller and smaller fractions, we are going to get a total of $32.00: that’s the sum. Now that is the total amount of gross domestic product increase that resulted from the original expenditure of $16.00.

How does it work? It works because you’re spending becomes someone else’s income. They are going to spend part of it and save part of it, creating income for someone else. And eventually when you add up of the pieces, this is what you get. Now where does that number come from? Where does that multiplier number come from? There are two ways that we can derive the multiplier. First of all, let me define the multiplier carefully. The multiplier in Keynesian analysis is equal to the change in equilibrium gross domestic product that results from a change in autonomous spending. This change in autonomous spending can be an increase in autonomous consumption, an increase in business investment spending, an increase in government spending, an increase in net export spending; anything that increases autonomously, that is, on its own, that’s independent from income. Any increase in autonomous spending gives rise to a multiplier through this process. That is one person’s spending becomes another person’s income, until you have got a multiple of autonomous spending, created in new gross domestic product.
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Applications of the Multipliers

Well, let’s see where that number comes from. And there are really two ways for us to derive the multiplier. Method number one of deriving the multiplier is what we call the geometric sequence. That is, the change in equilibrium income is equal to the change in autonomous spending times one. This is the amount of money you spend at the record store. Sixteen dollars times one, plus the marginal propensity to consume. This is how much the record salesman spends. He put part of his money in savings and he spent one-half, plus margin propensity to consume squared; this is how much the person who owned the ice cream stand spent. She got half of what you spent, because the guy at the record store saved part, and then she spend half of it herself. So the number squared, and then cubed, and so forth, and it keeps adding up forever. Well, a geometric sequence like this has a nice simple expression that is, if you have a formula that is 1 + B^2 + B^3 + B^4, and so forth, forever and ever, if B is a fraction, that eventually converges to this: 1/1 - B. Imagine that B is 1/2, like in our example. One-half, if you subtract it from 1 gives you 1/2, and the reciprocal of 1/2 is 2. That is, we wound up with twice as much as the original change in autonomous spending. So the marginal propensity to consume in this equation is B and if we manipulate this a little bit, we can see that the change in real gross domestic product that results from a change in autonomous spending equal to this multiplier.

So that is one way to do it. And that way will be more fun if you know something about geometric sequences. But, the trick is in knowing that this formula right here eventually converges to this, if you add all of the terms together.

There is an easier way that uses just simple algebra, and that starts with output is equal to C + I; and in our simple model we have two components of aggregate expenditure: consumers and businesses. And also, we know that consumption is equal to A + B x Y. That is, we have a simple linear consumption function with an autonomous component, and with a marginal propensity to consume B—the fraction of each additional dollar that you spend of consumer goods.

Well, substitute this equation up here into this one, and you get Y is equal to A + BY + I; and if you subtract so as to get the Y terms on one side of the equation together, and here we have... let’s see this is equal to 1 - B x Y = A + I, and that gives us that Y = 1/1 - B times these two terms taken together—I’ll scoot this over so I can get this all on one page—and I have got A + I. And there is your multiplier effect: that output is going to be equal to 1/1 - B x A + I. That is, we have a simple linear consumption function with an autonomous component, and with a marginal propensity to consume B—the fraction of each additional dollar that you spend of consumer goods.

Well, substitute this equation up here into this one, and you get Y is equal to A + BY + I; and if you subtract so as to get the Y terms on one side of the equation together, and here we have... let’s see this is equal to 1 - B x Y = A + I, and that gives us that Y = 1/1 - B times these two terms taken together—I’ll scoot this over so I can get this all on one page—and I have got A + I. And there is your multiplier effect: that output is going to be equal to 1/1 - B x A + I. That is, if A increases, or if I increases—if either of these components of autonomous spending increase—then Y is going to increase by a multiple of that. The coefficient on both of these autonomous components is one over one minus B. So the multiplier is 1/1 - B. Any change in A, any change in I, any change in any of these autonomous components of spending increases Y by a multiple of that amount, and the coefficient is one over one minus the marginal propensity to consume.

Now let’s look at how this plays out in our diagram. We have used this diagram before and we can show the effect of an increase in investment spending on equilibrium output. Let’s start here, and let’s suppose that we have, in this case, a different formula that consumption is equal to 10 plus .8 x Y. This is the consumption function that we have used in our numerical example before. And we saw that if we have consumer spending as our only component of spending, then equilibrium income in that case is equal to 50. So I could go over here and write that on this axis, but I don’t want to clutter my diagram. Now let’s suppose we add investment spending, so if investment spending is equal to 10, I would have to add on another spending term down here. Here’s the investment line and it is equal to 10, and it is autonomous, it doesn’t depend on Y, so no matter what your level of GDP is, businesses are planning to spend $10.00 on investment. So let’s add 10 onto the consumption function, which shifts it up by this vertical distance. So, here we have our change in investment spending. It has gone from zero to 10 and we calculated last time that our, or we saw from our table in a previous example, that if you increased investment spending from zero to 10 that the equilibrium level of output rose from 50 to 100.

Well, how do you figure that? Here is the change in income down here, and here was the change in investment. The change in investment spending was from zero to 10, so that is only equal to 10. The change in income is from 50 to 100, that’s equal to 50. Where do you get that? Well, In this case the multiplier is going to be one over one minus the marginal propensity to consume, which is 8/10. So the multiplier in this case should be the change in output that results from the change in business spending, is equal to 1/1 - 8/10. Well, 8/10 from 1 leaves 2/10. Two-tenths—20 percent—is 1/5 and the reciprocal of 1/5 fifth is equal to 5. So in this particular case, our multiplier is going to equal to 5. Well, look, that is exactly what happened. We increased income by 50 after we increased investment by 10. So the ratio of this change in equilibrium income 50, to the change in investment spending 10, is 5.
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Applications of the Multipliers

How did it happen? It happened because businesses from the original equilibrium decide that they want to buy $10.00 more worth of stuff. Well, there is not $10.00 more worth of stuff for them to buy, so businesses have to increase their production in order to meet this extra demand. And whenever they increase their production by 10, they create $10.00 worth of additional income; which does what? It motivates people to spend more. And how much more do they spend? They spend $10.00 worth of income times 8/10, which is the marginal propensity to consume, they add $8.00 to their total consumption plan. Well, that then creates excess demand for goods so businesses have to produce more stuff. Then people decide to spend more with this new income they got from the increase in production and things keep going until finally output has increased—not just by the original $10.00 to satisfy businesses demand for investment goods—but by a full $50.00 after you take into account the multiplier effect. Businesses created an additional demand of $10.00, but that put income into the workers pockets who went out and spent more, which created more demand and more income, and more demand and more income, until finally the pieces get so small that you can’t even pick them up; and that is whenever you have converged to a new equilibrium.

So, that is the way this process works. You have seen it with simple example with my red bars, which is, if we use one-half as our MPC; we wound up with twice as much new income as the original change in autonomous spending. You have seen it in algebra. You have seen that the multiplier is the coefficient on equilibrium output whenever there is a change in autonomous spending. And finally, you have seen it in the diagram when you shift the line up, the new equilibrium point involves a much bigger increase in income, and then we had increase in autonomous spending. The trick here is the marginal propensity to consume that is what the multiplier depends on. When there is an increase in autonomous spending, that creates income, and part of it is going to be spent, part of it saved; but the part that is spent creates income for somebody else which means they are going to spend part of it, and save part of it; which creates income for someone else and so forth. And when all of the dust settles, you wind up with this: a multiplier, and the multiplier tells you the change in equilibrium income that results from a change in autonomous spending.
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Changes in Aggregate Expenditures

Think about the multiplier effect. A small change in autonomous spending has the potential to bring about a huge change in equilibrium output. And when equilibrium output increases, that means an increase in employment, and maybe an increase in the standard living. A decrease in autonomous spending can reduce equilibrium output by quite a bit, and this may be necessary in some cases to keep the economy from overheating. You’re beginning to get the idea that changes in autonomous spending can be policy instruments. That is, if we want a larger equilibrium output to increase employment, government could spend more and stimulate the economy. This is called Keynesian Fiscal Policy. An increase in government spending can bring about a boon. Likewise, a decrease in government spending, or government incentives for reduced business spending, or reduced consumer spending, can reign in the economy. Reducing equilibrium output and lowering employment, but perhaps taking the pressure off of inflation.

Let’s think now about how the multiplier effect can be generalized. That is, how the multiplier effect applies to every conceivable reduction in autonomous spending. Let’s start by writing out the formula for economic equilibrium in the macro-economy according to Keynes. That is, according to Keynes, equilibrium is defined in the spending approach as the point where income is equal to aggregate expenditure, which has several components: consumption, investment or business spending, government spending, and net exports. Now, if we take this equilibrium equation, we can add to it our behavioral equation for consumers. That is, we know if consumers spend A plus BY, where A is autonomous consumption, plus B, the marginal propensity to consume, times consumer income. Substitute this equation up here into the equilibrium condition and you get this: Y is equal to A plus B plus I plus G plus NX. What I have done is to isolate all of these autonomous spending components—autonomous consumer spending, business spending, government spending and foreign spending—all of which are independent of the level of income in the economy. The only thing that depends on income is this one component of consumer spending and now we have moved it over to the other side of the equation.

Well this allows me then to calculate equilibrium income as a function of the marginal propensity to consume, and all of these autonomous components. That is, if I divide both sides by one, minus the marginal propensity to consume, this is what I am going to get: equilibrium income is equal to one minus the marginal propensity to consume, multiplied by A plus I plus G plus NX.

Now how do you interpret this equation? This equation says that if you add up all of the autonomous spending in the economy and you multiply by the reciprocal of one minus the marginal propensity to consume, you get equilibrium output. You get the level of GDP that occurs in the economy when things have stabilized. Well you can use this equation now to predict how a change in any of these components of autonomous spending will influence equilibrium output, and that is what the multiplier is all about.

Suppose we focus a moment on government spending. If the government increased the amount that it spent by $15.00, how would that affect real gross domestic product in equilibrium? Well, the government spends $15.00. That becomes then someone’s income, they are going to save two-tenths of it and they are going to spend eight-tenths of it. So take those amounts, that tells you how much of it was passed on to the next stage of the multiplier process as income someone’s going to save and spend and things keep working their way out until finally that $15.00 increase in government spending translates into one over one minus eight-tenths, one over two-tenths, that is five is the multiplier. Fifteen times five equals the $75.00 increase in real gross domestic product. Once you know that the multiplier is five, then any time you increase one of these components of autonomous spending, just multiply the increase by five and you get the increase in real gross domestic product. It is really that easy.

So lets do an example and we will work this example out on our chart. So, suppose we start here in this situation, where we have aggregate expenditure and we are going to imagine to start with, that we have a closed economy; that is I am going to ignore net exports for this example, and I have only consumption, investment spending and government spending. And lets suppose that investment spending is initially zero and government spending is initially zero and consumption spending is equal to 10 plus eight-tenths times Y, that is the consumption function we have used in previous examples. Well, if that’s the case, the equilibrium output is going to be 50. That is, when income is 50, consumers are planning to spend 50; no savings, no investment, and were in a very simple macroeconomic equilibrium. But let’s make things now a little more interesting, let’s add government spending, and let’s suppose that government spending is equal to 15, that is that I would put a red line, a horizontal red line representing government
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spending, and that is going to be 15, regardless of the level of income. That is, government spending is autonomous; it’s independent of the level of output in the economy. No matter what the output is, the government is planning to spend 15. So add that 15 onto whatever consumers are planning to spend, and that results in an upward shift of the aggregate expenditure line, by the amount of the income increase in government spending. That is this upward shift right here is delta-G the upward shift is 15, the new intercept is $15 higher than before. The slope is still equal to the marginal propensity to consume. So what happens, the government spends 15, that creates $15.00 worth of extra income some of which is spent, some of which is saved. The spending creates additional income and that process multiplies over and over and up, until we wind up with our new equilibrium.

Now according to our new formula the new equilibrium involves an increase in gross domestic product of 15 times the multiplier of five or an increase of 75. So the original equilibrium was 50, add 75 to that, and you get the new equilibrium of 125. If the government decided to spend $15.00 in this model, it ends up creating an additional $75 worth of gross domestic product. Seventy plus 50 is a new total of 125; this is what we call expansionary fiscal policy. When the government decides to increase it’s spending, the aggregate expenditure line shifts up and the new equilibrium point involves a larger GDP.

Now, this would be a good thing for us to do, if in fact the economy started from a position of unemployment. Let’s suppose that 125 is equal to full employment. If that is the case, then with full employment out here at 125, we are originally of an output level of 50, under producing; that is we are not providing enough demand to give factories the incentive to hire everyone who wants to work. If we go back to the original set up, and we consider that our equilibrium is 50; if 125 is full employment then the difference between 50 and 125 is an unemployment gap. We have a recessionary gap here. And the recessionary gap is the difference between the equilibrium output and the output that would fully employ the resources of the economy. So Keynes’ view of how to solve this problem is to stimulate the economy with government spending, shifting up the aggregate expenditure curve, and giving you a new equilibrium at the point of full employment. That is the solution: government spending stimulates the economy and brings in the production those resources that previously didn’t have jobs.

Now we can look at this from another prospective. Suppose that we start in a situation, same as we were before, with output of 50; but now we believe that full employment is actually lower maybe we think it is down here, closer to 25. Now what we have is what we call an inflationary gap, were trying to produce more out put than the economy would produce in full employment. And the only way you could produce more output is through aggressive bidding by bringing people into the labor market that weren’t previously working, and bidding up the price of raw materials, making companies to go out and work harder to go out and get them, to expend more effort to explore for oil, and other minerals, all of that pushes up prices. So, full employment involves an output of 25. And were initially at an output of 50. Then we have got an inflationary gap. That is we should be down here in order to keep prices from rising. Well if we want to get to that point, we have to somehow cause aggregate expenditure to drop. That is, we have to push the aggregate expenditure curve downward until the intersection would give us equilibrium at an output of 25. That is, we have to get that red curve to move from its initial position to a lower position, and one policy that might accomplish that is one that discourages consumer spending. Perhaps a tax on consumption, perhaps a government policy encouraging people to save more, anything that causes people to decide to reduce their consumer spending would shift the red line downwards. That is, as long as there is a change in autonomous spending, the line shifts down at a parallel fashion. So instead of having an autonomous spending of 10, people decided to have an autonomous spending of five instead, there has been a reduction in A, the letter that represents the autonomous consumption: a reduction from 10 to five. So, that $5.00 reduction of autonomous consumption is multiplied by the multiplier of five, to give us a reduction in real gross domestic product from 50 to 25. So the $25 reduction in real gross domestic product is the multiplier at work. $5.00 reduction on autonomous consumption is multiplied by five, the multiplier to give us a $25 reduction from 50 to 25 in equilibrium real gross domestic product.

So, you see, this is how things work: you can use any change in autonomous spending and you wind up getting the same analysis. Shift the red curve up, shift the red curve down, you can close an inflationary gap or close a recessionary gap by choosing the right position for the red curve, encouraging or discouraging the autonomous components of spending.

One more thing to point out is that you can get a new equilibrium also by changing the marginal propensity to consume. Suppose we keep our intercept here at 10, but we, through some government incentive, encourage people to save more. So that the marginal propensity to consume changes and instead of being point-eight, now it is only
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point-five. That is we have encouraged people to save half of each additional dollar that they receive instead of only saving one-fifth. If we reduce the marginal propensity to consume then our aggregate expenditure line is going to get flatter; because the slope of the aggregate expenditure line is the marginal propensity to consume. So, if people are saving more, this line is going to be flatter, and we are going to have a new equilibrium intercept.

Now what is the new equilibrium intercept going to be? Well in this case take your autonomous components of spending and multiply them by the new multiplier. Whenever the marginal propensity to consume was equal to eight-tenths, the multiplier was five, but when the marginal propensity to consume was only one-half, the multiplier is only going to be two. So originally, in the original example, the autonomous spending totaled 10, that is the only component of autonomous spending in the original example was A, what consumers were spending. So if you multiply 10 by the multiplier of two, then you are going to get a new macroeconomic equilibrium with an output, not of 50, but at a much lower level of 20. That is when people are spending less of each additional dollar the multiplier effect is dampened and weakened. So output is going to be smaller then it was when people were spending more of each additional dollar. When less of its passed on then there is less income created at each successive point in the chain.

So there you have it, the multiplier effect at work. If you keep the marginal propensity to consume constant, changing autonomous spending, shifts the red curve up and down, perhaps to close a recessionary gap, or to close an inflationary gap. If you change the marginal propensity to consume itself; the line gets steeper if the MPC gets bigger and flatter if the MPC gets smaller. All of these begin to show us how we can use this graph in Keynes’ demand driven model to explain economic policy at its effect on output.
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You can see the macroeconomic equilibrium according to Keynes by looking at the circular flow diagram. In the circular flow diagram, you can see households spending on goods and services, a flow of money into the goods market, and a flow of goods and services into households. The money they spend goes to the firms who produce the goods and services, so that those firms are able then to pay income to the households. Macroeconomic equilibrium occurs when consumer spending is equal to income of households.

Now there are, in some cases, leakages from the system. For instance if households divert some of their money into savings instead of spending, that is a leakage out of the system. They are spending less on goods and services, and that then reduces demand, which causes companies to cut back production, thereby reducing income. The way to restore balance is to create an injection that matches the leakage. For instance, the money that people put into banks winds up being borrowed by businesses who use this money then to purchase goods and services in the goods market.

We call this spending “investment spending.” The acquisition of tools, plant, equipment, and other things that businesses use to do their work. So, in macroeconomic equilibrium the leakage of savings has to be equal to the injection of investment spending. That is, the amount by which consumers are reducing the flow of goods into households; the amount by which the amount of consumer spending falls as a result of the savings, must be matched by the amount by which businesses are demanding goods and services. This flow compensates for the reduction of consumer spending when consumers decide to save instead of purchasing goods and services. So, another way of describing macroeconomic equilibrium is that anything that leaks out, in the form of savings has to then work back into the circular flow as investment spending. Leakages equal injections.

Now, having discussed this phenomenon of leakages and injections, and using the example of savings and investments, we can now use another example, in which leakages equal injections to give us a macroeconomic equilibrium. Let’s think of something else that causes spending to be reduced; another way in which household money leaks out of the circular flow. And that is going to be the case of paying taxes. When households pay taxes, they reduce the amount that they spend on goods and services, in the same way that they reduce their spending if they put it into the bank. In this case they are giving the money to the government; and therefore, they are not spending it in the market. So that reduces the demand for goods and services. Tax payments are a leakage from the circular flow.

Now, the government gets the tax money, and the government doesn’t necessarily spend it, it could just get the money and sit on it. But in that case, we are going to have a reduction in overall demand for goods in services, which means we are out of equilibrium. Businesses, seeing that they can’t sell these goods and services, because of the reduction in household spending, will cut back their production. People are going to be laid-off, the demand for factors of production will fall, and household income will fall until we get to a new equilibrium.

One way of compensating for this is to have the government actually spend the tax money. So if the government gets the tax money and then spends it in the market on goods and services, the government spending will compensate for the reduction in household consumption. That is G, government spending—one of the components of aggregate expenditure—is an injection back into the system. Household spending is reduced, whenever households pay taxes; government spending can compensate for that reduction in household spending and keep the circular flow going. So, one way of explaining this equilibrium is that leakages equal injections. We saw it with savings and investment. It’s the same idea with taxes and government spending. If there is no savings in the model, and no investment spending, then our equilibrium would require that taxes equal government spending.

Now, let’s look at a simple numerical example, then were going to do some algebra, and then I am going to draw this on a graph, to show you how this other idea of leakages and injections can be represented in the picture we’ve been using. We are going to see, however, that taxes are a special kind of leakage requiring special treatment. So let me go ahead, pull this off of my pad, and show you a numerical example.

My numerical example is based on this consumption function that we have been using all along. That consumption is equal to autonomous consumption of 10 plus a marginal propensity to consume of .8. And now, in my parentheses here, I have modified income so that it is now representing disposable income. I have subtracted taxes from consumer income to give me what’s left to consume out of. Notice that when taxes fall, that disposable income is reduced, and that the marginal propensity to consume applies to disposable income.
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Now, down here we have our general form for aggregate expenditure \( Y = C + I + G \); I am going to leave net exports off for just a moment, to keep this example very simple. In fact, I am going to make it even simpler by setting \( I \) equal to zero. Let’s suppose that businesses aren’t spending anything in my simple example.

Now, I am going to start with a case where income is equal to 50; and that means that if income is equal to 50, and taxes are equal to zero, then consumer spending will be \( 10 + .8 \times 50 \), .8 times 50 is 40, plus 10 is 50. So consumer spending is 50, income is 50, and everything else is equal to zero. Savings is zero because consumption is equal to investment. Now let’s make a change; let’s introduce a leakage, that is, let’s have some money leave the system in the form of a tax payment. If people have to pay $5.00, say, in taxes, and the government doesn’t spend the money, it just sits on it, then what happens is this. The reduction in disposable income causes people to cut back their spending, they are going to cut back their spending by the amount of the tax payment that they have to pay; however, not by the full amount, only by eight-tenths of the amount. The other two-tenths of the tax payment comes about from a reduction in savings.

Well, after all the dust has settled, people reduce their consumption, businesses cut back their production, because now there’s excess demand, because people aren’t buying the stuff they were buying before. Then businesses lay off people, which further reduces income, which causes people to further reduce consumption. After all the dust has settled, we wind up with an equilibrium of 30 for our income, 30 for consumption, and 5 for tax payment. The 5 leaks out of the system and contracts the overall circular flow. So notice, that instead of an economy worth $50.00, now we’ve only got $30.00 worth of stuff cycling through the circular flow.

Now, what if government spending came along and the government decided to spend the 5? If the government spends the 5 and taxes are equal to 5, then consumers are going to wind up spending $50.00 on consumption, when income is 55. Fifty-5 is equal to consumer spending, 50, plus the government spending of 5. Together they add up, since I is zero, to our gross domestic product. And, the reduction in consumer spending, that comes about from the taxes, is compensated for exactly by the increase in government spending.

Now you are probably wondering at this point, where do these numbers come from? I get the point that when taxes increase, the economy shrinks, and that if government spending increases, the economy will expand. I got that, but where did you get the numbers? Well, what I am going to do now is show you the algebra behind this table. And from now on, when we do examples in this Keynesian model, we’re going to just use the algebra directly; because it’s really much more intuitive then me just presenting you with a table of numbers.

So let’s look at that algebra. “Mercy,” you say, “that’s a lot of numbers.” Well, let’s go through them one at a time and see if they don’t make some sense. First thing is we have our consumption function up here and it is modified because we have added taxes to the picture, so consumption is equal to autonomous consumption plus the marginal propensity to consume times disposable income. Now we have our familiar aggregate expenditure equation.

Aggregate expenditure is equal to income this is the condition for equilibrium in Keynes’ model of the macro-economy. Income is equal to aggregate expenditure consumers plus government plus foreigners. Add them together. Spending equals income, this is the statement of macroeconomic equilibrium.

So, let’s take this equation, which represents the behavior of consumers, and plug it into our equilibrium condition. And what we get is, plugging consumption spending into this equation here. I do a substitution and I get \( Y \) is equal to consumption \( a + b \) times the quantity \( Y - T \), plus businesses spending, plus government spending, plus net exports. Then, I can take this term right here, \( b \) times \( Y \), and move it over to the left-hand side of the equation. So, since I have one \( Y \) on this side, and \( b \) \( Y \) on this side, \( 1 - b \) \( Y \) is now my left-hand term. That is equal to \( a \), and notice I have minus \( T \) and \( b \) left here, so I have minus \( bT \), plus all of these terms are just repeated.

Now, here is my payoff, down here. I divide both sides of the equation by \( 1 - b \), and I get \( Y = \frac{1}{1 - b} \) times a; minus \( \frac{b}{1 - b} \) times taxes; plus \( \frac{1}{1 - b} \) times businesses’ spending; plus \( \frac{1}{1 - b} \) times government spending; plus \( \frac{1}{1 - b} \) times net exports.
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This is the formula for macroeconomic equilibrium, right here; here it is, a description. Anytime I change any of these autonomous spending components; whether it’s autonomous consumer spending; whether it is businesses spending; whether it is government spending; or whether it is net exports; then my equilibrium income is going to be reduced proportionally. And the proportion, the fraction, the coefficient, is the multiplier. If you increase consumer spending by \( a \), then gross domestic product in equilibrium will increase by \( a \), that amount, times \( \frac{1}{1 - b} \). This is the multiplier that we have seen in earlier discussions. The multiplier is equal to one over one minus the marginal propensity to consume.

Now notice, here is the interesting term. This interesting term is the tax multiplier, and taxes, when they change, have a different effect than any of the other components of aggregate spending. When taxes increase, gross domestic product is reduced, first of all. Notice, an increase in taxes has a negative sign in front of it; therefore, a change in taxes reduces gross domestic product. That is because an increase in taxes leads to a decrease in consumer spending.

The second thing to notice about the tax multiplier is that it has a different coefficient. Rather than being one over one minus the marginal propensity to consume, it is \(-b\) over one minus the marginal propensity to consume. That’s because whenever you increase household taxes, consumers don’t reduce their consumer spending dollar for dollar when taxes go up. That is because part of the increase in taxes households will pay for by reducing their savings. Whenever you increase a household’s taxes, they will reduce their consumption spending by the amount equal to the marginal propensity to consume times the increase in taxes. That is because as far as the consumer is concerned, an increase in taxes is the same thing as a reduction in income. And when consumer income falls, consumers reduce their consumption as well as their savings.

So, when taxes go up, consumers reduce their consumption by an amount equal to the marginal propensity to consume times the change in taxes. They reduce their savings by an amount equal to one minus the marginal propensity to consume times the change in taxes. This is the important insight behind the tax multiplier. The important insight is that when you increase household taxes, only part of it comes about from a reduction in consumption. The rest of the tax increase, consumers deal with by reducing their savings.

Now, let’s show a picture of this phenomenon. Here we have our typical aggregate expenditure diagram, and I have got my equilibrium condition represented by the dotted black line. So let me go ahead and go in and draw aggregate expenditure here as a function of income; and this is equal to consumption plus investment plus government spending plus net exports. The slope of the red line is, of course, the marginal propensity to consume and the vertical intercept is the sum of all of the aggregate spending components.

Now, let’s do an experiment in which we increase taxes. Suppose we increase consumer taxes by 5. If we increase consumer taxes by 5, the result is going to be a change in this vertical intercept. That is, when taxes go up, consumers reduce their autonomous spending and the amount by which they change their autonomous spending is equal to \(-b\Delta T\). That is if taxes go up by 5, then consumer spending is going to be reduced by, in our case 0.8 times 5, or 4. Autonomous consumption is reduced by four-fifths of the amount of the change in taxes. So, we have a downward shift; that now gives us a new aggregate expenditure line. And here is aggregate expenditure as a function of income, now that taxes have gone up. So I put a little prime here to tell us that the function is different, because disposable income is less, because of the increase in taxes.

Well what happens, what happens to equilibrium? Equilibrium in this case is going to shift from, as we saw in our numerical table earlier, an equilibrium gross domestic product equal to 50; downwards to an equilibrium gross domestic product of 30. So, what we get here then, is a reduction in equilibrium GDP equal to this amount. And the change in output in this case, the reduction in equilibrium gross domestic product is going to be equal to \(-b\) times \( \frac{1}{1 - b} \) times the change in taxes.

Now, suppose we not only increase taxes, but increase government spending at the same time. And suppose also, that the increase in government spending is exactly equal to the amount by which taxes are increased. That is, we increased taxes by 5, now lets increase government spending by 5 as well. Well, what happens in this case is that we
Changes in Taxes

Add on to our taxed aggregate expenditure line an amount equal to the increased in government spending. So what we are doing is, we are going back to where we were originally, and we were going a little further, because this time we don’t have to take the marginal propensity to consume into account. If government spending increases by 5, then we shift up aggregate expenditure by 5. Now aggregate expenditure is higher than it was originally, and we have a new equilibrium that is higher up on the line. So if I draw this down here—and do the calculation, and you saw me do this calculation in my table earlier—my new aggregate expenditure and income in equilibrium is 55. That is, whenever government spending increases, the change in income is equal to \( \frac{1}{1-b} \) times the increase in government spending.

So we started at 50 when we increased taxes by 5, our equilibrium fell to 30. And then when we increased government spending by 5, equilibrium increased back up to 55. Now, is it just coincidental that we finally end up at an equilibrium gross domestic product that is higher than the original by exactly the amount of the increase in government spending? Is that just coincidence? It turns out that it’s not. And the result depends on a funny little algebraic relationship that is called a balanced budget multiplier.

Let’s take a look at it. If the change in taxes is equal to the change in government spending; then the change in income that you get, is going to be equal to the tax multiplier times the change in taxes plus the government spending multiplier times the change in government spending. But look how these two multipliers are related: the tax multiplier has -b is the numerator; the government spending multiplier has one in the numerator. So if you add them together—and if T and G are changing by the same amounts so that we can say \( \Delta T \) is equal to \( \Delta G \) and we can just call the overall change, \( \Delta G \), since they are the same thing—then this is what we get, we get \( \frac{1}{1-b} \) times whatever the change is in government spending; or the change in taxes. Well look, \( \frac{1}{1-b} \) is just equal to one, and that means that the change in gross domestic product that results from a change in government spending, when we have a balanced budget, that means when taxes are changing by the same amount as government spending, that multiplier is equal to one. So if government spending is increasing by 5, and taxes are also increasing by 5, your equilibrium GDP is going to be increasing by 5 as well.

That is because the higher taxes lead to a reduction in consumption, but that reduction in consumption is less than the increase in government spending, because of the marginal propensity to consume. The net result is that GDP actually increases. So, this is a little bit of fun with multipliers, when you have an injection like government spending and a leakage like taxes, you can apply the same multiplier analysis that we’ve used other places. It just so happens that because of the marginal propensity to consume we get an extra payoff from studying the tax multiplier, and that is this balanced budget result.
Comparative Statics: The AE Model

Aggregate Expenditures Model

Changes in Net Exports

If you look closely at the circular flow diagram, you can see two ways of describing equilibrium in Keynes’ view of the macro economy. One view says that spending has to equal income; that is, what flows around the outside on top has to come back on the bottom. Another view says that anything that leaks out of the circular flow has to be injected back in at some point. That is, all of the money that households don’t spend on goods and services—what they save by putting in the bank or a mutual fund; what they pay in taxes, sending to the government—has to flow back in. Because when their demand is reduced, demand has to increase somewhere else to compensate. Either business buying goods and services with the money that households have lent to banks, or the government buying goods and services with the tax funds that households have paid. Let’s now add one more set of players to the circular flow before we take a final look at the equivalence of the income approach and the savings approach to describing macroeconomic equilibrium.

The last set of the players that we are going to add is the rest of the world. That is, people outside of the US economy. In this case, the rest of the world represents the movement from a closed economy to an open economy. That is, once we’re including the behavioral foreigners now, we’re talking about the place of this particular economy in the rest of the world. And here’s how foreigners enter the picture.

Foreigners buy stuff from our economy, we call that our exports—the goods and services we send abroad. We also buy stuff from foreign countries, we call that our imports, the goods that we purchase that are shipped to us from abroad. Now, the difference between our exports—that is, what we sell to foreigners—and our imports (what we buy from foreigners) is called our net exports, and our net exports is a flow of goods and services abroad. We call this an injection into the circular flow because it is demand that is injected back into the system when foreigners want to buy our stuff.

Now, net exports—the relationship between the amount of goods we are able to sell to foreigners and what we buy from them—depends on several factors. First of all, it depends on preferences. When people in the domestic economy decide they like foreign goods, they’ll import more of them. When foreigners decide they want more of our products, then we’ll be able to export more. Next, it depends on income. When income increases in our domestic economy, we’re going to spend part of that on exports and net exports can shrink when our economy is booming because our import bill will rise. A third factor is trade barriers: tariffs, quotas and other government negotiated restrictions on trade. When those occur, it may be difficult for us to export. Or, when our own government imposes tariffs, it’s harder for us to import goods. A fourth factor is the exchange rate. Whenever the value of the US dollar changes relative to the value of the German mark, people in both economies will adjust their behavior. When the dollar becomes relatively strong, or expensive, then Germans are less inclined to buy goods from the United States because they are more expensive, measured in terms of German marks, their home country currency. On the other hand, Americans are very excited because German imports now look like a bargain. So these four factors influence the volume of net exports.

Now that we have got the circular flow diagram complete then, let’s look at an algebraic representation of the equivalence between the two approaches to equilibrium. That is, let’s start with the spending equals income condition, and use an identity about income to derive the savings explanation for equilibrium. Watch, here’s how we’ll do it. Let’s start with this equation: \( Y = C + S + T \). You’ve seen this before; this is the description of what households can do with their income. All of the income that you get, winds up in one of three places. You spend it on goods and services, you put it in the bank or a mutual fund or buy stocks or bonds with it—that is, you save—and finally you pay taxes to the government. These two components are a leakage. These are a leakage out of the circular flow. This is household demand, this is the thing that creates jobs and business activity. So, we start then with an algebraic representation of the equilibrium condition. Income equals aggregate expenditure. That is, the income in the economy is equal to what consumers, businesses, the government and foreigners are spending on the output of factories.

Now, since this income and this income are the same thing, we can set this equation equal to this one as I’ve done here below. And if I cancel the C from both sides, I can rearrange this expression by moving government expenditure over to the left-hand side and net exports over to the left hand side. Now look what I’ve got, I’ve got a statement about macroeconomic equilibrium in terms of leakages and injections, or in terms of savings and investment. It’s the same thing to say that income equals expenditure, and to say that savings equals investment. Those are mathematically equivalent statements that represent macroeconomic equilibrium. Look at the intuition. Businesses borrow money to buy factories, plant equipment, to spend on research and development, and things like that. All this business spending comes out of money that people have lent to business so that they can undertake business activity.

But where does that savings come from? It comes from three sources, it comes from households, which we represent by S, and this is the money that households are not spending on goods and services, or paying in taxes. It comes from the government. See, if the government takes more in in revenue than it spends on goods and services, then the government runs a budget surplus and the government budget surplus is a form of savings. This is money the government is saving and it’s available to be lent to businesses. Finally, there is what we call our trade deficit, and our trade deficit is the amount by which our imports exceed our exports. Notice here I have our net exports with a negative
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Changes in Net Exports

sign. This is now net imports, the amount by which we are buying more from foreigners than we are selling to them. Now how are we able to buy more from foreigners? It must be that foreigners are lending us money to do that. So this is a flow of savings into our economy, when we run a trade deficit than foreigners are lending us their savings. The combination of household savings, government savings and the savings that foreigners have lent us totals to the amount of money that businesses are borrowing to build plant, and equipment and expand their activities. That means if one factor in this equation changes, something else has to adjust to restore equilibrium. For instance, if the government spending were to increase, than the government budget surplus would shrink, or it may be even the government would run a deficit. In this case, the government is absorbing more of the savings that are in the economy, leaving less for business. The only way for us to keep business spending constant if government spending were to increase, would be either for the government to increase taxes or for savings to increase in our economy or for us to run a bigger trade deficit. Something has to give when one variable in this equation changes.

Let’s now look at this graphically, and here’s our final look at this Keynesian cross diagram, the aggregate expenditure picture. Let’s suppose now that net exports increase. That is, suppose that foreigners are going to buy more stuff from our economy, perhaps because of a depreciation in the US dollar, or a change in trade policy, or a general shift in preferences of foreigners towards American made goods. In that case, the red expenditure line is going to shift upwards. As it shifts upwards now, we have more spending at every level of income. So net exports increasing means more expenditure in the economy. And I can draw that new aggregate expenditure curve in, in red, so we can calculate our new equilibrium: consuming, business spending, government spending, plus our new larger quantity of net exports. An increase in net exports increases equilibrium income in the economy, so equilibrium income increases we go to this new place, where the red line crosses the black dotted line, and we get our new level of equilibrium output, Y-prime. The change in output is equal to 1/1 - B times the change in net exports. That’s a straightforward application of our multiplier.

But look what happens down below. Down below when net exports increase, that is a reduction in savings that’s available in our economy. That is, now that foreigners are buying more of our stuff, they are less likely to be lending us money. So the amount of savings that’s available in the economy shrinks. Net exports shifts the expenditure upwards at the same time as it shifts the savings curve downwards, and when that happens the equilibrium point where savings is equal to investment spending is going to change. That is, it gives us the same level of output as we had upstairs.

So see, there’s two ways of representing the change in net exports: as an increase in expenditure, or as shrinkage in savings. Either way, you get an increase in the equilibrium level of output equal to the change in autonomous spending—the change in net exports times the multiplier. There’s two ways of representing any change in the economy: you can either look at it on the outside of the circular flow wheel in terms of income equals expenditure—those have to be equivalent in equilibrium. Or you can look at the flows into the wheel, that is the leakages out of the circular flow and the injections back in: savings equals investment. Anything that shrinks the total amount of savings is going to change the equilibrium level of income.

Well there you have it... Keynes’ view of the world in which demand drives everything. You’ve seen it in a picture, you’ve seen it graphically, and you’ve seen it with simple algebra. Now you can apply it to explain how changes in the economic environment change output and with it, employment.
Are you worried about Social Security? Do you wonder how you're going to pay for your retirement? Well, at some point, you'll get concerned, but right now you should probably be saving. The Social Security Administration is designed to provide income to people in their retirement years as a kind of public assistance program. It began after the Great Depression and was originally funded as an old-age assistance program with the Two Percent Payroll Tax. People paid 2% of their income up to 3000 dollars into the Social Security Trust Fund, which is a government-administered savings plan. Then, in their retirement years after 65, they could begin to withdraw Social Security benefits, which they could collect until they died.

Now, what are you paying into Social Security today? About 15.3% of your paycheck goes into Social Security either to pay for your retirement benefits or to pay for medical benefits under the Medicare plan. You pay half of it and your employer pays half of it. Now, this money goes into the Social Security Trust Fund and, when you reach your early 60’s, you’ll begin to be eligible to withdraw money from this trust fund. Again, it kind of presents itself as a government-administered savings plan. You put the money in, it collects interest and you take it out in your retirement years. But nowadays the fund is in trouble, because the withdrawals from the fund are increasing much faster than the payments into the fund, and people are beginning to ask, "Is Social Security in trouble? Does it need to be saved?"

I'll start by asking you the question, "What are you expecting to get out of Social Security in your retirement years and have you even thought about it?" Well, the way that Social Security works, people pay in when they're young, so they feel entitled to take the money out when they're old. Of, if you think about it this way, right now, as a young person, your taxes are paying the benefits on older workers in their retirement years. So you have to look forward to that, when you're old, young workers will be paying the taxes that support your retirement benefits. There’s a kind of fairness to the whole thing. You should be able to get out something that you put in or you pay your dues now, you get your benefits later. But the system is starting show signs of strain and has been since the 1970’s, and people are concerned that the fund is shrinking so rapidly that it may actually go bankrupt. In fact, under current assumptions, there will be no money at all left in the Social Security Trust Fund by the year 2030. What's going on? What's changed since the years after the Great Depression that has put our national retirement system in such jeopardy?

Well, the first big change has been demographic. In the years when Social Security was first up and running, there were about 20 workers supporting each retired person. Nowadays there have been big changes in demographics. One is people are living a lot longer. A person who retired at age 65 in the years following the Great Depression couldn’t count on living that much longer by actuarial standards. Nowadays, you can count on living 20 years after you retire at age 65. So people are withdrawing from the trust fund a lot longer. Another thing is that birth rates fell in the United States after the 1960’s and there are just a lot fewer people working per retired person than there were before. So longer life expectancies and a lower birthrate combine demographically to put strain on the system, and that's why the money in the trust fund has been shrinking.

Another problem is that there have been a lot of programs added to Social Security. No not only do you collect money for retirement benefits, but you can also collect medical benefits under Medicare, you can also collect disability benefits and, if your spouse survives you, your spouse is eligible to collect Social Security survivor benefits. So the additional increase in benefits is taking money out of the system rapidly, also.

So what's going to happen now? What are the problems with the Social Security System and how might they be fixed? Well, let's look first. One of the big problems with the Social Security Fund as a savings plan is all the money you've invested in government bonds. Congress has not allowed the Social Security Fund to be invested in productive investments, like factories, and companies and anything that would pay high rates of interest. Rather, all the money is, effectively, borrowed by the government. It is invested in US Treasury securities. So there's no real interest being generated anywhere, because the money is not put to productive use. That means, ultimately, the Social Security Trust Fund is secure only to the extent that the government can raise taxes to payoff its own debt. So, because the Social Security Trust Fund is entirely invested in government debt, there is no real productive stock of capital backing it. That is, the government's ability to tax, it's, effectively, a transfer program that taxes the young to pay benefits to the old. Therefore, it security rests on the ability to raise taxes to pay benefits.

A second problem is that a lot of programs have been added without providing for the funding. That is, all of these extra medical and survivor’s benefits that have been added since the 1930’s have been added with no provision for funding them. In the long run, the fund is going to have to be replenished by taxes raised on the workers, but, in the
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short run, Congress finds that it is politically advantageous to cater to powerful voting blocks. namely, retired people, by giving them additional tasty retirement benefits and there’s been no real provision for how those benefits are going to be paid for. And young people notoriously don’t vote with nearly the strength and organization that retired workers do.

A third concern is that Congress is going to have to do something to benefits or taxes to make this thing stable, and this is where the politics come in. As I’ve already mentioned, these powerful voting blocks of retired people have consistently and strongly lobbied against any reduction in benefits. And you can’t blame them. After all, they paid in Social Security money all of their working years. They feel entitled to the benefits that they were promised. At the same time, the younger workers are kind of oblivious to what’s going on. We don’t inform ourselves about what these taxes are for and therefore we don’t put pressure on Congress to reform the system somehow. So the taxes are going to have to be raised. And since there are fewer younger workers working to support retired workers, those increases in taxes may be pretty dramatic, just to keep the system solvent, just to keep the fund from shrinking, much less build it up in any way. So, using current assumptions, the Social Security Trust Fund will be exhausted within 30 years. That means something radical has to be done.

Well, before we go to proposals to save the Social Security System, let’s consider in a broad sweep what could be done. One thing that could be done is the tax rates could be raised. Now, that’s going to put a big squeeze on working people. I mean taxes are already high in this country and workers are struggling to make ends meet. So raising taxes is going to be a very unpopular proposal.

The next thing is that benefits could be cut for people who are collecting money in their retirement years, but that’s going to be tough, because those people paid money in with an implicit contract that they would take benefits out at the rate at which they’re collecting them. And therefore there’s going to be sense, in which we are reneging on an agreement if we cut the benefits. So both increase in taxes and reductions in benefits are going to be unpopular. They may be necessary, but they’re going to be extremely politically painful.

Another way in which to reduce benefits would be to raise the retirement age and make the retirement age somehow a function of life expectancy. People are now vigorous and working well into their 70’s and therefore there may be no need for the government to provide public assistance-type retirement payments to people who are in their early 60’s. And this is something that we should certainly discuss. Again, people who paid money in 20 years ago were expecting to be able to start drawing money in their early 60’s, so that’s going to be viewed as a change in the contract, but it still may be something that’s necessary. Clearly, there’s no easy solution or the problem would have been fixed a long time ago.

The third thing to be addressed here, beside the taxes and the benefits, is the way in which the money is invested. Maybe all of it doesn’t need to be linked to the government. In fact, that’s probably a very, very poor use of the Social Security Trust Fund. Why not invest it in more productive assets, such as stocks and bonds, and shares in companies and other things that yield high rates of return, because they’re productive business investments. Why not invest in private assets? This would certainly increase the return on savings and give Social Security money to fund its obligations. This is going to be a concern, however, because, to the extent that the Social Security Fund is invested in the stock market, then the government is going to be under pressure to keep the stock market from crashing, which means the Fed may lose its latitude to pursue independent monetary policy. Right now people say the Fed needs to pump money in anytime the stock market starts sagging, because otherwise the Social Security Fund will be damaged. So there’s all those problems. Then there’s the whole horror of thinking about the government having to be accountable for all the different investments that it funds. Should we invest the Social Security Trust Fund in companies that produce cigarettes? What about companies that invest in countries that are run by dictators? All this would then put the U.S. Government so deeply involved in the politics of investment that it would just potentially create a political nightmare. So there we have that set of concerns.

But be that as it may, we’ve got three sets of plans to consider for reforming the Social Security System and let’s consider some of the advantages and disadvantages of each. First, President Clinton has offered his own plan for reforming Social Security, which is to dedicate 60% of the Federal budget surplus, which we’ve recently been running, to replenishing the Social Security Trust Fund and to do this for 15 to 25 years, however many is necessary, and also to invest part of the trust fund in private securities. Now, to the extent that the trust fund is invested in private securities, then we’re actually, in some ways, radically changing the Social Security System. However, if we just have
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A second set of concerns are raised by another plan that's been offered by Senator John Breaux, and the Breaux plan involves the following steps: first of all, partial privatization, invest some of the money in private assets; next, have the government subsidize people’s individual savings, that is cut some of the taxes on interest income and give people a tax advantage for putting money in savings accounts, like individual retirement accounts and 401K’s, that would reduce the need for Social Security in the long run, because people will substitute their private savings instead. And the third thing, of course, is cut the benefits and raise the taxes, just to reduce the overall amount of money that is in the trust fund.

The problem with privatization is can we really trust people to manage their own retirement money? And now, we’re at this uncomfortable question that economists are always bumping into, which is, “Can we really trust people? Can we really trust people to do care of themselves?” Think about this. I’m working today and if I’m given the choice, I don’t really want to pay taxes. But I also don’t want to save money. I’d rather spend now and have a good time, which means that, when I get to my retirement years, if I think I can count on the government to pay my way or to pay for my basic needs, then I don’t have to be worried about being hungry in my retirement years, and therefore I don’t save today. And this is what's called moral hazard. If I can pass the risk on to society at large, then I'm going to take more risks. And therefore, if we had a completely private Social Security System, it creates moral hazard and may discourage from saving unless the government requires the savings. So a forced savings plan is one way of protecting those of us who do save from those of us who don't. I have this fear that all the money that I'm putting into my 401K plan and my retirement accounts is going to be taken away by the government whenever I get to be 70 years old, because someone else won’t have saved. And the government has to raise taxes to provide for their public assistance. So I’ve saved all this money, you didn’t, now what’s going to happen? That's a concern. But if I know the government is forcing you to save, too, then I can rest easy and I have more of an incentive to save money now. So getting people to actually take responsibility for their retirement years is one of the things the Social Security System is doing right now, because the government is taking responsibility for it. So if we privatize it, we’ve got to make sure that individuals have adequate personal incentives to see to their retirement savings, rather than relying on the government to bail them out when they don’t save enough by the time they retire.

The third set of plans has been offered by the government’s Advisory Commission on Social Security, and they couldn’t agree on any single plan, so they actually came up with three plans of their own. Plan number one was to raise taxes and invest some of the trust fund in private markets. Plan number two was to cut benefits, raising the mandatory retirement age, and also to give incentives for people to start their own retirement accounts. And a third plan that was offered by the Advisory Commission was large mandatory individual retirement accounts, that is privatize the whole thing. Let people start their own accounts, manage their own accounts, take the risk they want and invest the money directly in stocks and bonds, and the government out of the business of Social Security.

Well, each of these plans has its own problems, as we’ve discussed, and the problems boil down to the politics of taking things away from people that they expected and the problem of moral hazard; people who won’t save unless they are made to save, and the question of what happens when the government gets involved in administering systems that involve the government responsibility for private companies. All of these are politically difficult things.

So, maybe we’re going to get lucky and the Social Security crisis isn’t going to be as bad as we thought. It could be that this whole notion that there’s going to be a crisis is based on faulty assumptions, such as that labor productivity wouldn’t increase. After all, the only problem with two workers supporting one is that that means huge tax rates on those two workers to pay the benefits that the first worker is expecting. However, if labor productivity is rising faster and faster, then you and I can afford to pay taxes at a higher rate without a reduction in our standard of living, because our paychecks are just bigger because we’re more productive. So a big increase in labor productivity would be a lucky break that could help reduce the pain of making good on Social Security obligations.

The second assumption that we can call into question is inflation. Whenever we were worried about a crisis in Social Security in the 70’s and 80’s, that was back when the inflation rate was 5 to 10%. Nowadays it’s been under 3% consistently for the last 5 years, therefore the amount of money that’s going to be needed to pay for Social Security
benefits for people who are going to be retiring in the coming years is going to be less than expected. So as long as inflation remains low, that works well for using the existing trust fund to payoff Social Security benefits for a longer period of time. If inflation heats up again, then we’re going to need to raise taxes quicker to make good on our existing obligations.

The third set of assumptions has to do with how many workers there are going to be. We’ve had lots of net immigration into the United States. Women are participating in the labor force in a much higher way than has been anticipated. So therefore growth in the labor force is going to reduce the pressure on the other workers who were expected to shoulder the burden of Social Security.

The final concern is with fertility, how many children are going to be born in the coming years who will be working in 2030 that will actually be paying money into the Social Security Trust Fund. And that depends entirely upon the behavior of potential parents today. We’ve had baby booms, we’ve had baby busts, lots more children born in the 50’s and 60’s than we expected, a lot fewer born in the 70’s and 80’s than you might have predicted. And demographers didn’t do a very good job of predicting the ups and downs in the birth rate. So maybe we’ll get lucky in some sense and more families will have children who will be working age and paying into the Social Security Trust Fund.

In the long run, however, we’ve got to answer the question, “Who should provide for retirement?” Who should take care of people’s needs in their years where they’re no longer able to work? And the notion that the government should be involved pretty much rests on the belief that if you let people do this for themselves, they won’t save enough, and therefore, in their old age, they will become dependent on public assistance and dependent on taxes for their care. If the government were to use a forced savings plan and let people decide how they wanted to manage the money, what kind of risks they wanted to take, we would still have all kinds of problems with that system. But it would be a different set of problems than we have with the Social Security System now, completely administered by the government. Where is the government’s role in retirement planning? Until we answer that question, we’re not going to be able to craft what we think is the best system for providing for people in their retirement years. But clearly, the way demographics are going now, there is some trouble ahead for Social Security and the best advice to you is save what you can in your private accounts and provide for your own retirement. And also, vote so that you can express to the government your preference about how taxes and benefits are distributed in any kind of public assistance retirement program.
Keynes and the Aggregate Expenditures Model

Relating the Keynesian Model to the AD/AS Model

Have you ever wondered why the government spends so much money? There are really two explanations. One is the government buys public goods; stuff that we wouldn't pay for on our own like streetlights and national defense and stuff like that. But the other reason is very compelling to a macroeconomist, and that is, that the government spends money because spending money creates demand for goods and services, which creates jobs. And sometimes the government wants to create jobs to help the economy expand out of a slump.

Consider the biggest slump in U.S. economic history: the Great Depression of the 1930’s. Twenty-five percent unemployment, all kinds of wasted resources, people sitting around without jobs. Prices that actually started falling because demand was so slack. The Great Depression was a terrible period in our economic history. And out of this period, came some new ideas about the way the economy worked. One British economist, John Maynard Keynes, surveyed the situation and said, “The Great Depression proves definitively, that the ideas of the classical economists don’t always apply.” The classical economists were the guys behind the supply and demand curves, who said that prices and wages adjust to make supply equal to demand, so that markets clear and we have equilibrium. Well here we were, in this huge period of dis-equilibrium—that is, there was a lot of excess supply of labor, a lot of wasted resources—but wages and prices didn’t fall nearly fast enough to clear the markets and solve the problem. The classical economist said, “Look, stand back and wait, in the long run prices will adjust to eliminate the depression.” Keynes’ reply was “Yes, but in the long run, we’re all dead.” Keynes’ idea about the way the economy works is grounded on his insight that you’re spending creates your income and if that is true, then it is demand that drives the economy.

Let’s look at the basic idea behind Keynes’ writing as we build a circular flow diagram that shows the way resources and money move through the economy. The axis of the circular flow diagram is the exchange between businesses and households. Households supply labor, capital, land, other resources, and entrepreneurial talent to businesses through the goods market. That is, the flow of resources from households to businesses follows this red arrow. And in the opposite direction, we have a flow of money that goes from businesses through the factors market, to households. That is their income. The other exchange between households and businesses is through the goods market. That is, resources that go into factories come out in the form of goods and services that then flow into households, as they spend money—we call this consumer spending—on the stuff that gives households satisfaction. Money flows in the opposite direction. That is, households spend money on goods and services that winds up as the revenue of businesses.

Now, look at the circular flow, the money that you get from businesses in the form of a paycheck is exactly what you spend on the products that businesses produce. Resources flow around the wheel in one direction, money flows in the other direction, and when income is equal to spending we have macroeconomic equilibrium, a stable outcome. Now in Keynes’ view of the world, what was happening was that people weren’t spending enough money, a sudden reduction in consumer spending created a dis-equilibrium, and here is how it worked. Suppose people were afraid, of the depression that is they were afraid of losing their job or they had already lost their job and didn’t know how bad things were going to get. So they started, instead of spending, saving money instead. Now when people start saving money, that is a leakage out of the circular flow, because they are saving now with their given amount of income and they are spending less. Now in the original situation, when consumers cut back their spending, stuff begins to accumulate on the shelves of the business, their inventories pile up because they are not selling as much stuff as they have made. The response of a reasonable businessman or woman in that case, is to cut back production. So what happens in that case, is that the accumulation of inventories leads businesses not to hire as much labor and capital and other stuff, because they don’t want to make as much output because consumers aren’t buying it. What begins to happen then, is that income shrinks as people are laid off and factors are unemployed. Then what happens is that people reduce their spending even further, because they don’t have as much income, and the spiral continues, until we wind up with a shrinking economy, less spending and less income. In equilibrium, it always has to be true, that what people are paid in income is equal to what they have spent on goods and services. So if people are saving, then the overall economy is going to be shrinking. That is, unless somebody injects that money back into the economy in the form of spending.

And this was Keynes’ idea about how to get out of the Great Depression. He said, “What if, since people are hoarding their money in saving and not spending, what if we introduce government spending, to fill the gap? What if the government steps in and spends money that it doesn’t have?” That is, the government undertakes deficit spending. If the government undertakes deficit spending, then what happens is resources flow from the goods market into the government, to compensate for the stuff that consumers aren’t buying, and the government prints money and pumps it back into the goods market to compensate for what people are saving. So you see, the leakage out of the system is...
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made up over here by government spending, that pushes money back in. If consumers won’t spend it, then let the government spend it instead. And that restores equilibrium with the higher amount of income, the higher amount of spending. All that has to happen is, any leakage out of the system is compensated for by an injection back in. Keynes’ view was, you could prevent unemployment and cause the economy to expand by having the government spend equivalent to what people were trying to save.

Now, Savings is not the only leakage out of the economy, and government spending is not the only possible injection. In fact, other leakages include taxes. It could be that the government is imposing taxes, taking money away from people and reducing the amount they can spend on goods and services. Taxes, just like savings, constitute a leakage out of the system, and the government is not the only entity that can spend money. Businesses can also spend money. So, here we have another way of thinking about Keynes’ equilibrium. In equilibrium, all of the money that is leaking out in the form of savings and taxes, that is the sum total of leakages, has to equal the sum total of injections. That is, whether it is businesses or the government that is spending the money in equilibrium, it must be true that savings and taxes are going to be equal to businesses spending and government spending.

If we have an open economy where we allow for imports and exports, then we also have an injection from foreigners. That is, foreigners spend money on our goods and services too, which flow overseas. So Keynes’ view is, it doesn’t matter whether businesses increase their spending, the government increases their spending, or foreigners increase their spending. In the end, it is going to be true that any time there are injections of demand back into the system, that is going to increase income and give us a larger economy in equilibrium. So, there are two ways of thinking about Keynes’ view of the world. One is that income equals spending in equilibrium. And if the government or businesses or foreigners increase their spending, they are going to cause the economy to grow. Because when they spend, they create income for households, and that leaves households to increase their consumption as well. The other way to think about Keynes’ insight is that anything that leaks out of the economy has to be injected back in by somebody.

Now, one problem with Keynes’ model is Keynes holds prices constant, which makes it hard then to examine the effect of changing prices on the economy. If you are holding something constant, you can’t look at how things are changing. So what were going to do then is we are going to modify Keynes’ model by asking the question, “how would it change the flow of resources in our economy if the price level went up?”

Well there are three effects of the price level that we can see in this model. The first is, when the price level goes up, people need to hold more cash to do their shopping, because price tags are demanding more cash to buy their groceries. When people try to get more cash, they go to the bank, everybody wants to get cash to do their shopping, they are going to drive up the interest rate, which is the price of money. And businesses, seeing higher interest rates will delay their investment spending, because investment spending usually relies on borrowed money. The higher the interest rate, the more it costs to borrow money, and the harder it is to get money to do business investment; the less profitable it is to pay those higher finance charges to build a new factory or to buy new equipment. So, higher prices lead to more demand for money, lead to higher interest rates, lead to less business spending; and that shrinks the economy and leads an equilibrium to less income.

The second effect of higher prices is that consumers say, “My savings account won’t buy as much, now that prices are higher, the value of my savings account in goods and services has shrunk.” And with the shrinking purchasing power of your wealth, you buy less. So, consumer spending falls when the prices are higher because of the wealth effect.

The third consequence of higher prices is that foreigners won’t buy your goods, they will buy their own substitutes in other countries instead. So higher prices in your economy, makes it less attractive to foreigners, and therefore your exports fall, and then your economy shrinks, and output is lower.

We can show the effect of prices on the economy in the aggregate demand curve. The aggregate demand curve summarizes the relationship between prices and output in equilibrium in the economy. As prices are higher, because of higher interest rates and investment spending being reduced, because of shrinking purchasing power of wealth and lower consumption, and because of higher prices that deter foreigners from buying your countries goods, then the consequence is going to be lower equilibrium income. Keynes’ model can be summarized with this equation. Spending equals income. That is, the income of the economy, in equilibrium, is equal to the combined spending of consumers, businesses, the government, and foreigners in the form of net exports. Y equals C plus I plus G plus NX. The effect of prices on all of these components of spending is what gives us the aggregate demand curve. Remember
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the main idea of Keynes, is the economy is driven by demand. And the way you pump up the economy, is you stimulate demand by giving these different agents incentives to spend more.
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The Multipliers

Deriving the Multipliers

Keynes model of the macro economy is driven by demand. And one of the cooler results that Keynes gets is called the multiplier. That is, your spending becomes someone else’s income and when he spends it, he creates income for someone else and sets up a chain reaction that creates a whole lot of income in the economy. In order to understand the multiplier, we are going to begin with a concept called the “marginal propensity to consume.” The marginal propensity to consume is defined as the change in consumption that results from a change of income. That is, if you get one additional dollar of income, how much of it are you going to spend, and how much of it are you going to save?

Suppose the marginal for propensity to consume is 50 percent, or one-half—that means that of every dollar that you get, every additional dollar, you are going to put half of it in savings, and spend 50 cents. Now suppose we are in an economy where everyone has the same marginal propensity to consume. That is everybody who gets a new dollar’s worth of income spends half of it and saves half of it. What would happen then, if you decided that you wanted to spend $8.00? Suppose you found it in a mattress and decided you were going to go spend it, maybe go buy a compact disc. What would be the effect on the gross domestic product of your one action?

Well, let’s follow the chain of events that would result whenever you spend your $8.00. Remember, the $8.00 that you spend at the record store becomes the income of the record storeowner which, is going to change his spending habits. So, let’s set this up carefully.

What you did whenever you went into the record store was, you spent $8.00—we’ll put $8.00 right here, because that is going to increase the gross domestic product that resulted from your choice to buy a compact disc. Now, think about the first round of results, this $8.00 was an income in the record storeowner’s pocket, and is going to change his behavior. Multiply $8.00 by the marginal propensity to consume, and you get his increased consumption. In our example, marginal propensity to consume is one-half; so the record storeowner is going to go out and change his consumption now by $4.00. And those $4.00, suppose, are going to be spent on ice cream. So he now creates income for the ice cream store owner of $4.00; so we add more income here, since we are keeping a tally of the total amount of income that is created in our economy of $4.00 created for the ice cream storeowner. Now the ice cream storeowner also has a marginal propensity to consume of 50 percent. So let’s suppose he goes and spends $2.00 at the greeting card store, so his consumption increases by $2.00, which becomes new income of $2.00 for the woman who runs the greeting card store. So, let’s put this income down here for her. Now, she’s got a marginal propensity to consume of 50 percent, so she’s going to go spend $1.00 to buy an apple, which adds $1.00’s worth of income in the pocket of the grocer. And by now you get the point, right, this thing just keeps going. You get consumption of one-half when the grocer spends half and saves half and then one-half of income is created by the grocer’s spending, maybe he buys a movie ticket. And this just keeps going, one-fourth, one-eighth, and so forth. And over here I put the additional income that’s added whenever each successive person chooses to spend, until the pieces are so small that I just can’t handle them anymore.

Now look, we’ve got a geometric progression here. The first act of spending creates $8.00 worth of income. The second act of spending—the record storeowner—creates half of that amount, or $4.00. The next choice creates half of that amount, or $2.00, and the amounts get geometrically smaller at each stage. Now, what’s that going to give us? If we add up all these pieces, we’re going to get the total change in income in the economy, so what’s it going to look like here? Its going to look something like this: let’s get my pieces added together. Eight plus four, plus two, plus one, plus one-half, plus one-fourth, plus one-eighth, I can’t even pick these up anymore they are so little, but look what I’ve got here: they all add up to $16.00. The total change in income that results from your original decision to spend $8.00, is $16.00 worth of increase in gross domestic product.

Now, how would you have known that? How would you have known that the total change in income in this case was going to be equal to $16.00? Well, you would have known it because there is a nice simple mathematical formula that shows how a geometric sequence can be summarized. That is, if you have one, plus one-half, plus one-fourth, plus one-eighth and you add them all up, you’re going to eventually get to two, and two is equal to one over one minus one-half.

That is, if the effect—the marginal propensity to consume—is one-half, then each successive stage is going to be one-half of the previous stage; and the grand total that you get is going to be one over one minus one-half, which is one over one-half which is two. So you originally spent $8.00, the grand total increase in gross domestic product was 16. This is going to be true in general. In general, the multiplier is going to be related to the marginal propensity to consume in exactly this fashion.
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Now, let me define what a multiplier is. A multiplier is defined as the change in gross domestic product that results from a change in autonomous spending. Say government spending, if the government spent $8.00 in our previous example, we’d get an increase in GDP of 16. It could also be a change in income that results from a change in investment spending; if businesses spent the money, you’d get the exact same consequences.

So, what’s important here is that when autonomous spending changes—that is, spending that’s not directly related to your income, but a decision to spend more money apart from your income—when you increase autonomous spending, the change in income that results from that change in autonomous spending, an equilibrium, is the multiplier, that ratio. And in our previous example it was two.

Well, in general the formula for the multiplier is going to be equal to one over one minus the marginal propensity to consume. Now, since the marginal propensity to consume is a fraction, and since the only thing you can do with your income besides consuming it is saving it, then one minus the marginal propensity to consume is equal to the marginal propensity to save. So, the multiplier is equal to one over the marginal propensity to save.

Now, again, let me stress the point that in our previous story, our chain reaction began with an increase in consumer spending, but it could have just as easily begun with an increase in government spending, or an increase in business spending, or an increase in the spending by foreigners. It doesn’t matter, whoever is spending autonomously is setting this chain reaction in motion; and a multiplier is defined as the change in equilibrium gross domestic product; that results when somebody autonomously increases their spending.

Now, you can see why Keynes was interested in this idea; because if the government spends money, what it does is create income for people who then, will themselves spend more money. And the net result is, gross domestic product begins to multiply, grow rapidly, creating jobs for people. During the Great Depression, Keynes argued that the way to get out of the Depression was to increase gross domestic products, by having the government prime the pump. If the government spends, then the government creates income for consumers through income checks for their work on government projects, and they go out and spend money themselves. Which creates income for grocers, and record storeowners, and ice cream parlors, and so on and so forth. So, the multiplier effect then, depends on how much money people are willing to spend. When the marginal for propensity to consume is high, the multiplier is big, and that chain reaction goes on and on. But, if people tend to put most of their income in the bank, and the marginal for propensity to consume is small, then the multiplier is small and the effect of a change in government spending will be much less than when the MPC is high.

So, this is Keynes’ idea, the model is driven by demand and the bigger the marginal for propensity to consume, the bigger effect a given change in autonomous will have on the overall gross domestic product.
I'm here at the bank making a deposit in my savings account and feeling very virtuous, because our culture regards saving as a virtue. However, what makes sense for one person, that is what's good for me to do may be bad if everyone tries to do it at once. This was an insight of John Maynard Keynes'. He says, “Think about it. When you're saving, you're not spending. And if everyone reduces their spending at once, they may create a recession.” This is what he called the paradox of thrift. That is, when I come to the bank and put my money in the vault, I am, at that same moment, making a decision not to spend it. And when I don't spend, I am reducing aggregate demand. And when I reduce aggregate demand, I am reducing income for someone else down the line. That is, my decision to put money in the bank is a decision not to buy a compact disc, which means that the record storeowner won't be buying ice cream, which means that the ice cream vendor won’t be buying a T-shirt. And the multiplier effect works in reverse, causing the economy to contract.

Think about this: savings has two components; there's autonomous savings, the amount that you're going to save regardless of what your income is, and then there's that amount of savings that depends on your income. For each additional dollar in income that you get, you're going to be saving a fraction of it, called the marginal propensity to save. So here's what happens; savings is a leakage out of the flow of goods and services. If everyone increases their autonomous savings, what they're doing is reducing demand, which means that businesses are going to cut back production and income is going to be falling. Eventually, what happens is that savings has to be equal to investment. That's our condition for macroeconomic equilibrium. So if investment is autonomous, that means, if it's a fixed amount, then what has to happen is the amount by which we have increased autonomous savings has to be the amount by which the economy reduces savings based on income. Income is going to shrink until savings falls to be exactly equal to the level that it was before everyone tried to save more. This means that since savings equals income, our efforts to try to increase our aggregate savings are fruitless and the only thing that's accomplished is a reduction in gross domestic product. People stop spending, businesses stop creating goods and services, and the economy shrinks. This may be what happened during the Great Depression. People were fearful for the future and tried to save more money. But, when they did, they didn’t spend and therefore stores closed down, and people didn’t have jobs and income fell further and the economy contracted. The same thing may have happened in Japan. The Japanese have a reputation for saving a lot. This was great during the 50’s and 60’s when there was a lot of productive capital investment to be undertaken. However, in the 80’s and 90’s, it worked against Japan, because their economy was in a recession and everyone was trying to save. And when the foreign sectors stopped keeping the economy afloat, the Japanese economy contracted further. They were saving too much and it wasn’t until the government started spending for the economy that the economy began to grow again.

My brother and I have this argument; he says that I should spend more and do my part to create jobs and help the economy grow. I believe, however, that I am doing my part for the economy whenever I put money in the bank. That's because there's a component to the story of the paradox of thrift that I think is oversimplified, and that's the idea that investment is autonomous. In fact, investment spending depends on the interest rate. And when the interest rate is lower, businesses are likely to come to the bank, borrow more money and build more factories and install more equipment. So what happens when I bring my money into the bank is that I increase the supply of loanable funds, pushing down the interest rate and encouraging businesses to borrow more. Once you allow the interest rate to vary and businesses to respond to lower interest rates, than savings can equal investment at a higher level. That is more savings means more investment in equilibrium. And my savings actually doesn't deter the economy from growth. In fact, I'm encouraging businesses to install capital stock that's going to help the economy grow faster in the long run.

So the paradox of thrift depends on a very simple view of the economy, one in which investment spending is autonomous. But if you introduce the interest rate and allow increased savings to push the interest rate down, then you can reason your way out of the paradox. Keynes was smart to come up with this idea, the idea that savings is the opposite of spending, therefore the more you save, the less you spend, and you may cause the economy to shrink. On the other hand, once you reintroduce the variable interest rate and see how savings is linked to the interest rate, you can see that putting your money in the bank is usually a very good idea, because it makes credit easier to get for businesses and, in the long run, increases our standard of living.
Are you worried about Social Security? Do you wonder how you're going to pay for you're retirement? Well, at some point, you'll get concerned, but right now you should probably be saving. The Social Security Administration is designed to provide income to people in their retirement years as a kind of public assistance program. It began after the Great Depression and was originally funded as an old-age assistance program with the Two Percent Payroll Tax. People paid 2% of their income up to 3000 dollars into the Social Security Trust Fund, which is a government-administered savings plan. Then, in their retirement years after 65, they could begin to withdraw Social Security benefits, which they could collect until they died.

Now, what are you paying into Social Security today? About 15.3% of your paycheck goes into Social Security either to pay for your retirement benefits or to pay for medical benefits under the Medicare plan. You pay half of it and your employer pays half of it. Now, this money goes into the Social Security Trust Fund and, when you reach your early 60's, you'll begin to be eligible to withdraw money from this trust fund. Again, it kind of presents itself as a government-administered savings plan. You put the money in, it collects interest and you take it out in your retirement years. But nowadays the fund is in trouble, because the withdrawals from the fund are increasing much faster than the payments into the fund, and people are beginning to ask, "Is Social Security in trouble? Does it need to be saved?"

I'll start by asking you the question, "What are you expecting to get out of Social Security in your retirement years and have you even thought about it?" Well, the way that Social Security works, people pay in when they're young, so they feel entitled to take the money out when they're old. Of, if you think about it this way, right now, as a young person, your taxes are paying the benefits on older workers in their retirement years. So you have to look forward to that, when you're old, young workers will be paying the taxes that support your retirement benefits. There's a kind of fairness to the whole thing. You should be able to get out something that you put in, or you pay your dues now, you get your benefits later. But the system is starting show signs of strain and has been since the 1970's, and people are concerned that the fund is shrinking so rapidly that it may actually go bankrupt. In fact, under current assumptions, there will be no money at all left in the Social Security Trust Fund by the year 2030. What's going on? What's changed since the years after the Great Depression that has put our national retirement system in such jeopardy?

Well, the first big change has been demographic. In the years when Social Security was first up and running, there were about 20 workers supporting each retired person. Nowadays there have been big changes in demographics. One is people are living a lot longer. A person who retired at age 65 in the years following the Great Depression couldn't count on living that much longer by actuarial standards. Nowadays, you can count on living 20 years after you retire at age 65. So people are withdrawing from the trust fund a lot longer. Another thing is that birth rates fell in the United States after the 1960's and there are just a lot fewer people working per retired person than there were before. So longer life expectancies and a lower birthrate combine demographically to put strain on the system, and that's why the money in the trust fund has been shrinking.

Another problem is that there have been a lot of programs added to Social Security. No not only do you collect money for retirement benefits, but you can also collect medical benefits under Medicare, you can also collect disability benefits and, if your spouse survives you, your spouse is eligible to collect Social Security survivor benefits. So the additional increase in benefits is taking money out of the system rapidly, also.

So what's going to happen now? What are the problems with the Social Security System and how might they be fixed? Well, let's look first. One of the big problems with the Social Security Fund as a savings plan is all the money you've invested in government bonds. Congress has not allowed the Social Security Fund to be invested in productive investments, like factories, and companies and anything that would pay high rates of interest. Rather, all the money is, effectively, borrowed by the government. It is invested in US Treasury securities. So there's no real interest being generated anywhere, because the money is not put to productive use. That means, ultimately, the Social Security Trust Fund is secure only to the extent that the government can raise taxes to pay off its own debt. So, because the Social Security Trust Fund is entirely invested in government debt, there is no real productive stock of capital backing it. That is, the government's ability to tax, it's, effectively, a transfer program that taxes the young to pay benefits to the old. Therefore, it security rests on the ability to raise taxes to pay benefits.

A second problem is that a lot of programs have been added without providing for the funding. That is, all of these extra medical and survivor’s benefits that have been added since the 1930’s have been added with no provision for funding them. In the long run, the fund is going to have to be replenished by taxes raised on the workers, but, in the
short run, Congress finds that it is politically advantageous to cater to powerful voting blocks. namely, retired people, by giving them additional tasty retirement benefits and there’s been no real provision for how those benefits are going to be paid for. And young people notoriously don’t vote with nearly the strength and organization that retired workers do.

A third concern is that Congress is going to have to do something to benefits or taxes to make this thing stable, and this is where the politics come in. As I’ve already mentioned, these powerful voting blocks of retired people have consistently and strongly lobbied against any reduction in benefits. And you can’t blame them. After all, they paid in Social Security money all of their working years. They feel entitled to the benefits that they were promised. At the same time, the younger workers are kind of oblivious to what’s going on. We don’t inform ourselves about what these taxes are for and therefore we don’t put pressure on Congress to reform the system somehow. So the taxes are going to have to be raised. And since there are fewer younger workers working to support retired workers, those increases in taxes may be pretty dramatic, just to keep the system solvent, just to keep the fund from shrinking, much less build it up in any way. So, using current assumptions, the Social Security Trust Fund will be exhausted within 30 years. That means something radical has to be done.

Well, before we go to proposals to save the Social Security System, let’s consider in a broad sweep what could be done. One thing that could be done is the tax rates could be raised. Now, that’s going to put a big squeeze on working people. I mean taxes are already high in this country and workers are struggling to make ends meet. So raising taxes is going to be a very unpopular proposal.

The next thing is that benefits could be cut for people who are collecting money in their retirement years, but that’s going to be tough, because those people paid money in with an implicit contract that they would take benefits out at the rate at which they're collecting them. And therefore there’s going to be sense, in which we are reneging on an agreement if we cut the benefits. So both increase in taxes and reductions in benefits are going to be unpopular. They may be necessary, but they’re going to be extremely politically painful.

Another way in which to reduce benefits would be to raise the retirement age and make the retirement age somehow a function of life expectancy. People are now vigorous and working well into their 70’s and therefore there may be no need for the government to provide public assistance-type retirement payments to people who are in their early 60’s. And this is something that we should certainly discuss. Again, people who paid money in 20 years ago were expecting to be able to start drawing money in their early 60’s, so that’s going to be viewed as a change in the contract, but it still may be something that’s necessary. Clearly, there’s no easy solution or the problem would have been fixed a long time ago.

The third thing to be addressed here, beside the taxes and the benefits, is the way in which the money is invested. Maybe all of it doesn’t need to be linked to the government. In fact, that’s probably a very, very poor use of the Social Security Trust Fund. Why not invest it in more productive assets, such as stocks and bonds, and shares in companies and other things that yield high rates of return, because they’re productive business investments. Why not invest in private assets? This would certainly increase the return on savings and give Social Security more money to fund its obligations. This is going to be a concern, however, because, to the extent that the Social Security Fund is invested in the stock market, then the government is going to be under pressure to keep the stock market from crashing, which means the Fed may lose its latitude to pursue independent monetary policy. Right now people say the Fed needs to pump money in anytime the stock market starts sagging, because otherwise the Social Security Fund will be damaged. So there’s all those problems. Then there’s the whole horror of thinking about the government having to be accountable for all the different investments that it funds. Should we invest the Social Security Trust Fund in companies that produce cigarettes? What about companies that invest in countries that are run by dictators? All this would then put the U.S. Government so deeply involved in the politics of investment that it would just potentially create a political nightmare. So there we have that set of concerns.

But be that as it may, we’ve got three sets of plans to consider for reforming the Social Security System and let’s consider some of the advantages and disadvantages of each. First, President Clinton has offered his own plan for reforming Social Security, which is to dedicate 60% of the Federal budget surplus, which we’ve recently been running, to replenishing the Social Security Trust Fund and to do this for 15 to 25 years, however many is necessary, and also to invest part of the trust fund in private securities. Now, to the extent that the trust fund is invested in private securities, then we’re actually, in some ways, radically changing the Social Security System. However, if we just have
Hot Topic: Does Social Security Need to be “Saved”?  

A second set of concerns are raised by another plan that's been offered by Senator John Breaux, and the Breaux plan involves the following steps: first of all, partial privatization, invest some of the money in private assets; next, have the government subsidize people’s individual savings, that is cut some of the taxes on interest income and give people a tax advantage for putting money in savings accounts, like individual retirement accounts and 401K’s, that would reduce the need for Social Security in the long run, because people will substitute their private savings instead. And the third thing, of course, is cut the benefits and raise the taxes, just to reduce the overall amount of money that is in the trust fund.

The problem with privatization is can we really trust people to manage their own retirement money? And now, we’re at this uncomfortable question that economists are always bumping into, which is, “Can we really trust people? Can we trust people to spend money well? Can we trust people to take care of themselves?” Think about this. I’m working today and if I’m given the choice, I don’t really want to pay taxes. But I also don’t want to save money. I’d rather spend now and have a good time, which means that, when I get to my retirement years, if I think I can count on the government to pay my way or to pay for my basic needs, then I don’t have to be worried about being hungry in my retirement years, and therefore I don’t save today. And this is what's called moral hazard. If I can pass the risk on to society at large, then I'm going to take more risks. And therefore, if we had a completely private Social Security System, it creates moral hazard and may discourage from saving unless the government requires the savings. So a forced savings plan is one way of protecting those of us who do save from those of us who don’t. I have this fear that all the money that I'm putting into my 401K plan and my retirement accounts is going to be taken away by the government whenever I get to be 70 years old, because someone else won’t have saved. And the government has to raise taxes to provide for their public assistance. So I’ve saved all this money, you didn’t, now what’s going to happen? That’s a concern. But if I know the government is forcing you to save, too, then I can rest easy and I have more of an incentive to save money now. So getting people to actually take responsibility for their retirement years is one of the things the Social Security System is doing right now, because the government is taking responsibility for it. So if we privatize it, we’ve got to make sure that individuals have adequate personal incentives to see to their retirement savings, rather than relying on the government to bail them out when they don’t save enough by the time they retire.

The third set of plans has been offered by the government’s Advisory Commission on Social Security, and they couldn’t agree on any single plan, so they actually came up with three plans of their own. Plan number one was to raise taxes and invest some of the trust fund in private markets. Plan number two was to cut benefits, raising the mandatory retirement age, and also to give incentives for people to start their own retirement accounts. And a third plan that was offered by the Advisory Commission was large mandatory individual retirement accounts, that is privatize the whole thing. Let people start their own accounts, manage their own accounts, take the risk they want and invest the money directly in stocks and bonds, and the government out of the business of Social Security.

Well, each of these plans has its own problems, as we’ve discussed, and the problems boil down to the politics of taking things away from people that they expected and the problem of moral hazard, people who won’t save unless they are made to save, and the question of what happens when the government gets involved in administering systems that involve the government responsibility for private companies. All of these are politically difficult things.

So, maybe we’re going to get lucky and the Social Security crisis isn’t going to be as bad as we thought. It could be that this whole notion that there’s going to be a crisis is based on faulty assumptions, such as that labor productivity wouldn’t increase. After all, the only problem with two workers supporting one is that that means huge tax rates on those two workers to pay the benefits that the first worker is expecting. However, if labor productivity is rising faster and faster, then you and I can afford to pay taxes at a higher rate without a reduction in our standard of living, because our paychecks are just bigger because we’re more productive. So a big increase in labor productivity would be a lucky break that could help reduce the pain of making good on Social Security obligations.

The second assumption that we can call into question is inflation. Whenever we were worried about a crisis in Social Security in the 70’s and 80’s, that was back when the inflation rate was 5 to 10%. Nowadays it’s been under 3% consistently for the last 5 years, therefore the amount of money that’s going to be needed to pay for Social Security
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benefits for people who are going to be retiring in the coming years is going to be less than expected. So as long as inflation remains low, that works well for using the existing trust fund to payoff Social Security benefits for a longer period of time. If inflation heats up again, then we’re going to need to raise taxes quicker to make good on our existing obligations.

The third set of assumptions has to do with how many workers there are going to be. We’ve had lots of net immigration into the United States. Women are participating in the labor force in a much higher way than has been anticipated. So therefore growth in the labor force is going to reduce the pressure on the other workers who were expected to shoulder the burden of Social Security.

The final concern is with fertility, how many children are going to be born in the coming years who will be working in 2030 that will actually be paying money into the Social Security Trust Fund. And that depends entirely upon the behavior of potential parents today. We’ve had baby booms, we’ve had baby busts, lots more children born in the 50’s and 60’s than we expected, a lot fewer born in the 70’s and 80’s than you might have predicted. And demographers didn’t do a very good job of predicting the ups and downs in the birth rate. So maybe we’ll get lucky in some sense and more families will have children who will be working age and paying into the Social Security Trust Fund.

In the long run, however, we’ve got to answer the question, “Who should provide for retirement?” Who should take care of people’s needs in their years where they’re no longer able to work? And the notion that the government should be involved pretty much rests on the belief that if you let people do this for themselves, they won’t save enough, and therefore, in their old age, they will become dependent on public assistance and dependent on taxes for their care. If the government were to use a forced savings plan and let people decide how they wanted to manage the money, what kind of risks they wanted to take, we would still have all kinds of problems with that system. But it would be a different set of problems than we have with the Social Security System now, completely administered by the government. Where is the government’s role in retirement planning? Until we answer that question, we’re not going to be able to craft what we think is the best system for providing for people in their retirement years. But clearly, the way demographics are going now, there is some trouble ahead for Social Security and the best advice to you is save what you can in your private accounts and provide for your own retirement. And also, vote so that you can express to the government your preference about how taxes and benefits are distributed in any kind of public assistance retirement program.
Imagine a world without money; how would you get the things that you want and need? Suppose you are a canoe maker, and you want a chicken. Well, what you are going to have to do is make a canoe. Then you are going to have to carry it around, looking for someone who has a chicken. And when you find him, you have to hope that he wants a canoe. Then you have got to decide how many chickens is a canoe worth... will you exchange for it? Then, do the transaction, carry your chickens home. Its very, very inconvenient and with all of these search costs in effort to find trading partners, you probably aren’t going to spend nearly as much time actually making canoes and creating things of value.

Eventually what happens in an economy like this, an economy that depends on barter is that some good begins to circulate as a medium of exchange. Suppose that everyone wants salt, so you have made a canoe, you can trade it for salt. Then eventually you find somebody who has got chickens, he may not want a canoe, but he wants salt, so the trade is pretty easy to do. A medium of exchange lowers the search costs. Plus what happens, is all prices begin to be quoted in terms of salt, rather than having to figure out how many chickens a canoe is worth, the salt acts as a kind of common denominator, it’s called a ‘unit of account.’ A third thing that happens is, if salt can be stored, you can sell your stuff for salt, put salt in your warehouse, and spend the salt when you want stuff in the future. That is it can be a ‘store of value.’ Now you have got something that is functioning as money. Money is anything that is commonly accepted in exchange for goods and services. That is anything that is actually used and accepted for shopping.

Now, lets be very clear about the way the term money is used. When we talk about money, we are usually talking about ‘exchange’ that is, things that can be traded. Whenever you say “money,” you might talk about the money that you have in the bank, that is the value that you have stored up. But typically when economists are talking about money, were concerned about those tools that are used in society to make shopping easier to do. The functions of money are: unit of account, medium of exchange, and store of value.

Now the earliest forms of money, like salt are all commodities, things that are valuable for their own sake: cattle, wine, tobacco. In fact, some places in the world today, occasionally when the paper money is worthless, people will still use cigarettes in the transaction. Maybe to pay for a cab ride, or in prison, often cigarettes circulate as money, are commonly accepted in trades.

What is it though, that is going to be the best kind of money? The best kind of money is going to be durable, that it isn’t going to melt or rot. It is going to be portable, easy to carry around. It is going to be standardizable, that is, everyone can look at it and clearly see that it is valuable. And it is going to be divisible. That is it is pretty easy to make change from. So, what is going to be ideal, what commodity best serves? Well one commodity that is pretty good is gold, or any of the other precious medals. Actually antiquity people probably thought that this gold and silver, and other precious medals were valuable because it reminded them of the celestial bodies which many of them saw the signs of the divine. Once these things are commonly accepted and agreed upon as valuable, then you can cut them up into standard sizes and make coins that can circulate as money. Pretty easy to carry around and everybody knows that they are good.

Now, one problem with this is that a sack full of gold is pretty heavy. So what is about to happen in history is were going to witness the evolution in the ancient world, from people actually carrying commodities around, to carrying around pieces of paper that represent claims on the commodities. So, you put all of your gold with the goldsmith somewhere, he gives you a certificate that stands for gold, and now you can pay in shopping, with this certificate, representative money. Once people are accepting a piece of paper, the next step is that you don’t need any gold to back it, that is the government simply says, this money is valuable. This is a movement from commodity money and representative money to what we call ‘fiat money,’ money that gets its value from the word of law.

Now, the way that the government gives money value is first, it requires that you hold this money to pay your taxes. And the army stands behind that, so unless you want to run a foil of the structures of authority, you have got to agree that this is valuable, and you have to come up with some at tax time. The second thing the government can do is it can declare that this is legal tender. Legal tender means that it is good for settling debts. If I owe you money and I give you legal tender, then you can’t sue me because the government will throw your claim in court, because I settled it with an instrument that everyone says, by law, has to be accepted. That is what fiat money is all about.

Now why should we care about money? Money makes transactions easier to do, and if there is enough money, then business proceeds normally. If there is too little money, then people revert toward something kind of like barter. They
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Money in the Economy

The Money Supply

don’t specialize, they don’t trade, and in the modern world, we call that a recession. The economy slows down when money and credit are difficult to get and business activity slacks off, employment is down and we get a recession. On the other hand, if the government is printing and circulating too much money, then we have got too much money chasing too few goods and that creates inflation, an excess supply of money that drives up prices. So there is a fine line to walk between too little money and a recession in credit crunch, and too much money in inflationary pressure rising prices.

So the Federal Reserve is the monetary authority of the United States. It’s charged to making sure that there is not too much money and not too little money. That is, it’s charged to making sure that money retains its value by prices remaining stable. That means the Fed has got to make sure that there is just enough money.

So that raises the question, if the Fed is trying to measure money, what in practice, is it actually measuring? What is money? And this question has several answers; depending on who is willing to accept something in exchange for goods and services.

Let’s think about a very, very narrow measure of money. What is the stuff that everyone is willing to take in transactions? What can you use to pay for your groceries? What will the pizza boy accept whenever he delivers your pizza? The answer is cash. Everybody will take currency; everyone will take coins; and most people will take personal checks; and traveler’s checks. If you add up currency and coin in circulation, the total sum of personal checking accounts, and business checking accounts, and you throw in travelers checks; you have got a measure of money that the Federal Reserve calls M1. This is the narrowest measure of the money supply. And in the U.S. economy, it adds up to about one trillion dollars.

Now, let’s make the measure of money a little bit broader. Let’s include other things that we might call near money. The Fed’s concern here is, how much stuff is actually out there, circulating through the economy to make shopping possible. That is how much shopping are people capable of doing with the existing money supply. So the Fed is now going to say, well this is how much stuff that is actually being used to pay for shopping (and remember even if you are using a credit card, you are eventually settling it with a cash or check). So the next question is; how much stuff is out there poised, about ready to be converted into a spendable form, this is near money. And it includes, well, first of all, your savings account. It includes certificates of deposit, especially the small ones that consumers use when they are saving for things. It also includes the money market/mutual fund shares that you hold. Maybe you have a money market account that you use every so often writing a check to transfer into your account, your checking account whenever you need to pay tuition, or something like that. All of these measures, these broader measures of money are called M2. M2 includes everything that is in M1 plus these additional instruments. See these measures of money are inclusive. M1 is the narrowest measure and M2 includes everything that is in M1 as well as some other stuff; in this case: savings accounts, certificates of deposit, and money market shares that are held by households.

Finally, there is one more layer to this, we now can add other things that are less frequently used for shopping that represent a store of wealth that will be used for shopping before too long. These include larger CD’s. CD’s in an amount over $100,000, count as large negotiable CD’s. Frequently these are used to settle businesses between banks. Also included in this near money measure are repurchase agreements. These are arrangements where businesses lend their checking accounts overnight to banks; so that banks can invest them and earn a little bit of interest in the global markets overnight. These repurchase agreements are secured by treasury bills. That is, the bank gives IBM treasury bills overnight in exchange for IBM’s checking account. In the morning the transaction is reversed. The treasury bills go back to the bank and IBM gets their checking account to do their business transactions with. These larger and less liquid (that is, harder-to-convert-to-cash) forms of savings are part of M3. M3 is the broadest measure of money that the Fed tracks in its effort to figure out how much stuff is actually available to support shopping. So, M3 includes everything that is in M2 as well as larger CD’s (that is CD’s in amounts over $100,000); repurchase agreements; the money market mutual fund shares, that are held by businesses, and pension funds insurance companies and other financial institutions, as well as Euro dollar deposits, that is money that is held in overseas branches of U.S. banks. Put that all together with the savings accounts, and small CD’s, and the currency, coins, and traveler’s checks, and you have got M3. M3 is the broadest measure of money that the Fed watches. Now M3 adds up to be about six-and-a-half trillion dollars. That is, if you include everything that is either payable to the pizza boy or could be converted into a checking account relatively quickly, you have got a lot of purchasing power circulating in the economy in the form of money.
The Money Supply

So the Fed measures the money supply, and we’re going to be studying soon how the Fed controls the amount of money that is actually in circulation. But this is an important thing to know, because the amount of money helps the economy. There is an amount of money that is right for the economy. It helps the economy do its business. Too much and you get inflation, too little and you could get a recession.
I came to the grocery store today knowing in advance that I don't have any money. That is, there's no cash in my wallet. And time was, this would be a big problem at the grocery store. Nowadays however, there are lots of ways to pay for your groceries.

I could write a personal check, but that's going to have problems. Joe's going to be concerned about whether the check is good, which means he's got to go to the trouble of calling the bank or using a check verification service. I than have to worry about whether someone at the store might use my check unscrupulously, maybe photo copy it and try to pass it off as their own. So, checks are convenient, but they have risks.

I could also use a credit card, but the credit card doesn't finally settle this transaction. A credit card is just my way of making a short term loan to myself which I have to pay off at the end of the month, either by writing a check or directing my bank to take the money from my account and give it to the credit card company. So, that just puts off the day of reckoning.

I could, however, also use a debit card. A debit card would electronically take the money out of my checking card. Joe likes that because he doesn't have to worry about the risks. The money shows up immediately. But, debit cards make me nervous. Not only do I lose the float, that is, I lose interest till the end of the month like I get with my credit card, but what if somebody found this card and figured out my personal identification number? A lot of money could come out of my checking account very quickly. So, I kind of keep this in a safe place, although it is convenient. Again, there's still risks associated with it.

Money is getting easier and easier to use as innovations and technology and creativity create new forms in which we can settle transactions at the grocery store. One of the hottest ideas in payment these days is electronic cash, or “E” cash. And the forms that it takes look a like debit cards and credit cards, physical forms that we're used to. Only nowadays what we’re getting are called “electronic wallets.” They're cards with little computer chips on them. And you take these chips to machines, kiosks at a shopping center or post office, plug in your card, enter your pin number and have money downloaded from your checking account directly to this computer chip. Now I can take this card to any store that has a chip reader and pay as if I had cash. Plug it in and enter the amount I want to pay, and it's transferred directly to Joe's account. I can see right here on the screen how much money is being taken off my card, so I have the confidence of knowing I’m not being defrauded, and Joe knows that he's also in a situation that’s safe. It's great, plus if I lose the card, I don't lose my whole bank account. I lose only the case that I down loaded onto this card. So, I'll keep it in a safe place just like I’d keep the green folding stuff.

Electronic cash doesn't even have to be administered by banks. People who get credit from me, either by me giving them my credit card number, or me writing them a check, or any form in which I can transfer money to them, can then watch my money for me. Any company could issue these chip cards. In fact, on the Internet nowadays, you have companies that use electronic case. They get credit from my credit card or a check that I send to them and then they dole out money to the people from whom I buy things online. When I buy books or computer parts, or cd’s, they take care of settling the payment by transferring money electronically to the accounts of those business.

“E” cash, chip cards, online money being sent around in wires. This is the direction are going and banks don’t even have to be involved. More and more, the payment system can be run by non-bank companies. Remember, a bank is a financial intermediary that makes loans as well as accepting deposits. But the payment system, eventually, can circumvent banks entirely. In fact, it doesn’t even have to involve dollars at all. We can have commerce that's settled in frequent flier miles or long distance telephone minutes. But I'm getting ahead of myself.

Why is it that electronic commerce isn't already entirely ruling shopping? Why isn't “E” cash the payments norm everywhere? There’s certainly great benefits to “E” cash. One of the benefits is it doesn't involve paper checks. Paper checks are expensive. It takes about five billion dollars worth of human labor and resources a year to truck those checks around and get them cleared from one bank to the next, whereas electronic commerce is relatively inexpensive. Once you’ve got these payment readers installed at stores, it costs almost nothing for me to pay Joe using a chip card. Another thing is I don’t have to worry about the fraud involved with checks, and Joe doesn’t have to worry about any fraud from his employees taking paper money out of the cash register at night. A lot of the fraud that's involved with paper payments is completely eliminated. Some other advantages are: it’s very, very convenient. It seems like I've also got my card with me and it's very easy to carry around.
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Money in the Economy

Case Study: The Cashless Society

The reason "E" cash isn't the norm nowadays is there are costs and risks associated with it that we still, as a culture, haven't gotten over. One is that there is some concern about security. Think about the difference between car crashes and airplane crashes. Car crashes happen all the time, but because relatively few people are involved in any single accident, they don't make the headline news. Whereas plane crashes, which are very, very rare, make the headlines because a lot of people are involved in the catastrophe and are affected.

Now, paper checks are fraudulently used every day. And cash is stolen every day, but that doesn't make the headlines. But, if somebody hacks into an "E" cash computer somewhere, and messes with the payment system, that's all over the front pages because it's a big, catastrophic, and focal news event. So, fraud with "E" cash is probably going to be less common and less damaging overall, but because it's scary and it strikes at the heart of our confidence in the payment mechanism, it tends to be bigger news. So, there are certainly security questions about whether hackers could mess with and "E" cash system.

Another thing about "E" cash that gets people worked up is privacy. I mean, do we really want the government knowing everywhere we spend our money? But with these chip cards now, there can be anonymity built in. I can download the cash from my account and maybe the account number doesn't come with it. So, whenever I come to the store, and use my chip card, I can pay without necessarily having to give my name. Once you can have anonymity involved with "E" cash, then it has a lot of the advantages of the green folding stuff. And eventually it will replace the green folding stuff because people are going to wonder if you're carrying cash around, what kind of transactions are you doing anyway? Embarrassing or illicit stuff that you don't want to leave an electronic record of? What do you have to hide? Why not transparency?

Another concern with "E" cash is that once the banking system is circumvented, the Federal Reserve loses its control over the money supply. And certainly, once we start using frequent flier miles and long distance minutes as cash, the Fed is in a really tough position as far as controlling the payments mechanism or the money supply. That can be a very big concern, because then do we control inflation and interest rates, and other macro-economic policy variables? Another concern is concern about taxes, concern about criminal activities, all kinds of things that have particular concern for "E" cash in ways that paper money doesn't raise the same set of questions.

So, what will money eventually become? Chip cards are a great new development that are going to catch on more and more as people see that they can be convenient and anonymous and very safe to use.

However, money is an idea. Money is a stream of zeroes and ones out there floating through the ether. It's just numbers on a balance sheet. And so, why do I need a card at all? Why can't some very smart reader pick up all the information it needs from me, including all my account information from some simple bit of biometric data, so that whenever I show up at the grocery store, all I have to do is identify myself, give my approval to the transaction and it's all settled?
Money: Banking, Spending, Saving, and Investing

Determinants of Money Demand

The interest rate is the price of money. It's what you have to pay to borrow money from the bank. The interest rate then depends on the interaction of the demand for money and the supply of money. In this discussion, we'll look at what the interest rate is and how it is determined. So let's begin with the question about the demand for money.

You for instance. What determines the amount of money that you hold; what determines the combined balances of your checking accounts, and the cash and coins that you choose to carry around with you and any given time? Well, one thing that is going to determine your demand for money is your wealth. And let this green bar represent your overall wealth; all of the things that you own that are of value. The bigger the bar is, the more cash and coins you are going to be carrying around, because you are probably going to be doing more shopping if you’re richer. But there is an alternative way of holding wealth besides cash and coins, and that is interest-bearing assets. If you hold cash, then you are not holding bonds, and stocks, and savings accounts for that matter. The thing that distinguishes assets from money is that assets earn interest. That is, assets create more wealth for you.

So, how do you divide your wealth then, between assets and money? Well, there are three motives for holding money; and each of these motives leads us to think about factors that influence the division of your wealth between money-holdings and asset-holdings. The first is called the transactions motive for holding money, and that’s really why you carry money around: is so you can go shopping. The amount of money that you carry around in the transaction motive is going to depend on three factors. The first is real income. The higher your real income is, the more shopping you are going to do, the more stuff there is you’re going to buy, and therefore you’re going to tend to hold more money. That is, you need more money to actually buy the stuff. A second factor that influences the transactions holding is the price level. The higher prices are, the smaller the purchasing power of any given quantity of nominal money. That is, your checking account doesn’t go as far if prices double. Therefore, you have to load up on money; increasing the quantity of your wealth that you hold in the form of cash and checks. A third factor is the interest rate. And the interest rate is the opportunity cost of holding money, because when you are holding money, you are not earning interest. When the interest rate is lower, you don’t care; you are willing to forego interest in order to have the convenience of carrying a shoppable medium of exchange. But when the interest rate is higher, you’ll tend to shift more of your wealth into interest bearing forms to take advantage of the higher interest rates. This the transactions motive for holding money, the tradeoff between the convenience of shopping and the opportunity of earning interest on interest bearing assets.

A second motive for holding money that is closely related to the transactions motive is called the precautionary motive. In the precautionary motive, you’re concerned about what might happen: the sudden need for money if you were to get sick or decide to quit your job; or need to buy a washing machine if the old one breaks. You never know what is going to happen. And the more things that can go wrong, the greater the uncertainty and the greater your anxiety about these things—the more likely you are going to be, to hold money. Nowadays however, the precautionary motive is probably less important. That is, because it is easier to convert assets into cash— that is to convert them into a liquid form or to liquidate them—then it was perhaps during the Great Depression, when Keynes first wrote about this motive. Also, people have credit cards nowadays, so you don’t need to stick cash in the mattress, if you have an emergency you can make yourself a loan very quickly with a credit card.

The third motive for holding money is called the speculative motive. The speculative motive is based on your guess about where interest rates are going next. Let’s think for a moment about the relationship between interest rates and the value of any given asset. When interest rates rise, that means that there are newly issued securities on the market that pay a higher rate of interest than the securities you may be holding. Higher interest rates means that nobody wants your old security that pays a lower interest rate, and if you want to sell it, you have to lower the price. You have to sell it at a discount, to make it competitive with newly issued securities paying a higher rate of interest. Now you start thinking if interest rates are very low right now, then they are probably going to go up. That means my securities are about to lose value. And therefore you may choose to sell the securities now and increase your holdings of cash, so as to protect yourself from the consequences of higher interest rates. Since higher interest rates shrink the value of interest bearing assets, then you protect yourself against that likelihood that eventually by holding more cash now. This is the speculative motive for holding cash, because when you are holding cash, you don’t stand to lose when interest rates go up.

Now we can take these three motives then, and we can draw a demand curve that summarizes these effects. In this demand curve, we are going to put on the vertical axis the rate of interest: the price of money. And on the horizontal axis, we are going to put the quantity of money that you choose to hold. The quantity of money is going to be related
Determinants of Money Demand

to the interest rate through those three motives. And let’s go ahead and draw the demand curve for money, downward sloping. The downward sloping demand curve indicates that at higher interest rates, the quantity of money demanded is smaller. At lower interest rates, the quantity of money demanded is going to be greater. That is what makes the curve slope downwards. And the reason for this negative relationship between interest rates, and the quantity of money that people want to hold is first of all, because of transaction. At higher interest rates, people would rather hold interest-bearing assets instead of cash, because of the high opportunity cost. So what people do at high interest rates is they take their cash and they purchase interest-bearing assets, converting their wealth into interest-bearing forms. The quantity of money demanded becomes small. At lower interest rates, people don’t want to give up the convenience of holding money, so they liquidate or sell their assets and hold cash instead.

A second thing that causes this negative relationship is the speculative demand for money. At low interest rates, people are concerned that interest rates may rise and shrink the value of their interest-bearing assets. Therefore at low interest rates, people protect themselves from this possible loss by selling their securities now and holding cash instead. So between these transactions, opportunity cost motive and the speculative fear of rising interest rates, we wind up with a downward sloping demand curve. Lower interest rates are associated with a larger quantity of money demanded; higher interest rates associated with the smaller quantity of money demanded. Now, we still have two other variables that aren’t represented in this picture, and those are the price level and real income. And, both of these variables influence the demand for money. In fact, if the price level increases, then people are going to need more cash in order to do their transactions. Their demand for nominal money balances the amount of money that they actually want to hold in their checking account increases when prices rise in order for them to have enough cash to do a given amount of shopping. Even if you are buying the same number of groceries, you need a larger balance in your checking account, if the price of groceries has increased. Therefore, a higher price level means a larger quantity of money demanded at every interest rate.

In the same a way, a larger real income shifts out the demand for money, because now you are buying more goods and services. When you are wealthier, you’re doing more shopping; and even if prices are the same and the interest rate is the same, you are going to want to hold a larger quantity of money in your checking account. You are going to need it to get your given amount of shopping done. When you are wealthier, you do more shopping and that means holding more transactions balances, a larger demand for money.

In summary, the demands for money depends on the price level, the interest rate, and real gross domestic product. These three factors combine to determine the fraction of people’s wealth that they hold as cash and checking for shopping, and the fraction that they hold as interest bearing assets. Now that we understand the demand for money, we are ready to add the supply of money, and with demand and supply, we’ll be able to calculate the equilibrium interest rate.
Money: Banking, Spending, Saving, and Investing

Money in the Economy

The Money Market

You read in the newspaper about interest rates going up and down, and you might ask, “What causes that? What changes in the economic environment show up as increasing interest rates or falling interest rates and what does that mean?” Interest rates represent the price of money; and therefore are determined in the market for money. We have discussed how the demand for money is related to the interest rate. That is, how people’s decision to hold cash and checking as opposed to bonds and stocks, is influenced by changes in the interest rate.

Now we’re going to add the supply of money to calculate Supply and Demand’s interaction to determine the equilibrium interest rate. But first, remember that as the interest rate falls, people choose to hold more of their wealth in the form of cash—that is, money. And lower interest rates, because the represent a smaller opportunity cost of holding cash, make it profitable for people to opt for the convenience of money instead of the return on interest-bearing assets. The downward sloping demand curve represents the movement into money as interest rates fall.

What does the supply curve look like in this market? The money supply is controlled by the Federal Reserve. The Federal Reserve determines the amount of money that’s appropriate for there to be in the economy in order to make sure there is enough money to make business easy to do, but not so much that the prices begin to rise sparking inflation. The Federal Reserve controls the money supply using a variety of tools that we’ll be discussing later. But right now, let’s just imagine that the money supply is fixed—that is, the Federal Reserve has sufficient power to make the money supply whatever it wants it to be. In particular, the money supply does not respond to changes in the market interest rate. The money supply may influence the interest rate, but it is not influenced by it. Therefore, we can treat the money supply as fixed. It is a policy variable that the Federal Reserve controls. Because the money supply doesn’t depend on the interest rate, when we draw it in this diagram, it shows up as a vertical line. Whatever the interest rate is, the Federal Reserve gets to choose the money supply that it wants. Now I can label this vertical curve “NS” representing the money supply.

Now that I have got a money supply and a money demand curve, I am ready to move on to the calculation of equilibrium. So equilibrium—as usual in a supply and demand diagram—occurs where the demand and supply curves touch each other. That is this point right here, where the curves cross, is going to be the point of market clearing, equilibrium interest rate I*. In order to see this clearly, let’s imagine that we are at some interest rate that isn’t market clearing; an interest rate where the supply and demand curves are at different places. If we are at an interest rate like I-sub-zero, an interest rate that is above equilibrium, then the quantity of money demanded at that interest rate is going to be less than quantity of money supplied. That is we have an excess supply of money. The Federal Reserve has made available to the market, more money then people want to hold at that higher interest rate. So what are people going to do?

What they are going to do is they are going to take all of this extra money and show up at their bank and they are going to want to put it into their savings account. Banks find then, that they are over run, they have got this glut of deposits, and therefore savings account rates begin to drop. The interest rate the bank will pay you becomes less because the bank doesn’t need any extra money. As the interest rate begins to fall then, people say, well I don’t want to put my money in savings. I want to hold it in my wallet to do shopping with instead; because the interest rate is less, therefore the opportunity costs of holding that convenient transactable form is less. So that will resolve this excess supply. As the interest rate falls, then people demand a larger quantity of money and eventually, as the interest rate gets to I*, the market is going to clear.

Now another way of telling the same story is, whenever people say I have too much cash at the going interest rate; they go and they buy bonds with it. When everybody wants to buy bonds, they’re bidding up the price of bonds, and as the price of bonds gets higher and higher and higher, the rate of return on bonds gets smaller. That is, if this bond pays you $10.00 a year and you can buy it for $100; that is a 10 percent rate of return. But if you have to pay $200 for the same bond, that is only a five percent rate of return. So as the price of bonds rises, as people aggressively compete for bonds—trying to get rid of their extra cash—they drive up the price of bonds and that is the same thing as driving down the rate of return, or the interest rate. As that interest rate falls, people then decide that they’d rather hold cash instead.

Consider the other possibility: that the interest rate is below equilibrium. If the interest rate is below equilibrium, say at some level like I*, then the quantity of money demanded on the demand curve is greater than the quantity supplied. That is, we have an excess demand for money. People say, “Hey interest rates are so low, why shouldn’t I carry cash? It’s not worth the hassle to deal with the bank account, the return isn’t high enough.” So what happens in that
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case, is everybody goes to their saving account and wants to withdraw cash from it so that they can carry the money
around. Banks then are running short on savings; they don’t have enough money in their banks to make their loans
and in order to attract savings, banks begin to aggressively compete, raising the interest rate on savings accounts.
And as they do so, people decide, “Oh, banks look attractive again,” and they come back to put their cash in. See the
point here is as banks bid up the interest rate, people decide that they would like to economize on their cash holdings
to take advantage of these rising rates. And the quantity of money demanded declines until the equilibrium is re-
established at I*. 

Alternatively, people down here people say, “The interest rate is so low who wants to hold a bond?” Everybody
decides to sell their bond, and when everyone sells their bond the price of bonds is pushed down. When the price of
bonds is pushed down, the rate of return on bonds is pushed up. Remember that bond that pays you $10.00 a year,
well at $100 for the bond that is a 10 percent rate of return. But if bonds lose value, that is, if their price drops to $50,
now that is a 20 percent rate of return when you get that $10.00 check annually. So whenever bond prices are falling,
because people are trying to get rid of their bonds and get cash instead, the interest rate on bonds—the rate of
return—is bid up. Until finally people decide that, yes, they are just as happy holding these bonds because the interest
rate is back at a level that gives us equilibrium.

So, what happens then in this market when something changes? We have looked at supply and demand and
equilibrium. Our last challenge is to do some comparative static’s exercises. That is what happens when the curves
shift? Well let’s think about a few things that would shift the curves. First of all what would shift the demand curve for
money? Well if the price level were to increase, everyone would need to hold more cash to do their shopping.
Therefore the demand curve would shift outwards.

With the demand curve for money shifting outwards to a new level, the old interest rate, I*, would create a situation, in
which we have excess demand for money. At this old interest rate now, there is a larger quantity of money demanded
then there is supplied. So that creates a bidding process, banks start to compete to hold on to their savings accounts
and the interest rate rises to restore equilibrium. If the price level increases then, equilibrium interest rate rises. The
same thing is going to be true if real output increases. If real output increases, the demand for money increases
across the economy. People need more cash in checking accounts to do their business. And everyone shows up at
once wanting to sell their bonds and get cash instead. When everybody tries to sell their bonds, once again, interest
rates are going to be bid up. The same thing if everyone tried to withdraw from their savings account at once, banks
would find themselves scrambling to hold on to their deposits. Interest rates would be bid up and a new higher
equilibrium interest rate would be established. So as far as the demand curve is concerned, a higher price level, or a
higher real gross domestic product, will increase the demand for money; and either of these developments would
push up the equilibrium interest rate.

The final thing that we could do is we could shift the money supply curve. If the Federal Reserve decided to increase
the supply of money, we’d get a new supply curve, maybe out of a point like this. And if the Federal Reserve were to
increase the money supply to a new, higher level, then at the old interest rate— I*—look, we have got a much bigger
supply of money then we have demand for money on the original red curve. Well people now have more money than
they want. And what are they going to do with it? They are going to show up at the bank and want to deposit it, and
when everybody deposits at once, the bank finds itself glutted with savings deposits, and that pushes the equilibrium
interest rate down.

An increase in the money supply creates excess supply of money at the original interest rate. And people’s behavior
at that point is going to be to go out and seek interest-bearing assets because they don’t want any more cash. When
everyone does that, the price of bonds is going to be bid up, pushing down the rate of return and banks are going to
find themselves glutted with savings deposits so they will lower their interest rates. Therefore an increase in the
money supply leads to a lower equilibrium interest rate. Whatever directions the money supply changes, the
equilibrium interest rate changes in the opposite direction.

So, now you can do your own experiments. There are really three variables that can change in this story: the price
level, real gross domestic product, and the nominal money supply controlled by the Fed. Anytime one of those
variables changes, you will get a change in the equilibrium interest rate, through an interaction of money supply and
money demand.
Financial Markets

Financial Markets and Intermediaries

We have been talking about the money market, and the decision that households make about how to hold their wealth. How much of your wealth do you want to hold in the form of transactions balances; that is cash and checks and things that you can go shopping with? And how much of your wealth do you want to hold in the form of interest-bearing assets? See the money market is about making the decision about how to divide your wealth between these two forms. So, in order to understand the money market better, let’s focus our attention now on the world of interest-bearing assets. And that means that we are going to be talking about finance.

Finance means any activity that involves borrowing, lending, or sharing risks. Let’s look at what happens in a financial market. In a financial market, we have borrowers meeting lenders. Borrowers are any agents who have investment opportunities, but who lack the cash to get those projects started. For instance, businesses might have and opportunity to make a profit if they could only borrow the money the build a factory. The government has the opportunity to build roads and bridges, but it is going to need to borrow the money to get those projects done. And finally, homeowners; that is, people who would like to buy a house and live in it, would be happy to do the transaction, but they are going to have to borrow money in the form of a mortgage before they can get their house off of the ground. So borrowers are people who have projects, ideas, but don’t have cash on hand to pull them off.

Lenders on the other hand are people who have surplus cash and are looking for an opportunity to earn interest. They are looking for an opportunity to earn a rate of return on their money, but they don’t have projects that they would like to do themselves. Therefore, getting lenders and borrowers together is an opportunity to make the economic pie bigger, and once these projects are underway, the borrowers can share their profits with the lenders. That is what happens in a financial market.

Let’s look at the flow of funds in a financial market. What happens in this financial market is that lenders send cash to borrowers, so that they can purchase plant, equipment, houses, road crews, and things like that, to create the assets out of which profits are made. In return, the borrowers give the lenders an IOU. Now this term, IOU is not an acronym that stands for anything, it’s a rebus, and it’s a word picture, IOU money. And an IOU is a financial security, or a financial instrument. That is, it’s a contract that explains what the lender is entitled to, at what date in the future, under what circumstances. That is, it tells the world and the lender what money to expect in the future as a result of this deal that the lender and the borrower have made. Now there are all different kinds of IOU’s. There are bonds, which are debt contracts that entitle the lender to a fixed interest payment in the future. And, that is the way that most other loans work too, even if it is not a bond, the loan entitles you to a fixed interest payment if it is a debt instrument. There are also particular kinds of loans called treasury bills that are issued by the United States Government. These are short-term instruments that the government uses to finance its debt, and they entitle the lender to an interest payment within a year. There are also stock instruments, and stock or equity contracts entitle the lender to a share of the profits of this business venture at some date in the future (usually paid in the form of dividends).

Now, the borrower and the lender can get together directly, in which case they are engaging in a transaction we call direct finance. That is what would happen if you bought a share of IBM stock directly yourself, from a broker; or if you lent your sister money so that she could buy a car. That is direct finance, where the borrower and lender deal with one another directly, face to face; or through a broker. However, rather than going into the world of direct finance, you may want to reduce your search cost. That is, you may not want to spend time going out and looking for someone with a good project, plus there are risks involved, if you don’t want to put all of your eggs in one basket. On top of that you are going to have to draw up a contract, and monitor compliance and all of that is going to involve a lot of transactions effort that you may want to spare yourself. Therefore, you are going to go through what is called a financial intermediary. And that is an agent in the economy that specializes in bringing lenders and borrowers together.

A financial intermediary is defined by its balance sheet. So let’s take a look here at a balance sheet. A balance sheet tells you two things. It tells you what you own, that is your assets, and it tells you what you owe, that is your liabilities. That is, if you own something, then the money to purchase that came from somewhere; that is, you probably borrowed it. A financial intermediary is an institution that simultaneously borrows and lends. In particular, a financial intermediary is an agent that borrows from the ultimate lenders. That is, households put money on deposit with the financial intermediary; and the financial intermediary then funnels that money, or lends it to the people in the economy, the borrowers who have the projects who can earn profits from this savings.

Let’s look at some examples of financial intermediaries and I think it will make clearer what’s going on in this process. One example of a financial intermediary is a bank, this is one you are probably very familiar with. A bank borrows
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Money: Banking, Spending, Saving, and Investing

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money from households, and it gets households to lend money by offering them deposits in a form that's attractive. What people want when they go to a bank are transactions balances like checking accounts, or opportunities to earn a little bit of interest by putting your money in a savings account that you can take out whenever you want. People are attracted to savings accounts and checking accounts because they are liquid. Liquid means easily convertible into cash without any risk.

Now, when the bank gets all of its money deposited by households it goes and makes loans: loans to businesses; loans to people who are building houses in the form of mortgages; and sometimes they will even hold treasury bills, which means they are indirectly making a loan to the government. Now, if you are in a savings and loan institution, you are probably lending most of your money to houses, because savings and loan institutions typically lend at-least three-fourths of their money in the form of mortgages. There are also credit unions, which lend most of their money to their own members and mutual savings banks, which are less and less common. So, banks are one kind of financial intermediary—they stand between lenders and borrowers.

Another example of a financial intermediary is a mutual fund. Now, here is the way a mutual fund works. People go to a mutual fund and they invest their money there, they put money there on deposit because the mutual fund offers them a diversified portfolio. That is you get a mutual fund statement which tells the funds you are invested in and once you look at the prospectus for that fund you can see that it involves the holding of thousands of shares of stock in thousands of different companies. What the mutual fund typically does, is it buys stock in thousands of different companies and since you own a share of the mutual fund you own a little piece of each of these thousands of companies. Rather than putting all of your eggs in one basket, by making a big loan to one company you can put your money in a mutual fund, get a statement and a share of that mutual fund and own a little piece of the stocks of thousands of different companies. The mutual fund diversifies for you that is, it goes to the trouble of locating lots of good investments and gives you a little piece of each one so as to minimize your risk.

Another example of a financial intermediary is an insurance company. And an insurance company works this way: the insurance company buys bonds of companies, and it offers the people who have deposited there insurance policies, many of which have an annuity component. An annuity is like a financial instrument; it's like a savings account. You have heard of life insurance policies maturing. Well when you buy a whole life policy, what you are dong is you're engaging in a kind of savings activity. When your whole life policy matures, you're entitled to receive your savings with interest at a date in the future. So the insurance company takes the money that you have deposited and pays you a rate of return on the money that you have paid in. All of the money that you have paid in in the form of premiums and annuity investments, gets invested in companies as the insurance companies buys bonds. Now insurance companies work on the principle of actuarial science, that is they look at the statistics on accidents and life expectancy, and they can calculate pretty precisely, exactly how much money they are going to have to pay out each year. That means they can afford to invest the bulk of the money that's deposited there into very long term investments that typically pay higher rates of return. That's why insurance company annuities are usually a relatively attractive investment for lenders. Also, they have good tax consequences and protection from certain kinds of taxes.

One more kind of financial intermediary is the pension fund. The pension fund, again, stands between lenders and borrowers, and it offers lenders retirement accounts and pensions. That is, it plays a role in peoples retirement planning. Then the pension plan itself invests this money into the stocks of lots of companies; that is, it engages in diversification. The pension fund knows when it is going to have to have money to pay people who are approaching their retirement years, so it can also do some long term planning and leave its money in the stock market looking for the best possible return.

Now, you've seen several examples of financial intermediaries. Financial intermediaries engage in bringing lenders and borrowers together; and doing so in a form that makes the terms more attractive for both sides. Well, think about what's happening here, people are putting money into financial intermediaries where they're buying bonds. What they are doing is they are saving; and all of the money that goes into financial markets comes out the other side. That is, it's borrowed by businesses or the government or households, who are making investment decisions. Building houses, building factories, building roads. Savings equal investments: everything that goes in comes out. With that insight, it's easy to see how the financial system is related to the rest of the economy.

Consider these equations. Let Y stand for income. Now what can you do with your income? You can consume it, save it, or spend it on taxes. And since everyone in the economy is in the same position, all income in the economy winds
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up as consumer spending, savings, or tax payments. Now think also about income. Income is received whenever you produce goods and services, and all of the goods and services that are produced have to be purchased by someone; whether consumers, businesses in the form of investment spending, the government or foreigners in the form of our net exports. Now this income, that's equal to the sum of its uses, and this income, that's equal to the total of all spending, are the same income. So set them equal to each other and you get these equations. This equation's set equal to this one. Cancel the C off, and do a little rearrangement and you get this remarkable statement: which is, that all of the investment spending, all the money businesses are borrowing in order to purchase plant, equipment and other capital goods, all of that business spending is someone else's saving. Whether the saving of households, the saving of the government (that is the amount by which tax payments exceed government or the governments budget surplus), or whether it's our trade deficit, that is the money foreigners are lending us, so that we can buy more of their goods than they buy of ours. These three forms of savings, private saving, public saving and foreign saving have to be equal, by accounting, to the amount of investment spending that businesses do. And that's the link between the real economy and the financial system.
Financial Markets

Hot Topic: Should the U.S. Government Bail Out Failing Financial Institutions?

Suppose you have a really amazing auto insurance policy. Anytime you have any problem with your car you can take it directly to the body shop or the auto mechanic, and your insurance company will pay for everything and not ask any questions. If you had this much insurance, chances are it would change your behavior, you might start to drive a little more carelessly or not be so diligent about parking your car in safe places. That’s because, since the insurance company’s bearing all the risk, you’re inclined to take more risk. This phenomenon is called “moral hazard.” Whenever you are able to pass the risk on to someone else, you’ll take actions that increase the risks and the costs for your insurer. That’s why your insurance company will give you a deductible; you have to bear some of the risk so you’ll be careful, or the insurance company will only insure a fraction of the risk, leaving some of it with you. Or perhaps, they’re going to monitor your behavior to make sure you don’t behave in careless ways. This is the way insurance companies solve the problem of moral hazard.

Now that you understand moral hazard, you’re able to think about what caused the banking crises of the 1980’s in the United States, because banks were in a similar position. Start with thinking about the depositors. Because depositors have insurance through the Federal Deposit Insurance Corporation, we don’t worry what banks are doing with our money, because if you have trouble getting your money out of the bank, the Government will simply bail you out with money from the insurance fund. Therefore, depositors don’t pay a lot of attention to what their banks are up to.

Next, think about the banks themselves, the owners of the have subscribed capital to the bank. That is, they put some of their own money at risk. If the bank invests in risky projects, and makes a huge windfall, jackpot profit, they get to keep it all. On the other hand, if the bank goes bust because of risky loans, all they lose is the capital they subscribed. Their up side is potential unlimited and their downside is strictly limited. Therefore, banks face a kind of moral hazard; they’re inclined to take risk, because their depositors don’t care because they’re insured and the banks have only a limited amount of capital at stake.

Now, this lets you know what’s going on in the 1980’s when we start to look at the banking situation. Consider what’s happening in the years leading up to the 1980’s. Suddenly there are all kinds of financial innovation giving small savers options for where to put their money. Before, they had to put it in the bank or else not earn interest; but now you’ve got suddenly money market mutual funds popping up and other opportunities for small savers to invest their money and earn market interest rates. In order to be competitive now, banks have to pay higher interest rates to attract savers; and earning higher interest rates means investing in riskier projects that pay those higher interest rates. So before, banks invested pretty much just in small business loans, but they understood, or mortgages, or household loans. But, in the 1980’s banks, due to a change in law enacted by Congress, suddenly had latitude to invest in a wide array risky projects, including commercial real estate ventures, and commercial paper of companies, and so forth. All kinds of things, eventually investing even junk bonds. Banks had to do this or they couldn’t earn the market interest rates that allowed them to compete with other options that were available to small savers.

Banks were quickly getting in over their head investing in risky projects that they didn’t really understand that well. They didn’t even know how to calculate the risks because they had no experience. Then when the economy slipped into recession in the mid-1980’s, what happened was, a lot of these loans suddenly became non-performing. The businesses that the banks invested in, the people that the banks had lent to, were unable to repay the loans and suddenly the banks found themselves with their assets evaporating overnight, losing value. But they still had liabilities, they still owed their depositors money and that meant, in many cases, the Federal Deposit Insurance Corporation had to step in, take control of the bank, and bail it out. That is, it had to make good on the commitment to the depositors out of the government’s insurance funds.

Now, from 1930’s whenever bank deposit insurance was first created by congress as a response to bank runs during the Depression, and the 1980’s; typically anywhere between two and six banks would fail in a typical year, and it was usually a very unusual event. However, in the 1980’s, between 1980, itself and 1994, about 1,600 commercial banks of the United States failed. That is, they became insolvent, they didn’t have enough assets to make good on their liabilities and the FDIC had to step in and bail out the bank, and make good on their commitments out of the insurance fund.

Now, ultimately, we taxpayers are responsible for replenishing that insurance fund; ultimately it’s us taxpayer that are left holding the bag when a bank fails and has made a bunch of bad loans and still has accepted depositors money that has to be paid off. So, we taxpayers may have a concern, why is it we are insuring the banking system; why is that we are creating a set of incentives that tempt banks to create relatively risky loans?
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Well, let’s think about it, one option would be to abolish deposit insurance all together, let’s don’t even have it. But then, you’re back in the situation we faced in the depression, which is, when one bank fails, everyone gets spooked that maybe his or her bank is going to be next. So runs on one bank; lead to banking failure; lead people to go to another bank; try to take their money out; create a run on that bank; and perhaps push that bank into a liquidity crises, or into insolvency. This is the problem with the psychology of banking, people think that the banking system is so tightly interconnected, that it’s very easy for failure of one bank to spread to another and another, through a kind of psychological contagion and hysteria. So, deposit insurance stops that chain of dominos from falling. What about private-deposit insurance so that the taxpayers aren’t responsible? Well, that’s a great idea; but you know, there isn’t any financial institution anywhere in the world with enough money to stand behind the United States banking system. The liabilities are just way too large, ultimately the government has to be behind it or the system won’t be credible.

Okay, then what about some of the fixes that my insurance company tries with my auto policy? What about deductibles, partial insurance and monitoring? Well, all of these things are now becoming more and more part of the way in which bank deposit insurance works. As far as deductibles are concerned, we can enact a policy that increases the amount of money that banks have at stake. That is how much they have to lose in the even of a bank failure. And these are the so-called “capital adequacy requirements.” Increase the amount of capital that the bank owners have to put at risk, so that they are less inclined to take extraordinary risks and threaten the Deposit Insurance Fund and pass the bag onto taxpayers.

A second policy is risk-rated insurance. That is, banks that are making riskier loans have to pay higher insurance rates, kind of like smokers have to pay higher health insurance rates, or you have to pay a higher auto insurance rate if you drive certain kinds of jazzy sports cars. A final policy involves monitoring. And that is, when auditors come into that bank, and make sure that banks are obeying all the rules for good standards and practices. That is, that the banks aren’t investing in loans that are regarded extraordinarily risky, and that in fact, they are running a tight ship. And that if the banks don’t measure up in these audits, that they are fined or their insurance can be taken away, or they can be even closed down.

So there you have it. The way to solve the problem of moral hazard that’s created inherently when you’re insured, is to do things that pass some of the risk back to the person who’s insured, through deductibles, through risk-rated insurance policies, and through careful monitoring to make sure that good behavior is enforced. So, maybe the government does have to have a role in deposit insurance. But if they do, they have to think carefully about the way in which deposit insurance changes the incentives of the banks involved. Otherwise, we wind up with that situation in the 1980’s, where every time you drove by a bank, it seemed like it had a different name on it, because banks were behaving in such a risky way that they were failing, being bailed out, being bought out, and being renamed almost as fast as the identity had previously changed. What we want is banks that are stable, that have an incentive to invest in good productive projects and the right kind of deposit insurance scheme can give us the benefits of a stable banking system as well as proper insurance for proper incentives for good bank behavior.
Financial Markets

**Stocks and Bonds**

Look, I've got this great investment opportunity; I think it is going to make a bundle of money; and all I need to get it started is five million dollars. Unfortunately all I have is $1 million. And, unless I can come up with another four, then this opportunity is going to go to waste. So where am I going to get the capital I need? Who is going to lend me the money that I need to take advantage of this wonderful opportunity? Well, I will put my million aside for the moment, and I am going to go and see if I can borrow some money. There are two forms in which I can borrow: I can go get debt or I can issue equity. Debt means going and borrowing money promising to repay it with a fixed interest payment at a date in the future. Kind of like, when you borrow money from the bank. Equity, on the other hand, is selling shares in the profits of my venture. That is, if you own a share of equity in my company you are entitled to a fraction of the profit when and if the venture makes a profit.

So let's see how I might arrange things. Suppose I go and I try to acquire debt by selling bonds. A bond is a financial instrument that entitles the holder to a repayment in the future. This repayment has two parts. First you get a repayment of your principle. Principle is the money that you originally lent to me for this project. In addition to getting your principle back, you get interest. And interest is an extra bit of money; a reward that compensates you for your patience and for the risk that you are taking. This interest payment covers the opportunity cost of the money to you. After all, you have got your own ideas, and if I pay you enough interest, then you will find it more profitable to lend to me, and my venture then investing in your own.

So, suppose I go to some people and I get them to lend me $2 million. And $2 million, they say, will require a 50 percent interest, that is they want $3 million back in a year, whenever this project pays off. So let me go ahead and add up, so far I have got $2 million raised. And I have raised that in the form of issuing debt. Okay, now my other option is I can sell equity. Well one of the things that I am thinking is, I'd kind of like to get a piece of this action myself; I mean it's my project; and therefore, I am going to hold $1 million worth of the stock in my company. Now, $1 million means that one million plus the two million that I have already got is three million, which means I need another two million to pull the project off. That means I need to sell $2 million worth of equity for a total of three million to add with the debt and have the money I need to get started. So one million, my share, is one-third of the total of $3 million that I need to raise by selling equity.

So here is the way I am going to think about it. I am going to hold one-third, or 33 percent of the equity in this venture. That is, I hold one-third if the stock in this venture that I am about to undertake. Then I am going to go find another investor who likes my idea and get him to give me $2 million, which will be two-thirds of the equity. See, two million plus one million is the three million I need; I put in one-third of it, and he puts in two-thirds. So I hold a third of equity, he holds two-thirds. I am entitled to one-third of the profits that are left over, after we have paid off our debt; he is entitled to two-thirds. So let's put my equity into the pot; let's put his equity back into the pot, and now we have one, two, three, four, five million dollars, that is enough to pull this project off.

Well let's see if we get lucky. Here is my project, and I am going to pour the capital in and see what comes out. And I am feeling lucky and let me see how this project pays off. So, looks like we have got one, two, three, four, five, six, seven, eight, nine million dollars came out of this project! Well of this nine million now, we know that we have to pay off our debt first. And that means, let's see, one, two, three, that is our $2 million worth of principle, plus $1 million worth of interest (remember that 50 percent interest contract). Which means we have got to get three of these million to our bondholders. And that is that.

Now that leaves for equity. We get all this rest of the stuff that is left; this is the gravy on our project and we get to keep it. And I get a third of it, and since there is a total of six million left, one-third of six million is two for me and my other equity investor gets a total of four. Well that is the way it goes. See I put in one million, I ended up with two million, I made a 100 percent return. Whooppee, the equity holders did really well because this project was highly profitable.

Now of course all projects don't turn out that way, we could have put in our five million and, under other circumstances, we could have gotten a different kind of payoff. Let's see what would have happened if our project had not have been quite so successful. Come on, that is it, and it looks like in this case we made just enough, just enough to pay off our bonds. Well in that case all of the money goes to service for debt and equity gets nothing. There is nothing left for equity. That is we put our million in, he put his two million in, and in the end we got nothing. Sometimes that happens, because when you hold equity, you are taking the risk. Bondholders get paid first, that is the
way the law works. The nature of the bond contract is, you get the prior claim on the returns on the project. If there is a loss to be made, equity takes it first.

Well let’s suppose that we put all of that money into the project and instead nothing had come out, well in this case, not only is the equity worthless, but the bond defaults. See the last people to lose money in the event of the worst possible outcome, are the bondholders, and if there is a default, then the bondholders suffer. See, even thought the bondholders have first claim on the returns on the project, it doesn’t mean that they are without risk. Because in some cases there will be such an extreme outcome that the bondholders will get nothing as well.

Well, with this little story we can see then, something about how debt and equity work. See, bonds have a principle: the money that you borrow; and an interest payment that you promise to pay when the project is over. Because of the possibility of default, because this is still a risky investment; the riskier the investment is, the higher the interest rate that bond holders will demand to lend you money. Because they are afraid of getting stuck with the default in certain circumstances.

Now some bonds, called junk bonds are bonds that you are intentionally gambling on. They pay very high rates of interest, because their default rates are especially high. These are highly speculative ventures that are financed with debt financing. With full understanding that default is certainly a possibility. There are also perpetuity bonds; bonds that are issued that pay you money every year from now on. These bonds are kind of like annuities. That is, they may you the money every year and they never mature. The maturity date is the date at which the bond repays you, your original investment, the date on which you get your principle back.

Bonds are issued by corporations, by the U.S. government, by state and county governments, by city governments, bonds issued by city and county governments are called municipal bonds, and they’re interest is tax exempt. Bonds are also issued by households, they are called mortgages. Whenever you borrow money long term to build or buy a house. And that is the way debt-finance works. Things that determine the interest rate in a bond are going to be its risk, the length of time that the borrower wants to borrow the money, and any tax consequences. That is, municipal bonds typically have lower interest rates because you pay fewer taxes on that interest.

Now lets think for a moment about stocks. Stocks, unlike bonds never mature. When you own a share of stock, you own a piece of the equity, a piece of the profits of that company. And therefore, as long as the company is in business, whoever is holding that stock is going to get the profits anytime that they’re distributed. A distribution of profits is called dividends; whenever profits are paid out to the people who are holding the equities. Sometimes when you hold stock, you don’t receive dividends. What would be your dividends is simply reinvested into the company, increasing its value and increasing the value of the stocks that you hold. Anytime that you sell a stock for a higher price than you paid for it, what you get is called a capital gain. The extra money in excess over the original purchase price is your capital gain, or reward for holding the stock when its price goes up. If the price goes down over the holding period, and you sell the stock at a loss, that is called a capital loss; the difference between the selling price and the original price at which you purchased the stock.

Stocks are traded on markets such as the New York Stock Exchange, which is an ongoing auction market, where buyers and sellers meet constantly trading the stocks. When the stock is originally issued is called the primary market. When IBM or some other company uses an investment banker as a broker to sell stocks to mutual funds and private investors, we call that a primary market transaction. But if you take a share of IBM stock and sell it to me; perhaps through agents on the NYSE, we call that the secondary market. IBM doesn’t get any additional money, but you and I can profit by trading based on our different expectations of what is going to happen to the value of the stock.

The Dow Jones Industrial average tells you about the average price of thirty important stocks traded on perhaps the New York Stock Exchange, or perhaps on other exchanges, but it is a general measure of what is happening to stock prices day to day. There are other general measures such as the Standard and Poor’s 500, or the Wilshire 5000. These are different indexes that give you averages of stock prices. And as they move up, generally means that people are bidding higher prices to hold the equities of company’s.

Other stocks are traded over the counter that is on a computerized network that doesn’t involve a constant ongoing auction. They are traded at fixed quoted prices that brokers enter in to computer terminals and broadcast to all interested parties. The most important over the counter market is the National Association of Securities Dealers.
Stocks and Bonds

Automatic Quotation machine. That is called NASDAQ. The NASDAQ system is a network on which stocks of usually younger companies and, especially nowadays, tech companies are traded. So the NASDAQ, the Dow Jones Industrial Average, the New York Stock Exchange, all of these are institutions that support the exchange of equities of companies.

So one final question, why would you choose to hold equity in a company when you could hold debt instead? And, the answer depends on how much risk you want to take. If you hold equity, there is a big possible upside. You may double your money. If on the other hand you hold debt, you can never make more than the stated interest rate that is written on your debt contract. Equity, on the other hand is limitless in its possibilities, the more successful the company, the higher your possible return. But you are always going to worry about the risk of failure.
Bond prices and interest rates are inversely related. To understand this relationship you first have to understand what a bond is and how they work; and then you have to be very clear on what an economist means when he or she refers to the interest rate.

Let's start by thinking about a bond. A bond is defined by four factors. First, its face value. The face value is usually $1,000. And this is the amount of money that you receive if you are holding the bond on its maturity date. The second thing is its coupon rate, the coupon rate is the rate at which the bond pays you interest. If the coupon rate is 20 percent, then you receive 20 percent of the face value every year in interest payments. For example, a bond with a $1,000 face value and a 20 percent coupon rate pays you $200 a year in coupon payments. The next thing, is the bonds maturity date. The bonds maturity date is written on the face of the bond, and that's the date at which you are paid the face value as well as the final interest payment. So for instance, if this bond matures on the 31st of March 2001, then on that date you will receive the final interest payment of $200, and you will receive the face value of $1,000. At that point the bond is finished.

So, suppose you are considering making an investment, and it's March 31, 2000. If you buy this bond today, whatever price you pay for it, then one year from now, on the 31st of March 2001, you will receive $200 (the final interest payment) plus the face value for a total of $1,200. Now, think about the rate of return on your money, it depends completely on how much money you pay to get this bond. If you could get it for a small price, then $1,200 is going to be a huge return, but the closer the amount you pay is to $1,200, the less interest, the less profit you are making for the year that you hold this bond.

To understand this inverse relationship between price and return, think of a bond as a candy bar. Now here's how it works: a year from now you are going to get this candy bar—that's what it means to own this bond—and this candy bar as we've seen is $1,200, now how much are you going to pay today to get this candy bar? Suppose you pay $600 to get this promise of $1,200 in a year; that means $600, which you originally paid for the bond, is your principle, how much you've invested in this opportunity. A year from now, when you get $1,200, you're going to break off $600 and call that the repayment of your original investment, the remaining $600 is your reward, your profit, and we call that interest. Calculate the interest rate by dividing the interest payment by the principle, in this case $600, divided by 600 gives you a rate of return of 100 percent. On the other hand, if you pay $900 to get this candy bar, then $900 of the $1,200 repayment is just repaying your originally investment. That means only $300 is profit or interest. Three hundred divided by 900 is an interest rate of 33 1/3 percent. Noticed as I moved the bar over as the price of the bond went up, the interest rate got smaller.

Finally suppose you actually pay more than the face value for the bond, suppose you pay $1,050 to get this candy bar. That means $1,050 is a repayment of your principle and only $150 is interest. For an interest rate of about 14 ¼ percent. So, I think it's very clear that, as you pay more for the bond, a larger share of the money that you get, counts as repayment of your principle; leaving a smaller and smaller piece of the candy bar as interest. As the price goes up, the rate of return or interest rate falls.

Let's think again about the relationship between prices and interest rates. But now I want to call your attention to the different ways in which economists use the term, “the interest rate.” One of the things that people mean when they say the interest rate, is the coupon rate on the bond, in our case, 20 percent. Another thing that they may refer to, when they use the term interest rate, is the actual rate of return on the bond. If you bought the bond for 900, then your interest rate, or your true rate of return, is 33 1/3 percent.

Let's look at how that works in a simple demonstration. Consider the way a seesaw works; you know that famous piece of playground equipment. It's got a fulcrum here and a horizon. On the right hand side we're going to put prices, on the left hand side we're going to put interest rates. Over here, let's start by putting the face value of the bond. And let's suppose, that as is the case with most bonds, the face value is $1,000. That face value over here is going to be balanced by the coupon rate and lets suppose the coupon rate is equal to 20 percent. Now these things are part of the definition of the bond because the bond is going to pay you $200 every year, that's 20 percent of the face of a thousand.

Now, you're probably not going to pay $1,000 for this bond, when the bond trades in the secondary market; it's price will go up and down, depending on peoples alternative investment opportunities, and depending on peoples assessment of this companies credit-worthiness. So, in order to represent the price of the bond in day-to-day trading,
The Price of Bonds and the Interest Rate

I'm going to put a teeter-totter on this seesaw and let the board move around. So for instance, we saw in our previous calculation, that if this bond is trading at a price of $1,050, the actual interest rate, or rate of return on this investment, is 14 ¼ percent.

Notice that when the price is above the face value, the rate of interest, the true rate of return is below the coupon rate. One the other hand, if the price of the bond were to be below the face value, say $900 as in one of our examples, the interest rate is above the interest rate, 33 1/3 percent. Anytime the price falls, the interest rate rises, the rate of return on the bond is higher, and any time the price rises above the face value, the rate of return on the investment drops below the coupon rate.

Now, this brings to the third way that economist sometimes use the term “interest rate” to refer to the alternative investment opportunities. That is, what is your opportunity cost for buying this particular bond? What interest rate are you giving up; that is, what could you earn if you took your money to a bank, or bought another bond instead? We refer to the best available return as the market interest rate. That is, what you could earn on an investment of comparable risk, and comparable tax treatment. Another investment that is in all other important ways, identical to this particular bond. Because see, this bond has to be competitive with the market or no one will buy it.

If the market interest rate is high, and this bond is only paying you 20 percent, and people could earn 33 1/3 percent on another investment opportunity; then this bond will have to sell at a lower price in order to make it competitive with what people could earn elsewhere. That is, when the market interest rate goes up to 33 1/3 percent, the price on this bond has to drop to $900 to make this particular bond competitive with alternative investment opportunities.

One the other hand, if the market interest rate goes down to 14 ¼ percent, then this bond can sell at a premium. That is the bondholder could charge $1,050 for the bond because that way the person buying it is earning the same return that he could somewhere else. So think of the market interest rate as that famous bully on the playground who would come and grab one end of the seesaw and just push it around while you're stuck on the other end and just decides where he wanted you to go. The market interest rate pushes the price of this bond down, or pulls it up, whenever the price of the bond has to adjust to be competitive with other opportunities in the market.

So bond prices and interest rates are inversely related. First of all, they are inversely related by definition. A bigger a chunk of the bonds repayment, a bigger a chunk of the bonds money, counts as repayment of you're original principle investment, leaves a smaller piece to be interest, so there's a mathematical necessity in the inverse relationship. The second thing is the market wants this bond to pay a higher interest rate; that can only be accomplished by discounting the price. And if the market wants this bond to pay a lower interest rate, that is accomplished by selling the bond at a higher or a premium price.

Now, the last thing that we want to touch on is this notion of present value. Present value talks about the relationship between the value of money received today, and the value of money received in the future. For instance, suppose you have a certain amount of money today, maybe $1,000, and you put it in the bank earning 10 percent interest. The value of the money one year from now, will be the present deposit multiplied by one, your principle plus I, the interest rate. So if you put $1,000 in the bank today, one plus 10 percent, the interest rate, means a year from now you will have $1,100. $1,100 is the future value of $1,000 deposited today, when the interest rate is 10 percent.

Well what about further years in the future? The value of the money two years from today is going to be equal to the value of the money one year from today, compounding the interest one more year. That is if you multiply $1,100, by one plus 10 percent, you will have $1,210. That is the value of $1,000 today, two years from now when the interest rate is 10 percent. So you could write that as, one plus the interest rate squared, multiplied by that deposit today. To find the future value, take the amount of money you have today and multiply it by one plus the interest rate, raised to the power of the number of years that you are interested in, whether it one, two or N.

Now consider the same calculations done in reverse. Divide both sides of the equation by one plus the interest rate, and what your answering is: what is the value today of money that you don’t expect to receive until the future. Now why does future money have any value today? The answer is because you can borrow against it, and a year from now when you actually get that money you can repay your loan with interest. But because you have to leave room for interest to accumulate, the amount of money that you can borrow today is less than the amount of money you expect to receive in the future. For instance, suppose you are going to get $1,000 in the future. How much could you borrow
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today if you have got to repay the loan with 10 percent interest? The answer is divide $1,000 by one plus 10 percent, and you will get about $909.00. Borrow $909.00 today and one year from now you will owe $1,000, just in time to repay your loan with the receipt that you get in the future. So the present value today of $1,000, that you are expecting to get a year from now when the interest rate is 10 percent, that present value is $909.00.

In general the present value of any amount of money is going to be that amount in the future divided by one plus the interest rate, raised to the power of the number of years you have to wait. This compounding down here in the denominator is called discounting when we are calculating present value. And this discounting takes into account the accumulation of interest between today, when you would borrow the money, and the future, when you actually receive the money and pay off the loan. So when you hear people talking about present value, think about this: the amount of money you could borrow today against an amount that you are going to receive in the future, when you know what the interest rate is.
Suppose you have the printing presses for money for your town. Isn’t that a great position to be in? Anytime you want something, you just go print out new dollar bills, take them to the store, and buy it and pay. If, however, you print too many of these dollar bills and buy too many things, your money is going to become so plentiful that it is going to begin to lose value. Prices in your town start to rise. You have to print more money to buy anything, and before long, you have inflation out of control. Then nobody wants to hold money, and people revert to barter to protect themselves because money becomes worthless so fast as prices are rising.

On the other hand, if you control the printing presses for your town, and you don’t print enough money, then there is not enough money in circulation to keep the wheels of business running smoothly. People have to go out and look for trading partners. They are going to start scrambling to get money. Interest rates are going to go up. Business is going to be hard to do and, before too long, stores are going to start closing, and the town slips into a recession.

See, you have a fine line to walk. Now you have some sympathy for the position of the Federal Reserve System, the monetary authority for the US economy. The Fed has to figure out how much money to make available so that we do not get too much and inflation or too little and recession. Underneath all of it, there is still that wonderful fact that the Fed gets to print money anytime it wants to buy something and that the Fed, in some sense, gets its money for nothing.

Let’s think about where the Fed came from. In 1907, there was a severe banking panic in the United States because banks tended to print too much money. That is, when gold was deposited and banks issued private currency. They would tend to issue too much currency for a given amount of gold. People becoming fearful that there was not enough gold to redeem bank notes with, would make a run on the bank. The bank would run out of gold and would shut down. When banks shut down we got recessions and panics.

So, in 1913, Congress passed the Federal Reserve Act to create a central banking authority that would regulate banks and require them to behave in such a way that panics would be less common. That is banks would have to hold reserves; banks would have to follow good business practice.

The Federal Reserve System is organized as follows. There are about 400,000 commercial banks in the United States that are members of the Federal Reserve System. Together, they own the 12 Federal Reserve banks. The United States is divided into 12 Federal Reserve districts and each district has its own Federal Reserve Bank. The presidents of those 12 Federal Reserve Banks play a role in the shaping of monetary policy. The Federal Reserve System is overseen by the Board of Governors; seven men and women appointed by the President of the United States and confirmed by the US Senate.

At the top of the pyramid is the chairman of the Federal Reserve System appointed by the President for a four-year term. That chairman gets to set the agenda for the Federal Reserve meetings and is always visible in the press. His or her every move scrutinized as the stock market and bond traders and everybody else tries to figure out if the Fed is going to tighten the money supply and push up interest rates or make money more plentiful, credit easier to get, and potentially create a risk of inflation.

The Federal Reserve Open Market Committee is the most important monetary policy making body. It consists of the seven members of the Board of Governors and five members that are that are drawn from the presidents of the Federal Reserve Banks. Each president is on the committee in some years and off the committee in other years. In any given year, there are twelve members of the Open Market Committee. The Open Market Committee meets every six weeks to determine weather the Fed is going to make money easier to get and lower rates or make money harder to get and raise interest rates.

How does this work? How does the Fed have influence over the money supply? Later we are going to talk about the specific policy tools that the Fed has to influence the money supply.

Let’s go ahead and start with the intuition of where money comes from and Fed’s role in creating it. Suppose the Fed wants to buy something like a Treasury bill. The Fed wants to add a Treasury bill, that is, a little piece of the government debt to, its stock of assets. In order to pay for it, the Fed prints money, maybe currency and goes to the open market pays currency so that currency now goes into circulation. The Fed gets a Treasury bill for free. The outstanding dollar bill is a liability of Fed. This is a claim on the Federal Reserve System. The asset that the Fed
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purchased is the Treasury bill. Anytime the Fed buys something, it pays with a liability that it created. The liabilities of the Federal Reserve System are the base of the money supply of the United States.

Let’s think, first of all, about the things that the Fed might buy. What are the assets of Fed? First of all it is treasury bills. The Fed owns about $400 billion worth of United States government debt. That is about a tenth of the total national debt. The interest on the debt that the Fed holds more than pays the expenses of operating the Fed. So the Fed is pretty much independent of the government. It does not depend on Congress for regular allocation of funds. Also, the Fed makes loans to insure depositories; that is, to credit unions, savings and loan associations, and commercial banks. The Fed receives interest on those loans. The Fed also holds a lot of gold and the Fed holds foreign currency. In addition, something else that is interesting about the Fed is that the Fed buys coins from the US Treasury and eventually puts those coins in circulation by sending them to the banks that rely on the Fed’s coins and currency delivery services.

How does the Fed pay for these assets? It pays, first of all, by printing money and putting that money into circulation. There is about $400 billion worth of currency in circulation, and the Fed put every dollar of it into circulation by buying something. Another way that the Fed can pay for stuff is by giving banks credit at the Fed. The accounts that the bank holds at the Federal Reserve are called reserve accounts. The reserve deposits that the Fed credit banks with, like the checking account of banks at the Fed, are a liability of the Fed, because banks can come in and withdraw them in the form of cash or some other asset whenever they want. The Fed also has a special account for foreign central banks that it uses for doing foreign exchange transactions that influence the value of the dollar. The Fed has an account called the US Treasury General account through which the Fed does transactions with the United States government.

The most important two liabilities are currency and reserve deposits. The amount of currency and reserve deposits that the Fed creates, determines how much money banks can create in new loans by a process that we are going to examine later. The most important thing though is to see that anytime the Fed buys something whether it’s gold or a Treasury bill, the Fed is going to be influencing the supply of money in the United States.

There is one more service that the Fed supplies that is pretty interesting. That is the service of clearing checks. Checks clear through the Federal Reserve’s check clearing service, which is a network of computers and wires and member banks, so that if I receive a check from you, and it is written on a bank that is not my bank, I take the check to my bank and my bank works through accounts at the Federal Reserve System so that money is transferred from your bank to mine when it goes into my account. That system is run by the Federal Reserve. The Fed also runs Fed wire, which, wires money among financial institutions when you want to make a quick transfer. The Fed provides coin and currency delivery service, as well an opportunity to make emergency loans to any bank that is insured by the Federal Deposited Insurance Corporation.

We are going to be looking now at the specific policy tools that the Fed uses to influence the money supply.
Hot Topic: Are Reserve Requirements Necessary?

Banking just gets more and more competitive. Nowadays, banks have to worry, not only about competition from foreign banks opening branches in this country, but insurance companies and stock companies and mutual funds are now offering services that substitute for the services offered by banks. Therefore, to stay in business, banks are always looking for ways to increase their revenue, expand their customer base, and shrink their costs.

One of the big costs associated with banking, is the cost of holding reserves. Bank reserves include cash held in the vault and money on deposit at the Federal Reserve System. These reserves are of zero interest, and the bank would rather take this money and lend it out to some business that would pay interest rather than hold it as reserves. Banks hold reserves, however, because it is necessary to have a certain amount of cash on hand just in case people want to take a lot out of their checking accounts on a particular day. However, the Federal Reserve System requires banks by law to hold ten cents in reserve for every one dollar that the bank has offered in checking accounts. It is a legal requirement. So, we might ask ourselves: what is this law accomplishing? Can we not rely on the free market to give us the right amount of reserves? Don’t banks best know how much to hold in reserves to do their business well or do we really need a law? Consider the question: are reserve requirements necessary? Are they accomplishing something for the economy?

Let us think about this question from two perspectives. The first perspective concerns risk. The reason banks hold reserves is in case synchronization fails. Synchronization means that on a given day, people are depositing about as much money as they are withdrawing. Therefore, the bank does not need to hold a lot in reserves; it can take the money that you have deposited and give it to me when I come in to make a withdrawal. This allows the bank to devote the bulk of its funds to long-term investments that pay high rates in interest. However, if on a particular day, maybe due to a big shopping sale or something like that, a bunch of people come in to make withdrawals from the bank, the bank has to scramble to come up with cash that has not been deposited that day. That means going down to the vault and taking out the reserves. Well, if it does not have the reserves, the bank finds itself in trouble, and the Federal Reserve System wants to make sure that banks, as a rule, do not get in this position very often. Why? Because when one bank finds itself having to shut its doors saying that it cannot meet the demand for liquidity on that particular day, customers of all the other banks in town get scared that maybe their bank is in the same position. The next thing that you know, the whole banking system, which depends on the depositors’ confidence, is under siege.

We have got a systemic problem. This is kind of like, you can decide whether you want to smoke or not, whether you want to put your own lungs at risk, but if you smoke in a crowded room, you are making a choice that puts other people at risk as well, and this is the reason why there may be a law that prohibits it. So, the reserve requirement is a law that keeps banks from taking risks that might impose costs on other banks. However, in some ways, there is no need to be quite as scared about this as we might once have been. That is because banks can get money pretty quickly if they need it. A bank that is solvent, that is, that has enough assets to back its liabilities, can always get cash for the short-term by borrowing from another bank; or, even in the extreme case, borrowing from the Fed itself. So, all we have to be worried about is whether the bank is solvent or not, and the bank is typically going to be solvent because the managers of the bank have put enough of their own capital at stake, that they are going make sure that the bank is well-managed and not taking extraordinary risks that could jeopardize the solvency of the bank. So, if banks can borrow money any time they run into a short-run failure of synchronization a liquidity crunch, then maybe the reserve requirement is not so necessary after all.

The second perspective in which to think about this is the concern about the stability of monetary policy. What the Federal Reserve wants to do is to create a steady demand for reserves so that it can provide more reserves when it wants to allow banks to create more loans, and increase the money supply, and provide fewer reserves when it wants to put banks in the position of having to call in loans and shrink the money supply. By creating a mandatory reserve requirement, the Fed creates a stable demand for reserves, which allows it then to manipulate the money supply with some regularity and security. If we allow banks to decide how much they want to hold reserves for themselves, they are going to hold the amount of reserves that minimizes the risk of not having money to give their depositors when they come in to take out of their checking accounts.

Now, the amount of money that the banks have to hold as a cushion is going to depend on the way in which deposits and withdrawals are timed. At a particular time of the year when there is a lot of shopping being done, there may be a lot more withdrawals than there are deposits. At other times of the year, there might be a lot of deposits and fewer withdrawals. Sometimes, there are surprising events like a crop failure, or a closing of a factory, or a special unannounced sale that suddenly change the demand for money, and if the demand for money changes unpredictably,
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The Fed

**Hot Topic: Are Reserve Requirements Necessary?**

the banks may have to very quickly try to adjust their holding of reserves to avoid a liquidity crisis. Well, if we are letting the bank do all of this based on their own best judgment, then what the Fed is going to say is, “We do not know how much reserves banks want to hold.” The demand for reserves is going to vary one week to the next, and that makes it harder for us to maintain a stable interest rate; that is, to supply the amount of money that meets the demand for money.

Well, is this a big problem? Can the Fed be flexible enough? Can banks be flexible enough? We can look at the example from some other economies. The United Kingdom, Canada, and New Zealand, all three of which have no legal reserve requirement on banks, yet they have a banking system that is as safe as the banking system in the United States and their monetary policy has been conducted with relative stability. That is, it does not seem to have been a huge problem for the central bank of those countries to provide money to meet the increased demand and to bring the money back in when demand goes slack. So, it just requires a little bit more flexibility. Sure, a reserve requirement creates a steady demand for reserves, but if the central bank is flexible, it can provide extra money when demand is up and pull it back out of the economy when demand goes down.

So, it is an interesting question. We cannot say for sure, one side or the other, but as a rule, it is generally good to let the market solve problems rather than law. Unless you can make a compelling argument for why the law is necessary, either to control events that impose risk on other or things like that, then let the market make the decision. Let the banks and the other actors in the financial system decide what is the right amount of reserves for a good bank to hold to do its business well. On the other hand, still concerned about the systemic nature of risk in the banking system and fears about policy being conducted in an orderly and reliable way, meaning that reserve requirements will probably persist for a while longer.
The Fed's Tools of Monetary Policy

You have heard it said that Alan Greenspan is the most powerful man in the economy. What does that mean? How does the Federal Reserve exercise its power? To understand the ways the Fed works, we have to begin by looking at the way banks work. Banks attract money from customers by offering them the convenience of easy withdrawal, that is, that you put money into a bank, into a checking account, so that you can spend it when you go shopping. Checking accounts are important, and the Fed keeps tally on how many checking accounts are out there and how much money is in them because this is an important part of the money supply. If you take checking accounts and you add them to the currency that is circulation, you have got the money supply in one. The Fed watches that money supply because if it gets too big, we could have inflation, and if it gets too small we might wind up with a recession. Again, people put their money into checking accounts because they like the convenience of taking it out when they want to write a check, but banks can attract money through other sources as well.

They can offer savings deposits, they can offer you a certificate of deposit, they can offer you other accounts that pay higher rates of interest, because in order to get you to put money into one of these accounts, you have got to give up the convenience of being able to take it out exactly when you want to. Now, think about the way a bank makes a loan. When the bank makes a loan, which becomes an asset of the bank, the bank lends you money by giving you a checking account. You walk in, you say, “I want to borrow money to build a house.” The bank does not just hand you a sack full of cash; they give you a checking account, and you can write checks out of that account. So, when the bank makes a loan, they are creating checking accounts out of thin air. The banks might be tempted to create a whole lot of checking accounts because that is profitable. When you create one, you also get a loan and that loan earns the bank interest.

Well, here is the way the Fed keeps this process under control. If you are a bank, you can only create a certain number of checking accounts, and this ratio of checking accounts to your reserves is called the reserve requirement ratio or the required reserve ratio. What is a reserve? A reserve is either cash that a bank keeps in its' vault or bank reserves that are on deposit at the Federal Reserve. The Federal Reserve Bank is the bankers' bank, and when a bank makes a deposit at the Fed, that is called a reserve deposit. So, by law, the bank has to maintain a ratio of cash in the vault and deposits at the Fed that is legal reserves. They have to keep a ratio of reserves to checking accounts of no more than 10%. That is, for every dollar you issue as a bank in checking liabilities, you have got to have ten cents either in cash in your vault or on deposit at the Fed. Now, this then, puts a constraint on banks. If banks want to offer more checking accounts, if they want to create more loans, if banks want to make more money, they have got to have reserves to do it. This is where the Fed gets its power because the Fed has the ability to control reserves. There are two things the Fed does. First of all, the Fed prints currency and can put it into circulation by buying and selling things. The next thing is, the Fed, being the bankers' bank, can influence how many reserve accounts banks have to hold or are able to hold.

Let's see how this works as we look at three policy tools of the Federal Reserve System. The three policy tools, the three ways that the Fed can influence the money supply, are: changing the reserve requirement, changing the discount rate, and finally, changing the amount of reserves available for business through open market operations.

The first is changing the reserve requirement. Suppose the bank says that instead of having to hold ten cents in reserves for every dollar in checking, you only have to hold five cents in reserves. Well, suddenly, banks have got too much reserves; that is, they have excess reserves. What banks will do in their pursuit of profit is immediately create more loans and create more checking accounts until the ratio comes to the legal requirement. So banks could almost double their checking accounts with their given reserves if the reserve requirement is cut in half. So, when the Fed tells banks that it does not have to hold as many reserves, banks are free to create more loans and to create more checking accounts. That increases the money supply. If the Fed increases the reserve requirement, then banks have to call in loans and destroy checking accounts and shrink the money supply.

The second tool that the Fed has available to it is changes in the discount rate. The discount rate influences the likelihood that a bank will borrow from the Fed. The discount rate is the rate that the Fed charges insured depository intermediaries. That is, all depositories, banks, savings and loans, credit unions that have federal deposit insurance from the government. If you have got that insurance, then you can borrow money from the Fed, and the Fed charges you a very low interest rate, much lower than you could get if you went to the open market. Borrowing from the Fed is kind of like borrowing from your parents. You usually get a good deal on the interest rate, but you have got to answer a lot of nosy questions, “Why do you need this money?” and the next thing you know, the Fed is in your bank doing an
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So, banks tend not to borrow from the Fed if they can help it, and although this was the most important tool that the Fed used in its early days, nowadays, it is relatively unimportant for the Feds influencing the money supply.

The third tool that the Fed uses is called open market operations. Open market operations influence the amount of reserves out there in our banking system directly. That is, the Fed buys and sells treasury securities on the open market. Now, think about this: if the Fed writes you a check for a treasury bill, say you are selling a treasury bill to the Fed, you take that check to your bank and deposit it. The bank then presents the check to the Fed for the payment. The Fed can either give the bank cash or it can give the bank credit in its reserve account. Either way, your bank just wound up with more reserves, which give it more room to create more checking accounts and the money supply expands.

So, these are the three tools of the Fed: change the reserve requirements, make discount loans to banks, or open market operations. Now, open market operations are by far the most commonly used Federal Reserve policy tool. The Fed does open market operations every business day, increasing or decreasing the amount of bank reserves in pursuit of its policy goals. The reserve requirement is the least frequently used tool because it is the most powerful. Using the reserve requirement to try to fine-tune the economy is kind-of like swatting a gnat with a sledgehammer. The reserve requirement has huge, far-reaching consequences. It has multiplier logic to it. Therefore, any small change here can result in a big change in the money supply that is not easy to control. The Fed is most likely to change the reserve requirement during a period of rapid inflation or very deep recession.

Finally, we have already talked about the discount rate. Banks borrow and lend with the Fed all of the time, but less and less do banks borrow from the Fed if they can help it because there are alternatives; they can borrow from each other, they can cash in their own securities on the open market, they just do not want to deal with the Fed’s scrutiny. So more and more, the banks that actually borrow from the Fed are banks that are in trouble and cannot get funds anywhere else. It is kind of an emergency loan that usually involves a lot of scrutiny from the Fed itself.

How do these tools work? Let’s go back and look at our map of the money market. Here is our map of the money market. The quantity of money and the price of money, which is the interest rate, the demand for money is represented on the red curve and the blue curve shows us the Fed’s supply of money that the Fed has determined in the market. If the Fed increases the money supply, then at the old interest rate, we are going to have an access supply of money and the interest rate will be bid down as people try to buy bonds with all of this extra cash that the Fed has pumped into the system. As the price of bonds is bid up, the interest rate is going to fall. As the interest rate falls, people decide that they are content to hold a larger fraction of their wealth in the form of cash. That is, as the interest rate falls, the quantity of money demanded increases. How does the money supply actually, in practice, increase? It increases by one of three ways. First, the Fed lowers the reserve requirement. If it does that, banks can make more loans and create more checking accounts. The second thing would be that the banks borrow from the Fed. If the Fed makes the terms of borrowing easier, banks will borrow more, and when they borrow more, they have more reserves and they can create more loans and more checking accounts. Finally, open market operations whenever people sell securities to the Fed, the Fed gives people cash or checks which they put in their banks and when the banks present them for clearing with the Fed, the Fed give the bank reserves which then gives the banks more room to create more loans and checking accounts.

The Fed has the banking system on a leash, and think of the banking system as a hungry dog that is trying to get over there to get that big piece of red meat. What the Fed does, is give the dog more leash by creating more reserves. Whenever the Fed creates more leash for the dog, the dog goes right for the meat. The banking system is going to expand to create as much money, as many checking accounts, as many loans as the Federal Reserve System will allow. That is how the Fed controls the money supply.
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How Goldsmiths Created Money

If you want to understand money, you have got to start with its history, and that means gold. Have you ever wondered why gold is so valuable? I mean, it is a really weak metal that does not have a lot of really practical uses. Maybe it is because it reminded people of the sun, which was worshipped in ancient times, that everyone decided they wanted it. Once everyone wants it, it is capable as serving as a medium of exchange. That is, gold can be used as money, and it is an ideal commodity to serve as a medium of exchange because it's portable, it's durable, it's divisible, and it's standardizable.

Everybody recognizes what they want, it can be broken into little pieces, carried around, it doesn't rot, and it is a great thing to serve as money. So, before long, gold is circulating in the form of coins. When goldcirculates as coins, it is called commodity money, that is, money that has intrinsic value made out of something people want. Now, once gold coins begin to circulate as the medium of exchange, we have got another problem. That problem is security. Imagine that you are in the ancient world, lugging around bags and bags of gold. You are going to be pretty vulnerable to bandits. So what you want to do is make sure that there is a safe place to store your gold because you can store all of your wealth in the form of this valuable commodity, but you do not want it all lying around somewhere that it is easy for somebody else to pick off. So, whoever it is in town that is the biggest and the strongest and has the most secure fort and the meanest dogs is well situated to serve the role of the protector of gold. Maybe he becomes the goldsmith, and the goldsmith begins by offering safekeeping services.

So safekeeping services work this way — the goldsmith has a vault, and people come and they put their gold in the vaults, and the goldsmith gives people receipts, and the receipts tell you how much you are able to withdrawal from the goldsmith later. So if I put ten pieces of gold into the vault, the goldsmith is going to give me a receipt for ten pieces of gold. Now, the goldsmith can charge me a fee for this service because he is doing me a favor, but the goldsmith can also make money by taking the gold that is in the vault and lending it to other people. Think about how this works.

So I want to borrow money to start a taco stand, I go to the goldsmith and I say, “I need some gold so that I can pay the people that are building my factory.” He says, “Okay, I will lend you some gold right now, but you have got to bring it back to me later with interest.” So since more gold goes back into the vault than came out, the goldsmith can take part of it as his profit. So the goldsmith can make money by lending gold to others. Now, a problem can arise here, of course, if the goldsmith starts lending out money, and then everybody comes back and there is no gold there. That is called a run on the bank, but one thing that makes that relatively unlikely is called synchronization. That is, think about the way people behave as far as deposits and withdrawals are concerned. People deposit and withdraw from the bank in a kind of predictable fashion. If I go to the goldsmith on a particular day and I want to withdraw some of my gold, chances are that somebody came by earlier that day or maybe the previous day and deposited gold. So the goldsmith, rather than digging in and finding the coins that I actually put in, can give me the gold that the guy left there the day before.

So as long as deposits are well synchronized with withdrawals, the goldsmith can take the bulk of this gold and lend it out keeping a relatively small amount on hand if people want to come in and withdraw, then, in the meantime, rely on synchronization. That is, gold flows in and out in some predictable way.

Let us think more about what the goldsmith could do, because rather than actually lend out the gold coins, the goldsmith has another strategy. That strategy arises because this receipt that I got for gold may actually begin to circulate as money itself. Think about this. If everybody knows that the goldsmith is reliable and if these receipts cannot be counterfeited easily, that is, that they would have to have the goldsmith's thumb print on them or something like that, then whenever I want to buy something, I do not actually have to go get my gold out of the vault at all. I can just give you the receipt. Now, you are entitled to go make the withdrawal yourself whenever you want. So, the goldsmith's receipts begin to circulate as money. They become a medium of exchange. The gold here that is in the vault is the commodity, but the receipt is representative. Because it is representative, people will accept it. That means that the goldsmith does not have to lend out gold at all. What he can do is if you want to borrow money from the goldsmith, the goldsmith can just give you a receipt directly so that you can go out and spend it like money. You give the goldsmith an IOU, which shows up in his vault, and he gives you a receipt, which you go out and spend. Now, anybody who wants to can take this receipt, bring it into the goldsmith, and cash it in for gold. So, the goldsmith now has to be careful how many of these receipts that he issues, because if he should get overstretched, that is, if the goldsmith starts issuing lots more receipts than he has in gold, he is now vulnerable to a run on his bank. That is, “I hear the goldsmith is issuing a lot of receipts. We are seeing a lot of receipts out there. I do not think that he has the
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"gold." Then everybody is going to bring their receipts at once come to the goldsmith, take all of his gold, and break the bank. That is the end of the goldsmith.

So you see the problem. This problem helps us understand the basic concept in the financial system. That is the concept of fractional reserve banking. Money circulates whether in the form of receipts for gold or whether in the modern world in the form of checking accounts and currency, but if there are not reserves to back those, and, in particular, in the case of checking accounts, if the bank is creating a lot of checking accounts because it wants to be issuing loans so that it can earn interest; if the bank is creating checking accounts and it does not have dollar bills to back it, then they are subject to the same kind of problems that the over-eager goldsmith is once he has issued all of these receipts.

Now, this raises an interesting question. That is, what is a dollar bill backed by? I have dollar bills right here in my wallet. What is it that determines their value? Can I take this and cash it in for gold? Absolutely not. The Federal Reserve that issued this currency will no longer trade it for gold. In fact, private households haven’t been able to get gold from the Fed since the great depression. What is it that determines the value of a dollar? The value of the dollar, because it is not based on anything that is actually backing it, depends on other people’s willingness to accept it, and ultimately, that value is grounded in two things. First of all, the government requires that you hold it to pay taxes, and second, it is legal tender. That is, if I pay a debt with it, then you cannot sue me in court for nonpayment. It all goes back, the basic idea of the way the banking system works, and all goes back to the goldsmith. The goldsmith starts with safekeeping, then begins making loans, then finds himself the custodian of the community’s money supply because his receipts begin to circulate as money. That puts him in the position of wanting to issue enough of the receipts that he makes full profit off of his lending activities, but not so much that he makes people afraid that he cannot actually back his receipts with gold. This is the basic idea behind the modern banking system, a fractional reserve system where checking accounts have to be backed with reserves. We are going to see shortly how that fractional reserve banking system works in the modern financial system.
The main problem in a barter economy is the need for double coincidence of wants. I have got cheese and I want chocolate. That means I have to find a trading partner who has chocolate and wants cheese and you can spend a lot of time looking. In order to reduce the search costs, people eventually begin to accept an exchange almost any good that is portable, durable, divisible, standardizable, and in broad enough demand that people know that they can rid of it anytime they want to trade for something else. That is, what I’ll do is, I’ll trade my cheese for salt because chances are I’ll eventually find somebody who has chocolate and is willing to accept salt in exchange because he knows he can turn around and trade that salt for what he wants very shortly. This is how commodity money is brought into being. People begin to use some commodity as a medium of exchange in order to reduce search costs and eventually some commodity begins to circulate that is convenient to use and has all the good properties of money.

That brings up the question, “What can you do with you cigarettes after you quit smoking?” Well, if you are in a German prisoner of war camp during World War II, you might have used cigarettes for money. Cigarettes began to circulate as money, quite naturally, in order to solve the problem of double coincidence of wants. The Red Cross brought care packages in to the prisoner of war camps and gave prisoners little packages that contained chocolate, cheese, other goods, and cigarettes. If you did not want cigarettes, and you did not want chocolate, you could make a trade. If you had cheese and wanted chocolate, you could trade your cheese for cigarettes, knowing that eventually you would be able to trade the cigarettes for chocolate when you found the right trading partner. Cigarettes began to circulate as money, the medium of exchange. They also began to fulfill the other roles that money plays, a unit of account. That is, prices began to be quoted in cigarettes. It cost 80 cigarettes to buy a shirt or 2 cigarettes to get a shirt laundered. Also, cigarettes began to be used as a store of value. People would hoard cigarettes as a kind of savings and spend them whenever they needed to buy something. So cigarettes were a kind of commodity money, circulating, being saved, and being used as a unit of account.

What can we learn from the experience of German POW camps? First if all, they were not unique by any means. We have prisons now in the United States in which cigarettes circulate as money all the time because there are not dollar bills available there. To solve the double coincidence of wants, prisoners use cigarettes as money. Even people who do not smoke cigarettes will accept cigarettes in exchange because they know they can spend them whenever they want something. Also, cigarettes circulated in the countries of the former Soviet Union after the collapse of the ruble in the early 1990’s because the government was printing so much money and sparking inflation. People were afraid to hold rubles and therefore an underground economy developed in which cigarettes were the commodity money and began to used as a unit of account, a stored of value, and a medium of exchange.

Anytime people find that commodities serve them better as money than the actual paper money of the government, they will shift and use commodities instead. This raises the prospect that even in the United States we could decide to use commodity money instead of the Federal Reserve notes. That could happen any time. The only reason we are so committed to Federal Reserve notes is, first of all, they are very convenient to use because everyone will accept them everywhere. The reason that is true is, first of all, they are legal tender. The government says that any contract you settle with dollars is settled and therefore, you cannot be sued for breech for non-payment. The second thing is, the Internal Revenue Service accepts payment of taxes only in dollars, so you have to have dollars to pay your taxes and that creates a demand for that paper money. However, if you and I are doing business among each other, we might settle our account in any way that is convenient for us to do so. So, why not commodity money beginning to arise in the United States today? Probably not cigarettes, because cigarettes are not as convenient as dollars. What about frequent flyer miles or long distance telephone minutes? Don’t these have all the same properties as money? They are measured in numbers. They are very easy to carry around. They can be stored on a computer chip, on a magnetized strip, on a card. They work just like money except they have the added value that they are inherently valuable. They are good for their own sake. They are commodity money as opposed to the fiat money, which has value because the government says that it does. You can imagine a money system beginning to be organized around frequent flyer miles or a long distance telephone minutes.

The Fed would probably find this to be an undesirable development because it is going to be harder to control the money supply when the money supply is effectively being controlled by airlines and telecommunications companies, and being controlled by private operations. Because of this, the Fed then might demand that those different kinds of commodities be controlled in a particular way so as to prevent inflation and instability in the economy. That is, the Fed would get involved in the business of those particular commodities. So that is one thing, the loss of control of the money supply is one fear that comes with a shift to a commodity system.
The other thing is that once transactions begin to occur in terms of those commodities they are a little bit harder to tax. So the Internal Revenue Service would want to get involved in this development as well. You can imagine, it makes very little difference how your bank account is measured. Whether those numbers represent dollars or they represent frequent flyer miles, the system would work exactly the same either way. The commodity money is always going to be appealing because it represents something of real and final value.

The Fed has to watch out because a private money system can pop up any time just like the cigarettes began to create a money system after World War II, and just like the cigarettes began to be used as money when the Soviet Union fell apart. Anytime a commodity money system can arise if people find it easy and convenient to use.
Although the Federal Reserve has a lot of control over the money supply, most of the money that is out there, is created by banks. The processes by which banks create money is nothing short of magic. To understand the way banks create money, remember that bank reserves put a limit on the number new checking accounts that banks can create. Anytime a bank makes a loan, the bank makes a loan by creating a checking account. That is, the loan is an asset of the bank, money that is owed the bank, on which the bank is earning interest. The checking account is a liability. The Federal Reserve watches checking accounts because they are part of the money supply, part of what people use to go shopping. So there is a restriction on the creation of new checking accounts, and that restriction is that for every new dollar that banks create in checking accounts they have to have reserves equal to 10 cents. Reserves have to be held in the form either of cash or reserve deposits, that is, the bank’s own deposits at the Fed. Once you understand that there is a reserve requirement, the process by which banks create money becomes very, very interesting, and ends up with the concept that we call the money multiplier. The money multiplier explains how a little bit of action from the Fed can create a lot of new money the banking system.

Let’s see how it works. Suppose you, a securities dealer, decides to do a transaction with the Fed. You sell a security to the Fed and the Fed gives you a check. You take that check to your bank. Let’s suppose your bank is called “Bank A.” Let us look at how the deposit of that check shows up on the bank’s balance sheet. Here on this “T” account I’ll put bank assets on the left and bank liabilities on the right. Suppose the check you deposit is for $1000.00. The first the first thing that happens is the bank has a new liability. That is, the bank owes you a $1000.00, which is the amount of money that you put into your checking account. We are going to call you person number one. When the bank takes the check you deposited and presents it to the Fed, the Fed can do one of two things. Either the Fed can give the bank cash or the Fed can give the bank credit in that bank’s reserve account at the Fed. Either ways Bank A winds up with an increase in its reserves of $1000.00. So the $1000.00 check deposit winds up as an increase in bank reserves because it’s coming from the Fed. The bank takes the check to the Fed and gets reserves in exchange.

The bank has some thinking to do. It’s got $1000.00 in reserves but only a $1000.00 new dollars in checking. Since the bank only needs to hold a fraction of this as a legal reserve requirement, it can lend out the rest. Let’s see how the bank does the calculation. The bank says to itself, “We have $1000.00 in new checking times a required reserve ratio of 10 percent means that we have got to hold $100.00 as required reserve. That means that if we subtract that $100.00 from our $1000.00 of reserves, $900.00 of that reserve is lendable.” The bank is going to lend it out as soon as it can because it is only the loan that earns interest. The reserves earn no interest. So the bank very quickly makes a loan and that is going to increase its loan portfolio by $900.00. So $900.00 in loan is created and the bank creates the loan by giving somebody a new checking account.

Let’s say Jane comes in and she wants to expand her bakery. She needs to buy a new oven that costs $900.00, so she borrows the money from the bank. The bank gives her a checking account, and she writes a check to the appliance company that brings the new oven to her store. What happens when that occurs? Jane withdraws the money from her checking account. Her checking balance of $900.00 is drawn down to zero. Meanwhile, the bank that the appliance company uses brings Jane’s check back to Bank A and wants to clear it somehow. It can either be cleared by giving the new bank cash or by giving the new bank $900.00 worth of Bank A’s reserves at the Fed. Either way will do. Whatever happens, Bank A winds up with $900.00 less in its reserve account than it had before. Let us look at what has happened on net here. After all the dust has settled and Bank A has done its business, the net result is that a $1000.00 in reserves came in; $900.00 in reserves went out. The net increase in reserves at Bank A is $100.00. Meanwhile, Bank A has had a net increase in checking deposits of $1000.00. It created an account for Jane, but Jane withdrew it immediately, leaving your account as the net change in checking, a $1000.00. If we take the ratio of the change in reserves to the change in checking, that ratio is equal to 10 percent. We say that Bank A is now “loaned up” because they cannot legally make anymore loans without violating their reserve requirement. Notice the interesting step is where Bank A created money. That is Bank A created money that did not exist previously just by the stroke of a pen. By making a loan to Jane and giving Jane a checking account, Bank A created new money. This money is added to the money supply.

I am going to set this money aside because in a minute I am going to ask how much money is created in total by the time we reach the end of the story. So we will put the money created by Bank A over here on the side and bring it back in a minute.
Meanwhile, let us follow this $900.00 in reserves that left Bank A and wound up at Bank B, the bank of the appliance dealer from which Jane bought her new stove. Let us consider how that works. The appliance dealer brings in a check from Jane for $900.00, and the appliance dealer we are going to call person number three. Bank B took that check to Bank A as we saw before and acquired $900.00 in new reserves.

Now Bank B has a calculation to do. Bank B asks itself, "How much of this money do we have to hold and how much of it can we lend? Our new checking account is $900.00. So $900.00 times 10 percent is 90. It takes $90.00 of reserves to back this checking account." Subtract 90 from $900.00 and that means that Bank B can create a loan equal to $810.00. Bank B is eager to do that as soon as it can so it does not lose a moment's worth of interest.

Let's suppose Jack comes in and he wants to take a vacation. He is going to borrow money from Bank B. So Bank B creates a checking account for Jack. He is person number four. What happens next is Jack takes his checkbook to his travel agent, writes a check for $810.00. The travel agent presents the money to his bank. His bank shows up at Bank B and wants reserves to clear the check. So, $810.00 worth of reserves flow out of Bank B to make Jack's check good. What is the net result of all this action at Bank B? The net result is $900.00 worth of reserves came in. $810.00 flowed out to clear Jack's check and the net change in reserves is $90.00. The net change in checking is that $900.00 that the appliance dealer brought in. The ratio of the change in reserves to the change in checking is 10 percent. Again, the most interesting thing on this T account is right here, the step from Bank B created some new money. Money that did not previously exist but they created by making a checking account for Jack. So let's put this money over to the side.

By now you get the point. I could go on and on, Bank C would have the same set up and the same numbers only they would be 90 percent of these numbers. Bank B would have numbers that are 90 percent of those. By now we're ready to ask the question, "How much does the money supply change in response to that security that you sold to the Fed?" You sold $1000 security to the Fed. You got $1000 check you deposited in your bank and set in motion a chain reaction. What is the total change in the money supply? The total change in the money supply is going to be equal to, first of all, the money that came from the Fed. The money that came from the Fed was $1000. Then there was the money that was created by Bank A when Bank A made that loan to Jane. That was $900.

Then there was the money that was created by Bank B when they made a loan to Jack that was $810. Bank C creates a loan of $729. It just keeps going. Each number is 90 percent of the number before. Why? Because banks are able to lend out 90 percent of the new reserves they get. That means the total is going to be 1000 + 900 + 810 + 729 and so forth. If you add all this up, Bank D, E, F and so on for infinity you get 10,000, ten times the original amount of money. How do we know that? We know that, first of all, because you could do it by brute force, just adding up the numbers forever, but the easier way is we have got a geometric sequence here. The geometric sequence is the net change in the money supply is equal to 1000 times 1, which came from the Fed, plus 90 percent, which was created by Bank A, plus 90 percent of 90 percent or 81 percent, which was created by Bank B and so forth.

Anytime you have a geometric sequence like this, it has an easy, simple expression. It is \( \frac{1}{1 - \text{fraction}} \). In this particular case, it is \( \frac{1}{1 - \text{fraction}} \). The fraction that banks are allowed to lend is 1 minus the required reserve ratio. In our case, the required reserve ratio is 10 percent, so the fraction that banks are allowed to lend is 90 percent. That gives you insight into the money multiplier. The money multiplier is simply \( \frac{1}{1 - \text{fraction}} \). The bigger the required reserve ratio, the more money each bank has to keep in its own vault and the less it can lend, the fewer new checking accounts they can create. The smaller the required reserve ratio, the more banks can lend and the more easily they can create checking accounts turning a small amount of new reserves into a big increase in the money supply.
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The Creation of Money

**How Banks Create Money**

If we take all those little pieces of money that we started with and add them up, here is the amount that was created for Jane. Here is the amount that was created for Jack. Here is the amount that was created in the next stage, and in the next stage, and the next stage, until the pieces are too small to add up. The end-result is a total change in the money supply. The total change in the money supply is going to be the original change from the Fed multiplied by the money multiplier, which is one over the required reserve ratio.
Money: Banking, Spending, Saving, and Investing

The Creation of Money

**How the Fed Changes the Money Supply**

We have seen how banks, in their pursuit of profit, create money. Banks make loans so that they can earn interest. When they make loans, they create checking accounts and checking accounts are part of the money supply. However, the Fed is really running this whole show. Because it is the Fed that determines how much reserve a bank has to hold against its checking accounts.

For instance, whenever a bank offers a new checking account, every dollar in checking has to be backed with ten cents worth of reserves whether cash in the vault or deposits at the Fed. Since the Fed gets to determine this reserve ratio, and the Fed gets to determine how much reserves are actually available to the banking system, it is the Fed that is really driving the process even though banks are making the decision about how many new checking accounts to create as they make loans.

Let us think now about how the Fed can use its power to influence the money supply. There are three important policy tools that the Fed uses as it seeks to increase or decrease the money supply at any given time.

The first policy tool is the required reserve ratio itself. That is, the Fed can decide whether the banks have to hold ten cents in reserves or twenty cents in reserves or fifty cents in reserves for every dollar in checking that the banks offer. Consider an extreme case: what if a bank had to hold 100 percent reserves? That is, suppose for every dollar that the bank offers in checking accounts, the bank has to hold a dollar in cash in its vault. If this is the case, banks cannot create any new money. That is, if I make a deposit in my bank, and the bank gives me credit in my checking account, the bank has to hold my cash in the vault and cannot lend it out. In this case, the bank is unable to create new money, and there is no money multiplier.

Now, the Fed is not going create such an extreme case because the Fed like the banking system to have the latitude to create new money or to create fewer loans in response to changes in the demand for money. So, the Fed would not create such an extreme case. Suppose that the Fed does change the reserve requirement. Say it changes it from 12 percent to 10 percent as it did in the early 1990’s. When the Fed does that, banks suddenly find that they do not need all of the reserves that they are holding in their vaults and then they immediately lend out the excess. That is, if they want to make a profit, they immediately make new loans so that they can earn interest. Whenever the reserve requirement shrinks, the money multiplier expands. That is, banks need to hold less of what is deposited there so they can make more new loans anytime they receive new reserves. When the required reserve ratio goes up, banks are not able to make as many new loans, and therefore the money multiplier is smaller. When the required reservation shrinks then banks are able to lend out more money because more of every new deposit is excess.

Now, the required reserve ratio, because it affects the money multiplier, is a very powerful tool, and the Fed rarely changes it. The Fed has increased the required reserve ratio as it did in the early 1980’s in order to reduce the money supply precipitously in the environment when there was a lot of inflation. So, an increase in the reserve requirement shrinks the money supply very fast. In the early 1990’s, the Fed lowered the reserve requirement because the economy was in a recession and the Fed wanted to make credit easier to get so that business would expand. In the required reserve ratio change is the least frequently used policy tool of the Fed because it is the most powerful. For the same reason that you do not go get a sledgehammer to swat a fly, the Fed doesn’t change the reserve requirement when it wants to make small adjustments in the money supply.

The second tool that the Fed uses is historically interesting, but not so important nowadays and that is changes in the discount rate. The Fed makes discount loans to ensure depositories. That is, any bank, credit union, or savings and loan that has insurance through the Federal Deposit Insurance corporation or one of the other federal depository insurers is able to go to the Fed and borrow money when it needs it. Now, in the early days, the Fed operated as the lender of last resort. That is, whenever a bank was finding people withdrawing money rapidly, and there was a liquidity crunch and in danger of failing, the Fed would lend this institution money at a very low interest rate in order to prevent its failure and help to protect the money supply. However, nowadays, banks have other places they can go to borrow when they need it. They can borrow from one another through what is called the Federal Funds Market. Or they can use some of the treasury bills that they hold, and sell them in order to get cash.

So, since they do not have to borrow from the Fed, banks do so very infrequently for the same reason you do not want to borrow from your parents. You get a good interest rate, but they are going to ask you a lot of nosy questions. The Fed comes in and audits banks that borrow from it because if you are borrowing from the Fed, that is a bad sign. It means that other people will not lend you money.
The Creation of Money

How the Fed Changes the Money Supply

So, discount loans, although they were important in the early days of the Fed, nowadays, are less important. In fact, the discount rate, which the Fed changes every so often, is viewed as largely symbolic. Increases in the discount rate signal to the financial markets that the Fed is tightening the money supply, but since few banks are borrowing at that rate, it is not especially important as a policy tool.

The final tool that the Fed uses is what is called open market operations. Open market operations refers to the purchase and sale of government securities. The Fed holds about $400 billion worth of US government debt and it can buy and sell government debt, as it wants to change the money supply. This is the most frequently used policy tool of the Fed. In fact, every business day, the agents of the Fed are in the financial markets buying and selling government securities to change the money supply.

So, you see that all of the tools of the Fed operate on two different directions in creating money. Either they change the amount of reserves that are available to the banking system by lending banks more reserves, or by providing money to people who deposit in banks, thereby creating reserves, or they change the reserve requirement giving banks more room to create loans with the given amount of reserves.

Let us look, finally, at how these policy tools show up on the balance sheets, first to the Fed and then to the banks. Look at the Feds balance sheet. The assets of the Fed include the government debt, and the liabilities of the Fed include the reserve deposits of banks. So the Fed has reserve deposits over here that it owes to the banks that have made them, and the Fed over here has assets such as treasury bills and loans that the banks owe to the Fed. When the Fed does a discount loan, what happens is the Fed gets an asset over here and the liability is an increase in bank reserves. So, banks now have more reserve credit at the Fed. When the Fed does an open market operation, say the Fed buys a government security, then the Fed acquires treasury bills, and whenever it writes a check to some trader in the public, and that trader deposits it in his bank, then the bank gets reserve credit at the Fed.

Let’s see now how this actually creates money by looking at a bank balance sheet that we did earlier. Suppose the Fed buys a government security from some trader; that is, the Fed writes a check for $1000 to you whenever you sell a treasury bill to the Fed. You take the check to your bank and deposit it. So, the bank now gives you credit in your checking account for that $1000 check that you deposited from the Fed. When the bank presents it to the Fed, the bank gets $1000 in reserve credit.

Now, the bank does not have to hold all of that money, and if the reserve requirement is only 10 percent, the bank can lend out 90 percent, which it does. It creates a loan for $900 and that $900 loan is created in the form of a new checking account for somebody, say, person number two. This is the step at which the bank actually creates money. The open market operation pumps new reserves into the banking system and gives the banks more room to create more money. Of course, then, the person who got that loan immediately spends it, and the reserves flow to another institution setting up a multiplier process.

So, that is the way that the Fed works. Now, the multiplier process may not be as strong in practice as it is in our theories for three reasons. First, banks may not want to lend out all of the reserves that they are able to. That is, even though they can lend out 90 percent, they may only lend out 80 percent and keep 10 percent in access reserves. Banks do this if they cannot find high quality loans or if they are afraid that the economy might turn down and they get stuck with a bunch of non-performing loans. A second concern is households may not choose to put all of the money in the bank.

Suppose that whenever you get this check from the Fed, you go in and cash it, but you do not put it all in your checking account, you hold it in currency instead. As long as it is outside the banking system it doesn’t count as bank reserves and that limits the number of new accounts that banks can create.

Finally, there is another concern that keeps the Fed from having such tight control over the money supply. That is that there are things that count as near money, repurchase agreements, large CD’s, savings accounts over which the Fed does not have nearly as much control. The reserve requirement is directly aimed at checking accounts, and these near monies, these other kind-of liquid ways of storing wealth may increase or decrease without as much direct control from the Fed. When that happens, then people may change their shopping behavior using mediums that the Fed is not directly controlling, and that limits the Fed’s ability to as tightly fine tune economy as it might like.
Investment Demand

We have made a big deal out of the fact been in macroeconomics equilibrium savings equals investment. Remember these equations? Your income and it’s uses – spend, save or pay taxes, aggregate expenditure which in equilibrium has to equal income. Set income equal to income and with a little algebra you derive this remarkable equation, which says that in equilibrium savings equals investment. That is, all the money that businesses borrow to build new factories and buy new equipment has to come from peoples’ savings. Whether households, the government, or foreigners. What makes this happen? Usually this kind of equilibrium comes about because of the adjustment of prices in a market, and this case is no different. The money that businesses borrow and the money that people save is brought into equilibrium by adjustment in the interest rate. The interest rate changes so as to make the quantity of funds saved equal to the quantity of funds borrowed.

Let’s see how this works by looking at a supply and demand diagram. The supply and demand are going to be savings and investment. We will start with the demand for loadable funds, which is the money that businesses want to borrow. Then we will look at what people want to save. Both of them are influenced by the interest rate. When you draw a supply and demand diagram, you have to be very clear about what's on the axis. On the horizontal axis, we put quantity, and in this case, it's the quantity of loadable funds. Since we are going to talk about demand first, we're going to label this axis with capital “I”, investment spending, because this is businesses wanting to borrow money, the demand for loadable funds. On the vertical axis, we have the price of loadable funds, which is the interest rate, what you have to pay to borrow money.

This brings up a point that can cause some confusion, so stay with me for a minute. That is the difference between the nominal interest rate and the real interest rate. The nominal interest rate is the interest rate that's written on the sign at the bank, what you get paid for your savings account, say, 10 percent. You leave $100 in the bank today and next year you can take out $100 plus 10 percent interest for a total of $110. That's not really what people care about. They don’t really care about what's on the sign. They care about their purchasing power. I care about this: I’m going to put in $100 in the bank today. That means on giving up a pair of shoes. I want to know next year when I take out $110, what can I buy with it? A pair shoes and a cool pair of socks? Maybe prices have gone up by so much that I cannot even afford the shoes anymore. Maybe now I have to settle for something less. The question is: what happens to my purchasing power? What's going to happen to my purchasing power determines whether I want to save money or whether I want to spend it today.

Let’s look at Irving Fissure’s equation. We have seen this before, that the nominal interest rate, that is, what the bank pays you is equal to the real interest rates plus the rate of change in prices, that is, the rate of inflation. The real rate of interest plus the rate of inflation is equal to the nominal interest rate. Let me see if I can make this clear with an example. Suppose the bank agrees to pay you 10 percent interest. So, you put $100 and today, at the end of the year, you're going to get 110.

Your question is, “How much of that money just goes to keep my purchasing power constant?” That is, suppose the rate of inflation is 6 percent. If the rate of inflation is 6 percent, then of this 10 percent that you're getting, it takes 6 percent just to keep your purchasing power constant, just to keep your purchasing power from shrinking. That means the remaining 4 percent is actually an increase in your purchasing power. That is, after prices have risen, your $110 that you get at the end of the year actually allows you to buy four percent more stuff than you could have bought last year. Is four percent enough to get you to save? Maybe, maybe not. Let’s see if we can make the deal even better. Suppose that 10 percent interest occurs in an environment that has only 2 percent inflation. That means the rate of change in the level of prices is now only 2 percent. That means that of this 10 percent, it takes 2 percent to keep you even with inflation, which means the real interest rate is 8 percent. You have an 8 percent increase in your purchasing power. Now, maybe you are more interested in putting money in the bank if that is going to be the case, because you get more stuff. What people care about when they decide whether to save money or not is the real interest rate and the real interest rate is a comparison between what the bank says it is going to pay and what you think prices are going to do.

Think about this from the point of view of a business. Suppose you're a farmer and you can plant two bushels of wheat today and wind up with 11 bushels of wheat a year from now. The real rate of return, the rate at which your output is multiplying, is 10 percent. So, you would be willing to pay the bank up to 10 percent interest to borrow the money to buy the wheat. However, suppose wheat prices are rising. Maybe they are rising at 5 percent annual rate. So you know that the wheat you buy it today is going to cost less than the wheat you sell one year from now. It is as if you are going to get extra money out of this deal just because of inflation.
Money: Banking, Spending, Saving, and Investing

Saving and Investment

Investment Demand

Well, the fact that you’re going to get this extra money makes you willing to pay the bank an even higher rate of interest because the money you get next year is going to be part of what you pay back the bank. The 10 percent real rate of interest plus the inflation rate of 5 percent adds to a nominal interest rate of 15 percent that you could afford to pay the bank and still break even on this deal. What you really care about is the real rate of interest. You want to know how much purchasing power is going to be left for me, the business owner, after I have pay off my loan. The nominal interest rate is equal to the sum of the real rate of return on the project plus the rate of inflation.

Let’s suppose for the sake of the rest of our discussion here that inflation is held constant. If that is true, then the real rate of interest such, "R", is going to move in exactly the same direction as the nominal rate of interest. The bank raises the nominal interest. If inflation does not change, the real rate of interest goes up.

So for the rest of my discussion, even though businesses and savers and everybody’s concerned about purchasing power and the real rate of interest, if we hold inflation constant, we can talk about the nominal rate of interest and be talking about the same thing.

Now, lets think about the demand for loanable funds. What makes businesses willing to borrow money? The answer is making a profit. Suppose the rate of return on a project is 10 percent. If the rate of return on a project is 10 percent then you are willing to pay up to 10 percent to borrow the money, not 15 not 20, 10. However, if you could borrow the money for 5 percent interest, then you have extra profit. If you could borrow it for 2 percent you are ecstatic. What happens is we did a downward sloping demand curve for loanable funds.

The downward sloping demand curve says this: as the rate of interest increases, as the nominal rate of interest increases, businesses are less interested in borrowing money because there’s less profit left for them after they have pay off the bank. At high interest rates, businesses will borrow small quantities of loanable funds because there are not enough projects that earn a high enough rate of return to make it profitable. At a low rate of interest, however, businesses will do lots more projects because is more projects are profitable. There is more left for the business after the bank is paid off. That's why the demand curve for loanable funds slopes downward. Businesses find that more of their projects are profitable, the lower the interest rate goes because there's more profit left for them after the bank is paid.

Now the next question we want to ask as we develop this picture is: what causes the curve to shift? Say we have a given interest rate here, maybe it's 10 percent, and at this given interest rate businesses want to borrow a total amount of money say it is equal to $100,000. What could happen that would lead businesses to want to borrow more money at the same interest rate? What would lead businesses to want to borrow, say, $200,000 at this interest rate of 10 percent? Let’s think about the things that would increase business profits and make borrowing money more attractive.

The first is a change in technology. Suppose a new technology comes along that allows you to replace workers with less expensive machines in your business. Or maybe there's a productivity change that makes your existing workers more productive when they use computers or some new technique. You get more output from a given amount of input, and that makes your project more profitable, and since it is more profitable you need to borrow more money so you can build more factories and take advantage of this profit opportunity.

A second thing that shifts out the demand curve is tax policy. Suppose the government cuts corporate profit taxes. That means you get to keep more of every dollar that comes into your business. Since business is more profitable, you are inclined to expand your business and that means borrowing more money at any given interest rate. A third thing that influences this demand is increases in real gross domestic product. We have talked before about the multiplier. That is, an increase in investment spending increases GDP by multiple.

There is also a relationship that works in the other direction. It is called the accelerator. When real gross domestic product increases, that is, when the economy grows, businesses decide that they want to invest more. That is, since business opportunities are obviously better, the economy is growing, investment spending increases. This is called the accelerator because the expansion in GDP feeds back into businesses’ decisions leading them to spend more on plant and equipment.
Saving and Investment

Investment Demand

A fourth factor is expectations about the future. When you become more optimistic expecting that your business profit opportunity are going to be brighter, then you want to take advantage by building a factory today, acquiring new equipment, borrowing more money at any given interest rate.

Finally, is what we call animal spirits. Animal spirits is kind of the herd instinct. Everybody senses that the economy is going well, everybody else around you is investing, things are booming so you just jumping to go with it. Maybe your gut just tells you now is a good time to build a factory. Who can account for animal spirits, people's instincts and how they work themselves out in the economy?

Any of these changes can lead to an increase in the demand for loanable funds. An increase in investment spending at any given interest rate. We show that by shift in the demand curve. On the other hand, if things change in a way that is adverse for business, then the demand for loanable funds shifts inwards. Businesses want to borrow less money at any given interest rate.

For a quick recap: if you look at the relationship between business investment spending and the real interest rate you'll find that it is inverse. Higher real interest rates deter investment spending. The lower real interest rates encourage investment spending. A little catalog of factors including taxes, technology, and animal spirits can lead to an increase in investment spending at any given interest rate which we show by shift in the demand curve.

Now we have talked about the demand for loanable funds. Next, we will consider the supply and the behavior of savers.
By now, you're wondering why we're spending so much time talking about savings investment. That is because it's at the very heart of the connection between the real economy of goods and services, and the financial economy of money and interest-bearing assets.

Let's go back and review the relationship one more time. We have almost got a model together that is going to help us predict the interest rate, and show us the connection between the interest rate and the real economy. Here is income and all of its uses. Here is aggregate expenditure adding up to income. Income equals income. Do that algebra again and you come up with this remarkable key equation — equilibrium expressed as the equality of investment and savings. We have already talked about this side of the equation; that is, investment spending because when businesses are building factories they're borrowing money. The amount of money they borrow depends to a large degree on interest rates, the price of money.

Now we're going to look at the other side of the equation, the supply of loanable funds. Loanable funds are supplied when people save money and put it into the financial system, households, the government, and foreigners. It turns out, that what influences people's decisions to save money is also the real interest rate.

We have demand, which depends on the interest rate, supply, which depends on the interest rate, and then we're going to put them together and find the equilibrium interest rate, that is, the rate of interest that gives us an equality between the supply of loanable funds, that is, savings and the demand for loanable funds, that is, investment. We're going to find the interest rate that makes this macroeconomic equilibrium happen.

Let's go back over to our supply and demand diagram. This time you'll notice I have changed the labels. The horizontal axis represents the supply of loanable funds that is the money that people put into the financial system. They put it there because they're not spending it today, so we call it “savings.” On the vertical axis we have the price of loanable funds, or the return that you get on your savings. The money they have to be paid in order to put your money into the financial system. As we said before, what people really care about is the real rate of interest. That is, the return that they get on their savings measured in terms of purchasing power. I am saving a pair of shoes today. What am I going to have next year, a pair of shoes and socks, more pairs of shoes, or maybe only a cup of coffee? That is certainly going to influence my willingness to put money into the financial system. As you'll recall, the real rate of interest is equal to nominal rate of interest, with the bank pays, minus the rate of inflation. Therefore, if we hold the rate of inflation constant, the real rate of interest moves exactly one for one with the nominal rate of interest. So, I can draw people's savings decision as a function of what the bank is paying them on their savings accounts.

Let's think then about the behavior of savers. Whenever the nominal interest rate goes up, if inflation is constant, the real rate of return goes up also, which means that you can afford to buy more stuff than before if you save money today. The higher the nominal interest rate, the larger the return on your savings. If inflation is constant, that means you can buy more and more stuff as the nominal interest rate rises. That means that you are going to be willing to forego consumption. You're going to be willing to forego spending today in return for larger amount of purchasing power tomorrow, and next year, and so on into the future. So, what we have then, is a supply curve that slopes upward. The supply curve for loanable funds looks like this. That is, as the nominal interest rate rises households are willing to forego consumption and put more of their purchasing power into the bank today in the form of savings.

Now, households are only one component here of the savings. There's also the government, which is saving, if it is taking more in, in taxes then it is spending in government spending. There is also foreigners. Foreigners are saving if we are running a trade deficit. That is, foreigners are lending has money so that we can afford to buy more from them, importing more, than we sell to them – exports. So, if our net exports are negative we are running a trade deficit and foreigners are lending us the money that makes that possible. So, the savings is a combination of foreigners saving in our economy, the government saving, and household saving. In general, whenever the interest rate rises, the total quantity of loanable funds made available, supply that is saved, is going to increase.

The next question is, "What is going to cause this curve to shift?" What would cause, for instance, at any given interest rate, the total quantity of loanable funds put in the financial system, the total amount of savings to increase? What would cost that to happen? Let's think about all the players whose behavior could lead to this shift.

First of all, what would influence households to save more at any given interest rate? Suppose, people became fearful about the future then they decided that they needed to save more because they were afraid they may lose their
jobs. Another thing that might happen is, the government providing incentives to households to save more like whenever you have the opportunity like when you did in the '80s to have an individual retirement account or a 401(k) or 403 (b) these government incentives encourage people to do more savings.

Now, we can talk about a third thing, which would be changed in the behavior of the government itself. Suppose the government runs a smaller deficit or a bigger surplus. That is, suppose the government reduces government spending and increases taxes, now the government is saving more money. That is, it is taking more in revenue and it is spending last so its savings is increasing. That is going to shift out the savings curve. At any given interest rate, total savings in the economy increases, anytime the government runs a bigger surplus or a smaller deficit.

A fourth thing that can happen here is a change in foreign behavior. Suppose the exchange rate changes and the cost of foreigners buying stuff from our economy changes. For instance, if the U.S. dollar becomes weaker and the U.S. dollar will buy less foreign goods than before, the people from the United States are less interested in importing. When we're not interested in importing, then our trade deficit is going to shrink.

Meanwhile foreigners, seeing that goods and services in the U.S. are a bargain, will start buying more stuff from us. So our exports increase our imports decrease, net exports are increasing, the trade deficit is shrinking, and foreigners are saving less money in our economy. On the other hand, if it happens in reverse, if the dollar appreciates, then we are going to find ourselves exporting less in importing more. The trade deficit increases, foreigners are lending us more money, and the savings curve shift outward at any given interest rate. So, a bigger trade deficit shifts out the savings curve.

So, here is a quick summary of what can cause there to be more savings in our economy at any given real and nominal interest rate. First of all, the change and household behavior, perhaps due to incentives from the government or a fear of what can happen in the future and the desire to protect yourself with savings. Next, a change in government behavior. If the government runs a bigger surplus, it is saving more; if it runs a bigger deficit, then it is going to be reducing overall savings in the economy. Finally, a change in foreign behavior. If the trade deficit gets bigger, then foreigners are lending us more money. If our trade deficit gets smaller, then foreigners are lending us less money.

So, now we have the behavior of borrowers and the behavior of lenders. We’ve got the supply curve for loanable funds and the demand curve for loanable funds. We’ve got savings and we’ve got investment. Now we’re ready to put them together and find out how the change in the interest rate gives us equilibrium.
Money: Banking, Spending, Saving, and Investing

Equilibrium in the Money Market

One last time, macroeconomic equilibrium, savings equals investment, but how does it happen? Remember this famous equation, it came from the uses of your income and spending equals income and voila! You have the sum total of all savings in the economy is what is available for businesses tomorrow if they want to build new factories, install equipment and do other investment spending. The thing that makes saving equals investment, is the adjustment of the interest rate. The interest rate is the price of money, and we're talking here about financial markets, people saving, people borrowing. This financial market, this investment spending, this interest rate story, is the link between the financial system, money, interest-bearing assets, and the real economy, all of the spending that people do.

So let's look at how this happens. We will start with the diagram that we have drawn before. Here is the demand for loanable funds. This is businesses wanting to borrow money. Businesses want to borrow more money whenever the real interest rate is lower. They want to borrow less money when the real interest rate is higher. That is because investment projects are profitable when you can borrow money at low rates. Investment projects are less profitable when you have to pay most of your profits to the bank; that is, when the interest rate is high.

The other side of the story is the behavior of savers, that is, the supply of loanable funds and that is the blue curve. It is upward sloping because households are willing to forego their consumption and put more of their income into savings whenever the reward for savings is higher, and if inflation is constant, you get a bigger real return on your savings when the nominal interest rate is higher. We have already talked about this nominal interest rate/real interest rate problem. Everybody really cares about the real interest rate because the real interest rate is what determines the return on your project in the terms you care about, your purchasing power.

So, if the inflation rate is constant, we can talk about the nominal interest rate, because the nominal interest rate in the real interest rate move one-for-one in the same direction when the inflation rate is held constant. So, for the moment, hold inflation constant and look at the behavior of businesses and the behavior of savers. Now we are ready to talk about equilibrium.

Suppose we have an interest rate way down here. Suppose we call this “Interest Rate 1.” Maybe it's 5 percent. While at the very low interest rate, businesses are really eager to borrow money because a lot of investment projects are profitable if you can get the money at a low rate. On the other hand, if you look at the blue curve, people are not very interested in saving money whenever the return is so low.

Therefore, there is an excess demand for loanable funds. Lots of businesses want to borrow; very few households want to save. So, with this excess demand, businesses start competing aggressively to get money. They are willing to pay a higher interest rate, and whenever they pay this higher interest rate, then people are willing to save more money because the reward is higher.

The equilibrium interest rate is established as businesses bid higher and higher and higher interest rates to get funds. Whenever the businesses bid higher interest rates, some businesses decide to drop out of the bidding, they cannot afford to pay those higher interest rates and still make a profit on their investment projects. So, as the interest rate is bid up, we move along the red demand curve, that is, the quantity of loanable funds demanded shrinks.

Over here as the interest rate is bid up, households want to supply more loanable funds because the return is higher. Eventually we reach a point to where an interest rate is established where the quantity of loanable funds demanded is equal to the quantity of loanable funds supply and we can call that, in this case, R0. This is the equilibrium interest rate in this market. The equilibrium interest rate, at which the quantity of loanable funds demanded, equals the quantity of loanable funds supply, but the people supplying the funds are savers. The people borrowing the funds are businesses doing investment. So, at this point. Where the blue and the red curves cross in equilibrium, savings equals investment. The adjustment of the interest rate helped us establish macroeconomic equilibrium. You get the same story if you start at an interest rate that is too high. If the interest rate I1 were way up here, then you would have everybody wanting to save and fewer businesses wanting to borrow, an excess supply of loanable funds. So, what would happen in this case is that savers would have to accept the lower interest rates if they wanted to get any kind of return on their money.

So, savers would start to bid against one another agreeing to accept a lower interest rate rather than doing without any return all. Then what happens is that as the interest rate falls with savers being willing to accept a lower interest rate
Equilibrium in the Money Market

rate, more businesses want to borrow money. The interest rate continues to fall because of this excess supply of loanable funds until finally we return to the point at which savings equals investment. We're back at the equilibrium where the red curve and the blue curve cross, an interest rate at which the quantity of loanable funds demanded is equal to the quantity of loanable funds supply.

There you have it. The usual story, excess demand is eliminated by prices going up, excess supply is eliminated by prices going down. The bidding mechanism establishes the equilibrium interest rate.

The next step is to look at what would happen to the equilibrium interest rate if there were a change in the environment. Suppose something happens that causes either businesses to change their behavior at any given interest rate or savers to change their behavior at any given interest rate; that is, a shift in one of the curves.

Let's start with the demand side. Suppose now that the government gives businesses tax incentives to install new equipment. That is, some kind of government incentive to increase investment like happened in President Reagan's administration in the early 1980s. Businesses were allowed to write off their investment expenditures faster to accelerate a depreciation, and they get tax credits when they made new investments. The intent of this policy was to stimulate the economy. Indeed, what happened was that businesses found it profitable to borrow more money so that they could install more equipment and build new factories. The government incentives resulted in an increase in the demand for loanable funds. That is, businesses wanted to borrow more money at any given interest rate.

So, at the original interest rate now what have we got? We're still on the blue curve because savers have not changed their behavior, but now we have this new red curve out here so we have excess demand. Businesses want to borrow a lot more money at this interest rate than savers want to save. What happens? The bidding mechanism kicks in and interest rates begin to rise. Interest rates keep rising until we reach this new point of intersection between the new demand curve and the original supply curve.

That means, after this accelerated depreciation, after these tax incentives to increase investment spending, what we get is a higher equilibrium interest rate and a larger quantity of investment spending. The financial markets expand as businesses try to borrow more money to take advantage of the opportunity created by favorable tax treatment of investment spending. There you have it. Anything that shifts the demand curve out is going to push up the interest rates and cause financial activity to increase.

Let's consider a possible change on the other side now. Suppose that the U.S. government decides to run a bigger deficit so there is a bigger federal government budget deficit. In that case what happens is the government now is saving less. When the government saves less, then the total savings in the economy shrinks at any given interest rate. With the decrease in government savings, total savings decreases and the savings curve, the supply curve of loanable funds, shifts inward. What is going to be the consequence? The consequence is, at the original interest rate, the quantity of loanable funds supplied is less than the quantity of loanable funds demanded on our original red demand curve. Once again, we have excess demand. With excess demand, interest rates will be bid up. This time, however, the total amount of financial activity is going to be shrinking in the market. What we get in equilibrium is, I1 a smaller amount of overall investment, and a higher interest rate. This is what we call, in macroeconomics, "crowding out."

When the government comes into the financial system and borrows more money because it is running a bigger deficit, it crowds out business spending. It pushes up the interest rate leaving less of the funds that are available for the business. When the government borrows more, there is less of the savings in the economy that is available for businesses to build factories with. Crowding out, an increase in the government budget deficit leads to a higher equilibrium interest rates and a lower overall amount of investment spending.

Any story you tell now you can represent by a shift in either the demand curve for loanable funds or the supply curve for loanable funds. Whatever story you have, by shifting the curves appropriately, you can predict what will happen to the interest rate and the overall amount of business spending. Whatever the story, the economy adjusts; the interest rate adjusts until macroeconomic equilibrium is re-established. You know what that means: savings equals investment.
Aggregate Demand/Aggregate Supply Model

Aggregate Demand

Deriving the Aggregate Demand Curve

Suppose you are a policymaker during the Great Depression. The economy looks bad. Unemployment is high, banks have failed, and a lot of people are experiencing a big drop in their standard of living. People are afraid that things might get worse and it is their instinct to save money. As a policymaker, we have two problems. The first is: is this increase in household savings want to improve the situation or make it worse? You have to figure out what is going on and what might happen. The second problem is: how would you persuade people in your economy to act against their instincts if that was, in fact, the best thing for them to do?

This is where a model comes in. A model takes all of the chaos of life and tries to cut through irrelevant facts to focus on the most salient features of a problem, those things that really bear on what it is you want to know and you want to control. A model does two things. First, it helps you understand the world better. Next, it acts as a teaching tool that can help you explain to someone else how cause and effect create a situation.

We are going to begin now to build a model of the way the economy works. The thing we want to explain is the business cycle. The ups and downs of the economy, recessions, booms, increases in unemployment, booms times where jobs are plentiful. We would like to understand how interest rates, prices, output all that stuff fits together so that we know how a change in the economic environment, maybe a policy change like a tax cut, is going to effect all of these variables. Is it going to increase our standard of living? Is it going to make it worse? Who is going to benefit and who is going to be hurt? We want this model to be simple and clear enough that with a little bit of investment of time and attention someone else can learn it so that then you can have an intelligent conversation with other people about policies that might improve life for people in your economy.

Let's think then about the business cycle and where it comes from.

We begin with a notion of the flow of business services in our economy, a circular flow diagram that we have developed earlier. Households, businesses, the government, foreigners, spend money on goods and services. The money that businesses get becomes household income, and in equilibrium, the circular flow has to be such that spending equals income. That means any leakages from the circular flow, savings or taxes, has to be re-injected in the form of spending by government, businesses, or foreigners.

Let's begin to build a model by thinking about the difference between the nominal economy and the real economy. The nominal economy is the world of prices and money. The real economy is the world of goods and services. The picture, as I have drawn here, is a picture of real flows, people actually spending on stuff. Everything in this picture is measured in terms of actual physical goods and services. When you draw this circular flow diagram, you have held prices constant. I am going to begin to build my macroeconomic model by asking, "How will a change in the price level, an increase in the consumer price index, for instance, how will it effect the circular flow? How is it going to effect people's behavior and either expand or shrink the real economy?"

Suppose the price level goes out. Let's think about everyone in this picture who is going to be effected by that. First of all, households will be effected. Households have savings accounts and these savings accounts are usually measured in nominal terms. That is, I have $10,000 in the bank. When the price level goes out my $10,000 will buy less. Therefore, I feel poorer and because I feel poorer, I may reduce my consumer spending. When I reduce consumer spending, economic activity begins to shrink.

Another thing that can happen is, when the price level goes up, the money supply in the economy, the fixed amount of money that the Federal Reserve has printed and put into circulation, that fixed amount of money will now pay for less shopping because price tags are reflecting bigger numbers. So, the fixed money supply does not go nearly as far to doing your shopping and people are scrambling to get more cash. The increased demand for money pushes up the interest rate and makes businesses less likely to spend, a second effect.

A third effect is higher prices in our economy deter foreigners from buying our goods and services. They would just as soon buy in another economy where prices have not risen. The effect on the exchange rate, that is, the relative price of U.S. goods relative to goods abroad, shows up with decrease foreign spending. Once again, shrinking economic activity. This is the beginning of a model, the price level and its influence on the real economy.

We can summarize the effect of the price level on the real economy in a curve that we call the aggregate demand curve. The aggregate demand curve looks at aggregate expenditure as a function of the price level. Aggregate
Aggregate Demand/Aggregate Supply Model

Aggregate Demand

Deriving the Aggregate Demand Curve

Expenditure is the sum of all of the components of spending in the economy. Consumer or household spending, business spending or investment, government spending and foreign spending are net exports. Add all of these up and you get, aggregate-total-spending in the economy, which in equilibrium is equal to income.

Let's look at the aggregate demand curve, which shows aggregate planned spending as a function of the price level. Let's see how we can represent that. We have already talked about how the relationship between price level and income is going to be negative. That is, when the price level goes up, there are three channels through which higher prices lead people to want to spend less money. The first is, households feel like they are poorer because of the shrinking of their savings’ purchasing power. The second is increased demand for money pushes up interest rates and deters business spending. The third is that higher prices deter foreign spending as foreigners look for bargains in other countries. All of that says then that a higher price level leads to lower aggregate spending, which in equilibrium leads to a lower income level.

This is just the first step in the creation of a model that is going to help us predict when income is likely to increase, creating a boom, and when it is likely to fall, and what is likely to happen to employment and interest rates along the way. This first step is important because what we're doing is identifying those factors that are likely to be important in building an explanation. In this case, what we have said is the price level is important. The price level, a nominal variable, interacts with other nominal variables like savings and the money supply to influence people's behavior. Once real spending starts to change, there is going to be an effect on output in the economy and all the other variables that depend on it.

Now we are going to look in greater detail at this aggregate demand curve, what causes a movement along it and what might cost a shift in it.
Aggregate Demand/Aggregate Supply Model

Aggregate Demand

Movement Along the Aggregate Demand Curve

We're building a model of the macroeconomy as we seek to explain the business cycle and we've begun with the relationship between the aggregate price level and the real gross domestic product. You recall that the equilibrium equation in macroeconomics is that income equals spending. That is, everything that is produced in the economy has got to be purchased by someone in equilibrium. The real gross domestic product in equilibrium is the sum of spending by all of the agents who buy things, that is, consumer spending, business spending, the spending of government, and the spending by foreigners, that, is our net exports.

What we're going to do now is look at the aggregate demand curve, a curve that we drew to explain the relationship between the aggregate price level and the real gross domestic product and understand the story behind it. This aggregate demand curve is drawn to show that when the aggregate price level rises, the equilibrium real gross domestic product shrinks. As the price level rises, consumers, businesses, foreigners, and the government buy less stuff. A movement along the aggregate demand curve means a reduction in real gross domestic product as the aggregate price level rises. What is the story behind this curve? Why is it that rising price levels lead to shrinking real gross domestic product?

Let's look now at the three stories behind this particular curve to answer the question, "Why does the aggregate demand curve slop downwards?" The first story concerns consumer spending. How does a rise in price level influence consumer spending? Think about it, when price levels are rising, that means the prices of all goods and services are going up together along with your paycheck. There are some aspects of your wealth that are fixed in nominal terms. Your savings account for instance, your savings balance does not rise along with inflation, it stays fixed, and therefore your real wealth actually shrinks. A given amount of money to positive in the bank will buy less after all prices have gone up. The shrinking real wealth causes households then to feel poorer and when they feel poorer they reduce their consumer spending.

Now if consumers are buying last stuff, businesses don't want to make as much stuff. Otherwise, they will be stranded with a lot of excess inventory. A reduction in consumer spending leads to a reduction in factory output and that means a shrinking real gross domestic product. So the first channel through which rising prices lead to a shrinking real gross domestic product is through the channel of real wealth and its effect on consumer spending.

The second way in which rising price levels lead to shrinking real gross domestic product works through business spending. Investment spending is going to decrease whenever the price level rises. The story here is a little bit longer and involves a few more steps. When the price level goes up, everybody needs more cash and more money and checking account to do their shopping because prices are higher. What you see with the rising price level is an increase in demand for money.

The increase for demand in money, however, is frustrated because the Fed has not increase the money supply. The rise in price level increases the demand for money but the supply for money is fixed. Therefore, the excess demand for money is resolved by a higher interest rate. The price of money goes up so people are content to hold the cash and checking balances that they have. The rising interest rates as an effect on business spending. Businesses are not interested in doing as much purchase of capital goods whenever interest rates are high because finance charges are higher and therefore investment spending falls.

Businesses are not buying as many capital goods, they are not building as many new factories, and they're not outfitting them with equipment. So, because of the reduced demand for investment goods, businesses cut back their output of investment goods. That means that real domestic gross product is going to shrink. The second channel through which rising prices lead to shrinking real gross domestic product is the investment spending effect, rising prices, increased demand for money, increasing interest rates, shrinking investment spending, and shrinking real gross domestic product.

The third channel through which rising prices lead to shrinking real gross domestic product is through the effect on net exports. When price levels rise, foreigners look at the price of goods and services in our economy and compare them with the prices of goods and services elsewhere. They say, “Hey, it's no bargain to buy stuff from that economy anymore; let's buy our goods from another country.” Our net exports shrinking as foreigners seek bargains in other countries. Since our net exports are falling, since people from abroad are no longer buying our goods and services but buying them from somewhere else instead, then our factories here see that there is less demand and they reduce their output and real gross domestic product then shrinks. So, the third effect is through the effect on net exports,
Aggregate Demand/Aggregate Supply Model

Aggregate Demand

**Movement Along the Aggregate Demand Curve**

Rising prices deter foreigners from buying our products, and when net exports shrink, real gross domestic product falls also.

So, there are three effects. All three of these effects are summarized in the aggregate demand curve. The aggregate demand curve shows the relationship between the aggregate price level in our economy and our real gross domestic product. When the aggregate price level rises, there are three consequences. Consumers see their real wealth shrinking and they buy less. Businesses, because of the increased demand for money, see interest rising and they buy less. Foreigners see that our prices are high relative to the prices in other countries and they buy less. With all three of these reductions in demand, we get a reduction in real gross domestic product and our economy. That is why the aggregate demand curve slopes downwards.

That leads us to one final question. This is often a point of confusion. How is the aggregate demand curve related to a demand curve from microeconomics? Suppose here we have a demand curve like we draw in the microeconomics course. Maybe it's the demand curve for onions. On the vertical axis, we have the price of onions. On the horizontal axis, we have the quantity of onions demanded. Think of what this curve is telling us. When the price of onions rises, people are willing and able to buy or fewer onions, therefore the quantity demanded of onions decreases.

The demand curve in microeconomics is about two effects: the substitution effect and the income effect. The substitution effect says that when the price of onions rises, onions are not as interesting anymore because of their opportunity costs have gone up so you buy carrots or radishes instead. The income effect says when the price of onions goes up then your purchasing power is shrinking, the purchasing power of your income. Therefore, you buy fewer onions and less of everything else as well. That is the microeconomics story. It's about opportunity costs and purchasing power.

The macroeconomic story, on the other hand, is different. On the vertical axis, we do not have the price of any particular good, we have the aggregate price level, the prices of all goods and services including your income. On the horizontal axis, we have the output, the overall output and demand in the economy. What this curve is telling us is that if the overall price level goes up, the price of everything going up that overall demand in the economy is shrinking.

The story has nothing to do with opportunity costs. It has more to do with the relationship between the price level and other nominal variables. When the price level goes up, your savings account has less purchasing power, you feel less wealthy and consumers respond to that. When price level goes up, you want more money, another nominal stock in the economy. Since there isn't anymore, than interest rates rise and businesses respond to that. Also, you can compare the price level in our economy with the price level in other economies, and foreigners respond to that.

The issue with the macroeconomic demand curve is that the relationship between the overall price level and the overall output in the economy is because price levels influence the real value of other nominal variables like the money stock or like savings accounts and other measures of wealth. Don't confuse the microeconomics demand curve for onions with the macroeconomic demand curve that is talking about how the overall price level effects real gross domestic product.

Now that we have the aggregate demand curve drawn and now that we understand what it means to move along it, we can talk about what shifts the aggregate demand curve. This takes us one step closer to completing a model of the macroeconomy.
Aggregate Demand/Aggregate Supply Model

Shifts in Aggregate Demand

We are building a model of the macroeconomy, and our goal is to be able to predict business cycles and explain how the economy will respond to changes in the environment. We have started with this aggregate demand curve, which is kind of the main axis of the model we are building. The aggregate demand curve shows how total spending in the economy is related to the aggregate price level. The aggregate price level influences spending through three channels: First of all, rising prices shrink the real wealth of consumers and leave them to purchase less. Next, rising prices increase the demand for money, pushing up interest rates and leading businesses to spend less. Finally, rising prices cause our goods and our economy to be uncompetitive so that foreigners buy goods from other countries shrinking net exports. The effect is that when prices rise, total spending falls and that means equilibrant income and the economy, equilibrium spending, is less. That is why the aggregate demand curve slops downwards.

Now, the next question is: what would cause this curve to shift? A shift in the aggregate demand curve means that there is more demand for goods and services in our economy at every price level. That means that, for any given price level, people want to buy more stuff, and so factories respond by producing more. Let us ask the question then: what would cause the aggregate demand curve to shift outward from this original curve $AD_0$ to this new curve $AD_1$? On $AD_1$, the total economy spending is greater at any given price level. Here is the question you need to answer: what would cause people to spend more money if the price level did not change? We know that rising price levels have the effect of shrinking total spending, but what would cause people to spend more at any given price level?

The first answer is an increase in autonomous spending. Autonomous means stuff that is by itself, unto itself, not caused by something else. If consumers decided that they just wanted to spend more money for the heck of it, or were feeling rich or confident about the future of the economy, then an increase in of consumer spending at every price level would shift this outswards. More GDP, because factories have to produce more to keep up with increased consumer demand.

The second thing could be an increase in autonomous investment spending. If businesses are feeling confident, they may decide to spend more on factories, plant and equipment. If that is the case, at any given price level, we have a larger aggregate demand and businesses have to produce more to satisfy that. The same happens with foreigners. An increase in autonomous net exports comes about whenever foreigners decide they want more of our countries’ goods at every price level. That is the first thing that shifts out the aggregate demand curve, an increase in autonomous spending from any of these components.

The second set of things that can increase aggregate demand are related to policy variables. Let me list them in order. The first of the policy variables is government spending. If the government decides that it wants to spend more, that is that there is an increased amount of government spending on goods and services, that adds directly to aggregate demand at every price level. If the government starts building more roads and bridges, and spending money on schools and things like that, this increased government spending increases the aggregate demand on the economy, so businesses have to respond to produce the stuff that the government wants. That is one policy variable. It is autonomous. The government can increase its spending or decrease its spending any time that it wants, but when the government increases spending, we have an outward shift in the aggregate demand.

Another component that can shift the curve that is related to policy is taxes. Now, taxes have the opposite effect because when taxes go up, people have less disposable income therefore, they are inclined to spend less. When taxes fall, it is like giving extra income to consumers and usually consumers will spend a big chunk of it and that increases aggregate demand at any price level. If the government wants to shift out the aggregate demand curve, if the government wants to increase the aggregate demand, the government has tow policy tools to use: government spending and taxes. An increase in government spending shifts the curve out, and a reduction in taxes shifts the aggregate demand curve out.

The final policy variable that can shift out the aggregate demand curve is a change in the money supply. If the money supply increases, then the interest rates are going to fall because there will be excess supply of money at the original interest rate. The bidding mechanism pushes down the interest rate, and businesses respond by doing more business spending at any given price level. An increase in money supply shifts out the aggregate demand curve because of its direct effect on interest rates.

So there you have it; that is what can shift the aggregate demand curve outwards. To shift the aggregate demand curves inwards, just reverse all of these stories. Decrease autonomous spending, reduce government spending, raise
Shifts in Aggregate Demand

taxes or shrink the money supply. The outwards and inwards shift of the aggregate demand curve can happen naturally because of changes in the behavior of the big spenders in the economy or it can happen by choice. A policy shift can move this curve. We will see later why the government may want to change its spending or why the fed may want change the money supply in order to calm the business cycle or stimulate the economy. First, we need to expand our model by adding an aggregate supply curve. Then we can put supply and demand together and we can find an equilibrium price level for the economy and an equilibrium level of real gross domestic product.
Aggregate Demand/Aggregate Supply Model

Aggregate Supply

The Short-Run Aggregate Supply Curve

We are building a model of the macroeconomy because we want to explain the business cycle. We want to see what influences the output and employment. We would also like to see if changes in policy could increase our standard of living.

So, in an attempt to build a model, we started with an aggregate demand curve. This is the main axis of our model. It shows the relationship between the aggregate price level, that is the price of all goods and services taken together, and real gross domestic product, the output of the economy.

Now, you might think the next thing we are going to do is slap an aggregate supply curve in here and get an equilibrium, but we have run into a problem. That is, while economists are pretty much in agreement about the aggregate demand curve, how spending works, the way that the price level is related to output on the supply side is controversial. In fact, there are all kinds of different theories about the aggregate supply curve. This is where economists are most likely to disagree.

We start with a basic problem with aggregate supply and prices. That is this: why should the aggregate price level affect the behavior of producers at all? After all, what producers really care about are profits, and profits depend upon their revenues and their costs. So, if the aggregate price level is rising, then the prices of all goods and services are rising together. That is, the price of final goods and services like cars and airplanes, and raw materials like steel and labor.

Now, the price of your goods determines your revenue. If goods prices go up, and sales remain constant, then revenue increases. The prices of raw material and labor determine your costs. If the price of raw materials and labor rises, if wages go up and input prices rise, and your input quantities remain constant, then your costs are going to go up. If revenues and costs are going up at the same rate, then your real profit is not changed at all. If your profit opportunities remain unchanged, then why would the firm change its behavior? Why would it increase or decrease its output?

Now in the long run, that is, after enough time has passed, an increase in the aggregate price level means that the prices of all these goods have increased together, whether it is the final goods or the inputs, but in the short-run, that is, during the period of adjustment, labor prices may increase faster than raw material prices, goods prices may increase faster than labor. That is, these prices are not going to move upward adjusting in a constant smooth rate. The adjustment is going to be jerky, kind of like traffic on a highway. Sometimes labor is going to pass raw materials. Sometimes goods prices are going to pull ahead of them all.

It is this misalignment of prices; it is the difference in the rate of adjustment that creates opportunities for profits in the short-run. That is, there is a period of time that may not persist very long, during which businesses can take advantage of the fact that goods prices are rising faster than labor or raw materials.

One example would be if there are labor contracts that fix wages. If the prices of goods go up when labor costs are fixed, then you have a profit opportunity and firms are going to increase their output. If raw materials prices were fixed by law or by some kind of agreement? What if the price of airline tickets rose relative to the price of automobile rides in the short-run? People would do substitution, the way we describe in microeconomics.

What I am going to do now is use this insight that prices adjusting at different rates, creates opportunity for profit. I am going to use that insight to derive the short-run aggregate supply curve. The short-run aggregate supply curve shows the relationship between the aggregate price level and output in the economy in the short-run. The short-run is going to be a period before all prices have reached their final adjustment. If I say that the price level goes up from a level of 100 up to a level of 110. If I say that, the price level in the economy has increased by 10 percent. In the short-run, the price of automobiles may be increasing faster getting to that new target than the price of labor. It takes a while for prices to adjust, and some prices adjust faster than others do.

Now, there are two stories I can tell you about the way in which prices adjust. The final story, which I will tell you later, involves labor contracts. The first story about the adjustment in prices is about confusion. Suppose you are an automobile manufacturer, and you see that people are coming into your automobile dealership with more money to pay for cars. That is, that they are offering to pay higher prices than before. The price of cars on your lot is being bid up. Well, in the short-run, confusion is going to persist. You are not going to be sure whether there is just increase
Aggregate Demand/Aggregate Supply Model

Aggregate Supply

The Short-Run Aggregate Supply Curve

demand for automobiles or whether there is general economy-wide inflation. Maybe everybody is willing to pay more for everything because the money supply has increased or something. The price of all things, that is, automobiles, airplane rides, and labor are rising together. In the short-run, however, you are confused because you do not see the prices of these other things and you have to act from your one observation which is that the price of your good is going up. What you are going to do then is you are probably going hedge your bets, imagining that there is at least a possibility that your profit opportunities have improved and you will respond by increasing your output from y=0 to a higher level of output y=1. So an increase in the general price level can lead businesses to increase their output because of confusion. They are not sure whether it is increase demand for their individual product, which is a profit opportunity, or whether it is economy-wide inflation which is not a profit opportunity. Since they are uncertain, they respond anyway, their response leads to an increase in real gross domestic product, and that gives us an upward sloping of the supply curve in the short-run. The aggregate supply curve in the short-run is upward sloping because of confusion.

The second possibility is what we call the “sticky-price theory” or the “sticky-price explanation.” The “sticky-price explanation” says this: that when the general price level is rising, not all firms are going to be able to raise their prices immediately because it is costly to raise your prices. One cost might be the cost of printing a new menu. You want to raise your prices because the demand is obviously strong; people are bringing in more cash to pay for your meals, but it is going to cost money to print up new menus. So, in the meantime, you leave the menu just like it is. Or in your grocery store, you may find that items are piling up on the shelves, but you do not want to go around and stamp them all right now, you want to wait and see if this is going to persist, because it is costly to adjust your prices. Or some businesses are afraid to raise their prices for fear of making their customers happy. Imagine what would happen then if the general price level was falling. That is, if the price level falls from 110 down to 100 and most businesses are quick to adjust their prices downwards, but some of them are slow because of the menu costs or because of some other cost of changing their prices. If that is the case, then these businesses that do not adjust their prices downward with the rest of the economy suddenly find that they are not competitive anymore. Their prices are too high, and therefore the demand for their products is going to be cut back and, as a result, they are going to reduce their output because nobody wants to buy their stuff because of the high price. Now, in the long run, they will eventually get their price down to the market, but in the short-run, the cost of adjustment causes them to delay. The cost is that they sell less, and the consequence is they produce less.

So, I just told you two reasons then why the short-run aggregate supply curve will slope upwards. One is because of confusion between demand for your product and general economy-wide inflation and the second is because of the cost of adjustment, the “sticky-price problem.”

Next, we are going to look at how labor contracts can give us the same upward sloping aggregate supply curve in the short-run.
We have got an aggregate demand curve and we are trying to come up with an aggregate supply curve so we can put the two together and get an equilibrium price level and output for the economy. But we have run into this problem, which is that if the price level rises, the price of goods, raw materials, and labor are rising together. Since business opportunities are not changing when all prices rise together, why should businesses change their output?

This has led us to ask the question, what in the short run could be happening? That is during the price adjustment process, what could be happening that creates profit opportunity that leads business to change their output? We considered the possibility that there is confusion. It takes you a while to figure out whether the price of your good is changing relative to other goods or whether it is just general inflation.

And businesses will respond during this period of confusion to what they think may be a profit opportunity. We have considered the problem of "sticky prices," that is, it takes a while to adjust your prices because of the cost of printing a new menu or the fear of angering your customers. In that case, a profit opportunity is created in the short run as some businesses fall behind the price adjustment process and become uncompetitive.

Now we are going to consider a third thing that can happen in the short run that can create a profit opportunity when the aggregate price level changes. That third thing is fixed wages. Now the classical view of the market is that wages and prices all adjust very quickly to make supply and demand equal to each other. In the classical view, the bidding mechanism quickly establishes equilibrium any time something changes. So, there is no profit opportunity created. All prices go right up and you are left right where you were before.

In the view that we are going to discuss now, which is a Keynesian view, wages remain fixed in the short-run. When wages are fixed and the process of goods increase then there is a profit opportunity because the real wage that your factory is paying has shrunk. That is the wage as a percentage of your revenue is getting smaller, so it looks like your profits are getting bigger because, in fact, they are. In that event, businesses are going to produce more output when the general price level rises because the price of their goods and services, their revenue, is rising faster than their costs because the wages are fixed.

Now, before I go back the aggregate supply curve, you are probably going to ask me, "Why would wages be fixed in the short-run?" Why is it that there is a period of time during which wages do not rise during a period of general inflation? Usually, rising wages are going to occur during periods of collective bargaining if the workers are unionized. So inflation occurs, and the workers gather represented by their union, and their union negotiates a nominal higher wage so that the workers can keep up with inflation. Then that wage is locked in for a period of two or three years. If, during that two or three year period, there should be unexpectedly high inflation, prices increase faster than the workers expected, then the workers are going to find themselves at a disadvantage because they locked in a wage increase, but it was less than they would have needed to keep equal with inflation. So, if there is an unexpected price increase, then the fact that wages are fixed works to the workers' disadvantage. So, why would they put themselves in a position were that could happen?

Because, think about it, workers accept fixed wages, and many of us accept fixed salaries as a kind of risk sharing arrangement. I have an agreement with my employer that I get paid a fixed wage whether I am working harder during a period of high demand at my business or whether I have more time to play computer games because demand is slack. Along the way, my wage remains fixed. I get paid about the average of what I add to my company's bottom line. I like that. It is better that my company paying me better in boom times and less in bust times, and then I would have to go buy the insurance myself. So constant wages, or fixed wages, are kind of an insurance arrangement, and I like that even if it means that sometimes the price level is going to be rising faster than my wages because I bought insurance.

Another thing is the problem that as wages rise, sometimes workers actually want to work less. So, businesses find a wage that encourages workers to be willing to supply labor rather than using their newfound wealth to buy leisure by taking more time off. We have also discussed elsewhere the phenomenon of efficiency wages, that there are reasons why employers would not adjust wages over time because of the effect on workers' moral, workers' ability to buy healthcare and good nutrition, and the ability to attract high quality workers. There are a lot of factors in the labor market, including laws like minimum wage laws, union contracts, efficiency wages, and the desire for leisure that can cause wages to be less flexible than other prices.
Aggregate Demand/Aggregate Supply Model

Aggregate Supply

The Labor Market

If wages are, in fact, sticky during a period of time, then it is possible that goods prices will rise faster than wages. When they do, then you have got an opportunity for profit. That opportunity for profit can be seen in the short-run aggregate supply curve. Here is a general increase in the price level. When the price level increases generally and wages remain sticky, then the firm is now able to make more profit because revenue is rising faster than costs. Another way to put it, real wages are shrinking, wages as a percentage of the price of the company's product is shrinking. Therefore the business sees that there is a profit opportunity and it expands output. Now, if wages are generally fixed across the economy, that is, they're sticky, they are not adjusting especially rapidly because of these concerns, then a general increase in the price level creates a broad opportunity across the market for firms to make profits by increasing their output, and that is precisely what they will do.

In the long run what happens is that workers go back to the negotiating table and ask for a higher wage that helps them keep up with the increase in the price level. But in the short run, if wages are fixed, then the businesses take advantage of the situation. They increase their output and they make more profits. So now we have got three reasons why the short run aggregate supply curve slopes upwards, three reasons why a general increase in the price level leads businesses to produce more output. That is, confusion about relative prices, the cost of adjusting prices or sticky prices, and finally the problem of fixed wages.

In the classical view there should be no relationship between the price level and output. But in the view that we have talked about, the more sophisticated view that tries to adapt some of Keynes' ideas to a modern way of thinking about the economy, there is clear reasons why increases in the price level in the short run lead to increases in the overall level of output.
Aggregate Demand/Aggregate Supply Model

Aggregate Supply

The Long-Run Aggregate Supply Curve

We've almost completed our model of the macroeconomy. We're almost ready to find the equilibrium price level and output and see how changes in the environment can generate a business cycle and what policy can do to encourage more output and growth. But what we need to add now is the long-run aggregate supply curve; a curve that answers the question, What is the relationship between the aggregate price level and output in the economy in the long run after all prices have completed the process of adjustment.

Recall that the process of adjustment may proceed in a jerky fashion. Good prices may be rising faster than labor prices. Raw materials prices are rising at a different rate. But the long run is when all of those prices have completed their adjustment and the general price level in the economy has risen, say by 10 percent. Once all prices have risen by 10 percent, what would we expect businesses to do in response? Well, think about it. Businesses are out to make a profit and profit is the difference between revenue and cost. Goods prices determine your revenue; materials and labor prices determine your costs. And if all of those prices rise at the same rate, there's been no change in the relative prices of output and inputs. There is no new opportunity for profit. You're back where you started. So in the long run after all prices have completed their adjustment, there's no new opportunity for profit. Businesses are back in the same position in which they started and we would imagine that they would choose the same output level that they were choosing before.

So in the long run there's no relationship between the aggregate price level and the level of output. The long-run aggregate supply curve is a vertical line. So if we want to draw that vertical line in our diagram, the next question we have is, Where does it go? Where should we put the long-run aggregate supply curve? Should it be over here close to the axis or out here further away? The answer depends on how much output the economy can produce when all resources are fully employed. We're now going to define the concept of full employment output.

Full employment output is the output of the economy when all resources are employed, perhaps all employed in their best uses. You see, now we're starting to get into some fuzzy stuff because you can always work people harder, right? You can always go try to find more materials. But there's a notion of full employment output when everyone who wants to work is working as hard as they want and all materials that are relatively inexpensive to get to have been employed; that nothing is being wasted. That's the idea. The output that we can produce when nothing is being wasted. You can always push the economy harder and try to make more, but that means paying people who don't want to work to come get a job while climbing further up the mountain to cut down more trees. So the full employment level of output can be thought of as a kind of speed limit to the economy. This is the amount of output that we can produce when all resources are employed. If we go faster than the speed limit, then we run the risk of inflation that is pushing up prices. And if we go below the speed limit, then we've got unemployment and the prices will tend to drop over time. Over time wages will even tend to drop if there's unemployment in the labor market.

So the speed limit of the economy, full employment output, depends on two things. First, the resource pool. How much labor is there? How much raw materials do we have to work with in our economy? So if you combine labor and raw materials, these two things together determine the resource base of the economy. Also another important resource is capital. I could put a hammer in this picture and we'd have all of our resources represented.

The important component that determines full employment output is technology, that is our skill or ability to turn these resources into output. The better our technology, the more output we can produce with a given quantity of resources. So take your resources and take your technology, put them together and that determines full employment output; the output that's produced when all resources in the economy are fully employed. Think of that as a speed limit to the economy. You can go faster, you can go slower, but if you do you're in a situation that's unstable. Prices are going to start to adjust and other changes are going to be set in motion.

So let's go ahead then and draw our curve to represent the long-run aggregate supply curve. And here it is. It's a vertical curve and I'll label it LRAS for long-run aggregate supply and I'll call this 0 because this is my original one. And the long-run aggregate supply curve then represents the output of the economy when all resources are fully employed. In the long run, we're going to wind up back on this green curve. I've colored it green to remind us that the economy is constrained by the natural environment. All of our resources come from the natural environment and that natural environment determines how much output we can produce given our technology.

So now what we're ready to do is we're ready to put the short-run aggregate supply curve and the long-run aggregate supply curve together and find out what would cause them to shift. Before I put the short-run supply curve in this
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**The Long-Run Aggregate Supply Curve**

diagram, let’s think about what would shift the long-run aggregate supply curve. What would change the speed limit of the economy? What would allow us to produce more output at any given price level? And the answer here is a change in our resource base or a change in technology. If we get more resources, say there is immigration of labor, more labor comes and joins our economy, now we can produce more output than we could before. Or if we get more raw materials in the economy, that’s going to be an increase in our resource base. An increase in the resource base for a given technology shifts the long-run aggregate supply curve outwards. That is it shifts here out to the right. If there should be a reduction in the resource base due to a war, then the long-run aggregate supply curve shifts inwards. Now let’s put the long run and short-run aggregate supply curve together in one picture and see what happens. So let me go ahead and draw my short-run aggregate supply curve and remember the slope of the short-run aggregate supply curve reflects the impact that the price level has on output in the short run when people are confused and when there are fixed wages and sticky prices, we get this short-run aggregate supply curve. So in the short run, we always have to be on the blue curve. If the price level is to increase, then in the short run we’re going to get an increase in output because people aren’t sure whether it’s just their sector or inflation across the economy. Also because wages are fixed so businesses see a profit opportunity. Also because of sticky prices there’s going to be an increase in output as some people keep their prices low relative to the overall rising price level because of the cost of adjustment. So you’re always going to be on the blue curve, but in the long run you’ve got to be on the green curve as well.

We’ll see how we get there when we talk about the process of adjustment after we put demand and supply together and sound equilibrium. But we’ve got one more thing that we need to address and that is what causes these curves to shift?

Suppose there’s an increase in resources in our economy due to immigration? What’s going to happen then is the long-run aggregate supply curve is going to shift outwards like we talked about before. And we’re going to have a new long-run aggregate supply curve and I can label that long-run aggregate supply curve one. The level of full employment output in that case is increased. We’ve increased from $YF_0$ to $YF_1$. The new higher level of full employment output is due to an increase in the resource base. You’d get the same result if you had an improvement in technology. If technology were to improve, we would get an outward shift in the long-run aggregate supply curve. Notice that any time you shift the long-run aggregate supply curve, it pulls the short-run aggregate supply curve with it. So the short-run aggregate supply curve shifts as well. So I can label this SRAS1. If the long-run aggregate supply curve were to shift inwards due to a war, it would also pull the short-run curve with it. So anything that shifts the long-run aggregate supply curve shifts the short-run aggregate supply curve along with it. It’s as if they’re attached right here at this point.

Now there’s one more thing to consider and that is that the short-run aggregate supply curve can change on its own power. That is if we were to go back to our original set of curves, that is the long-run aggregate supply curve here and the short-run aggregate supply curve, then the short-run aggregate supply curve can change due to a change in expectations. This is the factor that can shift the short-run aggregate supply curve on its own. Suppose everyone, due to some change in the environment, decides that prices are actually falling. They expect a lower price level. What’s going to start to happen is that workers in order to remain competitive will be willing to accept smaller wage increases. What happens also is that my business trying to stay ahead of your business is going to try to lower its prices first. Everybody, if they think that prices are falling, is going to move quickly to lower prices ahead of everyone else. What happens then when people expect lower prices is they build those expectations into their decisions, into their negotiations, into their wage contract and so forth. So if the short-run aggregate supply curve shifts downwards so that you can get a given level of output now at a lower price level. This is the one thing that shifts the short-run aggregate supply curve independently of the long-run aggregate supply curve; people’s expectations about the price level. Once we start talking about the adjustment process, we’ll see that the short-run aggregate supply curve frequently moves independently of the green curve, especially if you’ve created inflation by trying to go faster than the speed limit. But in the meantime, we can keep in mind the summary that says that anything that shifts the long-run aggregate supply curve, pulls the short-run aggregate supply curve with it. And the factor that shifts the short-run aggregate supply curve independently of the long-run aggregate supply curve is people’s expectation about the price level. Prices going down, the price expected, the SRAS shifts down. If people are expecting inflation soon they preempt it by pushing prices up now shifting the SRAS up.

So now we know what these curves mean, why they slope the way they do and what can cause them to shift. We’re ready now to introduce the aggregate demand curve and calculate an equilibrium. So we’ll be doing that next.
Aggregate Demand/Aggregate Supply Model
Differences in the Long Run and the Short Run

The Classical View

From time to time you’ll hear a macroeconomist refer to the classical perspective on some problem, or a classical model. What does an economist mean by the term “classical”? It means simply this—that wages and prices adjust instantly to clear markets. The classical perspective in macroeconomics is to be contrast with the Keynesian perspective. The Keynesian perspective is a view of the world as if wages and prices are sticky, but the classical perspective imagines that wages and prices adjust instantly to clear markets and asks what is the outcome of fiscal and monetary policy going to be in a world where prices and wages adjust instantly?

Let’s look first at the classical view of the labor market. It’s very simple. The wage or the price of labor adjusts immediately to give us equilibrium. Here’s the wage or the price of labor, and here’s the quantity of labor supplied and demanded in the labor market. The demand curve for labor represents the behavior of firms that hire labor in order to produce goods and services. The demand curve for labor is downward-sloping because at higher wages firms will use less labor and substitute to capital and other inputs instead. Also, at higher wages, firms use less labor because they’re producing less output. The demand curve for labor will shift when labor productivity changes, or whenever capital or the endowment of other resources changes, which makes firms willing to hire more labor at any given wage rate. So we’ve got this downward sloping demand curve for labor. The supply curve for labor, for the sake of simplicity, is going to be drawn vertically.

Now, it isn’t always going to be the case that the supply curve for labor is vertical, but in a classical view of the world there are a certain number of people who want to work, and full employment means giving them all a job. So whatever the wage rate is in this simple, classical view of the world, we’ve got a certain number of people. We can call this $\ell_f$, full employment, that are ready and able to work. So what happens in the classical view of the world is this. The intersection of demand and supply points us towards an equilibrium wage rate, say, $5.00 an hour, and this is the wage rate at which the quantity of labor demanded, and the quantity of labor supplied are equal. If the wage were above this equilibrium, we would have fewer workers demanded that are wanting to show up for a job at that wage rate, and there will be excess supply of labor.

In that case the bidding mechanism would immediately correct this situation by pushing the wages downward. The same number of people, of course, would show up for work under the assumption of this inelastic supply. However, with lower wages now, firms find it profitable to hire more workers and use less capital, or simply to hire more workers to produce more output than before. On the other hand, suppose we have a wage rate that is below equilibrium? In this case we have an excess demand for labor. There are more jobs that are looking for people to fill them than there are people who want to work. In this case firms will bid up the wage rate in order to try to take workers away from each other. Competition for labor bids up the wage rate so that firms then choose to move along their demand curve, economizing on labor, and using more capital instead, or simply producing less output.

In the end we have an equilibrium wage rate. The classical view of the economy is this: we are always at this point. We are always at the price and quantity at which the labor market clears. Any change in the demand for labor is going to immediately move us to a new wage rate. There’s not going to be any period of unemployment or any period of excess employment. A shift in the demand curve for labor brings about an immediate adjustment in the wage rate to clear the labor market, and that’s the way things work in the classical view of the economy.

Now, if this is the case, then the economy is always at full employment. The given number of workers are always going to be working at whatever the going wage rate is, and we’re going to be producing an amount of output that depends on only two things—the technology that is available to us, and the number of workers that are available to work. We’ve got a given work force, we’ve got a given technology. Put those two things together and we’ve got a set amount of output that can be produced in our economy, and that’s called the “full employment output level.” So the resource endowment of your economy and the technology that these workers can use, which is going to also depend on capital stocks and the endowments of other natural resources, determines full employment output level. And full employment output level then determines the amount of output that will be produced in the classical macro economy.

Let me go ahead and put on the vertical axis here now the overall price level in the macro economy and on the horizontal axis, output in our macro economy and let me also go ahead and put in the classical supply curve. The classical aggregate supply curve is the total amount of output that is going to be produced in our economy at full employment.
Aggregate Demand/Aggregate Supply Model

Differences in the Long Run and the Short Run

The Classical View

Well, the view of the classical economist is we are always at full employment, that the price level will change so as to bring us to the point where aggregate demand and aggregate supply are equal, and that will be the equilibrium price level in our economy. So suppose we were at some price level that was too low? If prices were too low then the aggregate demand in our economy would be large. That is, prices are low; the given money supply is plentiful relative to the amount of shopping that people are doing. Interest rates are low. People are buying stuff. Businesses are buying capital goods, and there's a lot more demand than is being met by the output of our factories when workers are fully employed.

Well, in this case the bidding mechanism will kick in, push up the aggregate price level, and as the aggregate price level rises, the real money supply shrinks, or people demand more money to do their shopping, interest rates go up, and consumer spending and business spending is curtailed until we get to our equilibrium point, P*. If we have a price level that's above equilibrium, then in this case people are trying to demand a whole lot of money to do their shopping; interest rates have been pushed way, way up as people scramble to get the cash to make their purchases, and in this case we wind up with consumers and businesses doing very, very little purchasing because interest rates are so high, and in this case we have a situation where aggregate supply exceeds aggregate demand. In that case the prices will begin to fall because stuff is piling up on businesses' shelves, excess inventories lead businesses to cut prices, and as they do then the demand for money falls because people don't need as much money to do their shopping, interest rates fall, and consumers and businesses increase their spending until we get back to our equilibrium price level, P*.

This is the way the classical economy works. We are always at P* and we are always at the full employment level of output. Wages and prices adjust continually, instantly, so as to keep us at full employment. When you hear the term "classical," you know we're talking about a world where wages and prices adjust and we are always at full employment. That's what it means. So if something happens to shift out the aggregate demand curve, say an increase in the money supply, which lowers interest rates and leads people to do more shopping at every price level. Then what will happen is, at the original price level we have excess demand for goods. This excess demand pushes up prices, increases the demand for money, raises interest rates, and eventually brings us back to full employment at a new higher price level. The interesting thing to notice about this classical adjustment is that prices do all the work. There's no increase in output because you can't ever have an output level that differs from full employment.

Prices and wages adjusting constantly, instantly, frictionlessly, so as to keep us at the point where supply equals demand. The labor market clears, full employment output is the only option in this model, and if you're not there, prices are going to adjust instantly to take you there. It's an extreme view of the world, but it's one that's quite simple to analyze, because you always have to be on the vertical blue line, and if you're not there, some wage or some price is going to adjust pretty fast to take you back there.
Aggregation Demand/Aggregate Supply Model

Differences in the Long Run and the Short Run

Equilibrium in the Long Run and the Short Run

We’ve developed the supply side of the economy. We’ve developed the demand side of the economy and now we’re ready to put the two sides together to find out what equilibrium looks like in the macroeconomy.

Our study of equilibrium is going to proceed in three parts. In this part we’re going to look at the short run; what determines the aggregate price level and the output of the economy in the short run when there’s confusion about the prices, when wages are fixed and when prices are sticky. Next we’re going to talk about the adjustment process. What happens when the economy tries to produce more than the full employment level of output? What does that do to prices and how do we show that in our model? That’s the adjustment process. And finally, we’re going to look at long-run macroeconomic equilibrium. What does the economy look like when all the adjustment is finished, all the dust has settled and we wind up with a new price level and output? So let’s begin with the short run.

To examine short-run macroeconomic equilibrium we'll need our aggregate demand curve and the short-run aggregate supply curve. So let's draw those. First the downward sloping aggregate curve represents the inverse relationship between the aggregate price level and real gross domestic product. When the price level rises because of the wealth affect, because of the affect on foreigners and because of the affect on the money supply through interest rates on investment spending, we get a lower level of real gross domestic product whenever the price level rises. So we’ve talked other places about why the aggregate demand curve slopes downwards. The short-run aggregate supply curve we’ve been drawing has an upward sloping line representing the fact that when the price level rises in the economy, in the short run, we get an increase in real gross domestic product because firms respond to a higher aggregate price level by increasing their output. They perceive profit opportunities and therefore, they produce more. They perceive profit opportunities because, first of all, wages are sticky in the short run. So when the price level rises, firms find that they are able to sell their products for more revenue and yet the fixed wages keep their costs controlled. The profit opportunity leads them to produce more.

Next we have sticky prices. That is some firms find it costly to change their prices in the short run so they lag behind and as the general price level rises their products become a bargain. Customers run into buy them while the prices are still low and those firms then find it profitable to produce more. And finally there’s confusion in the short run. When the general price level rises and prices are going up and you’re able to charge more for your product, as a business you’re not sure in the short run whether that’s just an increase in demand for your product or whether it’s general economy wide inflation and you respond to a perceived profit opportunity by producing more output in the short run.

So let’s look then when we put these two curves together at the point where they cross because this is short-run macroeconomic equilibrium. The point where they cross is a price level and let’s call this P0 and a level of real gross domestic product, let’s call this Y0 where the economy is in equilibrium. If the price level were below P0, then look at what would happen. If we were at a lower price level, then there would be a large aggregate demand. The lower prices would lead to a decreased demand for money, which would lead to lower interest rates which would cause businesses to want to spend more. Also with lower price levels the real value or the purchasing power of wealth is higher so consumers would spend more. Also when our price level is lower, foreigners are going to buy our goods instead of goods from other countries. Also with the lower price level businesses are going to cut back their production because they perceive that they are losing profit opportunity. With the price level lower when wages are fixed in the short run, businesses want to cut back because it’s not profitable to produce. Also with prices being sticky some companies aren’t going to be able to lower their prices fast enough and they’re going to lose customers so they cut back their output.

And finally the third thing is expectations. The price level is falling but you're not sure in the short run whether this is all over the economy or whether it’s just you. People may not want your products so you hedge your bet by cutting back your output.

Well, look what happens. The lower price level in the short run gives us a small supply and a large demand. We have excess aggregate demand in the short run and that would then tend to bid prices back up. We get exactly the opposite problem if the price level is above this equilibrium. If it is, then businesses are really gung-ho to produce because they've got lots of profit opportunity they think, and therefore, they increase production. Wages are set; prices are higher and so on. Also with the higher price level, demand is shrinking because the demand for money is going up and with it interest rates so business spending is falling, consumers aren’t buying as much because their real wealth is shrinking and foreigners are looking for bargains in other countries. That then creates a situation which we
Aggregative Demand/Aggregative Supply Model

Differences in the Long Run and the Short Run

Equilibrium in the Long Run and the Short Run

Have excess aggregate supply and that will with goods piling up on the shelves lead to businesses to lower their prices until we return to equilibrium.

So this is what equilibrium looks like in the short run. It’s a price level and gross domestic product at which quantity that people are willing and able to buy in the economy is equal to what businesses are producing.

Now let’s do a few comparative statics exercises shifting the curves to see how equilibrium changes. Let’s begin with an increase in government spending. An increase in government spending is shown by an outward shift in the aggregate demand curve. If the aggregate demand curve shifts outwards because the government now is spending more at any given price level, this means that the economy has to produce more at any given price level to give us an equilibrium. If this is the case, then at the original price level we’re going to have excess aggregate demand. So if I follow this dotted line over, this is the new aggregate demand with the government spending more and it’s way more than what businesses are producing which we find by following the price level to where it touches the blue line. With the government and everybody else wanting to buy a lot and businesses producing not enough, we have excess aggregate demand and the price level begins to rise. As the price level rises, consumers, businesses and foreigners buy less and if the price level rises with sticky wages, sticky prices and confusion; businesses produce more until we reach our new short-run macroeconomic equilibrium. That’s going to be shown in our graph as an output level of Y1 and a price level of P1. So the excess aggregate demand is resolved by rising prices, which reduce planned spending and increase planned production until we get to the new short-run macroeconomic equilibrium point.

Let’s consider another alternative. Suppose now we start with a situation in which aggregate demand and aggregate supply are crossing and we’ve got macroeconomic equilibrium in the short run. And now let’s consider a case where taxes are increased. If taxes are increased relative to this original macroeconomic equilibrium with the price level of P0 and an output level of Y0, we’re going to have an aggregate demand curve shifting inward. Higher taxes reduce consumers’ disposable income and cause consumers to spend less at every price level. This means that at the original price level, total planned spending is less than it was before. And since this price level gives us on the blue curve this quantity of planned output, we now have excess aggregate supply. People are buying less than factories are making. That puts downward pressure on prices and if the price level falls, consumer’s real wealth increases, the demand for money decreases and with it the interest rates so that business spending increases and foreigners buy more as well. However as the price level falls, businesses sense that they don’t have such good profit opportunities. Remember, wages are sticky. Some prices are sticky and there’s confusion. So the falling prices lead businesses to produce less output than before. The new equilibrium then occurs at a lower level of real gross domestic product and a lower price level. So what happens when the aggregate demand curve shifts inward is the price level falls and output falls in the short run. This is the new point of short-run macroeconomic equilibrium.

Well, I’ve shifted the aggregate demand curve twice; I should shift the aggregate supply curve at least once for good measure. Remember, what shifts the aggregate supply curve is a change in expectations about prices. Once people believe that inflation is occurring in the economy, everyone wants to raise their prices so that they don’t left behind.

Well, here’s how this is going to look. We start with a situation where we’ve got aggregate demand and short-run aggregate supply and we have macroeconomic equilibrium in the short run occurring where the two curves cross. So here’s P0, the original price level, and our original gross domestic product Y0. Let’s suppose now that a war occurs in the Middle East and that oil prices are pushed up very quickly. Well, all the firms in our economy are now facing higher input prices increasing their costs so they’re going to immediately pass those on to their customers in the form of higher prices. Otherwise they’d have to drop out of business. So with a supply shock and higher oil prices or higher input prices of any kind, what we have then is an upward shift in the short-run aggregate supply curve from SRAS0 to SRAS1. Now to produce any given level of output, businesses are going to charge a higher price. Well, look what this does. At the original level P0 we still have the same aggregate demand, but now aggregate supply is less because of the increase in the cost of doing business. We now have excess aggregate demand for goods and services and that then is going to cause price levels to rise. As price levels rise we have the usual effects; real wealth shrinks, the demand for money increases and with it higher prices lead to reduced demand for spending on the part of consumers, businesses and foreigners. By the same token whenever prices rise, businesses find that their profit opportunities are improving because wages are sticky, some prices are sticky and there’s confusion; therefore the rise in prices lead businesses to produce more goods and services. Now the net result is going to be that the supply shock winds up reducing real gross domestic product. Prices do up, however with the rise in prices, we get a reduction in real gross domestic product through the usual channels.
Aggregate Demand/Aggregate Supply Model

Differences in the Long Run and the Short Run

**Equilibrium in the Long Run and the Short Run**

This is short-run macroeconomic equilibrium, the aggregate demand curve intersecting the blue curve, the short-run aggregate supply curve. This, however, leaves us with a question. What if our output level is not at full employment? We've talked before about full employment output, the level of output that the economy can produce without causing inflation or deflation. We're now going to consider the relationship between the short-run equilibrium output level and full employment and that's going to set up an adjustment dynamic. What happens to prices as they begin to move towards a long-run equilibrium level?
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Differences in the Long Run and the Short Run

Expectations in the Long Run and the Short Run

We've talked about macroeconomic equilibrium in the short run but you can't stay at the short run because the short run has no respect for the constraints of the economy. The economy has a speed limit called full employment output and if the economy tries to produce more than full employment output, it's going to put upward pressure on prices. Now this may sound abstract, the idea of being past some curve creating some change in some variable, but this is a very human thing. If the economy is booming and everybody is trying to take advantage of a perceived profit opportunity by hiring more workers and getting more raw materials, what they're going to do is create a shortage and when the shortage is created, workers and people who own raw materials are going to be able to charge higher prices for their goods and services. Prices begin to rise. You don't get any further increases in output and the economy being past its speed limit moves into a zone of inflation. This is the adjustment process of the economy as we move from a short-run equilibrium in which we can violate the speed limit temporarily to a long-run equilibrium in which the speed limit must be respected. How do we get there?

Well, we get there through a process of people figuring out what's going on in the economy. If the economy is running faster than its speed limit, prices are going to start rising and at first there's going to be confusion about that. At first some prices are going to be sticky because of the cost of adjusting prices. At first some wages and other input prices are going to be set by contracts and the economy is not going to move immediately to its new long-run equilibrium point. But in time people are going to figure out that this economy is running too fast and in time wages will rise as contracts are renegotiated. In time input prices are going to go up and in time the confusion is going to lift and people are going to realize that it's inflation, not profit opportunity. And when that happens, people will revive their estimates of inflation and build those in to the prices they charge for their products. That's how we move from the short run to the long run, a process of people figuring out what's going on, changing their expectations. Let's look now at how the short run gives way to the long run through an adjustment process. We'll look first at how the adjustment process works and next we'll consider how the way in which people form expectations influences the speed of the adjustment process.

So here's a long run aggregate supply curve. That is the speed limit of the economy. It tells us how much output we can produce. We'll call this full employment output without creating inflation. If all of the resources in the economy are fully employed, this is the amount of stuff that we can produce. Now we've got to consider then what happens when we're away from that green curve. When we're away from the green curve, we're either to its left or to its right. If we are to the left of the green curve, we're in a region of unemployment. That is resources are not fully employed. They're slack in the economy. And in that case there's going to tend to be downward pressure on prices. Prices are going to tend to fall because wages are going to tend to over time fall because workers are in surplus supply and therefore, companies can get their workers for lower wages. That may take time, however, because wages don't fall easily. Unions see to it that wages are kept as high as their bargaining power will allow. Also in time over here what happens is companies are able to adjust their prices downward when demand is slack and over here in time, also, all inputs being in more plentiful supply relative to demand is going to create a general downward pressure on prices. So the rule is if the economy is running a lot slower than the speed limit, prices will adjust downward. So this is our adjustment dynamic for a period of unemployment.

We get just the opposite on the other side of the economy. That is if the economy is trying to run faster than full employment, there's going to tend to be upward pressure on prices. That is because labor and other raw materials are going to be in short supply. Companies want to produce more than the economy can produce with fully employed resources and therefore, companies go and try to bid workers away from each other. They go and try to bid raw materials like lumber and aluminum away from each other. And when that happens, the price of everything goes up. In the long run you can't get more than the full employment level of output. In the short run, however, you can violate the speed limit. You can bring people into the market who don't really want to work at lower wages. You can entice companies to go further up the hill to cut down expensive timber, but in the long run you can't do that. You can't go faster in the speed limit and in the short run, what happens is prices begin to rise.

So the green curve, besides showing us the point of full employment, divides the economy into two zones; a zone where prices are falling because of unemployment and zone where prices are rising because of the economy violating its speed limit trying to over-employ or create fierce competition for inputs.

Now that you know that, you can see how the short-run equilibrium is not a sustainable point. Let's take an example. Suppose we have aggregate demand right here. So the combined spending plans of businesses, the government, foreigners and consumers gives us this curve. Here's the short-run aggregate supply curve. And where the supply
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curve and the demand curve intersect in the short run is always where the economy is. So the economy is right here right now. So we’re going to start $Y_0$ for our gross domestic product and $P_0$ for our aggregate price level. Now that’s short-run equilibrium. Firms are producing what people want to buy. However, it is not a stable point. Why? Because the economy is running faster than its speed limit. We’re producing more output than full employment. Because we’re producing more output than full employment, the price level is going to tend to rise. Now we’ve already got an increase in prices to coax firms to produce that extra output in the short run. However, because of the intense competition for labor, raw materials and other productive resources, prices are going to start to rise in the economy. And firms are going to begin—three things are going to happen that’s going to cause the blue curve to shift up. And those three things are, first, the competition for labor is going to cause wages to rise and firms pass the higher wage costs along in the form of higher prices for any given level of output. Number two, what’s going to happen is firms are going to form expectations that, in fact, it’s not increased for their products, but rather it is general inflation. Once they’ve figured out that it’s general inflation, they raise their prices so that they’re not caught behind. And third, what firms are going to do is they’re going to be able to raise the prices because that sticky price problem, the problem of small menu costs goes away in the long run. In time you find that you have to reprint your menus anyway or you have your usual inventory where you stamp the price on products. In time it’s not costly to change the prices because you change prices regularly as a matter of restocking your shelves and other business activities.

So in the long run or in the adjustment process, three things happen. Wages are renegotiated upward, prices are much higher and firms figure out that it’s inflation, not a business opportunity and therefore, they raise their prices to keep up. We would show that in this picture by an upward shift in the short-run aggregate supply curve. We move from SRAS0 to SRAS1, a new short-run aggregate supply curve that factors in higher wages, the expectation of higher prices and firms going ahead and changing their menus. So the prices rise. What happens in that case is aggregate demand. We’re going to move along the aggregate demand curve to a new quantity of aggregate demand. The rising prices shrinks real low and causes consumers to purchase less. It increases the demand for money, increasing interest rates and shrinking business spending, all the usual story. We move along the aggregate demand curve to a new lower level of real gross domestic product. Call that $Y_1$. So what’s happening then in the adjustment process is that as firms discover that we’re in an inflationary economy, prices begin to rise and aggregate demand shrinks.

Now when is the process going to end? Well, as long as our output is above full employment, the general price level keeps rising. That means the aggregate demand curve keeps shifting upward until finally we reach a point to where we have returned to full employment. That is things are going to end when the short run aggregate supply curve has adjusted far enough to bring the economy back to full employment. That’s when this price pressure ends. We’re going to call this short-run aggregate supply curve infinity because this is where we finally get when all the adjustment is done. That is after all the adjustment is done, we wind up at this point with a new aggregate price level being higher than the old one, but output having returned to its stable level of full employment. That’s when the adjustment process is over. In the meantime the economy is going through a learning process. Wages are rising, prices are being adjusted upward and people are discovering that we’re in an inflationary economy, prices begin to rise and aggregate demand shrinks.

Well, this raises a question. How long does it take to get from this original situation of output above full employment to the new long-run equilibrium? How long does it take? And the answer is it depends on how quickly people discover what’s going on. How do people form their expectations about where prices are going? If people are forming their expectations in a form that we call adaptive, then they are backward looking. They’re looking at what’s happening in the recent past to form their ideas about the future. In that case people say, “Huh! Prices went up a little bit last year. I bet they’re going to go up a little bit this year. This year’s inflation rate is probably going to be a lot like last year’s.” So if people are backward looking, forming their expectations adaptively, basing their decisions of the future based on what’s happened in the past, then the economy may adjust very slowly to get from this point to this new long-run equilibrium. On the other hand if people form their expectations by looking ahead, they have so-called rational expectations. People are carrying around in their head a picture of this model. They’re carrying around this story about the economy and they say to themselves, “Huh! Given that aggregate demand is all the way out here, prices have to keep rising until we get to this point of full employment.” If that’s the case, if people are rational and forward looking, if they form their opinions about the future based on the model, then what happens is we may jump immediately to the long-run equilibrium. If expectations are rational, the long run may turn into the short run. That is people may say, “The economy’s going to keep adjusting till we get to this point, so I’m going to go ahead and raise my prices anyway so I don’t get caught behind.” Workers see that we are out of equilibrium and therefore, they want their increase in wages now so that they don’t suffer through inflation. If everybody understands that this is where the
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economy is going, they may take action now that results in shifting the short-run supply curve to their choices asking
for higher wages, marking their goods at higher prices now and in so doing, takes us immediately to the long run.

So if expectations are backward looking or adaptive, the economy ratchets up slowly. If however, they are forward
looking and rational, then the economy may move very quickly or immediately to the new long run. In this era of
better and better information technology we have reason to expect that expectations are becoming increasingly
rational. We have better models to predict where the economy is going, instant access to all the data we need to run
those models. I mean, it’s probably not very long before a freeze in a farm in Florida immediately shows up in a
computer ticker at your grocery store as higher orange juice prices. That all goods are priced the way stocks and
bonds are priced electronically changing throughout the day in resource to news on the markets.

Well, let me say one more thing about the aggregate supply curve. Here is the long-run aggregate supply curve. This
is the point of full employment. The adjustment process is asymmetric. That is prices tend to rise more easily than
they fall probably because due to the power of labor unions and the attitudes of workers, wages don’t fall very easily.
If this is true, then the short-run aggregate supply curve may actually look less like the smooth line we’ve been
drawing and more like a kind of kink. That is in the short run what we get is a kind of asymmetry between prices rising
and prices falling. That is if the economy tries to go over the speed limit, it may be that prices rise very rapidly and
output doesn’t increase so much. On the one hand, during a period of unemployment we may get very little
adjustment in wages and prices and instead, get a big drop in output. This is because of an asymmetry. Wages just
go up more easily than they come down because of the bargaining power of workers. And when you see this curve
drawn in your textbooks, a short-run aggregate supply curve that has a bend or a kink in it, what it’s trying to say is
that prices go up more easily than they come down. Now we’ll consider what can change equilibrium in the long run.
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We now have in place all of the pieces of our model of the macroeconomy and we’re ready to put it to work. What we’re going to do now is tell some stories about how the economy adjusts in response to some change in the environment. And for every story we tell, there are going to be three parts: first, what happens in the short-run; second, what happens during the adjustment process, when prices are change; and third, where do we wind up in the long run?

Now, when you look at this model, you can see that there are only three things that we can shift. We can shift the aggregate demand curve to represent a change in planned spending in the economy, we can shift the short-run aggregate supply curve to represent a change in expectations or a change in long-run aggregate supply and finally, we can shift the green curve itself. And anytime we shift the green curve to represent a change in the economy’s potential output, we have to take the blue curve with it. So let’s now do each of those three possible shifts and tell the stories that go along with it. And along the way, we’re going to be reviewing everything that we’ve discussed for the last several discussions.

So let’s start then with a shift in aggregate demand. A shift in the aggregate demand curve comes about because of a change in the planned spending or consumers, businesses, the government, or perhaps a change in taxes that’s going to influence consumer spending. It could also come about because of a change in the spending plans of foreigners and our net exports. And finally, a shift in the money supply on the part of the Fed will influence the interest rates and change planned investment spending. So anytime any of these variables change, they’re going to show up as a movement of the red curve. So let’s suppose now that there’s been an increase in aggregate demand. Consumers want to spend more, businesses feel confident about the economy and are investing more. The government increases its spending or lowers taxes. Foreigners decide they want to buy more of our products at every price, or the Fed increases the money supply, reducing the interest rate and stimulating investment spending. This would be shown then as an increase in the aggregate demand curve. So we’ll label our original AD₀ and our new curve AD₁. With this change in aggregate demand now, we’re going to get three sets of consequences.

The first set of consequences is going to be the short-run consequence. We start with a price level in equilibrium of P₀. What happens then, when aggregate demand increases, is that we have excess aggregate demand; that is at the original price level, the quantity of goods and services that everyone wants to buy exceeds what businesses are producing. That is the point on the blue supply curve, where produces are operating. This leads then to an increase in prices, as competition for goods and services bids up prices. As the price level rises, we have a response on both sides of the market. Over here, the rise in prices shrinks real well, increases the demand for money, pushing up interest rates and raises the price of our goods relative to foreign goods. All three of these effects reduce the quantity of goods and services that people want to buy, as we move along the aggregate demand curve. Businesses respond to the higher price level by sensing profit opportunities and increasing their output; that is wages are sticky, prices are sticky and firms are confused. So they make more stuff as prices go up. And that leads us then, in the short-run, to a new equilibrium point, and this new equilibrium point we will label P₁.

So, in the short-run, what happens is the economy is going faster than its speed limit. That is Y₁ is greater than the full employment level, Yf. Now, because Y₁ is greater than Yf, this short-run position is unsustainable. And what we get then is an upward movement of prices. Because we are exceeding the speed limit, the price level begins to rise. Firms begin to compete aggressively for workers and raw materials, pushing up prices. Now, what happens then in the adjustment process is the rise in prices, the increase in wages and the passage of time cause the blue curve to begin to shift upward. That is, as firms have to pay higher wages to attract workers and the competition pushes the wage level even higher, as firms have to pay higher prices for raw materials, and as time passes and labor unions renegotiate their wage contracts, as firms have the opportunity to stamp new prices on their products with the passage of time, and finally, as firms figure out that it’s not just their prices that have gone up, but all the prices in the economy, everyone begins to pass these higher prices along. Everyone decides, they form the expectation that inflation has set in and people begin to raise their prices in anticipation of even more inflation. So the price level goes up with the passage of time and the fog clears and everyone realizes that we’re in inflation. With inflationary expectations setting in, the short-run aggregate supply curve keeps shifting upwards, until we get to the new short-run aggregate supply curve, and I’m going to label this SRAS₁, because we get to this curve at the end of the adjustment process. There are going to be intermediate steps along the way, the curve will shift up, as I just show you. That is, we’re going to move along the aggregate demand curve as businesses cut back their production and raise their prices. And finally, we wind up at this new long-run macroeconomic equilibrium, where the red curve intersects the blue curve intersects the green curve. So, in long-run macroeconomic equilibrium, firms pass the rising prices onto
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their customers until aggregate demand is choked back to full employment. Long-run macroeconomic equilibrium occurs where the blue curve and the red curve cross on top of the green curve. That is, we’re not in long-run macroeconomic equilibrium until we have returned to full employment and the prices have stopped rising. This is what long-run adjustment looks like.

Now, of course, there’s the question, “How quickly do we get there?” And that depends on expectations. If expectations are adaptive, then it may take a long time, because people are basing their notion of price changes on what’s happened in the previous period. So prices adjust upward gradually. People keep increasing their prices at the same rate that prices increased last year. On the other hand, if expectations are forward-looking and rational, then we move immediately to the new short-run aggregate supply curve, because people see that we’re past full employment and they raise their prices immediately. The raise their wage demand immediately to get here, so that they’re not left behind. People anticipate where the economy is going to wind up and they make choices right now that move the economy immediately to that point. One of those choices would be a choice about investment demand. Firms say, "Well, we are at a point right now where there’s a lot of demand in the economy.” But we know prices are going to be rising and, when prices rise, people aren’t going to buy as much stuff. Plus interest rates are going to go up, so firms say, “Whoa, we’re not going to invest, we’re going to cut back our purchase of plant and equipment tools, so that we don’t get stuck with a lot of excess capacity.” So anticipating that prices are rising leads businesses to invest less, and that’s part of this decrease in aggregate demand.

So, people are make decisions in a forward-looking fashion. That causes the adjustment process to be very quick. On the other hand, when people are making decisions based on what’s happened in the past, adaptive expectations, the adjustment process may be slow.

Let's consider something else that can happen in the economy. We’ve shifted the red curve, now let's do a change that involves the blue curve. This is what’s called a supply shock. A supply shock occurs whenever the price or some important input increases dramatically. So suppose we have an increase in the price of raw materials, like oil, or an increase in wages due to a sudden surge of strength of labor unions. If that happens, then we show that as an upward shift in the short-run aggregate supply curve. Because of the higher price of inputs, businesses are going to charge customers higher prices for outputs and, as that happens across the economy, we get a new short-run aggregate supply curve representing higher prices.

Well, what’s going to happen in this economy if we have a supply shock? What’s going to be the consequence? Well, let's suppose that we start with a macroeconomic equilibrium on the long-run of price of P0 and we’re at full employment output, because if you’re not at full employment output, you're not in long-run macroeconomic equilibrium. If we’re here to start with and the supply shock causes businesses to raise their prices and reduce their output, the initial situation is one of excess aggregate demand. People are still buying at the point on the red curve, but businesses want to supply at the point on the blue curve. With this excess aggregate demand, prices are pushed up. And as prices rise, businesses, consumers and foreigners cut back their demand. Business, meanwhile, because of sticky wages, sticky prices and confusion, increase their output, until, in the short-run, we find ourselves at this point P1, an increase price level, and this output level, Y1, which is below full employment. Well, because we’re below full employment now, we have downward pressure on prices. Wages and prices tend to fall, because of unemployment and slack in the economy. What’s going to happen then is that businesses pass these lower costs on in the form of lower prices. Competition leads business to lower their prices, because wages are falling, until we return to the original short-run aggregate supply curve. That is, we’re going to be below full employment until the short-run aggregate supply curve moves along the aggregate demand curve, dragging equilibrium back to its original point. So, whenever you have a supply shock, there’s going to be a point at which you are below full employment equilibrium in the short-run; that is, you're below the long-run full employment output. However, because you're in a slack economy, prices are going to fall and the short-run aggregate supply curve moves outward or downward as businesses pass these lower wages and lower costs on to customers in the form of lower good prices. So, because we’re on this side of long-run aggregate supply, prices are falling ant and the blue curve is moving downward, back to long-run macroeconomic equilibrium.

Well, what happens is the price level winds up exactly where it was before. Even though oil more expensive, the price of everything else falls, until the price level returns to its original level. So a supply shock can give us a temporary period of unemployment and higher prices, but, in the long-run, everything else adjusts to bring us back exactly where we were to start with. This is the response of the economy to a supply shock. Once again, the speed of adjustment depends totally on expectations. If people have adaptive expectations, the adjustment period is slow. If they have
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Forward-looking, rational expectations, they immediately see where the economy is going and they make the decisions now that will actually lead to this outcome occurring immediately or very, very quickly.

One more possibility to consider: what if the productive capacity of the economy actually changes? What if the green curve shifts? The factors that could lead to a shift in the productive capacity of the economy are: first, an increase in our pool of inputs. What if immigration increases labor or the accumulation of capital through investment increases our productive capacity? Also, the green curve shifts outwards if there’s an improvement in technology, allowing us to make more output with our given inputs. Finally, big changes in the environment could influence our productive capacity. For example, if there’s a war that decimates the capital stock or reduces the labor supply or bad weather that simply allows you to produce less with what you have. Any of these changes are going to shift the green curve by changing the economy’s productive capacity, changing the speed limit.

Now, one thing to keep in mind is that any time the green curve shifts, it takes the blue curve with it, because these two curves are stuck together; that is, any change in the economy’s productive capacity shows up both in the long-run and immediately in the short-run. So, for instance, suppose there’s an improvement in technology that shifts out what the economy can produce. What you’re going to get is the long-run aggregate supply curve shifting out and taking the short-run aggregate supply curve with it. So let’s actually now draw those curves and consider what happens, first in the short-run and then in the long-run.

So, here’s the new long-run aggregate supply curve. It’s a vertical curve, just like its predecessors, and that means our full employment output has moved from \( Y_{10} \) to \( Y_{f1} \). With new technology, we can make more with our give inputs. So let me go down here and label this new green curve LRAS\(_1\). This is its new position. Now, the blue curve came right along with it, as we saw just a moment ago, so let me draw it in. Here’s SRAS\(_1\). The new curve has shifted outward; that is, with the increase in technology, at any given price level firms will produce more output than before.

Now, what happens to output? Well, first of all, in the short-run we move along the aggregate demand curve to the intersection of the red and blue curves. As you figured out, this is where we always go. We’re always going to be where the red curve and the blue curve cross. So, originally, we had a price level of \( P_0 \). After the technological change, we have now excess supply; that is, firms are producing a lot more, given their new technology and lower costs, so there’s more stuff piling up than people want to buy. This puts downward pressure on prices, leading businesses to cut back their output relative to what they would have produced at the higher price level. And, as prices fall, consumer and businesses want to buy more. So the new price level, in the short-run, is going to be where the red and blue curves cross at this point \( P_1 \). However, relative to the full employment line, we’re still below potential; that is, because we are below what the economy could produce with all resources employed, there’s going to be downward pressure on prices. Prices are going to tend to fall, because we’ve got unemployment, because we are on the left side of our full employment curve. And as prices fall, we represent that in this picture by a downward shift in the short-run aggregate supply curve. Because there is slack in the labor market and slack in the market for material inputs, the prices of those inputs is going to fall and firms in competition with one another will pass those lower costs on to their customers in the form of lower prices. Eventually, we get to this point right here, SRAS\(_\infty\), where the short-run aggregate supply curve winds up when all the price adjustment is done. This is our new long-run macroeconomic equilibrium. Long-run macroeconomic equilibrium occurs at the point where the red and blue curves cross on top of the green curve. We’ve now got no more price pressure.

Look what happened in this case; prices fell and output increased. Our standard of living unambiguously improved. That’s what happens when technology shifts out the green curve. And this is the idea behind supply side economics, which we’ll be discussing later, is that if you change the productive capacity of the economy, you can get lower prices and larger output. Once again, how long does it take us to get from SRAS\(_b\), the original equilibrium, to this new one in infinity? Does it take forever? Well, it might, if expectations are adaptive and people keep looking backwards, letting adjustments occur in a slow process. But if there are rational expectations, people see that this is where the economy is going and competition pushes prices down now, businesses invest more in anticipation of the boom, and people start spending their newfound wealth, even before it’s completely in the bank. So with rational forward-looking expectations, the adjustment process is very rapid. With backward-looking adaptive expectations, it could take us a long time to get here.
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Case Study: The U.S. National Debt

You may have seen the national debt clock in Time Square in New York City, or maybe you’ve seen one of the debt clocks on the Internet warning you about the rate of which the Federal Government is accumulating debt. Nowadays the national debt is hot political rhetoric. There are politicians who say that we must pay the debt down now while we can and that the debt represents some evil. Others say that it’s no cause for concern. Should you be worried? How does an economist think about the national debt? Let’s start with the question of what it is.

The national debt is the money that the government has borrowed over time to pay for government spending in excess of taxes. In any given year if the government spends more than it takes in tax revenue, this is called deficient spending and these budget deficits add up to form the national debt. The government finances deficit spending by issuing IOUs, treasury bills, bonds and notes and other government bonds. If you take the total quantity, the total value, the total amount of outstanding bonds; you’ve got the national debt. Right now the national debt in the United States is equal to about 5.7 trillion dollars. Is that a lot? Well, it depends on whom you ask. The United States has the largest government debt of any country in the world and yet if you compare our national debt with our gross domestic product, the United States isn’t doing so bad. The national debt in the United States is only about 60 percent of gross domestic product compared with 130 percent for Belgium and 90 percent for Canada. Lots of countries have much higher ratios of debt to gross domestic product than the United States. Just because we’re not as badly as some other country, should we still relax? Is the national debt a problem? What is the concern?

Well, usually people think that debt is a bad thing because it means that in the future you’re going to have to cut back your spending in order to pay back what you borrowed. Is this the case with the national debt? Who have we borrowed it from? Don’t confuse the national debt with the United States foreign debt. Foreign debt is the net amount of money that the government and private borrowers have borrowed from people over seas. In time that money will have to be paid back and that means a real transfer of resources from the United States to foreign countries in order to settle that debt. So the foreign debt may be a cause for concern, but even that, we’re going to reconsider in a moment.

What about the national debt? The national debt is money that the government has borrowed in the United States from its own citizens. As a lender to the government, I am paying money to buy a government bond. I’ve lent my money and therefore in the future, the government is going to pay this money back to me with interest. And interest is the key idea here because the government will pay off its bonds by raising taxes in the future. Which means that those of us, those U.S. citizens and other nationals here in this country who hold these bonds are due money from the government. That is I’m going to collect money from you when you pay your taxes that enables the government to settle the debt in the future. So the national debt is not really money that the United States owes to anyone. It’s money that’s going to be transferred between taxpayers and those who have bought government securities in order to finance the debt. In the meantime, those of you who don’t hold bonds are on net paying taxes that cover the interest for those of us who do hold bonds. So as a bondholder I’m collecting interest from my fellow American citizens and other people in the U.S. who pay taxes that goes to cover the interest stream that I get as a bondholder. It’s a redistribution of money within our economy. It’s not like money that we owe to someone outside. If we default it, if the U.S. government defaulted on the national debt tomorrow, there would be no net destruction of anything of value. Just those of us who hold bonds would suddenly find them worthless. It would be as if the government in one fell swoop redistributed money from bondholders to everyone else.

So the national debt is not as much of a problem as perhaps your credit card debt or even your student loan is because these are amounts of money that you owe to someone in the future and you’re going to have to reduce your consumption, perhaps your standard of living in order to settle the debt. For the U.S. as a whole, however, the national debt is money that we owe to each other.

So does this mean that the national debt is nothing to be worried about? No. Absolutely not. There are three concerns that are associated with the national debt that can cause problems for an economy. The first is inflation. If the government is attempting to print money to redeem its bonds and pay off its debts, then this increase in the money supply can spark inflation in the future. When the national debt gets bigger and bigger and there’s concern that the government may print money to pay it off, then people get nervous and inflation is a real prospect.

Another concern is higher taxation. The more outstanding debt there is, the more the government will have to raise taxes in the future to pay off the debt. And these higher taxes have distortionary consequences in the economy.
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They can slow down the economy by making people unwilling to work and save because the returns are not so big because they have to pay higher tax rates to service the debt.

The third concern about the national debt is that government borrowing crowds out private investment. As the government borrows more and more money, it pushes up interest rates and competition for funds. That means private investors in households borrow less because of the higher interest rates. And every business that doesn't get built because the government is borrowing money, every kid who doesn’t go to college, that’s a lost investment opportunity that can increase the standard of living in our economy in the long run. In that sense, the debt is in some way borrowing from future generations because we’re reducing productive capacity when the government borrows money now and takes it a way from others who might want to borrow it to do business investments and investments can mean capital. However, if the government is borrowing money in order to build roads and bridges and other capital projects that increase the value of opportunities in the economy, that increase opportunities and make business easier to do, if the government is using borrowed money to invest in public goods; then the government is creating opportunities that wouldn’t otherwise exist. The government could be investing in defense, it could be investing in streetlights, it could be investing in the Internet; all of these things create business opportunities rather than reduce them. Which brings us to kind of the final word on debt. It all depends on what you're doing with the money. Are you investing in something that’s creating an asset, that’s going to yield value in the future that enables you to pay off the debt with profits to spare? Or are you investing the money in a good time right now that is borrowing money for consumer goods meaning that in the future you'll have to pay it off in terms of the lost opportunities. That is everything we’ve spent on consumption goods now is money and resources that aren’t being invested in things that can create a higher standard of living down the road.

What about the surplus? There’s a lot of talk nowadays about how the United States budget has moved into surplus. Well, this surplus is an opportunity to pay down the debt. Does that mean that we should? Not necessarily. Every time we use the surplus to redeem outstanding bonds, we're taking bonds out of circulation and these bonds are an important component of capital markets. What's the market going to do when all of the 30-year treasury bills and bonds have been retired? What's the market going to do when the 30-year treasury bond is gone, then long-term securities are not so easily accessible to people who want long-term safe investments and that's going to create some disruptions in the financial market which we’ve seen in the early months of 2000. But the surplus itself is an opportunity to pay down the national debt just as the deficit was the opportunity to accumulate it.

You needn’t think of the U.S. national debt in the same way that you think about your own credit card debts because it’s not money that’s owed to someone outside. On the other hand there is a cost, because when the government borrows money, it direct resources away from other people who might use this money to build factories and create opportunities for increases in value in the economy. Can the government use this money and invest in capital as effectively as business and other people in the private sector? That’s the question. If the government has opportunities, then its debt is a good thing. It’s borrowing to increase our standard of living in the long run. On the other hand if the government is borrowing to invest in unproductive products and projects, then the government is imposing a cost on us. But it’s odd the way debt works because it’s really you and I who owe the money to each other even though the government is doing the transaction.
A British economist, A. W. Phillips, observed an interesting relationship between inflation and unemployment. Looking at data from Britain over a very long period of time, he saw that there was an inverse relationship between the unemployment rate and the inflation rate. That is when the unemployment rate was low, the rate of inflation tended to be high and visa versa. In this discussion we’re going to try to account for Phillip's observation as we develop a tool that represents his conclusion called the Phillip’s Curve.

We want to start with the question, what causes inflation? And there really are two components to the answer. First of all rising prices or inflation are associated with competition for scarce resources. When the economy is being driven very, very hard and more jobs are being created and factories are trying to buy raw materials to expand their output, when the economy is growing rapidly, that tends to create inflation as businesses compete for scarce resources like labor and raw materials. So that's one thing. The inflation rate is going to represent scarcity that occurs when the economy is growing faster. When the economy is growing slower, then there's going to be less price pressure and the inflation rate will tend to be lower. The second thing that can cause inflation is simply people's expectations. When people believe that they are in a period of inflation, they're going to include a demand for higher wages in any contracts they negotiate. After all, if the inflation rate is 5 percent, then I believe the cost of living will rise 5 percent this year. I'm going to ask my boss to include a cost of living adjustment in my wage contract so that my wages rise along with the prices of goods and services, and my standard of living doesn’t get shrunken by inflation. Now, what happens, of course, is if wages are rising by 5 percent, my employer has to pass those costs onto customers by increasing his or her prices by 5 percent. So wages rising causes prices to rise which causes wages to rise and prices to rise again so that the expectation of inflation gets embedded in the economy and it becomes kind of self-perpetuating.

So two things that cause inflation. Demand for raw materials pushes up costs and causes businesses to increase prices. That's the relationship between the growth of the economy and rising prices. The second thing is expectations. Once the economy gets use to inflation, inflation just perpetuates itself. Now with this in mind we can draw a relationship between the inflation rate in the economy and the unemployment rate. This relationship is called the Phillip’s Curve.

To set up our Phillip’s Curve, let me offer a couple of definitions. The first definition we’re going to call the Natural Rate of Unemployment or the Non-Accelerating Inflation Rate of Unemployment. This is the rate of unemployment that is associated with a stable rate of inflation. The natural rate of unemployment is associated with the level of output, but does not cause prices to increase at an increasing rate. Suppose the economy is at this natural rate of unemployment. If it’s there, then any attempt to increase the output in the economy faster is going to start to drive up prices at an accelerating rate as there’s intense competition for labor and other raw materials. On the other hand if the economy grows more slowly than the speed limit, there’s going to be slack. There’s going to be extra unemployment and unused raw materials, which will put downward pressure on their prices, lowering costs and causing inflation to occur at a slower rate. So here’s the break point in the economy; the natural rate or non-accelerating inflation of unemployment. It’s the speed limit of the economy. Try to drive the economy faster, and inflation accelerates. Drive the economy slower and you get a lower rate of inflation.

The next thing I want to define is the underlying rate of inflation in the economy. And this underlying rate of inflation in the economy is driven probably by the growth rate of the money supply. The faster the money supply grows, the faster prices tend to rise. But it's also heavily influenced, heavily, by people’s expectations. If people expect or get used to a higher rate of inflation, the higher rate of inflation get built into wage contracts and so forth becoming the underlying rate of inflation for the economy. Now this underlying rate will adjust over time either as the growth rate of the money supply changes, or as people’s expectations change. If people expect a lower rate of inflation, they start requesting smaller wage increases from year to year and the rate of increase in prices slows down.

All right. So we’ve defined two things. We’ve defined the natural rate of unemployment, which, for the sake of our example, we’re going to assume is 5 percent and we’ve defined an underlying rate of inflation. That’s the rate of inflation that you would get if the economy is right at the speed limit, right at the break point before inflation would be pressed to accelerate by driving the economy faster.

So let’s put a point here. Suppose the underlying inflation rate for the economy is 5 percent. So if we put a 5 percent inflation rate here on this access, then we start with this point right here. If we are at our speed limit, we have 5 percent inflation. Now, what’s going to happen if we decide we want to drive the economy faster? If we drive the
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economy faster, we're going to get a lower unemployment rate. That is we're going to be pulling people into jobs that are presently not finding them. So if you drive the economy faster, you get something that's good. You get more output and you get less unemployment. So here's what we get. However, driving the economy faster means that you are pushing the labor market into shortage. You're creating a tighter labor market, it's harder to hire people now and wages begin to rise. And with those rising wages from competition for labor, you get rising prices which is a bad thing. So to counteract or to balance the good thing, we get a little bit of bad, too. So what we get is another point here. With less unemployment, maybe the unemployment rate is pushed down to 4 percent, however the cost of that reduction in unemployment is a higher inflation rate and maybe it goes up to 7 percent. So here's another point that's possible for the economy. And we can increase output more, reducing unemployment further, but at the cost of a more rapid increase in prices. And if you want to push it even further, you can have even more inflation. The more we reduce unemployment in this story, the faster you're going to push prices upward as the labor market gets tighter and tighter and wages start rising more and more rapidly.

So what you get then here is an inverse relationship between the inflation rate and the unemployment rate. The harder you drive the economy, the lower the unemployment rate goes. However this intense competition for labor begins to push up wages and prices faster. It's like a tradeoff. And the same thing would be true if we went the other way. If we wanted to reduce inflation in our economy, we could do it. We could get rid of some of this increase in prices, but the cost would be we would push some workers out of a job. And we can keep making this tradeoff, less inflation, but if we have inflation, we're going to be producing less output, which means more unemployment. So the curve goes the other direction. That is you can get lower inflation rates, but only if you're willing to accept a higher unemployment rate. That's the way the tradeoff works. This inverse relationship between the inflation rate and the unemployment rate, this menu of possibilities is called the Phillip's Curve after A. W. Phillips who looked at the wage data from Britain.

Now suppose that we try to drive the economy faster than its speed limit in the long run. Suppose we try to violate the speed limit and we're back here at 4 percent unemployment, which is an unemployment rate that is below the natural rate. We're trying to produce too much. We're trying to pull too much labor into the market. What's going to happen? Well, what's going to happen is people are going to get tired of working over time. They're going to start asking for higher wages and eventually what happens is the economy starts to adjust and as prices rise in the economy, then people are going to say to themselves, Huh! It's really not worth it to work these extra hours. And people are going to go back to their old habits of labor and leisure and the economy is going to find itself back, as you will see in our next discussion. It's going to find itself back at a natural rate of unemployment in the long run. However, because we've been driving the economy harder, people are now used to 7 percent inflation. And because they're used to 7 percent inflation, they are including that expectation in their demands for higher wages every year. So 7 percent becomes the underlying rate of inflation for the economy because people have become to expect it. That means that when the economy adjusts back to full employment at its natural course of things, returns to full employment, now it's going to return to full employment with a higher rate of inflation than before because people's expectations have changed. So I can draw a new Phillip's Curve now. The range of possible tradeoff has been changed. We now, if we're at full employment are going to have the new underlying rate of 7 percent as our inflation rate and now we can chose tradeoffs along this dotted Phillip's Curve.

The Phillip's Curve shifts upwards when people get used to a higher rate of inflation. When the underlying or expected rate of inflation rate moves up, usually because we've spent some time over here in an overheated economy, then the whole Phillip's Curve shifts up. Because now you've got to coax people harder if you want to get them to work faster than the speed limit. You've got to give them even more wage increases. So trying to keep the economy over here running faster than the speed limit winds up shifting the Phillip's Curve upwards as the underlying rate of inflation, the expected rate of inflation gets pushed up. Now in the long run you're always going to wind up on the speed limit. That is in the long run we can't hold the economy faster than the speed limit. Prices are going to start to rise so rapidly that eventually we just find ourselves back on this curve. Again, we'll see how that works in the next discussion when we look at the aggregate demand and aggregate supply representation of Phillip's idea. But let me say right now, the Phillip's Curve in the long run is vertical. It's vertical because in the long run you've got to be at the full employment level of unemployment. In the long run you've got to be at the natural rate because otherwise you're going to be in a situation of instability. As long as you're over here running the economy faster than the speed limit, the Phillip's Curve tends to shift upwards. As long as you're over here with a higher unemployment rate, there's going to be downward pressure on the inflation rate and the Phillip's Curve is going to tend to shift downward. The only stable Phillip's Curve occurs whenever you are on the natural rate of unemployment. It's only when you're on the green line that the Phillip's Curve doesn't tend to shift up or downward over time.
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So let's look at how our theory jives with some actual data for the United States. If we look at the data from the 1960's, we see a very smooth downward sloping tradeoff between the unemployment rate on the horizontal axis and the inflation rate on the vertical axis. As the economy builds up to the Vietnam War, the rate of inflation was pushed up as government spending and the defense buildup drove the economy very, very hard; that is we pushed ourselves faster than the speed limit. The unemployment rate fell below the natural rate and the rate of price increase began to rise. So what we did in the 1960's appears to be the Phillip's Curve of our theory. However, what happened in the 1970's made a mockery of that Phillip's Curve. Here we had our Phillip's Curve, but then in the 1970's, we wind up with all these data points that involve more inflation and more unemployment than the point from this curve. That is it appears that the whole Phillip's Curve has shifted upwards. This is called stagflation. When the inflation rate increases at the same time that the unemployment rate increases. Now what would cause the Phillip's Curve to shift outward? Here in 1970, '72 and '72 we've got a tradeoff at a higher level. That is more inflation for any given amount of unemployment probably because as inflation began to pick up in the late 1960's, people in the economy digested this and it became part of their expectations. That is as people got used to an inflation rate of 4 percent, they factored that into their demands for wages and businesses got use to increasing their prices at a faster rate than before. So the data from the 1960's taken with the data from the 1970's matches pretty well the picture we drew a minute ago, which is as long as inflation expectations remained constant, you get a smooth downward sloping tradeoff. However, when inflation expectations increased, then you get a new curve that's further out.

Now this suggests that it may be possible in the short run to make a choice between inflation and unemployment. However, in the long run that's not going to be possible. Because in the long run people get used to a higher rate of inflation. They build that into their expectations and they become unwilling to work unless wages begin to increase at an even more rapid rate. So in the long run the Phillip's Curve is going to be vertical. In the short run, however, there's a possibility of a tradeoff between inflation and unemployment.
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**Expectations and the Phillips Curve**

We’re going to now discuss the relationship between the Phillips Curve that we developed in the previous discussion and the aggregate demand, aggregate supply model that we described in macroeconomy. We’re going to see as we look at our aggregate demand, aggregate supply diagram that it doesn’t quite match the Phillips Curve; that is instead of measuring inflation and unemployment, it measures the price level and the amount of output. However, the amount of output in the economy is related to the unemployment rate. The green line in the diagram represents the speed limit of the economy. The long run aggregate supply tells us how much we can produce if all resources are employed. And if we try to produce more, that means pushing unemployment below the natural rate. The green line is associated with the natural rate of unemployment and increases in output mean unemployment is falling as we recruit more workers to produce more output. Although we won’t see inflation in the economy, we will see the price level rising in this picture. The price level goes up whenever the economy tries to run faster than the speed limit.

Let’s do an analysis using the aggregate demand, aggregate supply curves and then show how that translate into a movement along the Phillips Curve. In the process we’ll see what different expectations make for the Phillips Curve in the short run and the long run. So let’s start with an example.

Suppose the government decides to increase spending by building a satellite or a new system of roads. The aggregate demand curve shifts outwards as this government spending is added to the other demands in the economy to give us a larger total aggregate demand. At the original price level now we have excess aggregate demand in the economy as people are trying to buy more than businesses are producing. This excess aggregate demand pushes up the aggregate price level. As the aggregate price level rises, we get adjustment on both sides of the market. On the demand side, higher prices shrink consumer wealth and lead to less consumer spending. Higher prices increase the demand for money raising interest rates and reducing business spending. And also, higher prices deter foreign spending on the goods from our economy. So aggregate demand decreases. On the supply side, higher prices lead to an increase in output as businesses face sticky wages, sticky prices and confusion about whether there’s general inflation or an improvement in their own profit opportunities. This leads us to a new equilibrium point with an output level Y1 that’s greater than full employment. And a price level, P1, that’s greater than the original price level of P0. So notice what you have in this picture. An increase in output correlated with an increase in the price level. That is more output being produced, which means more workers are employed and the unemployment rate is falling. It’s falling below the natural rate associated with our speed limit of full employment to some rate that’s lower than that. More workers being hired in order to produce more output. Now we don’t see an increase in inflation here, but we do see a rise in price level. And if we tried to stay faster than the speed limit, over the time the price level would just keep rising and it would be rising at a higher rate the further past the speed limit we try to drive the economy. So you can see in this picture that as long as we’re moving along the short-run aggregate supply curve, there’s an inverse relationship between unemployment and the price level. The more output you try to produce, the lower the unemployment rate falls, the higher the price level is going to go.

Not that’s the short run. In the long run, however, people are going to start to adjust to this higher price level and the higher inflation rate. When they begin to adjust to it, they factor this new inflation rate into their behavior and the underlying rate of inflation in the economy begins to rise. What happens then is people figure out that we’re in an inflationary economy, one that’s trying to drive faster in the speed limit. Wages become unstuck and laborers ask for a bigger cost of living adjustments. Prices become unstuck and businesses raise their prices along with their costs. And finally, people figure out that they’re in an inflationary environment, not one that’s creating opportunities for their own particular business. When all this happens, we find that everyone begins to push these costs onto their customers by raising the prices they charge for their goods and services. And what ends up happening in the long run is we reach a new short-run aggregate supply curve where the price level is higher, but we’ve moved all the way back to the full employment level of output, that is, in the long run we’ve got to observe the speed limit. In the long run, the price level goes higher, but output goes right back to where it was before. In the short run there’s a tradeoff. You can get more output if you’re willing to tolerate higher prices. But in the long run as people pass the prices on, the costs on, as people adjust to the inflationary environment, we are restored to full employment. Even though the price level goes up, there’s no increase in output; there’s no reduction in unemployment. There’s no tradeoff in the long run. The only question is how long does it take us to get to the long run. How long is the short run and the possibility of a tradeoff last? Well, that depends. If expectations are adaptive or backward looking, then we can stay down here along this curve for a relatively long time. This curve would gradually and slow ratchet up as people see that, well, inflation occurred last year; it’s probably going to occur this year, too. Getting used to last year’s inflation influencing this year’s perception of inflation, influencing next year’s. As long as people are looking at what happened in the past, the rate of adjustment is going to be relatively slow. But if people are forward looking and have rational expectations,
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then what happens is the short run aggregate supply curve moves immediately. People, say, Look, prices are going
to keep adjusting till we get to P infinity, therefore everybody goes ahead and raises their prices right now and we
move immediately to the new long-run point. There is no period of tradeoff between unemployment and inflation.

So a Phillips Curve depends on people not having completely totally rational expectations. That is wages and prices
are free to adjust immediately and people see where we are in this picture, they're going to go ding, where I could just
point, without any tradeoff. On the other hand, if people are able to be fooled, if there are rigidities in the economy
from contracts, then you can have the persistence of lower unemployment and higher inflation in the short run.
There's a tradeoff along the blue curve.

Let's now translate this story into a Phillips Curve. Here we have a diagram with the inflation rate on the vertical axis
and the unemployment rate on the horizontal axis. And I'm going to go ahead and put in a green line, which
represents full employment. Here's the unemployment rate that's associated with full employment output. Maybe it's
5 percent. If you want, in the short run to have more output and lower unemployment, you've got to tolerate higher
prices. If you're willing to tolerate more unemployment and lower output, you can get lower prices or less inflation.
However, this only works in the short run, because in the long run people will get used to this higher rate of inflation,
therefore they'll change their behavior and go back and supply only the amount of labor that they were supplying
before as prices rise to make those new higher wages less interesting. So what happens then in the long run is the
Phillips Curve shifts up to reflect the new underlying rate of inflation. If you've driven the economy faster than the
speed limit, the Phillips Curve is going to be shifting up.

Now what's happened in the United States in recent years is that increases in productivity have caused labor costs to
rise relatively slowly. The slow increase in labor costs have then put a damper on inflation and people are now in our
economy used to inflation rates of around 2 percent a year. Therefore, the underlying inflation rate in our economy is
relatively low which means we're able to get a lot of output without a big increase in prices because contracts, cost of
living adjustments and people's expectations have fixed on an idea that inflation is going to be at a relatively low rate.
When the underlying rate of inflation is low because people expect it, then you get a more favorable tradeoff in the
short run. However, the more expectations become rational, the less likely we are to have any tradeoff in the short
run at all. The curve just moves up and down along the green line. If expectations are perfectly rational and people
are never fooled and wages and prices aren't sticky, there is no Phillips Curve. The long run Phillips Curve is vertical
and we're going to be on this curve as long as we as everyone is rational forward looking and is not constrained by
fixed wages or fixed prices. The short run tradeoff, the usual Phillips Curve, depends on people not being completely
rational or else some wages and some prices in the economy being sticky. The long run Phillips Curve is vertical and
the short run Phillips Curve reflects a tradeoff that centers around the underlying rate of inflation. If you drive the
economy faster than the speed limit, you can get less unemployment at the cost of higher inflation. If you drive the
economy slower, you get less inflation, but at the cost of more unemployment.

If you look at a graph of the performance of the U.S. economy over time, it’s easy to see what the business press is talking about when they characterize the economy as a roller coaster; the ups and downs of expansions and contractions. Now, in March of 2000, the U.S. economy injured its 110th month of continuous economic expansion. That is, we haven’t had a recession in nearly a decade and some economists are beginning to wonder if maybe the business cycle isn’t history. Does it really still explain the way the economy works? Or are we not in some kind of new economy where we won’t necessarily have another recession?

In order to evaluate this claim, we need to understand two things. First, what do economists think about the way business cycles have worked in the past? And next, what may have changed in the environment that’s rendered the business cycle obsolete? Let’s think first about the way business cycles have worked in the past. Typically what happens is the economy starts growing. Some technological change or new set of markets created by an international trade agreement and everybody is gearing up to take advantage of the profit-making opportunities. Businesses are building new factories and stocking them with equipment. Consumers are spending on goods and services out of the wealth they’re anticipating getting from the stock market or their paychecks. And the government, maybe, also is spending. So as everyone begins to spend, the economy grows. The multiplier effect. Income leads to more spending leads to more income. And as business expands, businesses have to hire more labor and to procure more raw materials. Now all the businesses during this boom are doing the same thing. Which means eventually they start depleting the stocks of these productive resources and driving up their prices. That means unemployment gets so low that you’ve got to start bidding workers away from other companies and wages begin to rise. Or, lumber is in short supply or oil is in short supply. Something. And the price of those commodities begin to rise as well. And eventually these costs of production have to be passed on to your customers in the form of higher prices for goods and services. Then the Fed gets concerned that we’re on the verge of inflation. So it takes away the punch bowl. That is it tightens the money supply, jacks up the interest rate and everyone gets scared, stops spending and the economy tips into recession. So there you have it. The business cycle. A boom, the fear of inflation, the Fed acts and we head into a recession. That’s the same old story that we’ve had for years and years and years in the U.S. economy. So what’s different today that makes economists think that we’re in some kind of new regime?

Well, first of all, we have unemployment that is at an extremely low level. Four percent lower than what many people thought was the NARU, the non-accelerating inflation rate of unemployment. Typically by now the Fed would have blown the whistle on this party. But what’s happening is we see very, very little inflation anywhere in the economy. Part of that is due to rapid increases in labor productivity. As offices are stocked with computers, the workers are better trained; they have more tools to work with. The output per worker has been rising rapidly in the last few years. This means that businesses can afford to pay their workers higher wages without creating inflation because the workers are actually producing more. Moreover on the other side of the picture, businesses are afraid to raise their prices because of globalization and technology. Globalization means that you can always import the product that you’re buying right now from other city or some other country. There are all kinds of people out there producing automobiles and sweaters and because you can buy from them, your local dealer is afraid to raise his or her price by too much. Technology plays a role in this, too, because the Internet gives you quick access to price quotes from other dealers around the country, and in some cases, around the world. So the Internet put the lid on the price increases that your local dealer can enact because if the prices get too high, you will buy your products from some other state or country.

So the same thing is true with workers. I want a raise, but if I ask for too much of a wage increase and my cohort does the thing, then my company will move its production to some other country where the wages are low and the productivity is rising. Globalization creates increased competition and in an environment with increased competition, workers are afraid to ask for big wage increases and companies are afraid to enact big price increases. This means that inflation is not especially strong a concern. So the Fed doesn’t have to act to take away the punch bowl. That is, we’ve got low unemployment and the economy is booming. This is like the best possible Phillips Curve tradeoff imaginable. Usually, when you think with unemployment this low, inflation would be raging. However, because of globalization and technology, inflation has remained low so we’ve got kind of the best of both worlds. Maybe this is some kind of new economy, but we should be careful. Because if we buy into this mythology, we might start making mistakes.

First of all, if we think inflation is dead, then the Federal Reserve may start to get careless and pump in money to stimulate the economy and satisfy the voters and the housing industry and all those people who like low interest rates.
And if they do that, then sure as you're born, we'll have inflation back before you know it. Because inflation is, in the end, also dependent on how tightly the money supply is regulated.

Other things that we should be concerned about is making sure that we don't over regulate the economy so that innovation continues and productivity gains are secured and, in fact, advanced by new methods of doing things. We need to keep doing the same stuff that we've been doing for the past few years. An environment in which entrepreneurship is rewarded and in which prices are stable, in which the climate for business is good. In this case, we've got the best possible outcome. However, it doesn't necessarily mean that the business cycle is over. These productivity gains will eventually plateau and reach some new level at which point they'll becomes stable. At that point, further increases in demand for labor are likely to push up wages and when they do, inflation could become a fear again. There are always going to be shortages of labor and raw materials during periods of booms.

Oil may be less important to our economy than it used to be. I mean, back in the 1970's and 1980's an increase in the price of oil could lead to stagflation. Even during a period of unemployment you could get prices rising because of the supply shock. Nowadays oil is less important to our economy, but we've seen in recent months that higher prices for oil can lead consumers to change their behavior and can raise the cost of doing business. Just because it's less important, doesn't mean it's irrelevant.

The new economy is interesting because it's diversified, because it's characterized by rapid increases in productivity and because globalization creates a very, very competitive environment. But at best the same rules apply. If you try to run an engine too fast with a limited amount of gas, you're just going to crash somehow. If we try to push our economy too hard without skilled labor to man the jobs, and enough resources getting to factories in time, then we're going to have rising costs and inflation. Those rules haven't changed. Right now we're just really lucky and we should keep doing the things we can to ensure that productivity and prosperity continues.
Monetary and Fiscal Policy

Recessions and Booms

Unanticipated Changes in Aggregate Demand

In the summer of 1998 financial turmoil in Russia combined with a deep recession in East Asia reduced demand for exports from the United States. The Federal Reserve chose to pursue expansionary monetary policy rather than risk a deep recession. Let’s now use the model of the macroeconomy that we’ve developed to keep a logic of this policy and to look at what its long-range consequences might be.

We start by looking at factors that might suddenly shift in the aggregate demand curve and create a recession. Those factors would be any of the changes in autonomous spending that could come about because of factors in the environment. If consumer confidence declines, consumers may decide that they want to save money rather than spend it. The increase in savings at the expense of consumer spending shifts in the aggregate demand curve indicating that at any given price level now, less output is needed to meet the demand of the economy. The same thing would be true if business confidence were to fall. If businesses believe that they face an uncertain future and therefore they wanted to buy fewer tools, capital goods, factories and equipment. Finally, if foreigners decide they don’t want to buy products from our economy, then the aggregate demand curve shifts inward as well. These three autonomous changes could suddenly shift the curve in and potentially lead to a recession. Let’s see how this recession plays out.

The reduction in aggregate demand creates an excess supply of goods at the original price level, but as factories are producing the amount that’s indicated on the blue curve at the price level, while people want to buy only the amount that’s indicated on the red curve. That gives us an excess supply of goods and services. What happens in this case is the price level begins to fall. As the price level falls, then consumers and businesses begin to spend more through the usual channels. First of all, the lower price level decreases demand for money and that leads to a lower interest rate, which increases investment spending. Also the lower price level increases the real value of consumer wealth, which leads to more consumer spending. And finally, the lower price level makes goods from the U.S. economy relatively attractive to foreigners, which increases net exports. On the supply side of the economy, the lower price level leads to reduced output. First of all, because real wages are now higher. Prices are falling relative to fixed wages so businesses find it unprofitable to produce as much as before and they cut back their output. Also the sticky price phenomenon. Some businesses are not able to lower their prices along with the market; therefore they lose market share and reduce their output. And finally, confusion. Businesses aren’t sure whether the price decline that they’re seeing in their own business is unique to them. That is whether it’s a reduced demand for their particular product or whether it’s just general economy-wide inflation. All this leads businesses to produce less and it creates this new short-run equilibrium. The short-run equilibrium involves a lower level of output, Y1, therefore we have a recession. Output is below full employment. Along with this recession we get reduced price pressure, or in our model, a lower price level. This is typically what happens when the economy suffers a decrease in demand. We get a lower price level overall, accompanied by a reduction in output. This is what we call bad deflation. That is a drop in the price level that’s accompanied by a contraction in the economy. The business cycle in this case is on the downward swing. We’re headed into recession and the lower prices are the consequence of reduced demand.

What would happen in the long run if we didn’t take any action? That is if consumers, businesses and foreigners were spending less and the government did nothing to accommodate it. Well, what would happen is that the output being below full employment creates downward pressure on prices and as prices begin to fall for labor and output and other factors of production, then companies pass these lower costs on the form of lower prices for products. So that the short-run aggregate supply curve shifts downwards until the economy returns to full employment. This is the adjustment process that the classical economists believe would happen in the long run. That is as long as you have output below full employment there’s going to be slack in the economy and that’s going to put downward pressure on wages and raw materials prices. As those prices fall, then output prices will fall as competitive businesses bid down the price to try to sell their goods and services. When the economy returns to this position the adjustment process is over. A good question at this point is how long does this adjustment process take? How long does it take the economy to get from this point to this point to this new long-run macroeconomic equilibrium? And the answer, of course, depends on people’s expectations and how quickly people figure out what’s really going on. How quickly do businesses figure out that, in fact, the lower prices are generally economy wide deflation. How quickly do people figure out that the economy has contracted and therefore, incorporate reduced price expectations into their behavior? The more quickly people figure this out, the more forward looking their expectations or the more people have rational expectations, the more quickly we get to this new long run point and the less time we hang out here with the recession.
Recessions and Booms

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There’s another problem, however, and that concerns institutional rigidities, wage contracts and the lot. Wages typically can move up very quickly in a competitive environment, but wages don’t actually fall because of union contracts and just the habit of the relationship between employers and employees. Because wages don’t fall rapidly, prices don’t fall so rapidly and we can wind up hanging up back up here at this point with unemployment that lasts for a long time. It maybe a long time before this adjustment process actually plays out and brings us back to full employment. Therefore, it’s probably better many economists argue rather than waiting for the economy to take its natural course and endure a prolonged period of deep recession with a lot unemployment and all of the consequences that that brings with people’s lives, it may be better for the government to take action that shifts the aggregate demand curve back to its original position rather than accepting that aggregate demand is now going to persist at a lower level with all of the consequences that entails. Government policy could countervail the decrease in private demand with an increase in public demand or an increase in the money supply that stimulates investment spending. Let’s now make a list of the policy tools that are available to shift the aggregate demand curve back out. They are, first of all, fiscal policy, which involves government spending or a change in taxes. And second, monetary policy, which involves changing the money supply so as to change the interest rate and influence business, spending. How would that work? First of all, an increase in government spending could shift the aggregate demand curve back to its original position. That is if households don’t want to spend the money, the government can simply spend the money for them, therefore, creating jobs and restoring the original price level and the original level of output. Rather than waiting for this long painful adjustment process, the government can simply step in and make up for the slack in demand. Alternatively, the government could cut taxes and cutting taxes might stimulate consumer spending by leaving more disposable income for households. By doing that the government shifts the aggregate demand curve back to its original position.

Finally, monetary policy. The Federal Reserve could increase the money supply by lowering reserve requirements, by buying government securities in open market operations and by lowering the discount rate. By increasing the money supply, the Federal Reserve lowers interest rates through the money market, which then encourages businesses to do more investment spending shifting the aggregate demand curve back outwards. If that happens, there is no need for this adjustment process. The way these policy tools work in this story is quite simple. The policy measure makes up for a reduction in private demand. The private demand shifts inward and government demand replaces it. Or the government gives a tax cut which encourages increased consumer spending or the Fed increases the money supply lowering interest rates and stimulating investment spending. This is how policy works then to countervail a reduction in aggregate demand.

Now, what difference does it make whether the policy is anticipated or unanticipated? If it’s very clear to people that the government is going to increase government spending right now, so that the aggregate demand curve is going to shift back outwards, there may be no period of actual recession. And maybe that’s just what happened in 1998. It became very clear to the economy that the Fed was going to make money easy to get so as to keep interest rates low and, therefore, prevent the aggregate demand curve from every shifting downwards. This bolstered people’s confidence and led to an increase in spending even in the face of bad news about Asia and Russia. So the commitment of the Fed to keeping the aggregate demand curve at this position became an organizing principle for the economy. Everyone knew then that the aggregate demand curve was going to wind up here so they adjusted their behavior accordingly.

One final story about policy that makes clear the power of the notion of rational expectations. Suppose the government increases spending in order to try to pull the economy out of a recession. Well, think about this. The government has a budget of its own and the government budget deficit is the difference between what the government spends and what it takes in taxes. In time the government has to pay off its debts and it has to pay them off with interest. So suppose the consumers decide that they want to spend less and the economy is in danger of dipping into a recession with lower prices and lower output. The government comes along and says, All right, we’re going to increase government spending and pull this economy out of a recession. But consumers aren’t fooled because they say, Huh! If the government increases spending today and it doesn’t raise taxes? Well, then what’s going to happen? We’re going to have to pay back that government debt down the road with interest. So what consumers do if they’re forward looking and perfectly rational, is they set aside extra money in savings to pay the taxes down the road. Every dollar that the government spends results in a reduction of one dollar in consumer spending as consumers increase their savings to pay off the government debt down the road. Now, maybe people aren’t that much of the sharp pencil calculators, but if they are, then fiscal policy becomes ineffective because people all set increases government spending by making decisions of their own in anticipation of having to pay off government debt. That’s one of the consequences of rational expectations pushed to its extreme.
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So depending on how much people are looking forward, depending on how quickly their expectations adjust, we may get a different story. But the basic story is this. If aggregate demand shifts inwards, then policy can stimulate aggregate demand and shift it back outwards. That way, government policy can prevent a recession from being as severe or deep as it might otherwise be.
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We've described bad deflation as a period of falling prices that coincides with falling output; that is, during a period of recession, prices often drop, particularly when the recession is driven by a reduction in demand. When the action starts on the supply side, however, you can get an odd alternative, which is that falling prices are actually occurring during the period of increased output. That is the best of both worlds; a lower price level and a higher standard of living. On the one hand, you can also get the worst of both worlds; that is, rising prices during a period of high unemployment. When the supply side is the main actor in the story, we wind up with prices and output moving in opposite directions. Let's see how this works.

Consider now a change in the environment that shifts the short-run aggregate supply curve. The short-run aggregate supply curve shifts independently of long run supply when there's a change in something that influences the prices that businesses have to charge for their goods and services. That would result, if for example, there was a supply shock like an increase in the price of some important resource input like oil or if wages were suddenly increased because of activity on the part of unions. If wages go up or if supply shocks occur, then the short-run aggregate supply curve moves independently of the green curve because businesses then have to pass these higher costs onto their customers in the form of higher prices for the output. So, for instance, if there is a supply shock, say during the early 1970's when war in the Middle East increased the price of oil substantially, it showed up in the model on this form. The short-run supply curve shifted upward meaning that businesses were now going to be charging higher prices than before for the same outputs. So here we now wind up with a new short-run aggregate supply curve. What's going to happen is the economy adjusts in the short run. At the original price level now we have excess demand for goods; that is, on the red curve businesses, households, foreigners and the government still want to buy the same quantity of goods and services. However on the supply side, because of the rising cost of doing business, businesses want to produce less. The result of this excess demand for goods is going to be a rise in prices and rise in prices then are going to have an effect on both sides of the market. As the price level rises on the demand side, the aggregate demand, the quantity of goods and services that people want to buy is going to be shrinking. First of all, because of the wealth effect. Consumers now feel less wealthy because higher prices shrink the purchasing power of their mutual funds and savings accounts and nominal wealth. Businesses want to spend less because the increased demand for money that accompanies rising prices bids up the interest rate and as the interest rate rises, businesses take advantage of what they think may be a business opportunity by increasing their output in the short run. The second thing is because of sticky prices not all of the businesses in the economy are able to get their prices up with the general price level and they experience a short term surge in demand for their products which are relatively under-priced. And finally there's confusion. Businesses don't know yet whether these rising prices represent increased demand for their particular products or whether it's just general economy-wide inflation so they take advantage of what they think may be a business opportunity by increasing their output in the short run. The end result is with the supply shock we wind up with the following change. Output in equilibrium falls below its full employment level at the same time as the price level increases from the original level of P0 to a new higher level of P1.

On the supply side of the economy, we're going to find that the quantity of goods supplied increases, because as the price level rises three things happen. First, the price of output rising relative to the price of wages, and when that happens then, businesses see a temporary profit opportunity and expand their output. The second thing is because of sticky prices not all of the businesses in the economy are able to get their prices up with the general price level and they experience a short term surge in demand for their products which are relatively under-priced. And finally there's confusion. Businesses don't know yet whether these rising prices represent increased demand for their particular products or whether it's just general economy-wide inflation so they take advantage of what they think may be a business opportunity by increasing their output in the short run. The end result is with the supply shock we wind up with the following change. Output in equilibrium falls below its full employment level at the same time as the price level increases from the original level of P0 to a new higher level of P1.

Well, look, there you have it; stagflation. Rising prices at the same time as a recession is occurring because output is falling below full employment. Unemployment coexists with rising prices. You can only get that outcome whenever the story is driven by a change on the supply side. Supply shocks create stagflation. Now the question is what could the government do, what could the Fed do to mitigate the impact of this change in the environment. Well, the problem is two fold. We've got rising prices; that is, inflation which has its own costs and we've got unemployment which has its own costs. It turns out that anything the government does is going to improve one of these problems by making the other one worse. Let's see how this might work.

Government spending and taxes, that is, fiscal policy, could be used to try to offset the effect of this supply shock. If the government wanted to try to take pressure off of prices, it could reduce government spending or raise taxes and shift the aggregate demand curve inwards. If the aggregate demand curve is shifted inwards, then what happens is the price level is going to fall back to its original level in the short run equilibrium. However getting this aggregate demand curve down here is going to mean that output falls even further, the recession deepens. So the government can take the pressure off the prices, but only at the expense of reducing output further and increasing unemployment. On the other hand if the government wants to get unemployment down to its original level or increase output back to
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full employment, it could spend more money or cut taxes to stimulate demand. In that case what happens is the economy returns to full employment. On the other hand the price level is going to wind up going higher in equilibrium. So, you see we’re stuck here with the tradeoff, the typical tradeoff that the Phillips Curve describes. You can either fight inflation or you can fight unemployment; but you can’t do both simultaneously. This is the tradeoff that these supply shocks create for the economy.

So let’s suppose that the government is particularly concerned about unemployment. If it is, then what’s going to happen is this. The government is going to spend more money pushing the aggregate demand curve from its original level of $\text{AB}_0$ out to $\text{AB}_1$. In this case, the increased demand for goods and services means that more output is required at any price level to satisfy demand. What that does then is in the short run pushes prices up even higher and as these prices rise, businesses are willing to produce more output and some of the demand from consumers and businesses is choked off even further till we get to the new equilibrium. But because the situation began with a supply shock, we wind up with a higher price level. If the government wants to close this unemployment gap and bring us back to full employment, the cost is going to be higher prices. And prices noticed wind up going up by exactly the amount that businesses were trying to raise originally in response to the supply shock. So prices wind up going up by the full amount of what it was that fed into the economy originally and created the problem.

What could the Fed do? Well, the Fed could reduce the money supply and fight the inflation by shifting the aggregate demand curve inward. If the Fed reduced the money supply, then the aggregate demand curve would shift back here as interest rates rose and businesses cut back their spending. That would push the price level back to its original level, but it would deepen the recession. Alternatively, the Fed could increase the money supply and lower interest rates and stimulate the economy pushing the aggregate demand curve to this level. Prices are going to go up further, but at least we don’t have to suffer the recession. That’s the way things work whenever the story is driven on the supply side.

Let’s consider one more possibility and that’s the case where the green curve actually shifts. If the green curve shifts, then the full employment level of output is going to increase in equilibrium. So we’re going to move from an original long-run aggregate supply curve, $\text{SRAS}_0$, to a new one and we’ll call this long run aggregate supply curve 1. What would cause this to happen? What causes a long-run aggregate supply curve to increase? What causes the economy to be able to produce more goods and services than before without having to worry about inflation? Well, the things that could do that would be an improvement in technology or immigration, which increases the labor supply to the economy. Also capital accumulation, building more factories increases the amount of output that we can produce before inflation becomes a risk. Alternatively the long-run aggregate supply curve could be shifted inward by an adverse development such as war that destroys capital stock or reduces the labor supply or bad weather, which makes the economy less productive. All of these things shift the green curve, that is, they change the economy’s speed limit; the amount of output that can be produced before the fear of inflation kicks in.

Well, let’s look now at how aggregate supply and demand interact in this situation. Here’s the original aggregate demand curve, $\text{AD}_0$ and the original short-run aggregate supply curve, $\text{SRAS}_0$. So the economy’s original position is at the intersection of aggregate demand and aggregate supply. We’re going to start here in long-run macroeconomic equilibrium. So the red curve and the blue curve cross on top of the green curve. That’s where every story begins. In this situation now suppose there’s an increase in productivity and the increase in productivity is going to shift out the green curve and the green curve, any time it shifts, drags the blue curve with it so we wind up with a new short-run curve, as well as a new long-run curve. Well, what’s the situation going to be in the short run? In the short run we’re always going to be where the red curve and the blue curve cross.

So here we are and the situation that’s created is we have excess supply at the original price level so the price level falls and as the price level falls, consumers and businesses buy more goods and services through the usual wealth effects and the effects from the money market and interest rates. Over here we have producers now. As prices are falling willing to produce less than they would have produced if prices had stayed at their original level. Until we wind up at short-run equilibrium and at short-run equilibrium, $Y_1$, and this new lower price level, $P_1$, occur because productivity has increased in its economy somehow. Notice what we have. Falling prices and output increasing relative to its original level. This is good deflation. Deflation that stimulates the economy, and increases the standard of living. And what’s really driving it here is the supply side activity. This is why some economists are very optimistic about changes in the economy that begin on the supply side. Because when the productive capacity of the economy increases, you can get more stuff at lower prices. That’s good deflation. Well, what’s going to happen in the long
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run? In the long run the blue short run aggregate supply curve is going to start shifting downward because, look; we're below full employment. The new full employment curve involves a greater output than the economy is producing in the short run. Therefore, prices are going to keep falling and they're going to keep falling for inputs in labor until we wind up at the new long-run equilibrium with a short-run aggregate supply curve in infinity. The new price level is going to be lower.

Now why would the government want to do anything about this? Well, it maybe a long time before these prices actually fall and it maybe the intention in this case of the policymakers that we quickly move to an expanded economy because of the technological change that's occurred. If there's been technological change in immigration, the economy is not capable of creating a lot more wealth. So why not go ahead and stimulate the economy and get us there quickly rather than waiting for prices to fall; especially if prices are not inclined to fall because of sticky wages and things like that. What the government might do in that case is spend more money. The government might cut taxes or the Fed might stimulate the economy by increasing the money supply and lowering interest rates. In all of these cases the aggregate demand curve is going to shift outwards until it reaches this new level. Expansionary fiscal policy, expansionary monetary policy moves the aggregate demand curve to this new level and gives us an equilibrium with a higher output and the same price level as we had before. Right here. So prices have remained unchanged but now we're all better off because the output of the economy has increased. Alternatively we can wait for falling prices to bring that result about, but if the government wants to get us there quickly, that's how it does it. Some people argue that that's what the Fed is doing today by loosening the money supply, that is, making money easier to get, pursuing expansionary monetary policy. The Fed is doing that as the economy is booming due to technology changes. Therefore there's been very little change in the price level, but there's been a big growth in the economy. Output is expanded. The Federal Reserve has provided the money that allows the output to grow without a change in the price level.

Let me summarize then by talking about the difference between good deflation and bad deflation. Good deflation is deflation that's driven by technological change. A period where prices are falling and output is increasing. That's probably what's happening today. The only reason prices aren't falling any faster than they are is because the Federal Reserve is allowing the money supply to grow. In the 1870's in the United States, we had a similar position. The rapid growth of the railroads then caused prices to fall because businesses became very productive and competitive. Prices fall at a time when the economy was growing rapidly. The alternative is bad deflation. Deflation that's driven by an inward shift in the demand curve. This is what happened in the United States during the Great Depression. People started saving and stopped spending. Therefore, prices fall and we had a huge increase in unemployment as the economy contracted. This was also the case in Japan in the late 1980's and early 1990's. The Japanese household stopped spending, therefore prices fell markedly in Japan as unemployment increased and the economy contracted.

So when prices are falling because the supply side of the economy is showing good development like increased productivity and expanding capacity for the economy, we call that good deflation because it's usually associated with an increased standard of living and economic growth. However, when it's driven by the demand side of the economy, falling prices typically mean more unemployment and a contraction in the economy.
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Fiscal Policy: The Mainstream

Fiscal Policy Using the AD/AS Model

When President Clinton first took office in 1993, one of his first proposals was a big increase in government spending to stimulate the economy. The idea was that if the government spent more money, it would create more income for people who would in turn spend more money and the economy would be pulled out of the recession that it had entered in 1991. This idea has a venerable history, beginning with John Maynard Keynes’ writing that the government should increase demand to make up for the fact that people were saving and not spending and that was the way Keynes believed the government could help get the economy out of the Great Depression. We’re now going to enter a discussion about the way in which the government’s budget interacts with the macroeconomy. What affect does the government have on the bigger economy?

Let’s think now about three questions. The first is how can the government actively influence the economy? The second is how does the government possibly influence the economy? And the third is what are the unintended consequences of the government’s effort to influence the economy? Before I answer these three questions, let me offer a metaphor. Think about the government’s relationship to the economy as a car driving down the road. The government at some point laid in place this road to guide traffic, to tell the car where to go. Now, of course, any car that wants to can drive off the road and cause its own path through the fields. But the road is there to suggest how far the car should go, to the left and to the right. The car also can be driven by pushing on the accelerator or slowed down by pushing on the brakes. Think of the brake and the accelerator, as the government’s active attempts to control the economy; and think of the shoulders on the road as guidelines about how far the car should or shouldn’t go.

So the first question. How can the government actively influence the economy? The government can push on the accelerator by increasing the amount of government spending. Say the government spends $20,000,000 on a satellite. The effect on the economy is going to be not only the $20,000,000 spent on the satellite, but the money that the people who built the satellite spent after they get their paychecks from the government. They turn around and increase their own consumption creating a multiplier effect. Also, the government can tap on the brakes by increasing taxes by reducing the amount of disposable income of households. The government reduces consumption spending and slows down aggregate demand. Finally, the government can also tap on the brakes or push on the accelerator through other kinds of tax incentives. For example, if the government allows factories to write off their investments for tax purposes more quickly, accelerated depreciation will stimulate more investment spending. Also by allowing households and homeowners to write off their mortgage interest against their taxes, the government encourages people to invest money in new houses, which stimulates the economy also.

So we’ve got three categories of what economists call fiscal policy, government spending, taxes and the way in which taxes are collected. So these are the ways in which the government operates the brakes and the accelerator the economy. Now what about the shoulders of the road? How does the government try then to reign in the economy whenever it’s accelerating too quickly and to stimulate it whenever it is slowing down too much? These are called automatic stabilizers; one of them is the progressive tax system. When people make more money, they pay more in taxes, which reduces the amount they get to spend. Another one is unemployment insurance. When people are without jobs and might otherwise stop spending, they can collect money from the government, which allows them to maintain the consumption even in a period when their income falls. We’ll talk about automatic stabilizers in detail later, but think of these as kind of the guardrails on the economy, an attempt to keep it from going too far, too fast in one direction or the other.

So now what we’re going to do before we answer the third question is think about how to show government policy in this diagram. Well, what we’re going to do is begin with a story. Suppose government spending increases by $20,000,000 but the government builds a new satellite and pays the engineers and the people who construct it and the people who maintain it. What the government is going to do is it’s going to create more income for people in the economy and this income is going to lead to an increase in aggregate demand. At any given price level now, what happens is it takes more output to satisfy the demand of the economy. Aggregate demand increases at any given price level and we show that by an outward shift in the aggregate demand curve. Now my first question is how far out does the aggregate demand curve shift whenever the government spends $20,000,000 on a satellite? Is this outward shift $20,000,000? Is the amount of increase in gross domestic product $20,000,000 or is it, in fact, more? The answer is it is, in fact, more because think about it. When the government spends $20,000,000 on a satellite, it puts $20,000,000 worth of paychecks in the hands of other people. Those people then turn around, save a fraction and spend the rest creating income for more people creating more demand for goods and services and through the multiplier effect, consumption increases at every stage of the story so that the total increase in gross domestic product
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is much greater than the original increase in government spending. We call this effect the multiplier effect. So that’s one of the unintended consequences of government spending is it stimulates more consumer spending by increasing people’s incomes.

A second unintended consequence is called crowding out. Follow the logic of this story. When income begins to increase in the economy, along with it the demand for money increases as people need more cash to do their shopping. But if the money supply remains constant, interest rates have to go up to equate money supply and demand. That then causes businesses to be less interested in doing investment spending because the cost of financing their purchases has risen. So as the government increases its spending, it creates income leading to an increased demand for money leading to higher interest rates leading to a reduction in investment spending. This is called crowding out. So the multiplier causes this outward shift to be greater than the increase in government spending. However, the effect of crowding out mitigates it somewhat and causes output not to increase by as much as it would if interest rates didn’t change. So we have the multiplier effect and crowding out operating already in this story.

Now we can’t ignore the fact that we’re not in equilibrium. When I shift out the aggregate demand curve at the original price level, aggregate demand is now greater than aggregate supply. The blue curve is still back here and the red curve at the original price level is way out here. So there’s excess aggregate demand. The economy then in the short run adjusts as follows. What happens is the price level begins to rise to eliminate the excess aggregate demand and as it does we have adjustments on both sides of the market. On the demand side of the market the rise in price level has three effects.

First, the effect on consumers. As the price level rises their real wealth shrinks and, therefore, consumption falls. The second effect is through the money market. The increase in the price level increases the demand for money and as the demand for money increases, we have an increase in the interest rates so business spending is going to be cut back. Finally, there’s the third effect, which is that foreigners will be less likely to buy our goods as the price level in our economy rises relative to the price level in other economies. So on the demand side, the combined effect is a reduction in real domestic product as demands decreases due to the rise in price level.

On the supply side of the economy we have an adjustment; as producers produce more goods and services, as the aggregate price level rises due to the usual three effects; sticky wages, sticky prices and confusion. Sticky wages means that the rise in price of output creates a business opportunity in the short run for producers who respond by expanding output. Sticky prices means that as the price level rises some businesses can’t keep up because of the cost of reprinting a menu and changing in prices. So they experience a temporary boom in demand for their products and they increase production. And third, the effect of confusion. As the aggregate price level rises it takes a while for businesses to figure out whether it’s just inflation or whether it’s increased demand for their particular products, and therefore, they respond in the short run by increasing output somewhat. So, in the short run we wind up with this new higher price level P1 and an increase in gross domestic product from our original level to the new higher level Y1. This is how fiscal policy works. Expansionary fiscal policy works by shifting the aggregate demand curve outwards. Now I told this story about the government building a satellite so an increase in government spending is one way to accomplish expansionary fiscal policy. We get exactly the same adjustment if the government cut taxes and gave money back to consumers so that they could spend it on goods and services stimulating demand for goods and services in the economy. Finally, if the government used accelerated depreciation or other incentives to get businesses or households to spend more money, that would accomplish the same thing. So the three tools of fiscal policy, increase government spending, reduction in taxes and providing incentives to businesses and households through taxes to spend more; these are the three tools of expansionary fiscal policy. This is how you get the economy to increase output. Notice that in the short run when output increases, the price level goes up. What’s going to happen in the long run? Well, in the long run we’re going to have an adjustment process because output is greater than full employment. Because output is greater than full employment, we know that the price level is going to rise. There’s inflationary pressure as we are competing for a scarce pool of workers and resources; prices are going to start to rise and after a while businesses begin to figure that out. As they adjust to an inflationary environment, businesses start raising prices and passing on these increased costs to their customers in a form of higher prices for goods and services. So the short-run aggregate supply curve begins to shift upward and that upward shift continues until the economy has adjusted to its new long-run macroeconomic equilibrium. The new long-run macroeconomic equilibrium occurs where the blue curve, the short-run aggregate supply curve cross the red curve, the aggregate demand curve. on the full employment line. So in the long run we’re going to wind up with a higher price level, but we’re going to be back at the original level of output which is the one where we have no tendency to produce inflation;
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that is where the economy has no excess demand for goods and services and the factors of production. Well, what happens in the long run? What's the net effect of fiscal policy in the long run? And the answer is really there's no change in aggregate output. Aggregate output is exactly what it was before. We're back at full employment. However, we can't say that there's no effect because if output is the same as it was before and the government is taking a bigger share of it, that means somebody is taking less. Well, who's getting less in this new long-run equilibrium? Now that the government has come in and taken more, who's getting less? Well, let's see. As the price level rises and we move along the aggregate demand curve, there's going to be a series of adjustments. Think about that. As the price level rises, consumers are going to buy less because their real wealth is shrinking. Businesses are going to buy less because interest rates are going up as the demand for money increases and the third thing is foreigners are going to buy less because they're going to look for bargains in other economies. So the government by increasing its spending has crowded out other forms of spending. The government has crowded out consumer spending. It's crowded out investment spending. It's crowded out the spending of foreigners. In the long run what happens is you get complete crowding out. If the government wants a bigger share of the pie, it's going to get it at the expense of other folks in the economy and the effect is going to occur through a rise in price level that is going to push other people out of the economy through the usual three mechanisms.

Now I could draw the same picture from another perspective. I could have contractionary fiscal policy instead. That would be pulling the aggregate demand curve inward and looking at the new equilibrium, which would be below full employment. It's exactly the same story told in the other direction. You'd find us hanging out here below full employment for a while until in the long run the price level adjusted downwards as slack in the economy pushed costs down and businesses pass those lower costs on in the form of lower prices.

So in the long run, fiscal policy may not do any good. It may do nothing at all except change the mix of who gets what in the economy. In the short run, however, it may be possible to drive faster than the speed limit for a while at least.

Well, let's look at one more case real briefly and that is suppose the economy is below full employment to start with. If the economy is below full employment to start with, fiscal policy may actually spare us a long period of adjustment. Suppose it's going to take a long time for the short run supply curve to shift down to its new equilibrium position. That is, if expectations are slow to adjust or if wages are sticky because contracts last for a long time or unions won't allow wages to fall; we could hang out at this point for a long time with unemployment and a lot of pain in the economy. On the other hand, this was Keynes' idea, if the government stimulates the economy by increasing aggregate demand, we can move to full employment very quickly by circumventing the adjustment process. The government just spends whatever the gap is between the output that we have presently in the economy and the output that would employ everyone. In order to put the economy back to work, the government increases spending and takes us to a new equilibrium point with a higher price level and a higher output. So here's an instance in which aggregate demand can actually do some good; is if we're hanging out back here in a situation of unemployment and if the adjustment period promises to take a lot of time, then forget the adjustment period. Go ahead and let the government pursue active policy to restore us to full employment by buying the stuff that the consumers and businesses and foreigners aren't willing to buy right now in the economy.

Well, you can see here then, that here's a case where it makes some sense for the government to step in where the government could actually do some good. And your position on this question of whether the government should actually stimulate the economy depends on how quickly you believe the economy adjusts. If you believe that the short-run aggregate supply curve will move quickly to the new long-run equilibrium, then don't get the government involved because you have all the other costs of government involvement, you know, the potential for corruption and waste and all of that. However, if you believe that this adjustment period is very, very slow, then what you can do is you can circumvent it by having the government step in and increase aggregate demand. This was Keynes' idea. Keynes' critics said, "Hey, in the long run we'll come back to full employment." Keynes says, "Yeah, but in the long run we're all dead because it takes too long for that adjustment process to occur." So depending on how quickly you believe this adjustment process occurs, you may want to argue that the government should step in and prevent a long painful recession.
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Fiscal Policy: The Mainstream

The Market for Loanable Funds and Crowding Out

Government spending increases aggregate demand in the economy. Let’s consider now how the government finances its spending, that is, how does it pay for the stuff that it buys? And how does the way in which the government finances its spending influence the effect that its spending has on the economy?

First of all, government revenue comes from taxes. That is, the money the government takes in in taxes in various forms is used to pay for the stuff that government buys. However, it’s very rare that the amount of money collect in taxes would be exactly equal to the amount of money that the government spends. Typically then there would be a difference between the amount of money that the government spends which we usually represent with the letter G and the amount of money that the government takes in in taxes, which we usually represent with the letter T. The difference between government spending and taxes is equal by definition to the government’s budget deficit. If the government spends more money than it takes in taxes, we think the government has a budget deficit and that deficit then requires that the government do what any of us do when we run a deficit and that is to borrow money. The government borrows money by issuing treasury bills and whenever the government runs a budget deficit it has to issue treasury bills or debt equal to the amount of the budget deficit. Each year’s government budget deficit then requires the issuing of additional treasury bills. And the total sum of outstanding treasury bills over all of the years that the government has run a budget deficit is called the national debt.

So here’s the way the government runs a budget deficit. In some years, as in recent years, the government actually takes more money in in taxes than it spends. We’ve had a very good economy in the past few years and the government has actually seen a huge increase in tax revenue due to the way in which the government budget operates. When the economy booms, people move into higher tax brackets and therefore, they pay more in taxes. Because government spending has not increased at the same rate, tax collections have surpassed government spending and the government has a budget surplus. The government has a budget surplus any time the total amount of taxes collected exceed the total amount of government spending. Now surpluses then allow the government to retire debt, that is, whenever the government has extra savings, it does the same thing that you or I might do. It pays off some of its outstanding debt. So when the government runs a budget surplus, it can take the money and buy back treasury bills, which is a way of paying off its debt. Any time the government runs a budget surplus, the national debt is able to be decreased. So the first thing that we’ve done is define a government deficit is any time the government spends more than it takes in taxes and the government finances it by selling treasury bills which is issuing IOUs. Any time taxes exceed government spending, the government has a budget surplus which allows it to reduce the national debt. The national debt is being retired right now as the government runs a series of budget surplus, but these budget surpluses are relatively new things. If we look at the economy over the past 30 years, what we see is we’ve got a history of federal budget deficits, that is, the government in Washington has been spending typically, in fact, exclusively more than it has taken in taxes. By a small amount in 1970 and then increasing in the later 1970’s and running huge deficits in the early and mid 1980’s as the economy was stimulated by a huge defense build up under President Reagan. Then the deficit shrank a bit in the late 1980’s, but increased during the recession years of the early 1990’s and then the budget deficit decreased. If we saw this line going on to 1997 through the year 2000, we would actually see that the deficit goes to 0 and then the government runs a surplus in the last couple of years. So the federal budget has been in deficit for more of the last 30 years. State and local governments, on the other hand, have run surpluses in most of these years, which to some degree offset the effect of government deficits on the economy.

Well, let’s see now what happens theoretically whenever the economy experiences an increase in government spending or an increase in the government budget deficit. The effect on the economy can be seen, first of all, through the market for loanable funds, which we studied earlier. Here we have the demand curve for loanable funds, which is all of the people who are borrowing money. They want to borrow more money at low interest rates and less money at higher interest rates. The blue curve represents the behavior of lenders, people who are saving money who want to lend it in the economy. People are more interested in saving money when they get a high return at high interest rates and they want to save less money at lower interest rates. So here we have demand and supply interacting to give us the equilibrium interest rate in the economy and the total volume of lending that occurs. Now suppose the government borrows more money, that is, if the government runs a budget deficit, what’s going to happen is the demand curve for loanable funds is going to shift outwards because the government has got to borrow funds in order to spend more than it’s taking in taxes. If that occurs, then at the original interest rate we have excess demand for funds, that is, if the interest rate that we started with, the demand for funds is going to be much larger than the quantity supplied. Therefore the bidding mechanism pushes the interest rate up so that a larger quantity of funds is supplied by lenders and some borrowers, particularly businesses and consumers decide that they want to borrow less
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because of the higher rates. After everything is said and done, we wind up with a new equilibrium that involves a
larger volume of finance at a higher interest rate. So the capital markets expand, that is, there’s more IOUs floating
around there because the government is issuing more treasury bills to borrow money. However the competition for
loanable funds pushes up the interest rate and some suppliers respond to the higher rates by lending more money but
some demanders or borrowers are pushed out of the market. And this is what we call in macroeconomics the
phenomenon of crowding out. When the government decides that it wants to run a deficit, it’s going to be taking a
bigger share of the pool of savings available in the economy and that means there’s less available for households and
foreigners and businesses.
You’ll remember an equation that we’ve used in macroeconomics and that is that the savings, that is the total amount
of savings that households do plus the total amount of savings that the government does, plus the total amount of
savings that foreigners do is equal to the amount of money that’s available for businesses to borrow. You may
recognize this equation by its representation in letters S + T – G – X = I. That is, think about all the sources of savings
that there are in economy. There’s the savings that households save. There’s the money that the government saves
by running a budget surplus and there’s the money that foreigners save by buying less from us than we buy from
them, that is, the negative of our net exports or the total that we’re importing in excess of what we’re selling to them.
Here’s the money that our households are saving, the money that the government is saving and the money that
foreigners are saving in our economy. Well, that’s the total pool of savings that’s available to finance the investments
that businesses want to do. Now what happens if the government decides to run a bigger budget deficit? Well,
suppose the government decides to cut taxes? If the government decides to cut taxes, then the budget deficit will
increase. The budget surplus will shrink, eventually go to 0 and then the government will start running a budget deficit
as it spends more than it’s taking in taxes. Well, something has to change in this equation to restore balance. One
thing it could change is as the government starts borrowing more money because it’s cut taxes and still needs money
to finance spending, interest rates will be bid up and when interest rates are bid up, then businesses will decide that
they can’t afford to do as many investment projects as before so this is crowding out. A decrease in taxes leads to a
decrease in business spending as interest rates rise pushing businesses out of the capital market. You get the same
story if government spending increases because there’s a negative sign here. If the government is going to take a
bigger pool of the savings, it’s going to do so by pushing businesses out. Another thing that could happen is if interest
rates rise, it may be that households decide they want to save more. As government spending increases, more
households enter the capital market because of the higher interest rate. But typically what’s going to happen is you're
going to get adjustment on both sides, both as the supply of funds increases and the demand for funds decreases to
make room for what the government wants. This is called crowding out. We’ll talk later about how foreign behavior
influences this economy, but for right now understand that any the government increases its deficit, any time the
government increases its spending relative to taxes, that means an increase in government borrowing or a decrease
in government savings and that’s got to have an offsetting effect somewhere else in the economy. Either households
have to save more to provide what the government wants to borrow or businesses are going to be pushed out of the
capital market by rising interest rates.
Let’s look finally at some historical data and see what we can tell about the effect of budget deficits on interest rates.
Here are the budget deficits for the years 1970 through 1996 and here’s the real interest rate as a percentage during
the same years. What could happen to the interest rate during the 1980’s when the government budget deficit
increased precipitously. The real interest rate went from a level that fluctuated around 0, that is, the nominal rate was
about equal to inflation to historic highs of around 6, 7 percent in the mid 1980’s. When the government deficit got so
big so quickly, a lot of private spending was crowded out as the real interest rate rose. Now in the 1990’s we had
even bigger budget deficits, but the real interest rate came back down to its ordinary levels. This was in large part due
to a huge influx of capital from abroad, that is, foreign savings offset the dis-savings that the government was doing so
that our businesses were able to borrow at interest rates that were lower than before. Typically there’s going to be a
relationship between the government budget deficit and the interest rate. If households will save a lot more or if
foreigners will lend us more during a period when the government wants to borrow, then there won’t be so much
crowding out, that is, the interest rate won’t go so high pushing out businesses. However, a big government budget
deficit during a period when foreigners don’t want to lend us money, typically leads to high interest rates in order to
attract additional savings from households and more importantly, pushing out investment spending.
So there you have it. Whenever the government spends more money, it competes in the capital market. It competes
for the limited pool of savings and the way the government gets more of the economy savings is by competing it away
from private businesses through a process called crowding out.
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Timing Problems and the AD/AS Model

When we do fiscal policy in our model, it looks really simple. But in reality it's a lot more complex. On the paper it's as easy as shifting the aggregate demand curve back out any time it shifts inwards. Suppose due to a reduction in consumer spending, the aggregate demand curve shifts inwards and whenever the economy adjusts to its new equilibrium, we have a lower price level and a lower level of output. This is a recession. Output is shrinking, the economy is contracting, unemployment is occurring, prices are falling and we wind up with unemployment and other costs of recession. Well, in our simple model what you do is you shift the aggregate demand curve back outwards either by cutting taxes or increasing government spending or offering other incentives that stimulate consumer spending and business spending. Aggregate demand curve goes in, and you just shift it back out and the problem is solved. Well, that makes controlling the economy look awfully easy. In reality, however, fiscal policy goes through Congress, and Congress is a bunch of human beings that are subject to political pressures and uncertainty, and because of all of this, the process ends up taking a lot more time than it does to shift a curve. Let's consider now some of the lags that are involved in implementing fiscal policy and see how the lags make fiscal policy so difficult that, in fact, we would actually not want to use it in many cases to try to fine tune the economy.

Lag #1 is called the recognition lag. How long does it take for you to look at the data and figure out that you're actually in a recession, that is, how long does it take to figure out that the aggregate demand curve has shifted inward because of a change in consumer and business behavior that requires a correction recognizing that the economy has actually flipped into recession. It takes a while to see that income is down and is going to stay there. It takes a while to collect the statistics that verify that we've moved from Y0 to Y1. So the recognition lag is associated with collecting the data needed to diagnose the situation.

Now not only do you want to diagnose the situation, but you want to diagnose that it's not something temporary, that is, you don't want the government stepping in to increase government spending if consumer or business spending is only down temporarily. If it's going to bounce back next week or next month, then government spending on top of that would lead to overshooting and more instability. So diagnosis, recognition, what's the problem, is it going to persist, is this a case that calls for fiscal policy.

Second, the administrative act. How long does it take to get Congress to actually take the action to cut the taxes or increase the spending or offer the incentives that would in theory shift the aggregate demand curve outwards. The administrative lag we could call the problem of red tape. First of all, you've got the politics which is getting Congress to actually vote on a tax cut or vote on a budget that increases government spending and this is no trivial matter because if Congress decides that spending increases would stimulate the economy, there's going to be 500 different opinions in Congress about what Congress should spend money on. Everybody wants it in their district; everybody wants projects that benefit the industries that support them, so there's all kinds of administrative problems that have to be solved. Then once Congress has decided what it wants to spend on, there's the matter of voting on things, sending the orders to the appropriate divisions that implement the policy and all of that. So the administrative lags or the red tape lags are a problem that's just basically rooted in politics.

The third kind of lag is called the operational lag. How long does it take from the date in which the policy is voted on until the date when it actually takes effect? Suppose Congress votes on Wednesday, January 12th to enact a spending package that includes building lots of new roads. How long will it take before the road projects actually get started and the construction workers actually start drawing paychecks? I mean, it could be April or July or who knows how long. Therefore, by the time the curve actually begins to shift out from the government spending, it may be that consumers and businesses have already changed their minds about the economy and the curve is shifted back of its own power. So the operational lag or the time it takes to actually implement the government policy may render fiscal policy ineffective.

Now there's another problem with fiscal policy and that is government spending and government tax incentives create constituencies, that is, people who make money off of them, people who benefit from them. And the people who benefit from government subsidies and tax breaks and spending projects certainly don't want to see them go away. So if the curve shifts in from consumers not wanting to spend and the government shifts it back out with some nifty spending programs and tax breaks, well, then if consumers decide they want to spend more money, then the government can't just cut these old programs because now they'll be taking candy away from people who may have become quite used to it and this becomes politically sensitive. When the projects create a constituency, that may be then that when consumer spending goes back to its original level, the aggregate demand curve shifts way past its
original position because the government has spent money or given tax breaks that it can't retract. This is just the nature of politics. Once you give people something they kind of decide that they're use to it.

Well, all of this makes fiscal policy complex. We still have policies that are in place from the Great Depression. The spending plans that the government enacted on the advice of John Maynard Keynes' writings have created constituencies in the form of agriculture and subsidies to different industries that are almost impossible for us to dismantle now, whether or not they're still required. Certainly trying to figure out when the government should spend the money, on what, under what circumstances government stimulates is actually going to do some good makes the real story a lot more difficult than the pictures that we've been drawing in our models. So, in conclusion, let's say that fiscal policy comes with a lot of complexity, the recognition lag, the lag of implementation, administration, all of this makes it more difficult to use government spending, taxes and other incentives to fine tune the economy than it would appear in theory.
Sometimes a small change in the economy can have a big effect on real gross domestic product. If consumers decide they want to spend more money, they create income for other consumers who want to spend more, and through the multiplier process a small change in autonomous spending results in a big change in output. Well, this is one of the things that causes the business cycle to be as severe as it can be. The multiplier effect and the fact that once income starts moving in one direction, everybody tends to ride it along increasing their spending as well until something else changes, we peak out and tank in the other direction.

The economy can move in jerky fashions like a roller coaster and everybody’s got a stake in things being more stable. We would all for output and employment and all of these other variables to be more reliable, more stable. Therefore, what we look for is policy measures that can increase stability. One of the things that can increase stability is activist fiscal policy. That is, if it’s executed well, an increase in government spending can compensate for a reduction in consumer spending keeping the economy at full employment. Or if consumers decide they don’t want to spend money, the government can coax them to spend more by giving them a tax cut.

However, there is a form of government policy that works passively without an active government decision and these are the automatic stabilizers that are built into the government budget. Whenever output begins to increase, there are certain characteristics of the government budget that slow down the multiplier process and cause consumption spending to increase at a slower rate than income, and this ends up dampening the business cycle and causing the roller coaster to be a little less extreme. Let’s think about what those automatic stabilizers are and then show how they would be represented in our model.

The first automatic stabilizer is the progressive tax system. When income begins to increase in the model, people find themselves in higher tax brackets. If you make more money, you’ve got to pay a bigger percentage of your income to the government. That means as your income grows, your consumption is going to have to grow at a slower rate and this tends to slow down the boom, and it also tends to keep the recession from being as severe. When your income is decreasing during a period of recession, you’re slipping into a lower tax bracket so your consumption doesn’t decrease as fast.

Another automatic stabilizer is unemployment insurance and other transfer payments. To qualify for unemployment insurance you have to be unemployed, which is a big decrease in your income. So what the government does during a period of unemployment when people’s incomes have fallen rapidly, is that it pays people unemployment insurance so that they can keep their consumption relatively stable. That is, your consumption falls a lot less than your income decreases during a period of unemployment and this tends to slow down the business cycle. I mean, imagine, without unemployment insurance when you lost your job, your consumption would be radically cut, which would then reduce the grocer’s income and all these effects would be magnified through the economy. But when you lose your job and your income falls, you start collecting money from the government, which allows you to keep your consumption relatively constant and reduces the multiplier effect.

On the other hand, when the economy heads into a boom, you stop collecting unemployment and that causes your consumption to increase less rapidly than your income because you’re losing a source of money that you had before when you were unemployed. So the progressive tax system and unemployment insurance and other government benefits cause the business cycle to vary less severely than it would in the absence of these two counter-cyclical automatic stabilizers.

Again, we call them automatic because the government has set them in place, but doesn’t have to vote on them every time it wants to enact a policy. These are automatically part of the government’s budget, automatically part of the way the government interacts with the macroeconomy.

Now let’s see how automatic stabilizers would be represented in our diagram. Here we have aggregate demand and aggregate supply represented in the usual graph. Whenever the economy is booming, it’s because aggregate demand is increased. Suppose aggregate demand has increased due to an increase in consumer confidence. Everybody opens their wallets, they spend more money, and as a result people who work in retail have fatter paychecks so they in turn spend, and the multiplier effect creates a big increase in output and equilibrium from $Y_a$ to $Y_b$. This is the output level during a boom. So how we would show that is we would move from the regular income level that we start with up to a higher income level during a boom.
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Automatic Stabilizers

Then suppose something happens and businesses become fearful and they stop investing because they’re afraid of a new government regulation that’s going to limit their ability to make profits. As a result they stop buying computers and stop building factories and aggregate demand shifts down to this lower level, AD_Recession, standing for recession which means that output is going to shrink to a level lower than the original level and here we got a business cycle. Then maybe it turns around again due to an increase in foreigners’ demand for our exports and the business cycle just goes on and on describing this purple snaky line where output which is measured on the vertical axis increases and decreases over time.

Now what’s going to happen if we have automatic stabilizers? With automatic stabilizers, whenever the consumers open their wallets and start spending more money, then the people who run retail stores experience an increase in their income, but now they’re going to have to pay higher taxes because they’re in a higher tax bracket. Because they’re in a higher tax bracket, they are not going to be able to keep as large a percentage of their disposable income as before and therefore their consumption spending grows less rapidly than their income.

The same thing happens as incomes increase. People who were previously collecting unemployment insurance and other government transfer payments, they lose that transfer of payment and therefore their incomes, their spendable income grows less rapidly than the increase in gross domestic product. So people are spending a lot more money, but aggregate demand doesn’t increase as fast whenever we have the automatic stabilizers of progressive taxes and unemployment insurance and other public assistance payments. So the actual increase in income is not as much as the boom income before, in fact, it’s going to be less. The same increase in consumer spending gives us an income of Y_prime which is actually less. So if we show the boom income now in blue, that’s going to be a smaller amount than before. So what we get is a business cycle that has lower highs and also turns out higher lows. Let’s see how that works.

If we have a situation where businesses become spooked and stop spending money on capital goods, then the people who make those capital goods suffer a decrease in their income. However, they also have to pay less in taxes and they’re able to collect unemployment insurance from the government. So their spending doesn’t increase by as much as the income does. Therefore, aggregate demand in the recession doesn’t fall by as much as it would fall in the absence of automatic stabilizers. So because the automatic stabilizers are present, the economy has a little break on it, it has a cushion, and people’s spending doesn’t fall as fast as it would fall if taxes weren’t progressive and unemployment insurance weren’t available. So what happens then is the business cycle has lower highs and higher lows. And that’s what happens. You end up with the business cycle being dampened by the automatic stabilizers. When the economy booms during a period of increased spending, consumption expenditures increase more slowly than GDP and that puts a break on the rate at which the economy grows. When the economy slips into recession, people can collect transfer payments. Also, people end up paying less in taxes so consumption spending doesn’t fall as rapidly as income does. All in all automatic stabilizers cause the business cycle to be dampened, that is the highs are lower and the lows are higher and there’s not as much instability as there would be in the absence of these stabilizers.
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Hot Topic: The Political Business Cycle

Nothing like a visit to the Halls of Power to teach you about how your government works. Inside that building your elected officials are passing laws to protect your property and your person. They’re also making decisions about how much money the government should spend to finance public goods and services and about when that money should be spent. In other cases we have our public officials trying to influence monetary authorities encouraging them to increase interest rates or reduce them. A theory comes out of the recognition that politicians have their own self-interest as well as the public interest at stake when they make laws and this is the idea behind the notion of political business cycles. The story works like this.

Politicians who are self-interested may at times engage in rent-seeking behavior. That is, behavior that is privately profitable but publicly destructive and it’s a matter of how government is spending its time. Would politicians, particularly the majority party in Congress, time public spending, that is, engage in a fiscal policy that stimulates the economy right before an election so as to make their constituents happy? Might they also exert influence on the monetary authorities to lower interest rates and pump a little white sugar into the economy so that voters are pleased? This notion of political business cycles says that the government in power in an attempt to be reelected is likely then to influence fiscal and monetary policy in such a way that the economy is stimulated before an election and then slowed down after an election so that inflation doesn’t get out of control.

Well, there is some evidence that politicians are thinking about their constituencies when they make fiscal policy and try to influence monetary policy. The Democratic administrations are characterized typically by lower unemployment rates and higher inflation rates reflecting the fact that Democratic administrations are more likely to work the inflation unemployment tradeoff to the advantage of their constituents, workers, labor. On the other hand, Republican administrations are typically characterized by lower inflation rates and higher rates of unemployment reflecting the fact that the Republican parties are more likely to have lenders as their constituents. However, when we go back to the notion of political business cycles, it’s all about timing. Are politicians timing the spending of government money in such a way as to stimulate the economy before the elections? And the second question is are the voters buying it?

Well, there’s lots of evidence particularly anecdotal evidence to suggest that Congress, the majority party, times spending so as to please voters right before an election. On the other hand there’s lots of anecdotal evidence suggesting that the President influences the Chairman of the Federal Reserve Board to lower interest rates right before an election. But it’s all anecdotal. There’s no hard and fast correlation and we never see behind the scenes why people are actually doing what they’re doing.

As far as presidential elections are concerned it does seem like there is some correlation between how the economy has done in the third and fourth year of a President’s term and the probability that that President will be reelected. On the other hand there’s almost no correlation between whether the majority party in Congress remains in power and how the economy has been doing up to that point. So it’s a great story. A story about self-interest, motives, rent-seeking, all the stuff that economists like. But even though the story is internal and consistent and makes logical sense, there’s just not a lot of statistical evidence to suggest that it’s actually what’s driving the economy. The political business cycle is a good notion that kind of weaves political science together with economics; but so far, it’s unproven. It’s a good theory, that is a good story, but its explanatory power is yet to be proven.
Now we're ready to enter one of the big debates of macroeconomics. Does fiscal policy work? For a lot of this century the government policy of the United States has been driven by the ideas of John Maynard Keynes, who argued that government spending can pull the economy out of a recession and reductions in government spending or increases in taxes can slow the economy down when it's overheated.

During the 1950’s and 1960’s in this country, government policy, fiscal policy, government spending and taxes were pretty much driven by the ideas of John Maynard Keynes. Now, developments in the 1970’s calls Keynes’ wisdom into question. Things that were going on in the supply side, supply shocks, oil price increases gave us stagflation and made Keynesian policy appear relatively ineffective, or in some cases Keynesian policy seemed to actually worsen the problems of the economy. Nowadays the big debate in macroeconomics is whether fiscal policy can be effective at all, that is, does Keynes’ idea still hold sway in the new millennium? Or have new ideas about economics, ideas that are based more on the disciples of Adam Smith, the spontaneous adjustment of prices and wages to clear markets; ideas about macroeconomics that are more closely based on macroeconomics. Those ideas seem to have captured the imagination of a lot of macroeconomists.

So what we're going to do in this discussion is look at why Keynesian ideas about fiscal policy may, in fact, not work, and then at the end of the discussion come back and talk about how the new Keynesians are defending their ideas against the new classical economists.

So let’s start with the new classical view. Why might it be that an outward shift in the aggregate demand curve that comes about when the government spends more money or cuts taxes, why might it be that this outward shift in the aggregate demand curve does not, in fact, have the effect of stimulating the economy and leading us to a new higher output level Y1? Why might that not happen? Well, there are two reasons to believe that aggregate demand outward shift would not, in fact, have the desired result.

The first is that the short-run aggregate supply curve may, in fact, adjust so quickly that the economy is pulled right back to full employment. If the short-run aggregate supply curve begins to shift upwards because we are above full employment, then prices are going to tend to rise. If that adjustment process occurs very rapidly because of rational expectations, then the short-run aggregate supply curve moves immediately to its long run position, the price level rises to compensate for the extra demand that the government has pumped into the economy and there’s no real change in output. Now there may be some change in the composition of output because we’re going to have crowding out, but there’s no stimulation of the economy. When the government spends more, prices rise flexibly and we never leave the green line. This is the view of macroeconomics that’s based on micro, which is that prices rise immediately to eliminate excess demand or fall to eliminate excess supply.

So the first reason why the new classical economists argue that fiscal policy is ineffective is that prices and wages adjust very, very quickly to eliminate excess demand, therefore we can’t hang out at a point like Y1 where outputs beyond full employment because prices will simply rise until we get back to the green line, kind of like a shortage of onions doesn’t persist because the price of onions goes up until the quantity supplied is equal to the quantity demanded.

The second reason that the new classical economists believe that fiscal policy is ineffective is that if people are rational and forward looking, then what’s going to happen is people think about the government budget. They say, “Huh! You know, the government’s spending more money which means that eventually they’re going to have to raise more taxes to pay off their debt, that means coming soon is more tax burden for me and I better start saving money right now to have the money in the bank to pay the taxes when the government finally gets around to increasing them.” What happens then is that every dollar that the government spends in additional money is a dollar that consumers are going to reduce their spending to put the money in the bank so that they’ll be prepared to pay the taxes when they come due. This is a very, very hyper-rational view of the way people think about the future, however in the new classical world, that’s exactly what people do. People are forward looking and then they see that an increase in government spending is going to lead eventually to an increase in taxes so they prepare for it now by reducing their spending accordingly. Well, what happens in that case is the aggregate demand curve doesn’t shift out at all. The government tries to shift it out, but people know that taxes are coming, so they shift it right back by reducing consumer spending so the aggregate demand curve never leaves its initial position and nothing happens, nothing at all. No crowding out, no adjustment in prices. People simply increase their savings to match the increase in government spending. So there you have it, the new classical view, a world in which people are rational and
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forward looking and a world in which wages and prices can adjust freely to clear markets. One of two things happens. Either the government spending increases aggregate demand and prices undo the effect or the government tries to shift aggregate demand outward and people undo the effect by saving in anticipation of higher future taxes. No effect for fiscal policy, no effect in the short run because there really is no short run. Prices adjust too quickly and, again, no effect in the long run because you're going to be at full employment always in the new classical view of the world.

Now how do the Keynesians answer this? The Keynesians answer this first of all by saying, well, wages are sticky. Wages are sticky for several reasons. They're sticky because of labor contracts that are negotiated by unions where the wages have to stay constant over a period of time. They're also sticky because of efficiency wage arguments that companies don't change their wages for fear of losing their best workers or for fear of not paying their workers enough to be able to afford good nutrition and adequate leisure to be productive and also the consequence of motivation. You pay a high wage simply to keep your workers showing up on time and doing the best work. So wages stay fixed because they're not purely driven by the need to make supply and demand for labor equal. There are other things that the wage does that influence the quality of labor and therefore, wages don't change to clear the market the way other prices do.

Well, if this is the case that wages are held fixed by institutional constraints like labor contracts negotiated by unions and other productivity constraints as in the efficiency wage story, then wages are sticky so when the aggregate demand curve shifts outwards with increased government spending, we will move along the short-run aggregate supply curve and it won't start shifting upwards until something else changes. It may not shift upward at all if the efficiency wage considerations are really binding and if labor unions have held the wage constant in the short run, it may be a while before the adjustment process starts. So the new Keynesians say that if you can shift out the aggregate demand curve, aggregate output will increase at least until wages can adjust and that may take a long time and it may not ever happen if efficiency wage considerations are very, very strong.

So there you have it. We've restored Keynes' power in a kind of sophisticated way by saying labor contracts and efficiency wage considerations give us sticky wages and this was the argument that was made against Keynes back in the 1930's when he first wrote that wages are sticky because of things that are additional considerations in the labor market that may not apply in the market for onions or the usual supply and demand situation.

Finally, there's this thing about how do we get the aggregate demand curve to shift outward if people anticipate higher taxes in the future and one answer that the new Keynesians would give to this is that people are liquidity constrained, that it's easier for the government to borrow money than it is for households to borrow money. So if the government gives you a tax break today, they've effectively lent you money and you're going to go out and spend more. Sure you know that taxes are coming in the future, but it's easier for the government to borrow money and give it to you in the form of a tax cut than it would be for you to go to the bank and get the same loan. The government gets a better interest rate, the government has a better credit rating and all of that. Therefore, tax cuts, even though you know you have to pay it back in the future, does stimulate your consumption because the government can borrow at a better rate than you can.

Well, there you have it. The two sides keep arguing with each other and if I haven't come down on one side or the other, it's because I want you to appreciate that the argument is kind of complex. Every year macroeconomists dig their ditches deeper trying to decide whether, in fact, Keynes' ideas can be justified in a world where information flows rapidly and contracts can be renegotiated. Are there reasons why the stickiness of wages might persist even in a very rational economy? And if that's the case, then Keynesians' policy prescriptions still have some validity. On the other hand as we move into a world where online auctions and instant stock market quotes and everything tends to cause prices to change constantly all day. As prices become more flexible, we seem to be more in the world of the new classical economists where you wouldn't expect for dis-equilibrium or imbalances to persist. Therefore these blue curves most instantly. People are rational and forward looking and in that world it seems less likely that anything the government does would actually be able to move the economy away from its full employment level. So there you have it, the debate between two camps of macroeconomists. One side that follows the thinking of John Maynard Keynes, sticky wages give fiscal policy power and the disciples of Adam Smith, the new classical economists who say that rapid adjustment of wages and prices means that the economy always has to be at full employment and it finds some way to get there. If people are forward looking and rational and prices are flexible, then fiscal policy is ineffective. These two sides will probably keep arguing for some time.
Supply-Side Policy

Ever so often in the press someone will refer to supply-side economics. What are they talking about? Well, we’ve talked about how fiscal and monetary policy work by shifting the aggregate demand curve. You can also imagine policies that work by shifting the supply curves. And you shift the supply curves by changing the incentives of the people who produce output, changing the incentives that affect workers or people who save money or people who supply raw materials to the economy. How do you change those incentives? One of the biggest things that affect people’s incentives is the tax rate. The more of your income you get to keep after taxes, the more enthusiastic you’re going to be about working extra hours, taking an extra job or doing a project if you’re self-employed. So what is the relationship between the tax rate that you are charged on your income and the total amount of revenue that the government collects in taxes?

Think about it this way. Suppose the tax rate were a hundred percent, you had to pay all your income to the government. You wouldn’t want to work at all so you’d work none and the government would get no tax revenue because there’d be no income to tax. On the other hand, if the tax rate is zero, you’re going to be very enthusiastic about working, a lot of stuff is going to be produced, but the government would get no revenue because it isn’t taxing any. Now somewhere in the middle is the point where the government is going to get maximum tax revenue. The higher the tax rate, the less enthusiastic you’re going to be about working after a certain point and, therefore one economist, Arthur Laffer suggested that by reducing the tax rate, the government might actually collect more money in taxes because people would work harder.

Let’s see his argument in a picture called the Laffer curve. On the horizontal axis, we have the tax rate, the percentage of your income that you pay in taxes to the government. On the vertical axis we have total tax revenue that’s collected by the government and this total tax revenue is going to be a function of the tax rate. We’ve already looked at two extreme cases. If the tax rate is zero, the government is going to collect zero in revenue. If the tax rate is 100 percent, then the government is going to collect zero because no one’s going to be working because they’d have to give all their money to the government. Well what happens, Laffer argues is that as the tax rate increases from zero towards a hundred, at first government revenue increases as people work and the government collects part of their paychecks in the form of taxes. But after a certain point as the tax rate rises, people are so unimpressed with their opportunities to earn money, that is, they have to give so much of it to the government, that they actually start working fewer hours and enjoying leisure instead. What happens then is that as the tax rate continues to rise, tax revenue actually falls back towards zero, which is what you’re going to get when no one’s working because the government gets all the money.

Laffer says the point that the government would like to be is right here. This is the point where you get maximum tax revenue. What is the tax rate that’s going to give us that maximum revenue? t* – they can’t be sure. But this is the argument that Arthur Laffer and other supporters of President Reagan made during the 1980 presidential campaign. Supply-side economics argued that taxes were above t*, that the tax rate was so high that some rate, call it tH for high taxes. That people were actually deterred from working and the argument was that if the government would cut the income tax rate from a high level to a lower level, that they would actually increase the total tax collections because people would work harder. That the additional income that people earned from extra effort would compensate for the lower tax rate. Now, for the most part, this is what happened after President Reagan’s big tax cuts in 1981 and 1982. Total tax revenue did increase. The economy grew out of a recession and that was probably part of it, but some of it might have had to do with the fact that business incentives were increased by a lower tax rate.

On the other hand, if you are over here in this region of the Laffer curve, say with a low tax rate, if you cut tax rates even further, then you’re actually going to get a reduction in tax revenue collected. If you cut that down to an extra low tax rate, then revenue is going to fall. The big question for an economist who’s advising a politician then is where are we are we on the Laffer curve? Are we up here where lower tax rates would increase tax revenue or are we down here where lower tax rates would just be giving away tax money without providing sufficient incentives that compensate for the lower rate. It’s an empirical question. It’s a question that has to be answered by trial and error or by studies. So it looks like in the 1980’s there is some evidence to suggest that we were at this point and that the Laffer argument actually applied. However, whether that would happen again today or not is not to be taken for granted. Supply-side arguments depend on such empirical information not just the logic that a Laffer curve might exist, but empirical information about where we are right now on the curve.

So this is what supply-side economics are about. Changing taxes, changing regulations in such a way that give people so much incentive to increase output that the lower tax rate is actually offset by the increased work effort.
Monetary Policy: The Mainstream

The Quantity Theory of Money (review)

So I just bought some groceries and I got this dollar in change and it says Lucy on it. Now I have no idea who Lucy is, but Lucy, wherever she may be, has made me think about the fact that any given dollar bill gets spent and re-spent and spent again in the economy in the process of our goods and services changing hands. It makes me think about the relationship between money and real goods and services. What's the connection and this is really an important question because it's at the heart of the question of whether the Fed can really influence the economy or not. Here's the question. What's the relationship between paper money, which is nominal, that is, imaginary, and real goods and services, that is, stuff that we actually buy at the store that satisfies our wants and needs. Is there a connection between the nominal economy, the money economy and the real economy, and if so, what is it?

We go back to this equation that explains the relationship between money, prices and real output in the economy. This is called the quantity equation. And the quantity equation is quite intuitive. It says that all the shopping that's done in our economy, the gross domestic product has got to be paid for somehow with the money supply. Whenever you go shopping, you pay for whatever you get with cash or checks and that's the money supply. Now the money supply in our economy is about a trillion dollars and the gross domestic product is about eight trillion dollars. That means that every dollar bill circulating in our economy on average is being spent and re-spent eight times during the year to make this equation balance. All the shopping has to be paid for and since the money supply is less than the gross domestic product, that means dollars are spent and re-spent, and the rate of re-spending is called velocity. Well, the classical economists said, "Look, consider this reasoning. If the velocity of money is constant, then any increase in the money supply shows up as either an increase in the price level or an increase in real output."

However, real output is governed by the speed limit of the economy, that is, there's full employment output and if you try to have more output than full employment, prices go right up and if you try to have less employment than full output, then you've got slack in the economy and wages and prices fall. So if you believe that wages and prices adjust instantly to keep supply and demand in balance, if you're a classical Adam Smith schooled economist who believes that prices do all the work in the economy adjusting up and down to make supply and demand balance, then you believe that any change in the money supply is going to immediately feed in to a change in prices with no change in the real economy. This is what's meant by the statement "money is neutral." If we say that money is neutral, we're speaking from a classical point of view. Increasing the money supply by 10 percent only increases the price level by 10 percent with no change in real output. Nothing changes. Output, investment, employment, all that stuff that we really care about, the whole real economy, the economy of goods and services remains unchanged. The change in the money supply influences only nominal variables. This is what's called the classical dichotomy. The world of money is completely separate from the world of goods and services, that is, the real economy is disconnected from the monetary economy. Now that's a very extreme position and most economists nowadays believe that changes in the money supply, at least in the short run, can influence output, as well as prices. But in the long run, the classical position holds, that is, even the models that we use nowadays that allow some latitude for money to affect output, in the long run all of the affect goes into a change in prices and we'll see that shortly.

But first, let me give you an example of what a timed series would look like following a change in the money supply. Suppose we're in a world where the money supply can have an influence on output in the short run. And this is certainly the case, I mean, in 1992 when the Federal Reserve had encouraged banks to lend more money to businesses and end the credit crunch that followed the banking crisis of the 80's. What happened was interest rates fell and businesses began borrowing and beefing up their capital stock, building more factories and buying more equipment. So in the short run with the increase in money supply, there was an increase in output. Here's what it looked like. The Fed was clipping along here with the money supply at a fixed rate and notice here I'm using movement along the horizontal axis to indicate the passage of time. So time passes as this line flows to the right. And here we are with the Fed making the decision to increase the money supply, let's say by 40 percent. So the Fed increases the money supply and this new money supply just clips along for the rest of time. Well, what's going to
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happen in the economy? What would really happen is that output would begin to increase because of the availability of credit. Businesses can borrow easier, interest rates are lower and output increases, but then at some point prices begin to increase and when they do, the demand for money increases and with the increase in demand for money, interest rates rise, people stop spending as much, consumers don’t like the higher prices because it shrinks the real value of their wealth and foreigners stop buying our stuff because other goods from other countries are less expensive. So the rise in prices then choke output back to its full employment level and output goes along. There’s been a temporary blip here, a little stimulus to the economy from the monetary policy, but nothing enduring. In fact, what happens is prices clip along at their regular rate and then with the increase in money supply, prices begin rising and they rise until they get to their new level which is going to be proportionally equal to the increase in the money supply. So if the money supply goes up by 40 percent, then in the long run prices are also going to rise by exactly the same amount, 40 percent, and output is going to be unchanged. That’s because output in the long run has to respect the speed limit and then if we’re above the speed limit, prices are going to rise until we’ve dropped back to the speed limit as we’ve seen in our other models.

So how long does this process take? How much of an increase in output are we going to get? Listen, even if it doesn’t last forever, it’s better than nothing, right? Can monetary policy have an affect in the short run even if it can’t have an affect in the long run? Well, that depends. It depends on quickly people digest the future. If people are forward looking, forming rational expectations of what’s to come, they’re not going to be fooled at all. This increase in the money supply, they know, if going to very quickly create inflation, in fact, they may even act in anticipation by raising their prices now. They say, “Oh-oh, money supply up 40 percent, that means prices are going up 40 percent. I better raise my prices now.” Labor unions negotiate for higher wages, people try to raise their prices so they’re not caught behind with their rivals raising the prices before them and what we might get is an instantaneous adjustment of prices with no period of higher income at all. This is the extreme view in which monetary policy can have no effect, not even in the short run. If expectations are rational, we’re more likely to have the case here represented by the dotted lines where all the adjustment is instantly on the side of prices with no change in real output at all.

So back to our original question. Can money make a difference in the real economy? Can a change in the money supply influence output, employment and investment? And the answer is it depends. In the long run clearly not. The nominal economy in the long run influences only the nominal economy. In the short run, however, it’s possible that only to the extent that people do not perfectly digest the future, don’t perfectly change their behavior in response to what they see coming to the extent that they do, money has no affect at all. It’s perfectly neutral. But to the extent that people are fooled, they’re slow to change their expectations, money can in the short run have an effect on the real economy.
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Monetary Policy Using the AD/AS Model

We discussed how the classical economists believe that money was neutral, that is, changes in the money supply in the long run have no affect on the real economy. Let's see if we can recreate that result now in our model of the macroeconomy. Let's look at how we would represent monetary policy using the aggregate demand and aggregate supply curves and see if, in fact, money can make a difference in the short run or the long run and what that conclusion depends on.

So we're considering here monetary policy, which means we're going to be shifting the aggregate demand curve. An increase in the money supply is going to lower interest rates, and therefore, shift the aggregate demand curve outwards as businesses do more investment spending at lower interest rates. A decrease in the money supply, on the other hand, is going to raise interest rates and, therefore, shift the aggregate demand curve inwards as businesses do less investment spending at the higher interest rates. So monetary policy is shown in the picture as a shift in the aggregate demand curve, but what is monetary policy? What actions are going to accomplish this shift?

First, there are changes in the reserve requirement. If the Federal Reserve lowered the reserve requirement on commercial banks, banks can create more checking accounts and therefore, more loans for a given quantity of reserves. That increases the money supply and lowers the interest rate and shifts out the aggregate demand curve. The second policy tool is the open market operation. If the Federal Reserve buys government securities, it puts money into circulation as it takes the securities into its own vault. This increase in reserves in the form of the Fed paying for securities with checks is going to increase the number of loans that banks can make and therefore, increase the money supply and shift the aggregate demand curve outwards. And finally, if the Federal Reserve lowers the discount rate or makes more discount loans, they're going to be pumping reserves into the banking system and increasing the money supply shifting out the aggregate demand curve. So a decrease in the reserve requirement, open market purchases of securities and lowering the discount rate and increasing discount loans, all shift out the aggregate demand curve. We call this expansionary monetary policy because the economy is going to expand as a result of the increase in the money supply. Let's show how this works now in our diagram.

The increased money supply shifts out the aggregate demand curve from AD0 to AD1. In the short run now, we're going to have a period of adjustment, that is, at the original price level, P0, in our original long-run macroeconomic equilibrium, we have excess demand in the markets, that is, people want to buy more goods and services than the economy is creating. If you look at the difference here between the price as it touches the blue curve and the price as it touches the new red aggregate demand curve. This means that there's going to be a shortage of goods and services and upward pressure on the price level. So as the price level increases then, the demand for money increases, interest rates rise and businesses cut back some on their investment spending. At the same time, consumers buy less because of the wealth affects and foreigners buy less because of our goods being relatively expensive. As the price level rises, businesses produce more in the short run until we get to this new point right here with a price level of P1 and higher output level of Y1. So in my diagram here, I'm going to have this adjustment in the short run. Now as long as the short run persists, we get expansion of the economy, that is, the increase in the money supply by lowering the interest rate relative to what it originally was has stimulated business spending and therefore, increased demand and increased production and the economy has grown and with it employment. Prices are also up a bit compared to where they were before. However, this situation is unsustainable and you can see why. We're above full employment, we're driving faster than the speed limit of the economy and, therefore, there's going to be upward pressure on prices as businesses compete more aggressively to hire workers and get raw materials. So what happens as the price level rises is businesses begin to pass these increased costs onto their customers in the form of higher prices for goods and services. So the short-run aggregate supply curve begins to shift upward. So the economy moves along the aggregate demand curve as the short-run supply curve keeps shifting upwards until finally we get to a new long-run equilibrium with this short-run supply curve, the short-run aggregate supply curve which I've labeled with infinity because this is the end of our adjustment process.

So what's changed relative to the initial situation? The money supply increased which stimulated business spending, but it caused the economy to overheat and with it rising prices. As the short-run aggregate supply curve shifted upwards, the price level continued to rise until it reached its new long-run equilibrium level and we're going to call that new long-run equilibrium level P infinity. This higher price level is the consequence of the increased money supply. Well, what's changed in this economy? Well, what's changed, in fact, is very little. The result of the increased money supply is that the price level is higher. But the economist isn't especially interested in that. We want to know what affect does this price level have on everyone else in the economy. Has it actually changed anything?
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Well, let’s see. Output hasn’t changed because in long-run equilibrium, we return to full employment so output is exactly the same as it was before. So to that extent, money increases have had no long-run consequence on output and therefore, they haven’t permanently expanded the economy. Well, what has changed? Has business spending changed? Well, perhaps not. Certainly government spending hasn’t changed because it’s completely autonomous. Our price level is higher than it was before, so foreigners may be deterred from buying our goods and services and if foreigners are deterred from buying our goods and services, then who’s made up the slack? Well, consumers are probably also deterred because their savings accounts are shrinking in purchasing power because prices are higher. So if foreigners and consumers are buying less, who’s buying more? The government is buying the same as it was before. It must be that businesses are buying more. It must be that the expansion in the money supply has lowered interest rates enough that businesses step in and buy more goods and services. Perhaps that’s the thing that’s changed in this model. Nothing else has changed. It may be that there’s a slight change in the composition of spending with businesses purchasing more of the goods and services and consumers and foreigners purchasing less. But in the end we have exactly the same output as we had before. The price level is higher and there have been no other real consequences in the economy. That’s what the classical economists mean whenever they say that money is neutral.

Well, that’s expansionary monetary policy. We could now draw the other picture, have the aggregate demand curve shift inwards as the money supply is reduced. The Federal Reserve would tighten the money supply by raising the reserve requirement or raising the discount rate or doing open market sales of security, taking money into their vaults and putting securities out into the market. In that case the interest rate will rise and businesses want to spend less and you get exactly the opposite adjustment process. The economy is below full employment, the price level falls and the short-run aggregate supply curve shifts outwards until we get a new intersection at a lower price level. Once again, no change in the long run in output and employment in the economy. The only changes might possibly be in the composition, that is, the relative, quantities of output purchased by households and foreigners on one hand and businesses on the other.

So from the point of view then, of the model we’ve been developing, it does look like money is neutral, that is, money might in the short run have an affect on output, but not in the long run except as far as who’s buying it depending on how prices influence people’s behavior.

Now this brings up a question, which is does monetary policy make any difference at all? And that depends on how quickly the supply curve moves from its original position to its new long-run equilibrium position and that’s going to depend on how quickly people figure out what’s going on. That’s the rate at which their expectations adjust to the new environment and the rate at which contracts like labor union contracts for wages and fixed prices that are in menus, the rate at which those things can change. If they can change rapidly to incorporate people’s expectations about inflation, then the blue curve might move very quickly and we might not spend much time at all at this point of expanded output. We might instead move very quickly up to this new point. If expectations are completely rational and there are not institutional constraints like contracts, then we’re going to go directly up to the new long-run equilibrium. There’s no affect at all. Output never increases and monetary policy has no affect at all as far as expanding the economy. We just stay where we were.

So there you have it. Money is neutral in the long run and we get to the long run faster if expectations are rational and there are few contractual constraints on the economy. The economy expands when the Fed increases the money supply, it contracts when the Fed decreases the money supply, but the extent to which those expansions and contractions actually change output, depend on the speed with which people adjust to the change in the economy.
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Monetary Responses to Changes in the Economy

We’re going to use our model of the macroeconomy to show how monetary policy can be an effective response to other changes in the economic environment. What we’re going to do is shift each of the three curves in our picture and show how, in each case, monetary policy can either shorten a recession or prevent inflation. Let’s look at what happens, first of all, if the aggregate demand curve shifts.

Suppose the aggregate demand curve were to shift inward representing a reduction in aggregate demand and setting up a recession. If aggregate demand goes from $AD_0$ to $AD_1$, the economy is going to tend to adjust to a position with lower prices and less output. This shift in aggregate demand would occur if, for instance, the government reduced its spending or if consumers lost confidence in the economy and started saving instead of spending, or if businesses decided that, in fact, the outlook was not bright and, therefore, wanted to do less business spending or foreigners started buying their goods elsewhere. If there’s a reduction in aggregate demand, we get lower prices and less output. What can monetary policy do in this case?

First, ask the question, “What would happen in the absence of any policy response?” Well, what would happen because we’re at an output level that’s below full employment, what happens is that the price level begins to fall because of slack in the labor market and resource markets, those prices begin to fall, and competitive businesses pass those lower costs onto their consumers in the form of lower product prices. Therefore, the short-run aggregate supply curve shifts from its original level downwards until eventually it reaches $SRAS \_\infty$, the end result of the adjustment process, at a much lower price level $P \_\infty$ and full employment. So the first thing to keep in mind in all of these stories is that if the economy is left to its own devices, it will eventually adjust back to full employment. Now, you know that prices tend to fall less easily than they rise. Wages are sticky downwards. In that case it’s more likely that a recession will persist because it takes a while for the slack in the labor market to actually translate into lower wages, therefore, the economy could hang out at this point for some time in a recession and only after a fairly long adjustment period does full employment get re-established. The classical economists said to John Maynard Keynes, “Hey, leave the economy alone.” In the long run it adjusts back to full employment. Keynes, thinking about sticky wages said, Yeah, but in the long run we are all dead. So what can we do rather than sit here and endure a long recession?

Well, monetary policy could be used. The Fed could reduce the reserve requirement, buy government securities or lower the discount rate and make more loans to banks, and in so doing, shift the aggregate demand curve back out to its original position. That then, prevents the adjustment process of prices, and takes the economy right back to where it was. So if aggregate demand is reduced because of changes in autonomous spending, then the Federal Reserve can respond with a countervailing monetary policy. Expansionary monetary policy is a response to a contraction in demand and the result is the economy goes right back where it was. As demand shifts the economy in, the Fed can shift it back out and leave us right where we were without a long painful recession. In theory, that’s how expansionary monetary policy responds to a contraction in demand.

Let’s look at another case in which the Fed can respond to a shift in one of the policy curves. Suppose that we have a supply shock in our economy and this supply shock shifts the short-run aggregate supply curve upwards. This supply shock might be an increase in the price of oil, perhaps due to a war in the Middle East. If that happens, then the higher price of oil gets passed on by businesses to their customers in the form of higher product prices. The short-run aggregate supply curve shifts from its original level downwards until eventually it reaches $SRAS \_\infty$, the end result of the adjustment process, at a much lower price level $P \_\infty$ and full employment. So the first thing to keep in mind in all of these stories is that if the economy is left to its own devices, it will eventually adjust back to full employment. Now, you know that prices tend to fall less easily than they rise. Wages are sticky downwards. In that case it’s more likely that a recession will persist because it takes a while for the slack in the labor market to actually translate into lower wages, therefore, the economy could hang out at this point for some time in a recession and only after a fairly long adjustment period does full employment get re-established. The classical economists said to John Maynard Keynes, “Hey, leave the economy alone.” In the long run it adjusts back to full employment. Keynes, thinking about sticky wages said, Yeah, but in the long run we are all dead. So what can we do rather than sit here and endure a long recession?

Well, how can this problem be solved? First of all, keep in mind that if the Fed does nothing at all, then the short-run aggregate supply curve will begin to shift back to its original position. The shift back to the original position occurs because after the supply shock, the economy is dragged down to an output level that’s below full employment. This means prices are going to tend to fall and as prices fall, the short-run aggregate supply curve shifts outwards and...
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takes the economy back down the aggregate demand curve to its original position. So, if we do nothing, the economy will adjust, but it may take forever, and may have to endure a long period of unemployment. On the other hand, the Fed could take swift action to prevent this recession by using expansionary monetary policy. The expansionary monetary policy would shift the aggregate demand curve out to this new position and establish an equilibrium back at full employment, but this time with a higher price level.

So this new higher price level, we’ll call this P2, is the result of the Feds increasing the money supply. When the Fed increases the money supply, interest rates fall and businesses begin to increase investment spending. So with the supply shock, businesses cut back their activity of producing and as the prices rose, consumers and businesses found themselves spending less. When the Fed increases the money supply by lowering reserve requirements, buying government securities and so on, the interest rate falls and business investment spending is stimulated. So the economy returns to full employment only now we’ve got a higher price level and that’s the cost here. You can’t have the best of both worlds here. You can’t have lower prices and higher output because a tradeoff is created by the supply shock. We can either increase the money supply and have higher prices and get back to full employment or we can leave the money supply unchanged and endure a recession and let the economy gradually adjust back to full employment. If the Fed wanted to take prices back to their original level after the supply shock, the Fed would have to increase aggregate demand and deepen the recession.

Now this has certainly happened in certain periods. We’ve had deep recessions, for example, in the early 1980’s when the Federal Reserve was aggressively fighting inflation. But see here, the inward shift of the aggregate supply curve following the supply shock has created a tradeoff in which the Fed can either restore full employment at a higher price level or lower the price level by shifting in the red curve at the cost of an even deeper recession. So this is how monetary policy works when there’s a supply shock in the economy.

Finally, let’s consider a case in which the green curve itself moves. What happens if the economy enters a period of very high productivity? Well, let’s look. Suppose the supply curve shifts outwards. The long-run aggregate supply curve shifts outwards, representing an increase in the productive capacity of the economy. We’ll call this new curve LRAS1. So the economy has increased its productive capacity through, for example, an improvement in technology or immigration or an increase in the capital stock. Remember, any time you shift over the green curve, you’ve got to drag the blue curve along with it. The short-run supply curve always moves right along with the long-run aggregate supply curve because these two curves are attached. Now what’s going to happen in the short run is we go to the intersection of our aggregate demand curve and our short-run supply curve. So what happens here is the technological progress and the shift in the long-run aggregate supply curve gives us a lower price level, P1, and an increase in output from the original full employment level, YF0, to a new output level, Y1. What will happen if we leave this economy alone? Well, what’s going to happen is prices are gradually going to fall until we have a new short-run aggregate supply curve, SRAS*, with a higher level of output at the new full employment level, YF1 and lower prices, down here, at a level that we can call P*. So the economy here is headed in a good direction. Look at this. We have prices falling and output increasing. That’s the great thing that can happen when the supply curve shifts in a favorable direction. You get prices decreasing, that is deflation, but you also get output increasing. That’s a good result. We call this good deflation, as opposed to the first case where prices were falling because the economy had insufficient demand. We call that bad deflation.

Well, what can monetary policy do here in this case? Well, monetary policy could hasten our arrival of the new output level. If the Federal Reserve decided that it wanted to move us to this new output level quickly, it could shift out the aggregate demand curve and prevent this adjustment process. What it would do is shift out the aggregate demand curve so that it intersected the short-run aggregate supply curve right on top of our new full employment line. That is, the Fed could keep the price level constant and immediately jump to a larger level of output. If the Fed wanted to keep prices constant and stimulate the economy, it could move us to this new aggregate demand curve, AD1, by expanding the money supply. Expansionary monetary policy immediately moves us to our long-run output level without any change in the prices at all. So that’s what can happen. When the economy grows, the Fed will often accommodate the growth in the economy by providing extra money supply to meet the increased money demand.

So this is how monetary policy works. In every case the effectiveness of monetary policy and the need for monetary policy depends on how quickly prices adjust. If prices adjust very, very quickly, then monetary policy really has no affect except for on the price level. However, if the economy is slow to adjust as is often the case whenever we are
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**Monetary Responses to Changes in the Economy**

below full employment, then monetary policy well used can cause a recession to be shorter and not as deep as it might otherwise be.

Monetary policy is probably most effective in situations where there is a sudden reduction of demand. The economy can be stimulated by an increase in the money supply so if people stop spending money and the economy is slipping into recession, the first case was showed, a shift inward in the aggregate demand curve. Then monetary policy can compensate for the reduction in demand by stimulating spending through lower interest rates.
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Monetary Policy: Accommodation

We've seen before how fiscal policy leads to crowding out, that is when the government spends more increasing income and increasing prices, the government increases the demand for money which pushes up the interest rate and crowds out business spending. Consider the following question. Can the Fed do anything to prevent crowding out or mitigate its affects? That is, can appropriate monetary policy accommodate government spending? That is, make it possible for the government to spend more increasing output without driving up interest rates and pushing out businesses. How might that happen? Let's consider the following story and I'm going to tell this story here on my storyboard instead of going directly to the graph because interest rates are not represented in the graph. Remember a movement along the aggregate demand curve is a change in the interest rate, as prices rise, the demand for money increases and the interest rate is driven up in the money market. So any time you move up along the aggregate demand curve, the interest rate is rising. That's why output is falling because businesses are buying less. But since the interest rate isn't clearly shown in that diagram, I want to start with this story before we look at the picture.

Here's the way the story works. The government spends more money. The government buys more stuff. That increases equilibrium gross domestic product and at the same time pushes up the price level. The consequence of these two changes is an increase in the demand for money. An increase in the demand for money is an outward shift in the red curve in the money market because the money supply is fixed by the Fed; the consequence then is a higher interest rate to give us equilibrium in the money market. That higher interest rate, however, crowds out business spending by making it more expensive to finance the purchases of plants and equipment and other investment goods. So that's how crowding out usually works. The Fed, however, can respond to the increased money demand by making more money available. If the Fed increases the money supply, the Fed can prevent the increase in interest rates. If we slap on extra money supply at this point in the story, everything changes. The money supply curve shifts out from its original level to this new level. And with this new level, money supply is such that the new money demand is met at the original interest rate. So if the Fed is willing to provide the money that the market wants at the original interest rate by increasing the money supply, there's no affect on interest rates, and therefore, no affect on investment spending, no crowding out. This is what we mean by accommodating money policy. If the Fed increases the money supply in an act of accommodation, what they are doing is preventing the interest rate from rising so that investment is not crowded out. Now let's see how that works in our model.

Suppose now that the government increases spending. If the government increases spending, then what's going to happen is an increase in income and an increase in the price level? Two things are going to happen. First of all, the increase in income alone at the original price level increases money demand. Even if the price level stays at its original equilibrium level, there's going to be an increase in demand for money because people need more money to do the extra shopping that's implied by this higher level of gross domestic product. So as people scramble to get that money, they're bidding up the interest rate and, therefore, investment spending is going to be crowded out. That's why this horizontal distance here, the increase in aggregate demand is going to be less than if the government were spending without a change in the interest rate. So to some extent the outward shift of the aggregate demand curve is already mitigated by crowding out, that is the aggregate demand curve's outward shift from government spending is constrained or pulled in a little bit because businesses are crowded out by the rising interest rates. Now when prices start to rise, that affect is compounded. When prices begin to rise, then demand for money increases further because people need more cash to do shopping when the price tags are bigger. The increased demand in money pushes interest rates up further and further crowds out business spending. That's why we end up with an output level, Y1, in the short-run equilibrium that's less than we would get if we were over here and prices hadn't increased.

Now what can the Fed do to prevent this crowding out? Well, what the Fed could do is increase the money supply and if the Fed increased the money supply, then we wouldn't get this affect over here from crowding out. There would be no constraint and the aggregate demand curve would actually shift out even further, out to some level like this. We'll call this AD2, where aggregate demand's 2 is the effect not only of increased government spending, but the additional effect of Fed accommodation. By increasing the money supply as we saw in our storyboard a moment ago, the Fed prevents interest rates from rising and keeps business spending from being crowded out. Now, of course, there's going to be an affect of increased prices because of the excess demand, so in the short run, prices are going to go up so the Fed has to really jolt the economy with extra money to provide not only enough extra money to meet the increased amount of shopping that people are doing at these large gross domestic product levels, but the Fed also has to give you enough money to compensate for these higher prices that are inevitable in the short run. So that's how accommodation works. The Fed does what it takes to increase money supply to meet money demand so that interest rates remain unchanged and business spending is not crowded out.
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Now what’s going to happen in the long run? Well, look what’s going to happen in the long run. Let’s go ahead and look right at the long run equilibrium where the red curve touches the green curve. The more the Fed accommodates, the more the Fed pumps money in, the higher the long-run price level gets, that is the blue curve before long starts to shift upwards simply because we’re above full employment, that means pressure on the wages, pressure on input prices and eventually those get passed on to customers as businesses raise their prices. But how far up does the blue curve have to shift before we get to a new equilibrium? If the Fed does not accommodate and let’s the government spend and let’s the natural course of price adjustment bring us back to full employment on the green curve, then we would be stopping at a point like this one. If, however, the Fed has jolted it to the economy and tried to keep interest rates from rising, then we’re going to get a lot more price adjustment, the price level is going to go up a lot higher as the short-run aggregate supply curve has further to travel to bring us back to the green curve. Now you're saying, whoa, hold on. As prices start to rise, doesn’t the Fed have to keep increasing the money supply to keep interest rates from rising? Now you see the problem. Fed accommodation is a short-run strategy. You can only accommodate in the short run. Once prices start rising, the Fed’s hooked. If they want to keep interest rates down, they have to keep pumping money into the system and if they do, that’s going to set up even more inflation once adjustment occurs and we head towards the long run. So Fed accommodation is a short-run strategy. If the government has a temporary increase in spending, the Fed might accommodate to keep interest rates from rising. But if this long run, if this increase in government spending is a permanent change in the government’s behavior, then the Fed can’t really accommodate in the long run. All it does is set up more inflation.

Here’s the problem. The Fed cannot keep the economy permanently above full employment output. The longer the Fed tries to hold us at an output level like Y1 or higher, the longer the Fed tries to hold the economy beyond its speed limit, the more inflation the Fed is setting up for the long run. Now, once again, the ability of the Fed to accommodate even in the short run is constrained by people’s expectations. If people see what the Fed is doing and see that this inflation is coming, everybody's going to raise their prices now so that they’re not caught behind the stampede. If people anticipate the inflation and raise their prices now, workers demanding higher wages, businesses trying to pass on increases and input prices right now, if they do that, then we go immediately to the new long-run level. If people’s expectations are rational, the Fed cannot accommodate even in the short run because people see that the consequence of this new increase in the money supply is going to be higher prices and people go there directly.

So Fed accommodation means that when the government spends more money, the Fed makes available money supply to match the increased money demand, however, any time the Fed tries to hold output above full employment, it sets up inflation. How soon will that inflation occur? It just depends on how forward looking people are. The more rational the expectations, the quicker prices are going to adjust and the less effective the increased money supply will be in accommodating the increased government spending.
Consider two professors. Professor A has a reputation for being tough, but fair. All of his rules are clearly laid out in the syllabus and if you take his class, you know exactly what you’re getting into. Depending on how hard you want to study and how well you do on the test, you know exactly what your grade is going to be. Professor B, on the other hand, has a reputation for being flexible. If you’re called out of town on business or family business, it’s more likely that you’ll get to take a makeup from Professor B. Professor B takes into account subjective information about each student whenever he makes the assignments and gives the grades.

Now, Professor B has the reputation for being flexible, and students who like Professor B think that Professor A is overly rigid. Professor A has a reputation for fairness and clarity, and students who like Professor A think that Professor B is arbitrary. Now who would you rather take economics from? Well, it depends on what kind of student you are. This is the same kind of debate that goes on all the time about what the Federal Reserve should do with monetary policy. Should the Federal Reserve be Professor A and adopt a set of clear, easy to understand rules and let the economy adjust to them or should the Federal Reserve try to be Professor B and change monetary policy in response to changes in the economic environment? Well, your position on this question is likely to depend on what you believe about the effectiveness of policy in general.

Keynesians who believe that economic policy can be useful, expansionary policy can pull the economy out of recessions and contractionary policy can prevent inflation. Keynesian economists are more likely to believe in discretion, that is, the chairman of the Federal Reserve Board and the Federal Open Market Committee that meets every six weeks to set monetary policy, that they should look at what’s going on in the economy, and if the economy is slowing down, they should increase the money supply to stimulate the economy, stimulate spending and pull us out of a recession. However, discretionary policy involves some problems, and these problems are pointed out by the other side of the economics profession, the monetarists who are in general favor of monetary rules.

The monetarists point out, first of all, that rules are really easy to understand and when they’re clearly announced, everybody in the economy knows exactly what’s going to happen to the money supply, therefore they can form their expectations in advance. Moreover, they say if you’ve got the Fed exerting discretion over here, deciding when to increase and decrease the money supply, you suddenly wind up with a number of problems. First of all, there’s that timing lag with all policy, that the Fed tries to stimulate the economy by increasing the money supply right whenever the economy is about to rev itself back up and then you’ve got the problems of inflation.

The next is a problem that Professor B is likely to run into and that’s the problem of rent seeking. Everybody is trying to influence Professor B to like them so that he’ll give them a better grade. And the same thing might be true with the Federal Reserve. The more the Federal Reserve is likely to exert discretion, the more likely our politicians will try to influence the Fed to increase the money supply and lower interest rates during periods when they are coming up for re-election. So the political business cycle can be sparked by a Fed that makes itself too open to suggestion from the economy at large.

A third problem is that with rational expectations, the monetarists say, all this discretion is meaningless anyway. When the Fed does things to try to stimulate the economy, everybody figures out what’s going on and their actions make the policy irrelevant. So if you believe that rational expectations are at work in the economy to begin with, you may as well stick with rules so that everybody’s expectations can coalesce around the same understanding of what the money supply is doing.

So there you have it, the tradeoff. More flexibility if you’re willing to exert discretion, but more clarity and a sense of what’s going on and stability if you’re willing to stick with a given set of easily understood rules.

Let’s consider some possible rules that the Fed might use if it wanted to commit itself to a rule for the money supply. One is called the monetary rule, where \( M^2 \) grows by approximately the long-run growth rate of the economy. This is a good rule if you want to provide an automatic stabilizer, because if the money supply is growing at a rate of 2 percent a year, and the economy starts growing faster, then what happens is that money gets to be in short supply, interest rates go up and the growth rate of the economy slows back down. The same thing is true if the economy is growing too slowly. The surplus of money causes interest rates to fall and stimulates demand so that the economy begins to grow back at the target rate.
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**Hot Topic: Should Monetary Policy Be Made by Rule or Discretion?**

A second rule is the nominal income rule where $M^2$ is allowed to grow at the same rate as the long run growth rate of real output. The effect of this rule is to keep prices relatively stable.

A final rule is called the price level rule and this rule is one that targets the consumer price index, or the GDP deflator, or some other measure of prices quite specifically and says we want inflation according to this rate to be no more than 2 percent a year, and if the inflation rate grows faster than that, then the Fed slows down the growth rate of the money supply until prices are stabilized. This is probably pretty much what Alan Greenspan has been doing in our economy for the past seven or eight years, which is a strong, strong commitment to stable prices, that is, inflation being no more than 2½ percent a year, and everyone knows that if the inflation rate would creep up to 3 or 4 percent, the Fed would slam on the brakes until prices started growing at a slower rate.

So this is probably a lot of why Alan Greenspan has been so wildly successful. It is that he has, in many cases, announced rules or, at least implied rules by his public statements so that everyone knows pretty much what the Fed is up to. This makes it easier to predict what the Fed is going to do and easier for businesses to make long-run plans based on stable prices because the Fed has committed itself to a growth rate of the money supply that’s going to keep inflation at bay.

So the old problem, rules versus discretion. One is rigid while the other is flexible. One is fair while the other is arbitrary. The debate will go on and the Keynesians who believe in discretion are ones who have an optimistic view of the power of policy to stimulate and control the economy. The monetarists who end to favor rules have a pessimist view of policy and, therefore, inclined to give the economy something stable and predictable to form expectations around.
Monetary Policy: Alternative Approaches

**New Keynesians vs. Monetarists**

Should the Federal Reserve use the money supply as a policy tool? That is, should the Federal Reserve increase the money supply when it wants to stimulate the economy, increasing output and reducing unemployment or should it not? Should it put the money supply on some kind of autopilot and let the rest of the economy adjust to it? These are the two positions that are held by two opposing camps in macroeconomics, the Keynesians and the Monetarists.

The Keynesians believe that it makes sense to use the money supply as a policy tool; that is, monetary policy by influencing the interest rate can actually stimulate investment spending and cause the economy to expand. Monetarists, on the other hand, believe that the only influence that money exerts on the economy is an influence on the price level; that is, if the money supply grows too fast, it can spark inflation, and if the government monkeys with the money supply trying to fine-tune the economy, it will only cause problems, price instability and confusion in the economy that will reduce efficiency. So let’s look closer now at these two positions, the Keynesian position that says monetary policy can do some good in the economy and the Monetarist position that says that the government should maintain a stable money supply and let the rest of the economy adjust to that.

Here’s how we can see the difference in these two positions. You'll remember this equation, called the quantity equation, which is used to explain the quantity theory of money. If you multiply price times output, you get the gross domestic product of the economy. $M$ is the money supply, the total amount of checks and cash available for shopping in the economy. $V$, the velocity of money, is the number of times the average dollar is spent and re-spent in a year to make all this shopping possible. So if we hold the velocity constant and we imagine that people spend money at a constant rate, then any change in the money supply is going to influence the gross domestic product.

Now, the way in which it influences the gross domestic product distinguishes the Keynesians from the Monetarists. Keynesian believe that if you increase the money supply, then, in the short-run at least, you’re going to cause the interest rate to fall and stimulate investment spending. The increase in demand in the economy leads factories to produce more, so that real output increases. Now, it’s probably also going to be true in the short-run that the price level is going to go up somewhat as well. So the Keynesians see an adjustment in the short-run with higher prices and higher output, when the money supply in increase. Of course, in the long run, this will go away, because output has to return to fully employment. But, at least in the short-run, an increase in the money supply can cause the economy to expand.

The Monetarists, on the other hand, have their roots in classical thinking; that is, wages and prices adjust quickly, they're not sticky, like in the Keynesian story. And if wages and prices adjust quickly, then the economy is always right at the speed limit; that is, if we try to go faster, increasing output beyond full employment, prices and wages rise until the economy is restrained to fully employment. Well, if it’s the case that we’ve always got to be at full employment, then an increase in the money supply immediately creates an increase in prices, with no change in the real economy. This is a really big difference between these two camps, because if you're a Monetarist, you don’t believe that increasing the money supply is going to stimulate output or reduce unemployment or achieve any of these other goals that concern the real economy. Therefore, the best thing you can do for the economy is keep the money supply growing at a constant rate, so as to keep the rate of inflation predictable. Increases in the money supply could throw off the economy by creating unexpected inflation, which then lead to all kinds of problems. Borrowers and lenders get confused, people start spending money faster to try to avoid future inflation, and you get all kinds of inefficiency. So the Monetarists say keep the money supply growing at a constant rate, so as to keep inflation predictable.

Now, notice something; the Monetarists would like to have the money supply growing at a rate that reflects the growth rate of real output. That is, if full employment output is growing over time as the population increases and the capital stock accumulates, then you need a certain amount of increase in the money supply just to match the increased money demand. There’s more stuff to buy as the economy grows, so you need more money to make that shopping possible. But if the money supply grows faster than the economy, then the extra money feeds into more inflation. That is, anytime money grows, it’s either making possible more shopping or it’s going to be just pushing up prices. So Monetarists say make the money supply grow at a rate that matches the growth rate of the economy and that keeps the price level relatively constant, or at least predictable.

Now, let’s look at this same story told in our aggregate supply – aggregate demand diagram. Here we have the aggregate demand curve and a shift in the aggregate demand curve will represent changes in monetary policy. Suppose the Federal Reserve begins with the economy in a position of long-run macroeconomic equilibrium and tries
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to stimulate the economy by increasing aggregate demand from \( AD_0 \) to \( AD_1 \). Well, what happens in the short-run is, at the original price level we have excess aggregate demand, so the price level begins to rise. And when it rises, we have the usual adjustments; on the demand side, consumer real wealth shrinks, the money demand increases and with it the interest rates, so that investment spending shrinks and foreigners buy their goods elsewhere, because our price level is rising. On the supply side, we've got sticky wages and prices, which make the increase in the general price level create a business opportunity in the short-run. Also, companies are confused. They don't know whether it's just them or general inflation, so output increases as the price level rises. And, when that happens, the economy is restored to equilibrium with a higher price level \( P_1 \), and a higher level of gross domestic product \( Y_1 \). Now, this is the Keynesian view of what happens. The Keynesian view is that the aggregate demand curve shifts outward and pulls the economy temporarily faster than the speed limit. However, what's going to happen, of course, is that prices are going to start to adjust upward. Because we're in the region of our diagram that's beyond full employment, prices are going to start to increase and, as they do, businesses start passing higher costs on in the form of higher prices for goods and services and the short-run aggregate demand curve shifts upwards. This new level, \( SRAS_{u} \), is where the economy winds up after all the adjustment has occurred.

Now, the question that divides Keynesians and Monetarists is “How fast does that curve shift? How rapidly do we adjust back to full employment output?” And the answer depends, of course, on whether people have rational or adaptive expectations. Rational expectations shift the short-run supply curve very quickly as people figure out what's going on. Adaptive makes it go more slowly. So you can see that rational expectations are closely in line with the thinking of Monetarists. That is, it pulls us right back to our speed limit, whereas adaptive expectations are more in line with Keynesian thinking. That is, we can hang out above full employment longer, because it takes people longer to figure out what's going on. Also, how quickly can wages and prices actually be adjusted? Are they sticky because of contracts and unions and things like that? Well, sticky wages are more in line with the Keynesians. They believe that unions exert enough power that wages can't adjust immediately and therefore prices don't change quickly, whereas Monetarists are a little bit troubled by these sticky wages and prices and therefore they don't believe that they play that big of a role in the economy. Otherwise, you couldn't believe that the economy went quickly back to full employment, if you believe that a lot of prices were sticky. So sticky prices and sticky wages and adaptive expectations gives us a view of the world that's essentially Keynesian. And, in fact, the new Keynesians, the modern Keynesians, have a sophisticated view of the world, in which institutional rigidities, like labor contracts and confusion and the time that it takes people's expectations to adjust, making people's expectations effectively adaptive instead of rational. The new Keynesians believe that you can put all those things together and get a convincing story, where the economy can actually go faster than the speed limit when the money supply increases, at least in the short-run. And that the short-run lasts long enough that it makes sense to pursue a policy like this. On the other hand, Monetarists, with their thinking anchored in rational expectations and flexible wages and prices, believe that this blue curve shifts back to full employment very, very quickly and therefore you get really no payoff to increasing the money supply. All you get is higher prices and higher prices aren't any good. What good is that? We're interested in the real economy, our standard of living. So, this is the view of things.

Now, when we have a debate between Keynesians and Monetarists, they're always going to be looking at certain periods in economy history to see whether the data correlates with their own thinking. Most economists believe that the inflationary periods in the United States, after oil supply shocks in the early 1970's and again in the late 1970's, that these periods of inflation would have been more severe if the Fed hadn't kept the money supply growing at a slower rate. That is, restraint in the money supply actually kept inflation from getting as bad as it might otherwise had been. So there's an argument or using control on the money supply to regulate inflation, which is a Monetarist position. On the other hand, the recession of 1975, and again in 1982, another recession, were probably made less severe, because the government used expansionary monetary policy to lower interest rates and stimulate spending. So there's a Keynesian argument that says that the recessions were actually counter-veiled or fought by good monetary policy, expansionary policy that made the economy grow when otherwise it would have stagnated even further. There's enough evidence on both sides of the argument to keep these guys arguing back and forth all the way to the present day.

We can end by summarizing the two positions. Keynesians say use monetary policy to stimulate the economy, because wages and prices are sticky, and because people's expectations are not completely rational. They are confused for a while, and therefore you can actually get an increase in output in the short-run. The Monetarists, on the other hand, said no, people's expectations adapt quickly and wages and prices aren't sticky enough to make monetary policy effective. Therefore, if you money with the money supply, all you're going to get is inflation whenever
you increase it and downward-adjusting prices when you contract it. So the debate goes on, but now perhaps you can participate in it in a more informed way.
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New Classical Macroeconomics

Can a change in the aggregate price level influence output in the economy? The new classical macroeconomics says yes, and their idea about how prices influence output can be captured in this story that was told by Nobel Laureate Robert Lucas. This is the way new classical macroeconomics works.

People are generalists in their consumption, but specialists in their production. Suppose we have two people, Harry and Louise, and Harry and Louise live on two separate islands and they cannot communicate with one another. Harry and Louise are each specialists in production. Harry produces automobiles. Louise, on her island, produces computers. Now, Harry and Louise each uses the money they earn from their respective production to buy a whole basket of goods. Harry buys some cars, some computers, some food, some movie tickets, some healthcare and so forth, and the same with Louise. Now, what motivates Harry? If the price of automobiles rises relative to the price of all of the stuff he buys, then there has been an increase in Harry’s return to labor; that is, his real wage has risen. Working a given number of hours, Harry can afford now to buy more stuff if the price of automobiles is high relative to the price of other goods. On the other hand, if the price of automobiles is low relative to the price of other goods, then Harry’s return to labor has fallen. His real wage has fallen and he’s going to be less inclined to work, because the reward isn’t as big. He’s going to be more inclined to take more of his satisfaction in the form of leisure. The same thing is true of Louise. Louise watches the price of calculators relative to the price of all other goods. And when that price is high, she works harder and, when that price is low, she doesn’t work as hard.

Now, let’s introduce a little wrinkle into this story, and that is suppose Harry is able to tell very quickly if the price of automobiles is changing, but he doesn’t see the price of other goods as quickly. He doesn’t find out other prices until a little bit later. The same thing is true with Louise. She sees changes in the price of computers, her output, immediately. But it takes her a while to figure out what’s happening to the price of other goods. This creates the possibility for some confusion. That is, if Louise sees that the price of computers is rising, she’s got to try to figure out is it true that computers are relatively widely demanded and the price of computers is being bid up, because everyone is buying computers? Or is there just inflation in the economy and the price of computers is going up along with the price of cars and everything else? Now, you can see this makes a difference to Louise, because if the price of computers rises relative to the price of everything else, she is going to work harder. But if it’s general inflation, so the price of computers is going up along with the price of everything else, then there’s no payoff to Louise for working any harder, and she would choose not to. She’d keep working the same number of hours as before. Louise is trying to figure out whether an observed increase in the price of computers means a special opportunity for Louise or whether it’s just general economy-wide inflation. And Harry faces the same decision whenever he see the price of trucks go up. Should he work harder or is this just general inflation, so that there’s no return for harder work?

Now, since Louise observes only the price of computers and not the general price level, when the price of computers goes up, Louise is going to gamble that, in fact she has a new opportunity to make profit. She’s going to gamble by working harder. That is, she’s going to split difference. She’s not going to work as hard as if she was sure, but she’s going to work harder than if there were no change in the price. She’s taking a chance and that affects her behavior. The same with Harry. So let’s tell this story now with a simple example.

Here’s the formula that explains the labor supply of a person in this island model. In this little island economy, the labor supply of Louise or the labor supply of Harry is a function of the difference between the price level they observe and the price level they expected. That is, if their particular price is higher than they expected, then they're going to work harder, because they think they may have an opportunity to get ahead. So let’s start this story with an expected price level on Harry’s island of 10 and an expected price level on Louise’s island also of 10; that is, if they observe a price level of 10, they're going to work just as hard as they planned on working, and let’s say that’s 8 hours a day for both of our two players. Now, let’s get this story rolling.

Let’s suppose that the price level winds up being higher than they expected, that Harry sees that the price of car is 11 not 10, and Louise sees that the price of computers is 11 not 10. What are they going to do? Well, Harry things, “Huh, is it just cars that are rising in price? If so, I’m going to work harder to take advantage of this opportunity so I can use the extra money I earn to buy all the other goods that are still at the same low price.” However, if it’s inflation, he doesn’t want to do that, because he’s not going to be getting ahead. But, since he’s not sure, he splits the difference and works harder. Harry decides to work 12 hours instead of 8. Same with Louise. Louise works 12 hours instead of 8, because she thinks there’s a chance to get ahead. Look what just happened; when the price level went up, we got a lot more work out of our two workers and therefore we got more output in the economy. That’s the way the Lucas story works. However, in the next period, Harry and Louise are both going to expect higher prices. So if
the prices stay at 11, they’re going to go back to their old levels of work. That is, the price level adjusts in their expectations, they’re now used to 11 as the price, if the price level stays at 11, they’re going to go back to where they were to being with. How do we get them to work hard again? Give them an unexpected price increase. And how do you get an unexpected price increase? You can get it by increasing the money supply. Increase the money supply, pump up prices and then people are confused for a while. And, while they’re confused, they’ll work harder. And, while they’re working harder, output is greater.

This is Robert Lucas’ story, the new classical macroeconomics story about how prices can influence output. When you confuse people, you make them work harder. But notice, getting people to work harder depends completely on confusion. The moment the confusion clears, there’s no harder work. See, if Harry and Louise new what the prices were on each others’ islands, they could figure out that, in fact, it’s inflation, it’s not an increase in demand for cars, it’s not an increase in demand for computers, it’s just general plain old inflation. And once they figure that out, they’re going to go back and work at the same level they planned to work at. It all runs on surprise. So this is how money policy can influence output in a world where people are trying to figure out what’s going on. You shock them, you surprise them, and you give them something they didn’t expect. And, until they figure out what’s going on, they’re going to work a little bit harder in the meantime.

Now, this brings us to what some economists call real business cycle theory. When things happen that change the productivity of labor on these two islands, if Harry, for example, gets especially good weather one day, then he’s going to work harder, even if prices haven’t changed, because other things are influencing his productivity. If a new technological development comes along that lets Louise make computes with less effort today, then she’s going to work a little bit harder, because of this nice, fortunate accident that’s influenced her opportunities. Real business cycle theory says that increases and decreases in output in the economy, recessions, booms, troughs, all of that is driven at the root by changes in the real economy. Changes in technology, changes in business opportunities, changes in things that are actually part of the tangible production process, not just money, not just government spending. Real business cycle theory is kind of like this story, only instead of looking for changes in prices you look for other changes in the environment that can influence your productivity. And when they change, everyone works harder.

So there you have it, the foundation of new classical macroeconomics. People get confused and, while the confusion persists, they may work harder to take advantage of what they think is an opportunity to better themselves.
Monetary Policy: Alternative Approaches

Case Study: Policy in the Great Depressions

What was the Great Depression and could it happen again? Many people are asking the question today about whether high-flying stock prices may be setting us up for kind of trouble, similar to what happened in 1929, when a stock market crash precipitated a general deep downturn of the economy, with 25% unemployment rates that persisted for several years in the early 1930’s, waves of bank failures and a great deal of misery. Could the Great Depression happen again?

Why did it happen? In the 1920’s the economy was humming with the force of new innovation, mass production, the automobile and the industrial revolution in full flower in the United States’ economy. The 1920’s, the so-called “Roaring Twenties”, were a time of great prosperity. But the wealth in the economy was not evenly distributed. In fact, a very small percentage of Americans held a huge percentage of all income and wealth and the vast majority of people had just enough to get by. What this meant was that the economy was unstable, that it was prone to shortages of demand. People who were very rich, the few who were, had all of their needs met and didn’t want to buy a lot of stuff, whereas those who were relatively poor couldn’t afford the things they needed. Therefore, the economy was prone to a reduction in demand any time income slipped.

What happened then, as technology excited people in the 1920’s, was stock speculation was rampant. People were borrowing money to buy stocks and then using that stock as collateral to buy more stocks with borrowed money. By 1929, the stock prices were so inflated that people began to be concerned, so, in mid-October, whenever stock prices began to fall – and, in fact, one day falling so rapidly that the ticker tape couldn’t keep up, many people, fearing that the end had come, began to sell their stocks frantically, sometimes being unable to find buyers out any price. The problem then went over to the banking sector, because banks had invested heavily in the stock market. Holding so many stocks as assets, banks became insolvent very quickly when the stock value was to close to zero. This meant that you and I and other ordinary Americans who had money on deposit in banks were unable to withdraw money to do our shopping. And, afraid that we might even be able to get out the money that we had set aside for our retirement or hard times, therefore demand dropped off precipitously in the economy. People stopped buying things and, when people stopped buying things, businesses closed, un-employing people, reducing income and therefore creating a chain reaction, a kind of strong negative multiplier in reverse.

Now, could this happen again? Certainly it could. If the stock market were to crash tomorrow, those of us who are spending money that we are expecting to get in the future when we sell our high-price shares would be in trouble. Many of us have lots of credit card and other consumer debt that we’re planning to payoff with the high-flying stocks down the road. That could create all kinds of problems that would reduce demand and cause knock-off effects throughout the economy. However, there’s a big difference between the era of the Great Depression and the turn of the 21st Century, and that was that, while the stock market crash and the unequal distribution of income precipitated an economic downturn, it was, for the most part, bad government policy that exacerbated the situation into the miserable Great Depression.

The first thing that the government failed to do was to provide money when the system needed it. The Federal Reserve was, in the 1930’s, under the constraint of a rule that said it could only lend to solvent banks. Since none of the banks who were in desperate need of borrowing money were solvent, all of their assets had been devalued with the stock market. They couldn’t borrow money from the Fed, and therefore they had to close. Now, that rule was changed when the Federal Reserve’s charter was amended in 1935 to allow it to lend to banks that were insolvent, if it would do good for the financial system as a whole. So, the Federal Reserve tightened the money supply; that is, it let the money supply shrink during a period when the system radially needed cash and credit. So, nowadays the Federal Reserve would stand ready, if the banking system were in jeopardy as it was in the 1930’s, to provide easy liquidity to keep business going, as it did in 1987, whenever the stock market crashed and the Feds stood ready to lend money to those banks that might be in trouble because of devalued assets. Nowadays, banks can’t invest as heavily in stocks. The laws that were passed, the Glass-Stiegel Act, that was passed after the Great Depression was in full swing, prohibited banks from getting in this position of vulnerability again. Banks were not allowed to hold stocks or equities directly. Nowadays, however, those laws have once again been amended, and the Glass-Stiegel Act has been effectively repealed, so banks are getting more and more into the business of buying stocks again. The question is, “Could they be vulnerable?”

The second thing that the government did wrong in the 1930’s was taxes were raised. Because many people were unemployed in the 1930’s and needed unemployment compensation, and because tax revenues were dramatically down as income shrank, the government ran big budget deficits. Now, John Maynard Keynes would later explain that
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These big budget deficits were a great way of combating depression by spending the economy back into a stimulated state. However, at that time, governments believed that they needed to have balanced budgets, so the current administration in the early 1930’s passed tax increases that actually worsened the situation by taking away from ordinary households even what little money they had and might spend on goods and services, and thereby stimulate the economy. So increases in taxes made the situation worse, an absolutely disastrous fiscal policy.

The third component of the government’s bad response was to raise tariffs and quotas; that is, international trade was blocked, because of fear that domestic industries would be hurt by foreign competition. When all the countries in the world followed suit and everybody raised their tariffs and quotas to protect their domestic industries, the United States and all other countries lost their export opportunities as well. And when we couldn’t sell goods to our own domestic consumers and businesses, and when we weren’t allowed to sell, because of tariff and trade barriers, abroad, then there was simply no market for our goods and services at all and the economy languished in depression.

So if you look at it in the 1930’s, the government did everything wrong. The Federal Reserve failed to provide money when the system needed it. Congress raised taxes at a time when the economy least needed it. And third, Congress enacted the Smoot-Hawley Tariffs that effectively sealed off our economy and denied us access to international markets that may have helped stimulate the economy earlier.

The Great Depression was mitigated by big increases in government spending under the New Deal of President Roosevelt. And finally, when World War II came along and there was a massive mobilization of resources for the war effort, the economy was put back in great running order. The stimulus of demand compensated for the reduction in demand that followed the stock market crash and the wave of bank failures.

Nowadays, we could have speculation on stocks, in an era where banks are able to hold more stocks and income is once again becoming relatively unequally distributed. The conditions of the 1920’s have come back to our economy. However, if the Federal Reserve and Congress with taxes and liberal international trade are all in place, then we have hope that we wouldn’t have a response as severe as in the 1930’s. The Great Depression, for the most part, was not just a natural consequence of a badly functioning economy. It was the direct result of bad policy that exacerbated an adjustment in the economy into a protracted period of poverty and unemployment.
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The Rule of 70, Compounding, and Growth

Now, listen very closely to this; if you start at age 19 and you put 2,000 dollars a year into a savings account at 10% interest from age 19 until age 26 and no more money into the savings account for the rest of your life, at age 65, when you retire, you will have about 1 million dollars. On the other hand, if you don’t saving money until age 27, you could put the same 2,000 dollars a year into that savings account every year until you’re 65, and only wind up with about 800,000 dollars. What’s going on?

The answer is the power of compound interest. Compound interest is something that a lot of us understand, since our parents take us to the bank when we’re little and open a savings account and we think about how interest accumulates and how sums of money grow. In general, however, we can think about interest as a representative growth rate. There are lots of other things that grow at compound rates and, in this discussion, we’re going to look at how compounding causes sums to grow at an exponential rate and what the implications are for economic development.

Let’s take a simple numerical example. If you have an interest rate or a growth rate of r, then you can calculate next year’s sum as a function of this year’s sum and the interest rate. Say you put 10,000 dollars into the bank today. If the interest rate is 10%, then 1 plus 10% equals 11,000, which is what your savings account will be worth next year if you leave you 10,000 dollars in at 10% interest. If you let that 11,000 dollars stay in the bank for another year at 10% interest, you’ll have 12,100 at the end of the second year. 12,100 is equal to the original 10,000 times 1 plus 10%, raised to the second power. You raise 1 plus 10% to the second power, because the money stayed in the bank for 2 years. We call this our compounding factor; 1 plus 10%, or 1.1, raise it to the power of the number of years involved in the story and you’ll wind up with the amount that’s left at the end of that number of years.

Now, suppose you want to know how long it will take for your money to double. If I put money in the bank and I leave it there a number of years, how many years will have to pass before I have twice as much money as I start with? The answer can be summarized by what we call the Rule of 70. Now, I’m about to say the word “logarithm”, so please, don’t freak out or tune out when I do that. Just stay with me and you’ll get a payoff. And you don’t even have to understand logarithms to follow this explanation, because you can just apply the rule at the end. But some of you are interested in where it comes from and, in order to understand where it comes from, you really have to think about logarithms. So, that having been said, let’s go forward.

Here’s our compounding term: 1 plus the growth rate. So 1 plus the growth rate raised to the n-th power tells you how much money you’ve got in the bank. And you wonder, “If I put 1 dollar in at the beginning, how long would it take me to have 2 dollars?” Or, in general, how may years do you have to leave it in the bank until the compounding term is 2? How long does it take for your sum of money to double? Well, if you take the logarithm of both sides, then you get this: the n comes down as the coefficient in front of the logarithm of what’s left, 1 plus r equals the logarithm of 2. And I’m using ln, these are natural logarithms. Well, here’s a little trick that will help you make this simpler. If you have 1 plus a small percentage, then the logarithm of 1 plus a small percentage is approximately equal to that small percentage. So if this 10%, the logarithm of 1 plus 10% is about equal to 10%. So what we’ve done here is we take n and leave it on the left-hand side of the equation and we divide by sides by the logarithm of 1 plus r, which is approximately equal to r. And here you have it, what mathematicians call the Rule of 70, because the natural logarithm of the number 2 is about equal to .70. So if you take an interest rate of 10%, which we’ve been writing as 0.10, and divide that into 0.70, you can see that it takes 7 years for your money to double if the interest rate is 10%. In general, divide any interest rate into the number 70 and you find out how many years it would take for your money to double at that interest rate. So if the interest rate is 7%, it takes 10 years for your money to double. If the interest rate is 10%, it takes 7 years for your money to double. If the interest rate is 35%, it only takes about 2 years for your money to double. This is what the Rule of 70 says. It tells you how long it takes for a sum to double at a given rate of growth or a give interest rate.

Here’s a graphical representation of the phenomenon of exponential growth. A is the sum that you start with. 1 plus r represents the rate of growth, with r being the interest rate or the growth rate, and 1 plus r being the compounding term. n is the number of years of compounding. So here we’ve graphed, starting with A, the purple line has this slope that shows the amount of money increasing at an increasing rate over time. That is, if we start with 10,000 dollars, then after 1 year at 10% interest, we have 11,000, after 2 years 12,100, after 3 years 13,310, and so forth. Eventually, the rate of money begins to increase quite rapidly, due to the phenomenon of compound growth. Now, let’s suppose we started with the same amount of money, 10,000 dollars, but instead of growing at a 10% rate annually, we grew at a rate of 20%. What that would do is give us a curve that is steeper at very point. We’d have
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exponential growth, but that exponential growth would take off faster and the curve would become steeper faster. So here we have now a formula that could be represented $A_0$, the original amount, times 1 plus $r_1$, a faster rate of growth, raised to the n-th power.

My point is this: if you are a developing country and you start from a lower base, but you’ve got a faster growth rate, eventually you can catch up with a larger country that’s growing at a slower rate. Here’s how you see it: let’s now start with a lower base, a lower initial amount. We’ll call this $A_1$, and let’s start right here. But let’s suppose that we have this faster rate of growth, $r_1$, so we have a curve then that looks like this. And here you have $A_1$, the lower base, times 1 plus $r_1$, the faster growth rate, raised to the n-th power. If we start at time zero, the beginning of our story, maybe this is the United States in 1920 and this is Japan in the same year. Japan has a smaller economy and much lower per capita income. However, Japan’s economy is growing more rapidly and, eventually at some point, because Japan’s growth rate is so much faster, the per capital income in Japan will catch up. That is, the average Japanese will be as well off as the average American after a period of time, simply because Japan’s economy is growing faster. And the time at which this happens we might call $n^*$. The point is this: if you have a country that has a lower base or a lower starting rate, but a faster rate of growth, then after enough time has passed, the country that is growing faster will surpass the country that is growing slower, regardless of what their initial starting positions are. This is the magic of compound growth; that is, the exponential, the doubling and tripling and raising to higher powers eventually offsets any gap with which these two countries start. Whichever country is growing faster will, in the long-run, be richer.

Compound interest is a fastening thing and it kind of attracts us, because of its odd stories, like the million dollars that comes from 10,000 that you put away in your 20’s. The Rule of 70 helps you calculate how fast a sum of money is doubling. And this set of curves reminds you that, even if a country starts with a lower base, if it has a faster growth rate, eventually it will win the race.
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The PPF, the AD/AS Model, and Long-Run Growth

We’ve been talking about economic growth as if it just fell from the sky. But economic growth doesn’t just happen, it’s the consequence of choices. Choices that either improve technology or that increase the resource base of the economy. Let’s see, as we go back to a tool we developed earlier, how economic growth happens and choices that we make this period can influence the productive capacity of the economy in the next period.

Here’s a tried and true diagram, the production possibilities curve. We’ve looked at the combination of goods that we can produce in our economy, holding constant our technology and our base of productive resources, land, labor, capital, and so forth. And here, in this example for the macroeconomy, we’ve divided the economy into two classes of goods: capital goods, that is tools or goods that produce other goods, and consumption goods, goods that we eat today and enjoy and are done with. Spending on this class of goods is called investment. Whenever you buy tools, you are investing. Spending on this class of goods is called consumption spending. Now, here’s a production possibilities curve and we’re going to label this PPF₀, because it’s our original production possibilities curve. We can choose any point on this curve. This curve tells us all the combinations of capital goods and consumption goods that we can produce in our economy, given our land, labor and capital and given our technology. The slope of the curve is negative; that is, if you want more consumption goods, you’re going to have to give up capital goods. That’s the opportunity cost, and the slope of the curve itself tells you how many capital goods you have to give up to get an additional consumption good. Notice that the curve gets steeper as we move down it, because some resources are better suited to the production of capital goods and others are better suited to the production of consumer goods.

Now, the point that we choose on the production possibility frontier in this period influences the position of the production possibilities frontier in the next period. Think about an example that seems intuitive. Suppose you’re a farmer and you take your harvest of 100 bushels of corn. If you eat it all today, then you’re going to have nothing next year, because you haven’t saved any to plant. On the other hand, if you save all of it and eat nothing today, you are going to have lots and lots of corn next year, because you’ve used all of your corn as capital. Now, you probably don’t want to do that, because you’d be very hungry for the next year. But choosing a point in the middle is a trade-off between eating some today and saving some to increase your productive capacity next year. Let’s look at two possible choices on this particular production possibility frontier.

Down here we have choice A. Choice A involves a lot of consumption in the present period, we’ll call this Cₐ, and relatively little investment. We’ll call this Iₐ. The alternative is point B. B involves relatively little consumption today, but instead doing a lot of investment, using the resources in your economy to produce tools, so that you can produce more in the next period. Well, depending on which point you choose, your production possibility frontier in the next period is going to have a different position. Let’s suppose you choose point A. If you choose point A, you’ve added relatively little to your capital stock. You’ve got basically the same stuff that you’re using to produce goods and services today, a little bit more in the way of tools, but not much. In that case, your production possibility frontier has shifted out, but not by a dramatic amount. So we have this production possibilities frontier, which we could label PPF₁A. On the other hand, if we choose B, which involves a lot more investment, then the production possibility frontier is going to shift out more dramatically, because we’ve added a lot to our capital stock and that’s what gives us productive capacity, more resources to produce stuff with. So if we spend more of our resources producing tools today, then in the next period we’re going to have a wider range of choices of goods and services to produce. This is the choice that we make. How much are we going to devote our resources to the production of consumption goods and how much are we going to devote our resources to the production of investment goods or tools? The more we devote our resources to the production of investment goods, the more we’re going to be able to produce in the next period. This is economic growth. Economic growth occurs because the base of productive resources is increasing, whether through immigration or population growth increasing labor, whether through increase in savings that adds more capital goods or anything else the discovery of new natural resources. Also, technological advance – if we get better at producing output with the goods we have, that would also be shown as an outward shift in the production possibility frontier.

Now, let’s translate this story into our aggregate demand/aggregate supply diagram. The long-run aggregate supply curve represents the productive capacity of the economy. So whenever we add to our capital stock, we can produce more output without creating inflation, because we’re adding more capital stock; that is, we can make more stuff without pushing the economy harder and bidding up the price of tools. If you add more tools, you can make more stuff at a lower price. Any time you shift out the green curve, the blue curve is going to get dragged along with it. So here’s our new configuration of supply curves after the capital stock has grown. If we devote more of this period’s resources to the production of tools or investment goods, then in the next period we’re going to have a larger full employment output. This is economic growth.
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Now, what happens in the economy when economic growth occurs? In the short-run, we’re going to more this point right here. We’re going to slide down the aggregate demand curve as the price level falls to a new level of prices, $P_1$, and an intermediate level of output, $Y_1$. $Y_1$ is greater than the previous full employment output, but it’s less than the capacity of the economy after we’ve added more capital. Full employment has increased, because the capital stock has grown. That means that, in the short-run, we have output below its new full employment level and prices are going to fall. As prices fall, the blue curve shifts downwards; that is, unemployment and underemployment puts downward pressure on wages and the fact that some raw materials are not used puts downward pressure on their prices. As businesses experience falling costs, they eventually pass those lower costs onto customers in the form of lower prices for goods and services, and the short-run aggregate supply curve eventually reaches its new long-run position.

Now, on this new long-run position, we’re back on the full employment line, the full employment line that represents the new larger capital stock, and the price level has fallen. Economic growth lowers prices and increases output, and that’s why economists are usually in favor of it. We get a bigger standard of living, we get more stuff produced and at lower prices - good deflation, an increase in output. Economic growth is represented then by a shift in the productive capacity of the economy. And it comes from an increase in the resource base or an improvement in technology. And a big decision that our economy can make is whether to encourage savings or not. To the extent that we encourage savings, we make more resources available for the production of tools and producing more tools today means more productive capacity tomorrow.
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The Production Function and Growth

We’re not going to look at a tool that economists use for describing the way in which the economy grows. The production function is used frequently in microeconomics to describe what a firm can do with the resources at its disposal. We’re now going to look at a production function for the economy as a whole, a kind of macroeconomics production function. And as we study this production function, we will get a language for talking about different ways of describing different kinds of economic growth.

Let’s look then at a production function for the economy. Y represents the output of the economy as a whole, and that output depends on the availability of resource inputs. Let’s first list the resource inputs: L stands for labor. When the population of the labor supply of the economy grows, L increases. K is capital or the tools that are available for making other goods. N is natural resources, minerals, land and other natural resources that have productive uses. And finally, H stands for human capital, people’s know-how. When you get education and increase your knowledge or your skill, you are increasing the stock of human capital. All four of these resources are important productive contributions to the economy. Now, the way in which these resources are translated into output depends on technology, what we know about combining labor, capital, human capital and natural resources in different ways to produce goods and services. F means that we have a mathematical function, that the different amounts of these resource inputs allow us to create different amounts of output. And the particular form of this function is our technology, how we know how to translate certain amounts of input into certain amounts of output.

Now, let me begin by saying, first of all, that this function is increasing in all of its variables. That means that if you add more labor, output is going to increase. If you add more capital or more land or more human capital, any of these are going to increase the total amount of output that our economy can produce. So the first thing to say about the production function is it is increasing in all of its variables.

The second thing to say about this function is that there may be a particular way in which it is increasing. Suppose you were to double the amount of labor, land, capital and human capital available to the economy. If you doubled all of the resource inputs, would output double as well? If output increases at the same proportion as the inputs increase, we say that we have constant returns to scale. Now, if you think about it, constant returns to scale is a pretty reasonable assumption. Suppose you have a factory that has a certain number of workers with a certain quantity of tools and a certain amount of resource inputs and all of these workers have a given level of skill. And that factory can produce 100 muffins an hour. Well, if you set up another factory right beside that identical, name number of workers, same tools, same skill, same raw materials, you’d expect that factory would produce 100 muffins an hour, too. What you’ve done is you’ve replicated the original factory right beside it and therefore you’ve doubled output. Now, if that’s true, if this replication is possible, then it’s reasonable to assume that our economy has constant returns to scale. I’ve been using the example of doubling, but you can use any proportion you want. Suppose we increase labor by 20%, so there’s a 20% increase in the labor supply in the economy. And suppose also we increase capital by 20% and we increase the availability of natural resources by 20%, 20% more trees, 20% more aluminum, and we increase human capital also by 20%. If all of the resource inputs are increased by the same proportion, then, if you have constant returns to scale, output will also increase by 20%. That’s the definition of constant returns to scale. A productive situation, in which increasing all the resource inputs by a given percentage increases output by the same percentage.

Now, if that’s the case, then you could write a constant returns to scale production function in the following way: multiply all the resource inputs by the same proportion, x, and that’s going to increase output by that same proportion, x. So if this is 2, if this is 1½, is this is 5, it doesn’t matter. Output is going to increase by whatever proportion you increase the resource inputs. So let’s take now a special case, in which the proportion is 1 over L. We’re going to multiply everything in our function by 1 over L and that’s going to multiply output by 1 over L, as well. So we get this. What I’ve just done is I’ve created a function that gives me output per worker in the economy, or output per unit of labor. This function then tells me that the amount of output that can be produced per worker in our economy depends on the following ratios. It depends on the tools available per worker, the resources available per worker, and the human capital available per worker. Any time any of these ratios increase we’re going to be able to produce more output per worker in our economy.

Now this should tell you all the ways in which an economy can grow. An economy can grow in any of the following ways: first, it can grow by adding population, more workers. The second way in which it can grow is an increase in output per worker, and that’s going to come if you have more tools per worker. A worker with more tools is going to be more productive than a worker with fewer. Also, more resources per worker; the more natural resources there are
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for each worker to work with, the more output you're going to get per worker in your economy. And finally, human
capital per worker; education increases the productive capacity of the economy by making each worker more skilled,
giving him or her more mental tools, more skills to use to solve particular problems and increase productivity.

So if you have constant returns to scale, you can turn the original production function into a statement about output
per worker. What does it take to make given worker more productive? The answer depends on these ratios: the tools
available per worker, the resources available per worker and the skills that each worker has. Any time any of these
ratios increase, output per worker increases. The production possibility curve shifts outward and the long-run
aggregate supply curve shifts outward, because your economy is able to produce more with the resources it has
available.
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Definition of Productivity and Factors Affecting It

What is the difference between a rich economy and a poor economy? In a rich economy, each worker has a relatively good standard of living; that is, a lot of goods and services produced with a relatively small amount of effort. In a poor economy, you work very, very hard and get very little. The difference between the two outcomes is productivity. And economist defines productivity as the amount of output that is produced from a given amount of labor input. Or, if you take an hour of labor input, productivity is the amount of output that that labor produces.

The question then is “What makes the difference between and economy where labor is highly productive and an economy where labor is less productive”. In the highly productive labor situation, this worker winds up, at the end of the day, with lots of goods and services, a rich economy. But if productivity is low, the same amount of labor yields a low output, a relatively poor economy.

So let’s review the factors that influence productivity. What is that allows a worker to produce a lot with a relatively small amount of time? The first thing that makes a big difference in productivity is the availability of good tools, what we call capital. The higher the capital labor ratio in an economy, the more workers are able to transform a given amount of time into a large quantity of output. So the higher the capital labor ratio, the higher the ratio of output per worker.

A second factor influencing productivity is natural resources. The more natural resources that are available to each worker, the easier it is to transform a given amount of time into a large amount of output. So the higher the ratio of natural resources to labor, the more productive the worker is, the more output produced per hour.

Another factor influencing the productivity of labor is human capital. The more skills the worker has, the more the worker is able to transform a small amount of time into a larger amount of output, doing it by smarts. The higher the ratio of human capital to labor, the more output per worker is likely to be produced.

Finally, there’s the matter of technology. The better the overall level of know-how in the economy, the better the skill, the accumulated knowledge about how to transform inputs into output, the higher will be the productivity.

So all of these factors influence the worker's ability to transform a given amount of labor time into a larger amount; that is, more capital per worker, more natural resources per worker, more human capital or skills per worker and better technology or overall know-how. Productivity is very, very important to the economy, because it’s closely correlated with the standard of living. The higher the productivity of a worker, the higher the price a company can afford to pay that worker to get that worker to work for them. Remember the company sells its goods for a given price, a price that’s fixed by the market. So if your worker can produce a lot of goods in a small amount of time, you can afford to pay him or her a high wage. Labor productivity is correlated with wages. The higher labor productivity is, the higher the wages companies can afford to pay their workers without sparking inflation; that is, without pushing up the prices of goods and services. The more output you get from a given amount of labor, the higher the wage you can afford to pay your worker in an environment with stable prices.

So, productivity is correlated with the standard of living. Higher productivity means higher wages for workers, more output per worker and a higher standard of living in the economy. One of the things that characterizes economic growth is an increase in the productivity of labor. When technology advances, when capital accumulates, when skills are being acquired by the labor force and when new natural resources become available, the productivity of labor rises and this one of the hallmarks of economic growth.
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Can the government of a country do anything to encourage its economic growth? Or ask the question another way: do certain policies stand in the way of economic growth? Let’s consider, first of all, the effect of government policy on investment spending. We’ve already seen that investment spending is closely related to economic growth, because economic growth relies on accumulation of capital; that is, an economy with more and better tools becomes more productive and grows. Now, tools are the capital spending of the economy. When businesses buy tools, we call that investment spending. So the question at hand is, “How does government policy influence investment spending?”

Government policies that encourage investment spending encourage companies to buy more new tools and therefore encourage the capital stock to grow and old capital to be replaced by new and better capital. So what’s going to encourage investment spending?

In order to answer that question, that we need to remember that investment spending depends on the amount of saving available in the economy, because businesses borrow money to finance their purchases of new equipment and new factories. So the investment spending is part of a larger relationship in the macroeconomy. Savings equals investment. Let’s quickly review that relationship, and then go over how government policy might affect investment through each of the channels in this equation. Remember the total amount of savings available in the economy is what businesses can borrow to purchase their tools. And that savings comes from three sources: first of all, it’s the private savings of households; next, it’s the public savings of the government, the amount by which taxes exceed government spending; and finally, it’s the savings of foreigners, the amount of money that foreigners are lending us by allowing us to import more from them than we export to them. So private savings, public savings and foreign savings add up to the total pool of savings in an economy. And that, in macroeconomics equilibrium, is equal to the amount of investment spending.

So, let’s go through this equation then and ask how the government can influence the end result. First, the government can encourage more accumulation of capital by enacting policies that encourage people to save money. One of the ways the government can do that is to lower taxes on the returns on savings. In the United States, we have 401K plans and 403B and individual retirement accounts and other policies that allow for preferential treatment of savings. If you put your money in a retirement account, you can defer the taxes and, in some cases, you can avoid taxes altogether. So one way of encouraging savings is to give savings preferential tax treatment. The higher the tax rate on interest income and other returns from savings, the less likely people are to save money, and therefore the less money finds its way to businesses to be used to accumulate capital.

Next, government spending. A country can encourage more investment spending by having the government take a smaller share of overall savings. This can be done by raising taxes, so that they cover the amount of government spending in the economy. If government spending exceeds taxes, then the government has to borrow money to cover its deficit, and the money the government borrows crowds out private investment spending. So if the government is taking the country’s savings, it isn’t available to businesses that would like to borrow it to accumulate capital. So good macroeconomic policy means keeping the government’s impact on the savings of the country minimal; that is, don’t run a big deficit or businesses won’t have money to borrow.

The third factor here is imports; that is, the more we can import from foreign countries, the more foreign countries can lend us money in the form of savings. Running a trade deficit causes capital to flow into your country, as foreigners are lending you money to allow you to buy stuff from them. Now, the things that will allow us to import more are going to be trade policies that are liberal; that is, tariffs and quotas block imports and do not allow foreigners to sell us their goods. It makes it more difficult for capital to flow into this country when there are high tariffs or taxes on imports or quotas that prohibit imports. Now, when foreigners lend us money, they can do so in two forms; foreign portfolio investment occurs when foreigners buy stocks and bonds in U.S. companies, but still hold a majority position in those companies. Whenever foreigners become majority owners of a particular firm or business, then they have control; that is, they can make management decisions for those companies, and we call that foreign direct investment. So foreign portfolio investment is when foreigners lend us money without taking control of productive assets. Foreign direct investment is when foreigners own the factories and the capital outright. There’s a difference, of course, because if foreigners own the companies, then they can make management decisions that affect labor in this country, and sometimes that becomes politically sensitive. However, in some cases, allowing foreigners to have ownership of our assets is the only way to entice the capital into a particular industry. And, of course, that creates jobs for people in this country, as well as a multiplier effect on the macroeconomy.
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So taken together, policies that encourage private savings, policies that keep the government budget deficit manageable, so that the government impact on savings is minimized, and policies that allow foreigners to lend us money by allowing us to import goods; that is, to run a trade deficit when we want to attract savings, all of these policies increase the overall amount of savings that’s available to businesses in our country who want to borrow to accumulate capital goods.

There are other policies that can encourage investment spending. One of them is allowing accelerated depreciation; that is, if companies can buy tools and quickly write them off as depreciated, which gives them a tax advantage, then they’re more likely to be able to afford to invest in those tools. They’re more likely to see those investments as profitable. Any kind of tax incentives that allow companies to write-off investments quickly encourage them to spend more money on capital goods and tools. This causes the capital stock to grow and increases the productivity of labor in the economy.

As we think about the relationship between capital accumulation and output in an economy, one more concept is important, and this is the concept of diminishing returns to investment. Let me start with an example. Suppose you’re making cookies in the kitchen. And suppose all you have is labor and raw materials; that is, you and flour and sugar and water. Now, how many cookies are you going to be able to make under those circumstances? Not very many, because you need tools. What you’d like to have first is a good bowl to mix in and a cookie sheet to bake on. Then the next thing you’d like to have is a good mixer to use to stir up the batter. And maybe also, if you had an electronic mincer that could chop up your nuts for you or something like that— all of these things would help make your job easier. However, the bowl is going to add a lot of productivity for you very quickly. If I give you the first unit of capital, it’s going to take you from making zero cookies to making maybe three batches in the afternoon. However, when we add the mixer, now maybe you’ll go from three batches to six batches. Once we add that electronic chopper, then you’re going to go up to maybe seven batches. You see what’s happening? As I give you more tools the extra output you get from each additional tool is diminishing. Why? Because there’s just one of you. With a given amount of raw materials and a given amount of know-how, you can only employ so many tools. The first tools employed increase your productivity substantially, but after a while, I can give you all kinds of new fangled gadgets, all kinds of new tools an they don’t increase your output at all, because you’ve already gotten more than you handle. The extra tools, after a certain point, don’t add very much to your productivity. Now, the amount of output that’s added by each additional unit of capital is called the marginal product of capital. And the same thing is true in your kitchen as is true in the economy as a whole. For a given amount of labor, a given amount of raw materials and a give skill level of workers, capital has diminishing marginal product after a certain point; that is, there are diminishing returns to extra investment. The early tools help equip workers with tools that they’ve been badly needing. More tools increase productivity further. But, after a point, your give labor force with its given raw materials and given skill levels can’t really effectively employ any more capital, and therefore the returns to investment diminish. The more capital you add in a given amount of time to a give labor force with given raw materials and given skills, the less productive each additional unit of capital becomes, diminishing returns to capital.

Now, we can show this relationship in another diagram that represents as we do more investment, that is, as we add to the capital stock in a given period of time, holding everything else constant, what happens to the rate of return on that capital? Well, what I’m doing now is I’m graphing the slope of the picture that I just drew and it looks like this. At first, the line is steep, but then it gets flatter and flatter and flatter. Each additional unit of capital that’s added, each additional dollar of investment spending has less return than the dollar before. What companies do is first that they invest in capital expenditure that has a high rate of return and that quickly increases their profits. But if you make them do more investment spending in a given period of time, they have to dig deeper and deeper down into the barrel, taking projects that are less and less productive, until finally they get down to projects that have relatively low rates of return. Elsewhere we’ve seen that this curve is the demand curve for investment spending, and the demand curve is a relationship between the amount of investment spending that companies want to do and the interest rate that they have to pay to borrow the money. The higher the interest rate, the less investment spending a company does, because there are only a few projects that have rates of return that are high enough to cover that interest obligation. However, if the interest rate is low, companies can afford to borrow money to do projects that are less productive, therefore more investment spending is done.

Now, capital accumulates in a country due to the decisions of businesses to invest. Businesses decide to build factories, to invest in research and development, to create new products, to import equipment or to buy equipment domestically. Businesses make those decisions because it makes sense for them in terms of profit. The more savings there are available in a country and the less of those savings the government is taking, the lower the interest
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rates are going to be and the more businesses can afford to borrow money to finance investment spending. The more liberal trade policies are and the easier it is for foreigners to invest in your economy, the more capital is going to be available from foreign savings in your country. And finally, the easier the government makes it to do investment spending by allowing tax advantages and by not over-regulating businesses, then the more likely companies are to find it profitable to acquire those tools and to do the investment spending that causes the capital stock to accumulate and causes the country to become richer. Remember even a country that is very poor can catch up if its growth rate is faster than that of the rich countries. Developing countries typically have rapid growth rates, because they have high productivity of capital. And they have high productivity of capital because they don’t have a lot of capital to start with. So a little bit of capital goes a long way in a developing economy. After that economy has accumulated a lot of capital, then the returns to capital begin to diminish and you get growth rates that are slower, like in the more developed countries.

So, here’s the relationship then between investment and growth. Investment is spending on capital goods, and the bigger the capital stock, the more the economy grows. The productivity of capital falls, but that happens once the economy has got a big enough capital stock that the economy is relatively productive.
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Other Policies to Encourage Growth

We've been talking about economic growth, increases in the productivity of an economy. How is it that workers become able to produce more output in a given amount of time than before? We've already talked about how the accumulation of the capital stock can increase productivity and how the availability of more natural resources can increase productivity. And we've discussed how government policy can encourage the accumulation of capital through tax incentives and other policies. Let's now consider ways in which the government can influence worker productivity through other channels.

First, consider the effect of government policy on the accumulation of human capital; that is, what can the government do to help workers acquire the skills that can make them productive? One thing the government can do is it can encourage education either by making education freely available to people or by subsidizing it or by providing opportunities for people to undertake apprenticeships or on the job training. Anything the government does to encourage education or at least no to stand in its way is to help people more rapidly develop the skill sets that can make them more productive workers. So government policies that directly encourage education encourage the accumulation of human capital and increase productivity and, with it, the standard of living of the typical worker.

Another thing the government can do is it can consider how its policies might enhance worker health. A healthy worker is a productivity worker and a worker that is ill or infirm is less likely to be able to produce output at their potential. Therefore, government policies that encourage public health are going to increase productivity. Often, this is a matter as simple as providing clean drinking water and breathable air to workers. Sometimes it is in the matter of immunizing children or providing other health services that help keep people from getting sick. So any government policies that encourage health or matters of public health, like reducing pollution or cleaning up water, these things make workers more productive and therefore make a country richer. Now, some countries don't become clean until they become rich, because clean air and water is a good that people have a demand for, a public good. But early in the development process the government needs to give special attention to those matters of public health that can keep workers from being productive. Otherwise, the country may never grow.

Now, these matters of human capital and public health are one thing the government can do. Another is the question of population. When a country's population is rising very quickly, you want to ask, "What is the effect of this rapid population growth on productivity?" Often, we see, in countries that are very poor, people have a lot of children as a matter of insurance, because not many of them will live to adulthood to care for the parents in the old age. What we've observed statistically and empirically is that as a country becomes wealthier, its birth rate naturally begins to fall. In the wealthier countries of Europe now, in Japan and even in the United States, the birth rate is falling low and, in many countries, is actually below the replacement rate, so that, in some countries, populations have actually begun to shrink when these countries have become richer. That's because people don't feel a need to have as many children out of a matter of making sure they're cared for in their old age. And also, people have more economic opportunities and choose to work and develop in their careers rather than have more children. So, the population rate is closely related to the rate of economic growth. In some cases and in some very dramatic and controversial cases, countries have actually imposed very strict population policies to limit the demand the people place on the country's resource base. In some bases, particularly China and India, there have been periods during which the government has officially strongly discouraged the having of more than one or two children in a family. In these cases, these population control policies, which have been difficult to enforce and quite controversial, have, in some cases, accomplished the goal of slowing down the rate of population growth so that the economy's infrastructure and other things that are relevant to economic growth and development can catch up to support a large population. However, population control occurs naturally as an economy grows. So sometimes the government steps in to try to jump-start this process by slowing down a train that it believes is moving too fast. But once the economy begins to grow, people find it in their own interest to slow down the birth rate in the country by their own choices. They don't feel the need to have as many children. So there is a kind of two-way relationship between population growth and economic growth in a country.

This brings us to another consideration, and that is what is the relationship between economic growth and international trade? We've already talked about how policies that discourage imports can keep a country from being able to borrow the money from foreigners that it needs to borrow to finance investment and get itself growing. However, let's think about the strategy that a country uses whenever it intentionally tries to shape its industry in a way that will encourage economic growth. Suppose you were in Mexico in the 1950's and 60's. People in Mexico, policy makers, said, "In order to get Mexico to grow, what we want to do is have our own automobile industry and our own television production industry, and we want to make all of this stuff that we've been importing, so that we get the
advantage of having these high value-added industries in our own country." So the way Mexico accomplished this was by shutting off its borders and prohibiting imports of these manufactured goods, and instead Mexicans had to buy them from factories in Mexico. Now, the outcome of this was that the goods became much more expensive and the quality of goods available to Mexican consumers dropped, because of import substitution. Import substitution refers to a policy where a country prohibits or deters imports through tariffs, and instead encourages its domestic residents to buy these goods from domestic factories. Now, these domestic factories are only in business because they don’t have to worry about foreign competition. The foreign competitors are making these goods at higher quality and lower price, and the only reason your country’s residents aren’t buying from them is because the government has shut the borders or put big tariffs on. Now, nowadays import substitution is out of favor. It is believed that countries grow more rapidly if they produce according to their comparative advantage. Countries that produce goods that they are relatively good at producing, that their workers are relatively skilled at or that their climate supports. Countries that produce those kinds of goods find, that by selling them, they can make money so that they can invest in human capital skills, in developing new industries. And that occurs naturally. This process of natural growth occurs as countries take advantage of opportunities that world markets offer. Rather than doing something artificial, like shutting off your country from international trade and trying to make everything yourself, open to international trade and enjoy the advantages of importing goods at lower prices and produce those goods, at which you have a comparative advantage. Now, you might ask yourself, “Well, how are we every going to get an automobile industry started in our country, if people can always buy automobiles less expensively from the United States or Europe?” There are two answers to this question. The first is you may not need to have an automobile industry in your country. Maybe your country is better suited to the production of agricultural products or information technology. The second thing is that if, in fact, your workers could become better in time at producing automobiles than your foreign competitors, then you should be able to find someone somewhere who wants to invest in this opportunity. That is, if people can agree that your country is a potentially strong and productive maker of automobiles, then you should be able to find venture capitalists or banks or somebody who wants to go ahead and bankroll this project for the period of time that it takes your workers to learn how to make cars better. Once this industry is up an running, the people who invested in this opportunity will reap big profits.

Now, the capital markets don’t always work that perfectly and sometimes it takes people a while to figure these things out. And sometimes many of the benefits of an investment go to people besides the people who put the money in. That’s where the World Bank comes in. The World Bank is an example of a financial intermediary that invests in projects that have returns that don’t just go to the investors, returns that spill over to society at large that create benefits in terms of public health and external goods and public goods and overall increases in the standard of living that nobody quite makes money off of, but everybody enjoys. The World Bank is a good example of an institution that invests in order create external benefits. The World Bank is funded by subscriptions from wealthier countries, and the World Bank typically invests in large projects in developing countries that it believes will create infrastructure that encourage these countries’ economies to grow.

So the headline for this discussion is that a country that wants to grow, wants to keep itself open to trade so that the people in that country can profit from the advantages and opportunities that are offered by the world market. If a country shuts itself off and makes itself an import substitutor instead of an export promoter, then what typically happens is the customers in that country pay higher prices and get lower quality of goods. Plus, the whole thing is running based on the government’s power. That is, the government decides who gets to import. The government issues licenses and therefore everybody wastes their time lobbying the government to get special favors, rather than responding to signals in the market about how their resources can be most productively used.

So, in summary, government policies can promote economic growth if they enhance the development of human capital and enhance the health of workers. Also, population control is a controversial matter. In some extreme cases, maybe it actually does some good, but there are always arguments both ways. And finally, trade policy; by encouraging the economy to be open, liberal trade policies allow people in countries to take advantage of opportunities offered by world markets and prevent the kind of corruption that occurs when the government begins to take a daily micromanaging role in the running of business affairs of the country.
Productivity and Growth

Hot Topic: Women's Roles in Rural Economic Growth

To understand the way a developing country emerges from poverty, you’ve got to think about the people who are taking advantage of the opportunities they find in the environment to better themselves. Economic development is the result of choices and decisions and opportunities seized by millions of people in a developing country. And as people have begun to wonder who it is that’s actually doing the work that helps a country to develop out of poverty, economists have begun to focus their attention on women in the rural economy.

Consider the way it works in a developing country. The typical woman, in a rural area, perhaps because of religious and cultural constraints, is married as a teenager and begins having children immediately. Her responsibilities include gathering wood for fuel, sewing, taking care of children and providing for the education of children in the household. Also, she’ll probably assist with some of the agricultural labor, usually in the post-harvest period, perhaps shelling rice or maybe going out and helping to find contacts or people who may come and buy the produce from the family’s plot. Now, the typical woman’s opportunities in a rural area are strictly limited. Because of the way law works in many developing countries, she has no right to land tenure, no access to credit, no ability to inherit property or any of these things. Her opportunities are strictly limited, and therefore she has very little control over what’s planted on the family farm, when it’s harvested and the way resources are allocated. As a result of the patriarchal society in rural areas, women’s opportunities remain limited, until something changes in the economic environment that improves their lot. Consider the ways in which the changes in the environment can help development precede a pace by improving the opportunities that women have.

One example is the green revolution in the 1960’s and 70’s. This was a period of rapid technological advance in agriculture, in which new seeds and new fertilizer and mechanical methods of agricultural production became available in rural areas in developing countries. As a result of the newfound productivity in the rural areas, suddenly people are less concerned about famine. There’s more food available. And with this increase in resources, women are able to better provide for the nutritional needs of their families. Health improves and the next generation is better off than the previous. In general, anything that increases opportunities for women is going to go right into improving opportunities for children and families in these rural areas, and that tends to create human capital. So that the next generation is more productive, healthier and better situated to be a part of the world economy.

Consider another example. In the Grameen Bank in Bangladesh, what began was that an economist, who founded a small bank, started making loans, very, very small loans to women in rural villages. These women would take the money they got, buy a small piece of capital, like a sewing machine or an oven, and start their own business making clothes or food, which they could then sell in their village. These women had not had access to capital before and, because they were provided with access to capital, they were able to become entrepreneurs and many of them quickly began making enough money that they could, in turn, make loans to their own friends. Women capitalizing on their social networks to become financial intermediaries, lenders, providing opportunities. And as the lot of women improves in villages, so does the lot of children and their families.

This is the interesting thing: because of women’s intimate involvement with their families in these rural areas, anything that improves their economic lot immediately contributes to development by providing nutrition and education and other things that are going to make children more productive in the long-run. So the agencies then that are engaged in rural areas, trying to help poor countries to develop to prosperity, do well to focus their attention on the plight of rural women. Anything they can do to get more resources to rural women for nutrition and education, anything they can do to help teenage girls have educational opportunities so that they can stay in school, learn about nutrition, learn about education, learn about production, all of these things are going to help these societies to develop more rapidly.

In general, don’t think of economic development as some abstract impersonal phenomenon. Think of the people who actually have opportunities, who are looking for ways to better themselves. And when you do, you’ll get better ideas about what governments and foundations and individuals and businesses can do to take advantage of the resources that are present and catalyze them for productivity to help an economy grow to prosperity.
Productivity and Growth

Case Study: Post WWII Japan

The big economic success story of the 20th Century is Japan. At the end of World War II, Japan lay decimated, its capital stock partly destroyed by the war, much of it devoted to wartime production and the people of Japan were poor. Yet between 1951 and 1973, the Japanese economy grew at an annual rate of about 10% during a period time when the growth rate of the United States economy was only about 3%. What was going on? What made the Japanese gross domestic product increase 7 1/2-fold during this period of time? What accounts for the Japanese economic miracle?

Well, Japan started from a much smaller base than the United States, so growth was going to be a higher percent anyway. But there were five factors at work in the story of Japan that made it especially well suited for an industrial revolution.

The first was a high savings rate. The people of Japan save a lot more of their income than their counterparts in the United States and Europe, therefore there’s a large pool of funds available for businesses to borrow to invest in plant and equipment. During the period I discussed, the 50’s, 60’s and 70’s, the capital stock of Japan was increasing at an annual rate of about 9%, a 9% growth rate of the total stock of machines and factories and tools available for producing output. At some points, gross domestic product was made up of almost 40% of it being tools; that is, the capital stock accounting for 40% of what was produced in the economy going right back into factories to produce more. The Japanese people save a lot and an economy with a lot of savings can grow rapidly as new machines are deployed.

A second factor is the imitation of technology from abroad. The Japanese didn’t have to invent their own technology; they could look at the factories of Europe and the United States, which had already learned by trial and error about best practices. So the ability of the Japanese to imitate and adapt allowed them to import technology and put it to work on the factory floor. And that allowed them to do that with much savings of time and effort.

A third consideration that’s related is the skill of the Japanese workforce. Japanese school children are well trained in science and math and their school curriculum is disciplined. When they graduate, they’re ready to go to work in industry and they’re ready to be good adapters and imitators of technology and creators of new ways of doing things. A high skilled workforce lets you quickly create an industrial revolution.

A fourth consideration is the relationship between labor and management in Japan. Lifetime employment has been the norm in Japan since World War II; that is, you go to work in a factory and you could expect to stay there for the rest of your life if you wanted to, and many Japanese workers do. Because the company knows that you’re going to be with them all your life, they have an incentive to invest in your productivity, give you good on the job training and invest in your human capital. And there’s a rule against other Japanese companies coming in and hiring away your company’s labor, so you’re not going to be poached away by a competitor. Your company knows that the investments they make in you are going to go right to their bottom line. Because of this cozy relationship between labor and management, there are fewer strikes in Japan, and managers and workers socialize more with one another on the factory floor. They eat in the cafeteria together, they wear the same uniforms and the gap in pay between managers and workers is much narrower than it is in the United States or in Europe. The good labor relations and the productive environment that is enhanced by lifetime employment were keys to Japan’s success over this period.

Finally, there is the relationship between the government and business in Japan. Japan has a very intentional industrial policy, overseen by the Ministry of Trade and Industry. The Ministry of Trade and Industry, sometimes known as MTI, in many cases, actually undertook to allocate capital and allocate resources in the economy to encourage some industries to grow and others to shrink. MTI probably oversaw the success of the computer industry in Japan by actually allowing certain firms to get certain kinds of patents or directing capital to particular efforts, or cooperation between the government and industry in the development of new chips and new technologies. Plus MTI put in place tariffs and quotas that protected these Japanese industries from foreign competition during their infancy, allowing them to grow rapidly without fear of being undercut by imports from abroad.

Another issue is the issue of antitrust. In the United States and Europe, there is a lot of concern that if firms become too big, they’ll begin to gouge customers by raising prices due to their monopoly power. In Japan, on the other hand, that’s never been especially a concern, rather the concern has been allowing firms to cooperate in the ways that allow them to grow and get their costs down low and become internationally competitive. Because of this, the Japanese firms are some of the largest in the world, because their own government has allowed them to get big. There’s also a
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Case Study: Post WWII Japan

pretty cozy relationship between Japanese businesses and the banks that finance them, the banks also being among
the largest in the world. The tight web of connections between banks, firms and the government in Japan is
something that distinguishes it from the U.S. and from most European countries. The Kuretsu arrangement in Japan
is a connection among firms that work together to create opportunities for themselves and to exploit them. This tight
relationship between firms, their suppliers and their banks is something that is distinctively Japanese.

So the Japanese economic miracle can be accounted for by these five factors: highly trained workforce, lots of
savings, good skills at imitation and adaptation and the Ministry of Trade and Industry and its involvement in the
government, as well as this special relationship between labor and the management of the companies.

Now, one more thing to keep in mind, and that is that the things that made Japan successful between the 50’s and the
70’s began to contribute to Japan’s troubles in the 70’s, 80’s, and particularly the 90’s. Take a country that’s saving a
lot of its income and put it in a situation in which there are no longer a lot of easily identified opportunities for
investment. What’s going to happen? Once Japan’s economy is fully stocked with good capital with the Japanese
people still saving a lot of their income, there’s an opportunity then for trouble, and that is that whenever the economy
slips into recession, as it did in the early 1990’s, the fact that the Japanese are saving a lot and not spending much
prolongs the recession. This is the Keynesian idea that sometimes savings is bad, because they’re not spending,
factories don’t have places to sell their output, then they’re inclined to layoff workers, which they can’t, because the
workers have to be paid anywhere because of lifetime employment. You’ve got an economy that just shrinks, and
shrinks and shrinks into a deeper recession. Because the return on capital is so low, the typical Japanese household
investing in Japanese businesses has to save a lot of money for retirement, because they’re not going to get a very
big return on their investments.

So Japan’s high savings rate, which, at one time, was a big part of its engine of success, may nowadays be working
against it. But the interesting thing to look at is how Japan grew so rapidly, how it so quickly became the second-
largest economy in the world and a major, major industrial power. And the answer has a lot to do with savings and
trained labor, but it also has to do with an alternative form of economic organization, one in which the government is
much more involved, and in which banks and businesses work together much more closely, and in which
management and labor have a unique relationship.
Emerging Economies

**Growth in Emerging Economies**

In 1997, the per capita GDP of Japan was about 40,000 dollars. In the same year, the per capita GDP in the United States was about 27,000 dollars. Now, compare those large numbers with the per capita GDP of India in the same year, which was only about 340 dollars, or Ethiopia, only 100 dollars, or at an extreme, Mozambique with a per capita GDP in 1997 of only about 80 dollars. One of the biggest questions in economics is “Why are some countries rich and other poor? What is it that makes a country prosperous?” Well, the moment we start talking about poverty, economics winds up in a tight spot. Not only does economics not really understand that much about poverty and why it persists, but even the language we used to talk about poverty is sensitive. In the 1970’s poor countries were called underdeveloped countries, but that language fell out of fashion, because underdeveloped implied some kind of norm of development and everyone can argue about what that is. So then, they began to be called less developed countries, because they were less developed than developed countries, which were rich. But then, the whole notion of development became a problem. What constitutes development? Even if we call them the developing countries; that is, instead of focusing on how far behind they are, let’s focus on the fact that they’re moving forward. But even a developing country implies some notion of development that’s well understood. Nowadays, the poor countries that seem to be heading up are called emerging economies. And maybe this language is better, because emerging implies that they are coming out of something into something else. And, in fact, this is probably a good description of economies that are making rapid progress from a low per capital GDP to a higher per capita GDP. Now, this doesn’t solve all the political problems of the language by any means. Go back to our discussion of whether gross domestic product really measures standard of living in a reliable way to find out that just because a country is producing more per person doesn’t necessarily mean that life is getting better there for its citizens rapidly. But, as a rule, when an economy is able to produce more than it was before, the standard of living is going to be rising for its citizens. Let’s ask ourselves the question, “What makes the difference between an economy that is emerging or trying to emerge from poverty and an economy that has already somehow emerged, made the break and is now what we would call a developed country or a prosperous one?”

Let’s consider, first of all, a trap that many economists believe that developing countries can be stuck in; that is, what keeps per capita GDP low. Here’s the gross domestic product of a country, Y, the total output of goods and services. And if we divide that by the population of the country, we get per capita GDP, a measure of the standard of living of the typical person in that country, holding constant all the other stuff that we worry about when we worry whether GDP really measures the quality of life. Well, if the GDP per capital is low, we wind up immediately with a couple of problems, the first problem being that demand in that economy is going to be relatively low. People don’t want to buy a lot of stuff, and this creates the Keynesian problem that when demand is low, then there’s not going to be jobs created and opportunities created and investment is not highly rewarded. Another thing that happens whenever per capita GDP is low is that savings is also low; that is, people don’t have a lot of extra money after they take care of their basic necessities to put in the bank or in some other form for investment. Well, because of these two problems, because savings and demand are relatively low, then there’s not going to be a lot of investment made in physical and human capital. So factories don’t get built, innovation doesn’t occur, people don’t invest in education, because the reward for those investments is just too small, and it’s too small certainly compared to the urgency of putting food on the table and taking care of your basic necessities. Well, since these investments don’t get made, technology gets stymied. We don’t get new tools, we don’t get new methods of production, and productivity remains low. And with productivity remaining low; that is, your labor doesn’t result in that much output, because you don’t have good tools to work with and good skills to use, then per capita GDP remains low. So there you’ve got it, a kind of vicious cycle with low output, low savings, low demand, little investment, low productivity and the whole thing just reinforces itself, and it becomes a kind of trap that a country gets stuck in, what we might call a low-level equilibrium. The outcome is poverty and, in many cases, misery. This is compounded in some cases by rapid multiplication of people; that is, population is growing rapidly, and often population grows rapidly in the poorest countries because people are desperate. They know that many of their children will die young, because of poor health care and bad nutrition, and therefore they have lots of children as insurance against the loss of some of their children because of the desperate circumstances they’re in. Well, notice this just makes the situation worse. With population growing rapidly, per capita GDP shrinks if output isn’t increasing, and this whole cycle just gets tighter.

So what can happen then in a country that can encourage the per capita GDP to grow and help a country break out of this low-level equilibrium, this cycle of poverty? Well, one thing that can happen is investments in technology. If technology gets transferred from richer countries to poorer countries to increase productivity, that can allow the given amount of labor input to translate into larger output, increase per capita GDP, increase savings and demand and pump up the cycle. So technology transferred from abroad can sometimes help to break the cycle.
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Another thing that can happen is incentives to increase savings, and this has happened often. You can look at the case of Korea or other countries that were in a low-level equilibrium with relative poverty, but then liberalized their financial systems, giving people an opportunity to save money, earn higher rates of interest and transfer that savings into more productive investment. And that helped to break the cycle. So things that increase the likelihood of savings can do that. Also, more political stability in a country and a more stable exchange rate encourage people to invest more in the assets of that country, things that are denominated in that country's currency; that is, anything that helps to limit or eliminate capital flight keeps the savings at home in this economy, available to local entrepreneurs to borrow to invest in capital goods. And that increases productivity and that helps break out of the cycle. So incentives to increase savings and to keep the savings at home is likely to be an improvement for this economy.

Another thing that can happen is increases in demand. If the outside financial institutions were to lend this country money that they could use to build dams or roads or even make small microloans to entrepreneurs in that country. That would increase the demand for investment goods there. Anything that happens that increases demand also in a Keynesian way stimulates the economy. So flows of investment from abroad can do that, and loans.

Other things that can happen is – of course, controlling the population is always a tough thing. You can use coercive policy that tells people they can only have one child. That's difficult to enforce and that raises all kinds of ethical concerns. But you can also use public health policies that encourage people to have fewer children, because the prospects for the children that they have are improved by cleaner water, better nutrition, oral re-hydration and basic health care for children. That kind of thing encourages people to have fewer children, because the prospects for their smaller number of children are improved. So that's a good thing. Overall, we see higher growth rates in poorer countries, often because of desperation, but typically, as countries become richer, their population growth rates drop off. In fact, the wealthiest countries in the world now actually have population growth rates that are below replacement; that is, their populations are going to be shrinking as we go forward, because people have fewer children.

So there you have it, a situation, in which an economy is stuck in a low-level equilibrium. Anything you can do at any point in this chain to improve the situation, whether it's bring in capital goods from abroad, whether it's improve technology, provide incentives for saving or spending, other things that improve productivity or slow population growth, any of these things are likely to make the situation better.

One big difference between poor countries and rich countries, if you look at things historically, is that countries that have gotten richer the fastest are countries that have well established institutions that support commerce; property rights, contracts, rule of law, things that make people willing to take risks in commerce with each other, because they don’t have to worry about the government seizing their factories or their tools or their contracts not being enforced by the government whenever they make a deal with someone who borrows money from them or takes a shipment of goods. The better the institutions are, the more reliable the rule of law, the more likely people are to make themselves vulnerable in the way we make ourselves vulnerable inherently, anytime we’re doing business with someone or finance with someone. So a big difference between countries that stay poor and countries that get rich is the existence of the institutions that support trade and specialization. In the end, wealth comes from trade and specialization, but that's very much a social thing. People’s willingness to become and accountant or to become a teacher or to invest their human capital in some specific endeavor, your willingness to do that depends on your expectation that you can then trade whatever you produce with other people to get the food and clothes and other stuff that you’re not producing. And if you’re scared that you might get stuck with some specific capital that wouldn’t feed you, you're going to keep a garden in your backyard and do more stuff for yourself. And when you spend more time doing that and less time specialized and trading, then the economy overall is going to be poorer and you're going to be poorer.

So a society in which people trust others, in which people are willing to become specialized and feel like trade is something they can rely on and the government enforces property rights and institutions exist that support commerce, those are the societies that tend to get wealthy. So some societies get stuck in low-level equilibrium that persists because of the lack of trust and because of abuse of the government, and because people stay suspicious because they've been abused. And sometimes getting out of that cycles means starting with very basic things, like building institutions and trust.
So here we have it. The economy of a poor country is a vicious cycle, but there are all kinds of opportunities along the way to break the cycle and help the economy grow itself out of poverty into prosperity.
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Policies to Promote Growth

Consider now some ways in which government policy can help a country escape from the cycle of poverty. Let's consider some strategies now that governments use to try to promote the development of their economies. Remember an economy can be stuck in a low-level equilibrium whenever per capital gross domestic product is low, therefore savings and demand is low, so that there isn’t a lot of return on investments in human and physical capital.

That then keeps productivity low, which just keeps the cycle going. When economy is stuck in this situation, there are several points in this chain where the government might try to break in to help the economy move to a more prosperous equilibrium. Let’s consider some of these policies.

The first is that the government might intentionally try to move its economy from agricultural production to industrial production. The believe here is that industrial production usually involves higher labor productivity, which increases per capita gross domestic product and lifts the economy out of poverty. Well, that’s a great idea, except that some economies really are better suited for agricultural production than for industrial production, given their natural resources and the skills of their laborers at a particular point in history.

If you want to try to move into industrial production before your economy is ready, then you’re going to be giving up a chance to earn profits on agricultural production. It may be that good investments in technology to improve the productivity of agricultural production would be a better move for the economy than trying to shift it into industry instead. So the countries that have tried this have done so with mixed results.

Another strategy that governments often use is to try to stimulate demand by producing products that foreigners want to buy; that is, to try to get export demand to lift the economy out of poverty. This, of course, involves moving your production away from goods that people want to buy domestically into the production of goods that foreigners want to buy. And countries that have tried this have, once again, done so with mixed results.

Japan tried to move its resources from domestic production into industrial production, and nowadays it seems like that Japan succeeded; that is, its efforts on the part of the government to coordinate the allocation of resources and product goods after World War II that would be bought by foreigners was associated with Japan’s rapid increase in per capital gross domestic product. But we don’t know but what Japan would have done just as well if it had produced goods for its domestic market and let trade arise naturally rather than as an intention of government policy. A lot of countries that have tried to produce the export goods instead of goods that were demanded domestically have found themselves in desperate situations; that is, the goods didn’t do well, because they were poor quality, the resources and labor of the country weren’t well suited to the production of these goods and overall it was just a bad move, because the country moved against its comparative advantage and per capital GDP actually fell.

Plus, anytime you get the government involved in the allocation of resources in your economy, you’re asking for trouble, from the point of view of a free market economist. And we’ll get to that argument next.

This is the argument that’s made about central planning, that sometimes you can break out of this cycle by moving away from free market allocation of goods and services towards allocation that’s directed by the government. The government intentionally says, “You people over here are going to become welders, and you over here are going to become shipbuilders, and you’re going to become auto manufacturers and we’re going to just create a developed economy by brute force of our will.” Well, the problem with central planning is that a central planner has to collect a lot of information about what people in this economy are good at. And that information, from the point of view of a free market economist, is better collected by the impersonal forces of supply and demand. Let the price mechanism tell you where you can get the highest reward on your talents, and your capital and your natural resources. The government doesn’t have any better information than the market does and, in many cases, its information is not as good. Plus, whenever you put somebody at the top of your economy, this guy now has an incentive to manipulate the economy to his own advantages or the advantages of his friends and you get all kinds of government corruption.

Plus, everyday in the economy now knows that there’s somebody running the economy that functions kind of like Santa Claus. If you’re nice to him, maybe he’ll be nice to you and you go and ask him for the things that you want. And people divert their efforts away from the productive investment in the creation of goods and services and instead they spend their time lobbying the government to get this guy to redistribute resources in their direction, which creates all kinds of waste. This is what happened in Mexico in the 1950’s, when Mexico became determined to become an export-led growth economy. The put tariffs and quota around the economy so that Mexican businesses got a reward by selling automobiles at high prices to Mexican citizens, and other goods and services. But then everybody moved to Mexico City, so they could be close to the government and have some influence over who got the license to import capital goods from abroad and what the tariffs and quotas were set at. And everybody became preoccupied with government planning as opposed to the production of value through creating a better mousetrap or a higher quality automobile. So central planning sounds like a good idea, but it’s go corruption problems, it’s got influence problems.
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and it’s got information problems. How does the central planner get the information that he or she needs to make this system work better?

Now, the World Bank and the International Monetary Fund are two governmental organizations that were created in the Bretton Woods Agreement in 1944 that began the modern period of international trade after the World Wars. The International Monetary Fund makes loans to developing countries that run to run trade deficits, so that they can afford to import capital goods and improve their technology and improve their productivity at critical junctures in their economic development. The World Bank invests directly by lending for projects, like dams and roads and bridges, which help improve the infrastructure of developing economies so that their markets can work better. These two institutions are the subject of a lot of hot debate these days, because if you’re lending in developing countries, you are influencing the course of events to the extent that some of these projects have had disastrous environmental consequences, or to the extent that they are not good for the conditions of the poorest worker in these countries, as perceived by certain Western critics. Then the World Bank and the IMF are going to come under attack for how their policies may actually keep countries in poverty or benefit certain elites at the expense of poor workers. But this is something you read about in the newspaper and you’ll have to form your own judgments about whether the policies followed by these two institutions are actually helping or hurting.

So, think about the cycle then. Anything that encourages people to save more, anything that pumps up demand, anything that encourages investment and increases productivity is going to help countries get out of this cycle. But a lot of the specific policies that governments use to try to pull their economies out of the cycle of poverty have counterproductive effects. They reduce productivity, they reduce the return on resources, they discourage savings or they discourage demand and, in so doing, they don’t help the economy, they hurt. But anything that actually helps this flow to work better, anything that breaks the cycle of poverty is going to, in the long run, be better for the people whose livelihood depends on this economy.
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Hot Topic: The Myth of Exploding Populations

Every so often in discussions about economic development, you'll hear people make the statement that, because of their exploding populations, poor countries are going to stay poor. Well, how would an economist evaluate that statement? Is it true? Does it even make sense?

Let's start with a famous economist, the first economist to hold a Chair of Political Economy in England, Thomas Malthus. The Reverend Malthus wrote in 1798 an essay on the principle of population, in which he laid out a very bleak view of the connection between population and economic reality. This is what he thought. Population tends to increase at a geometric rate; that is, exponentially, whereas the production of food tends to increase at only an arithmetic rate. That is, populations double every 30 or 40 years, whereas, if you take a fixed amount of land and crowd more and more workers onto it, each additional worker will be able to produce less food than the worker before, the diminishing marginal product of labor. Now, put these two facts together, population doubling every 40 years and the diminishing marginal product of labor, and you've got the recipe for disaster, and that's what Malthus saw coming, that very soon the growth in population was going to create a situation in which people were going to be in a desperate, desperate straight. He thought that either wages would fall to the subsistence level and people would stop having children or, even worse, the population would expand out of control and only war, famine or pestilence would reign back in the excess population, so that the capacity of the earth to provide food was equal to the number of people that were living on it. Malthus has a bleak, bleak view and people frequently cite it whenever they thing about developing countries. Indeed, in Africa today, we see tragic situations, in which famine and pestilence are limiting population growth in places where there isn't enough food for people. But, in general, is it necessary to believe that expanding populations are a cause for concern in developing countries?

Well, you can think about it two ways. First of all, expanding populations can impose costs on countries. That’s because there are problems absorbing the labor force into the economy there. A lot of developing countries do not have in place very sophisticated and extensive infrastructures, roads, telephone lines, electricity and so forth. And therefore you get more people and they crowd onto the existing public services and overload them, and there’s just simply not enough to go around. That’s a problem. I’d like to be productive and a productive worker. I’d like to open a business, but there’s no road to the village that I live. There’s no telephone line to connect me to the rest of the world. In the absence of infrastructure, exploding populations can create a problem. Another set of problems is there are scarce resources in the economy. There’s a limited amount of water, there’s a limited amount of arable land, and there’s a limited amount of certain important materials. And if the population grows too rapidly, then those resources can be depleted or their prices driven so high that people are once again in poverty. Also, as populations increase too rapidly and the government feels a need to take care of its people, it’s going to spend the national savings importing food from abroad, and that’s a bad situation to be in. In general, there are all kinds of problems potentially absorbing growth, especially when the infrastructure is not in place to plug people into once they’ve arrived on the scene.

On the other hand, if there is decent infrastructure, population growth is a wonderful boom for an economy, because it becomes the engine of wealth. Think about this: as the population grows, demand is stimulated. That means there are more people out there who want to buy my stuff. So if I want to become an inventor or a retailer or open a factory, there’s more profits to be made. The next thing to think about is the supply side. Whenever there are more people in an economy, there’s more scope for specialization and trade. I don’t have to make my own food and clothing and do my own carpentry repairs now. I can specialize in one job. I become a plumber and I go out and trade my services with other people. And when there are enough people to trade with, then, everyone considered, I’ll be able to get all my needs met either by doing the work myself or working for you and trading money for something else that I need. It’s only in a growing economy that there is an increasingly large scope for specialization. And specialization in trade becomes a huge engine for the creation of wealth. Another thing that happens under those circumstances is people start getting good ideas about new things to do and have opportunity to try them. So there’s more innovation, there’s more technical innovation. People think of good things and put them into practice in an economy that’s growing and that’s increasing in size and scope for specialization.

So there you have it. A growing economy is not necessarily a bad thing. In fact, if there’s an infrastructure, if there’s some foundation to the economy, growth can be good.

So where did Malthus get it wrong? First of all, Malthus missed an important development of the 1800’ and 1900’s, and that was rapid increase in the technology of agriculture. New tools, new fertilizers, new seeds came on the scene so that the existing labor on farms was able to produce lots and lots more food than Malthus ever foresaw. In fact, productivity was rising at such a faster rate than the productivity of the labor supply, that the output per worker
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increased unimaginably, remarkably during the late 1800’s and early 1900’s, the agricultural revolution. The second thing that Malthus didn’t see was that the economy was moving away from agriculture toward industry and mechanization. So people were going to change their behavior. As a developing country moves away from a primarily agricultural economy to one based more on industry, the incentives of individuals change. People who wanted to have a lot of kids on the farm so that they could have inexpensive labor don't want to have kids in the city, because children in the city are a liability. They find that their existing children are more likely to grow up healthy and education and prosperous if they don’t have such a large family. So as the economy moves from agriculture to industrialization, there are going to be natural changes in fertility, natural changes in infant mortality, natural changes in the behaviors that govern the population. Malthus didn’t see this coming.

So some of the best policies that a country can follow, if it wants to keep a population boom from becoming a Malthusian nightmare, are: invest in infrastructure, roads, bridges, cable lines, electricity, things that allow a growing population to become a workforce, an asset, rather than a liability, simply mouths to feed. Another thing is to allow government policies that are liberal for trade, that give people an opportunity to go out and start businesses and earn profits from their efforts. This will allow people to move from agriculture to industry, if that’s according to their comparative advantage. And provide for public health and such things like that in cities, so that they are livable places. If this happens and the population grows at a reasonable rate, then the transition from agriculture to industry is going to be associated with a naturally declining birth rate. In fact, the U.S. and Japan, which are thorough industrialized countries moving into the information age, actually have falling populations, because of birth rates that are below replacement. If it weren’t for immigration into the United States, our own population would be declining.

So there you have it. There’s no natural link between some population explosion and the poverty of developing countries. In fact, Malthus has proven to be quite wrong, because he didn’t foresee technological innovation and the transitions of economies into states where population rates would quite naturally adjust themselves to slower growth.
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Case Study: Growing Pains in Indonesia

Why is it that some economies seem to thrive whenever they are buffeted by competition from abroad, whereas other economies seem to fall apart when international economic events bear down on them? Consider the case of Indonesia, widely regarded as a success story in the 1970’s and 80’s. But then, in 1997, pressure from outside the economy forced Indonesia to devalue its currency and everything fell apart within the space of a week. What was going on? What made the Indonesian economy so fragile and what are its prospects for the future?

Let’s consider first how Indonesia got into the state that it was in. In the 1970’s, 80’s and early 1990’s, the gross domestic product per capita in Indonesia increased at a rate of about 7% a year, so that output increased four-fold in that country in a space of one generation. This is an incredible increase in economic output and one of the fastest reductions in poverty anywhere in the world in history. Not only that, but this economic miracle was spread pretty evenly over the population. In the early 1970’s, about 60% of Indonesians lived below the poverty line, and yet by 1996, only 11% did. So the economic benefits were spread throughout the population and the society appeared to be relatively stable. And yet, in 1997, events in East Asia put Indonesia’s economy under extreme pressure. In Thailand and Malaysia, troubles forced those economies to devalue their currency. And as their currencies depreciated, Indonesia had to depreciate its own currency, or else risk losing all of its export markets. It couldn’t be competitive with other Asian economies unless it followed suit and also depreciated. What was happening then in Indonesia was that the price of imported goods was skyrocketing. Bringing imports into the country became very, very expensive overnight, which put pressure on any businesses in Indonesia that depended on imported capital or imported raw materials. Not only that, but investors, fearing that the Indonesian rupia would further depreciate, very quickly tried to convert their investments from rupia into dollars or yen or some other more stable currency. So as everyone began selling off all of their Indonesian investments, capital was hard to get in Indonesia. Interest rates went through the roof and businesses found themselves closing for lack of capital and for lack of export markets. Very quickly, lots of poor Indonesians lost their jobs and output began contracting. Economic output in the country, which had grown by 8% in 1996 and 5% in 1997, began contracting at a rate of about 15% a year in 1998. The economy was actually shrinking. This balloon that had been blowing up began to deflate.

Well, very quickly the crisis turned from being an economic one to being a political one. A drought that arrived in 1997, right on the heels of the devaluation of the currency made food hard to get. So not only were people poor and unemployed, they were now hungry on top of this. And Indonesians took to the streets in 1998, rioting for political reform. Their dictator, Suharto, who had ruled the country since the late 1960’s, suddenly found himself faced with calls for resignation and overthrow, and there was even concern that the military would turn on him, because of popular unrest. So a popular election brought to power someone who was widely believed to be, again, someone under the influence of Suharto. So it appeared that there was no real change and discontent continued through 1998.

How did Indonesia get in this situation? How could a depreciation of their currency so quickly turn everything to dirt? Well, consider things that made Indonesia successful to start with. The first was rapid technological advance. Green revolution technology, which made agriculture more productive and other imported capital goods and technologies made Indonesia industrially productive as well as in the 70’s, 80’s and 90’s. So the quick adaptation of technologies that had been developed other place made Indonesia well positioned for industrial output increase and agricultural increases. Also, the government maintained prudent macroeconomic policies, rather than running budget deficits that created instability, they maintained budget balance, which typically kept interest rates low and made capital available to other sectors of the economy, because the government wasn’t using all of Indonesia’s savings. So good macroeconomic policy was also a key to the success early on. And a third thing was trade liberalization. In general, there was a dismantling of regulation of the economy during this period, and imports and exports flowed freely and businesses could start and compete with one another in an attempt to get profits. So the Indonesian economy was relatively deregulated during this period. So these three things would tend to combine to make Indonesia a good candidate for success economically.

However, there was trouble during this time as well. Because the economy was growing so rapidly, the banking system was expanding very, very quickly. And the banking system was not finding itself on very, very stable foundations. In fact, it was quite corrupt. There were people within the banking system that were directing capital not necessarily to the most productive projects, but to the projects that most benefited friends of the bankers. And this corruption then created a rotten foundation for the economy, because as soon as some of the bank loans began to go bad, the banking system found itself in trouble and vulnerable to runs on the bank. And once the banking system starts to collapse, then businesses lose capital and everything can go bad very quickly. So a weak banking system was being set up as the economy grew faster than a stable banking system could spread out to support it.
A second problem with the Indonesian economy was corruption at the very highest levels. The Suharto family, the family of the dictator, began to play a larger and larger role in the government, actually owning large shares of businesses, directing the allocation of capital and making profit off of crony loans, loans to friends rather than loans to the most productive projects. So as the Suharto family began to direct the economy, the benefits of the market allocation were lost. Rather than going to the highest bidder, capital began to go to friends of the dictator. And as the dictator began to play a larger and larger role in the economy for his own enrichment, then the economy was on shaky ground, because all it took was competition from abroad or a devaluation of the currency to set in motion a chain reaction, and one flimsy institution after another would fall.

Another problem was all of the capital that was in Indonesia, a very, very large chunk of it was coming from abroad. There was not a great deal of domestic savings relative to the amount of investment that was being done in the economy. Therefore, foreigners who became fearful that the rupia would depreciate would be very quick to take their money out of the economy. Not only was it foreign capital, but it was short-term capital, capital that people could get out quickly if they wanted. So this is typically going to be a problem for a rapidly growing country; that is, if a lot of finance is coming in from abroad, it can flow out just as quickly as it flowed in. And one of the things that will lead foreign capital to flow out of an economy is a risk of depreciation of that country’s currency. People want to get their money out before it loses value.

Well, all of this came to a head in 1997. In 1997, in the summer when Thailand and Malaysia first had their trouble, then Indonesia found itself in the position of being forced to depreciate its currency. It devalued its currency rather than trying to support a stronger rupia by spending foreign exchange reserves, because they knew that was a losing battle. So one thing that Indonesia did right was rather than spending all their reserves, they quickly depreciated their currency. On the other hand, that immediately set off all of the problems we’ve discussed: rapid inflation, capital flight out of the country. And then, on top of that, the banks began to find themselves in the situation that no one could repay their loans. Therefore, the banking system began to close down and the money supply began to shrink. And one problem after another popped up out of this crisis.

Well, as economists look back on it, they say, first of all, that the corruption that was inherent in the system should have been a warning to all of us. Why were foreign investors pouring so much money into this economy when so much of it was going to corrupt investments? In some cases, people were being bribed and paid on the side and the allocation mechanism wasn’t working properly. But people were still making money, because of the corruption that was going on. And yet, in the end, it all came home to roost whenever the value in the economy was destroyed by the depreciation and the events that followed.

Then the International Monetary Fund was invited in to try to help sort out the mess. But, by most measures, their intervention was a failure. It was too late and it was too little. The money that was promised didn’t come in time. The Fund closed down banks too quickly in some cases, even some banks that might have been able to struggle along, while other banks were failing. There was a lot of criticism of the International Monetary Fund’s intervention and perhaps they actually made things worse than better. Not that the International Monetary Fund doesn’t often help countries through periods of transition, but in this case it appears that their actions were relatively unsuccessful and may have exacerbated the problem.

So then there is the dictator himself, who seems to have made the problem go on and on by refusing to leave office until absolutely forced to do so by riots and strikes and all kinds of turmoil. What happens then in this case, when the political turmoil breaks out, is everyone starts looking for a scapegoat and the dictator stirred the populous up, as frequently happens, against the ethnic Chinese in that country, who were the people who, in most cases, running retail establishments and undertaking finance. So when the people who have the business acumen and the experience and skill and connections to make your economy work are being attacked and becoming the victims of crimes of prejudice, then that just makes things worse on top of that.

Nowadays, the situation in Indonesia has improved somewhat, largely due to a boom in the world economy. Export markets have been restored, some measure of stability has been restored, they have made a transition to a government that is no longer a dictatorship, but relatively popularly elected. And so the prospects for Indonesia have improved. But the country still has a long way to go. Like many of the countries of East Asia, their economic system, particularly their banking system, has been directed not so much by competition to officially allocate capital, but rather by friendship connections and, in some cases, just blatant corruption. And until the banking system is on firm
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foundation and until the businesses are competing for capital that should go to those who have the best use of it, then we're not building a strong foundation for an economy that can endure the kind of shocks that buffeted Indonesia 1997. If your institutions aren't being driven by efficiency, by allocation towards the creation of value, then, when something happens like this from abroad that forces you into a crisis, you can expect all the turmoil that you got in Indonesia. Indonesia had unusually bad luck, but this unusually bad luck exposed the unusual extent of the corruption in the economy.
Determining the Difference Between a Closed Economy and an Open Economy

The last time we talked about the market, we put the supply and the demand together and came up with the equilibrium price and quantity traded. That was a case where the market was closed to trade; that is, all the supply and all the demand were within the economy. This time, we’re going to study international trade. We’re going to use the supply and the demand diagram with one addition: in the case of international trade, we’re going to consider a market or a country that can bring more of the good in from the outside; that is, it can import. Alternatively, this same market or country can sell more of its goods to the outside world; that is, it can export. In this case, rather than determining an equilibrium price and quantity, we’ll be determining an equilibrium volume of international trade, imports or exports. Now, we’re going to be using the same tools that we used before, with one modification. Let’s look at it.

The demand curve this time represents the demand of all of those people who live within the market or the country. To make this more concrete, let’s suppose we’re talking about a country like France and product like this one. This is a pomelo, the world’s largest citrus fruit. Now, there are not a lot of these that are actually grown in France, because the climate isn’t suitable and it would be very expensive, a large opportunity cost, for the French to give up the other goods that they would have to give up to make these pomelos. So the pomelo is imported. On this curve, we’re representing the demand of people in France for pomelos. At each price, there is a quantity that the people in France will want to buy of the pomelo, given their income, the price of substitutes, the price of complements, expectations and all of those other factors that influence demand.

Let’s look now at the supply curve. This is the supply curve for pomelos in France; that is, the domestic supply curve. This curve tells you, at each price per pomelos, how many of them are actually produced by farmers in France itself. This supply curve refers to the supply of pomelos domestically. So I’ll go ahead and put a little sub-d in my diagram to remind me that this is the supply of domestic farmers. The demand curve is the demand for pomelos domestically, so I’ll put a little d here to remind me that these are the people in the market itself, in France, who want to buy different quantities of pomelos at different prices. Now, if this were a closed economy, the price of the pomelo would be determined where the supply curve and the demand curve meet; that is, there is only one price at which the quantity supplied and the quantity demanded are equal. There is one price at which we have an equilibrium. And the quantity demanded of pomelos is on the quantity axis below that intersection. But this is going to be a different story. Rather than considering the closed economy, we’re going to consider an open economy. And we represent the open economy by inserting a world price line. The world price line reminds us that, as far as pomelos are concerned, France is a small country. That means that the farmers in France can produce as many pomelos as they’re capable of without producing so many that they actually affect the world price. People in France can buy all the pomelos that they might be inclined to buy, also without influencing the world price. Most of the pomelos in the world are grown outside of France and most of them are consumed outside of France. So as far as this particular fruit is concerned, France is a small country, a country without influence on the world price. So we can put the world price in our diagram and it’s going to be a constant. No matter how many pomelos are supplied and demanded in France, there will be no effect on the world price. Let’s put the line in.

Suppose the world price for pomelos is right here, \( P_W \). This is the world price and we might imagine that it’s a dollar per pomelo; that is, you can buy or sell all the pomelos you want to on the world market for a dollar apiece. So I'm going to let this line go across the diagram. It represents the opportunity for international trade. It represents the opportunity to buy and sell outside of France, in the rest of the world, at the price of 1 dollar per pomelo. Now, with a world price given at a dollar, people in France are always going to have the opportunity to buy pomelos for a dollar apiece from someone outside of France. They might import them from Spain or Africa or somewhere else. Any farmer who produces pomelos in France has to compete with these imports; that is, they have to compete with farmers other places, who are able to produce and sell pomelos for a dollar. That is, no one will pay more than a dollar, because of the alternative to import the good, and no farmer can charge more than a dollar, because otherwise he or she would be undercut by competition. So what happens in this market? The world price is fixed. France is a small country and it takes this world price as given. What then do the people of France do? Well, let’s look at our supply and demand curves, which represent the behavior of people in this market.

On the blue curve, we can see what the French farmers are going to do when the price of pomelos is set at a dollar per fruit; that is, they can cover the opportunity cost of producing only a few pomelos before the opportunity cost rises to the point where it’s no longer profitable for them to make the fruit. The quantity supplied domestically will be given by this intersection. This intersection tells us the quantity that the French farmers can afford to supply. So we’ll use a QSD to represent the domestic quantity supplied. Going over to the demand curve, we see how many pomelos
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**Determining the Difference Between a Closed Economy and an Open Economy**

French customers want to buy at a price of a dollar each. This is the quantity that people in France are willing and able to purchase at the price $P_w$, maybe a dollar per pomelo. Notice that the quantity demanded is a much larger quantity than the quantity supplied. The quantity demanded domestically is very large, because French people find the pomelos to be a bargain and are very happy to buy a lot of them. Now, here’s where international trade is different than the closed economy.

In the closed economy, you couldn’t have a situation where the quantity demanded is greater than the quantity supplied. Remember we called that excess demand. And when excess demand is present, the bidding mechanism pushes up the price of the good, until we return to equilibrium. In this case, however, we imagine that, because international trade is possible, the quantity demanded domestically can be larger than the quantity supplied domestically. It’s possible for people in France to eat more pomelos than French farmers produce. How do they do it? They import the difference between the domestic demand and the domestic supply. The difference between these two points represents the quantity of pomelos that are imported in equilibrium.

In the international trade equilibrium, we don’t determine the price. The price is given from outside. What we do determine is the difference between the quantity supplied domestically and the quantity demanded domestically; that is, the volume of imports. And the volume of imports will depend on domestic supply, domestic demand and the world price.

So, to summarize, with international trade, instead of finding the place where the curves intersect, you put in the world price line and find the difference between the quantity supplied domestically and the quantity demanded domestically. This is our equilibrium.
We're back on location, talking some more about international trade. That's why I'm wearing my special shirt. In the last lecture, we showed how you could use the supply and demand diagram to represent an equilibrium when the world price is given. Remember we were talking about France and this product, the pomelo. Let's look back at that diagram that we drew before.

The red curve represents domestic demand and the blue curve represents domestic supply. The world price is given and the difference between domestic demand and domestic supply at that price is the volume of imports. Now, notice something; if France were a closed economy and had to make its own pomelos, the price would be up here at $P^*$, where the curves intersect. Because the world price is below this price, the price that would occur in a closed economy, we say that France does not have a comparative advantage in the production of pomelos. That's why France imports them. Because if French farmers had to make pomelos themselves, their costs would very quickly rise above the world price; that is, the blue curve rises very quickly above $P_W$. It's cheaper for France to import its pomelos rather than to make them at home.

Now we're going to talk about another case. In this second case, we'll look at another product, where France does have a comparative advantage; that is, a situation where the world price is greater than the domestic equilibrium price. The product that we'll choose to examine is wine. Let's imagine now that France is, for the sake of our story, a small country when it comes to the production of wine. That means that France can buy all of the wine that it wants and make all of the wine that it wants without influencing the world price for wine. We have to make this assumption of a small country, even though it's unrealistic. We have to make it, in order to be able to use the model that we've been using. So let's look at the picture.

In this case, the red demand curve represents the domestic demand for wine. It tells us how much wine people in France would like to consume at different prices, given their income, price of substitutes, complements and all of those other things that influence demand. The blue curve represents the domestic supply of wine. As the price rises, producers in France will make and offer for sale more and more wine as they are able to cover the increasing opportunity cost of making more and more wine. If France were a closed economy, the price of wine would be determined where the demand curve and the supply curve intersect. This would be the equilibrium price and here you'd have the equilibrium quantity. Now, let's suppose, for the sake of our story, that the world price for wine is greater than this equilibrium for a closed economy. Let's put the world price for wine way up here, maybe $8.00 a bottle. At this world price for wine, we can draw in a dashed line that touches the demand curve and the supply curve. And we'll see how the French economy would respond to this opportunity to trade at this world price. Well, notice first, at this high price for wine, French consumers want to purchase this quantity, determined by the intersection of $P_W$ with the demand curve. The quantity of wine demanded domestically we can write down here on the axis as $Q_{DD}$. The quantity of wine domestically can be found by going over to the domestic supply curve. At the price of $8.00 per bottle, the domestic producers of wine want to produce this larger quantity. And we can mark it down here on the axis as $Q_{SD}$, the domestic quantity supplied. Now, notice; the quantity supplied domestically is greater than the quantity demanded domestically at this higher price. If we were in a closed economy, of course, this could not be an equilibrium. The bidding mechanism would push the price of wine downward, until we reached the intersection of the two curves. But, because we have an opportunity to trade internationally, this higher price for wine does not give us an excess supply, but rather gives us a lot of extra wine that can be exported. The difference between domestic consumption of wine and domestic production at this high price becomes France's export volume; that is, the difference between the two is the quantity of wine exported. The equilibrium in this case is not a price level. The price level is given to us from outside the model, outside the story. The equilibrium is a volume of wine exported, a difference between the quantity supplied and the quantity demanded in France at this particular world price.
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Analyzing a Change in Equilibrium in an Open Economy

I'm still wearing my special shirt, and that can mean only one thing: we have yet another lecture on international trade. This time, we're going to look at how changes in the economic environment influence the equilibrium. Let's go back to the story we were telling before, the case of the pomelo, France's imported good.

You will recall from our diagram that we show that at the world price of \( P_W \), there is a larger quantity of pomelos demanded domestically than there is supply. So the extra pomelos are imported. Now we're going to do some comparative statics exercises; that is, we're going to show how the equilibrium changes when we make a change in one of the variables that we have previously held constant. Let me give you an opportunity then to walk through this comparative statics exercise with me and see if you can guess where it's going.

Here's the change that we'll be analyzing: how will the equilibrium be affected if French consumers become wealthier? That is, if there is an increase in incomes in France. Now, let's go through those steps that we go through when we do a comparative statics exercise.

Step number one: identify whom in the market cares about this change; that is, whose behavior is affected directly. Will it be the buyers or the sellers? You pick. The answer is the buyers care directly. As income increases, that is going to influence the quantity demanded at every price. If we suppose that pomelos are a normal good, that means that as incomes increase, French consumers will respond in a predictable way.

Now we're ready for step two: which curve will shift and which way will it shift? The supply curve, or the demand curve, inward or outward? You decide. Well, since pomelos are a normal good and since income is increasing, the demand curve is going to shift, representing a change in the behavior of the buyers. Since pomelos are a normal good and French consumers are richer, the quantity demanded will be larger at every price than it was before. That is, French consumers will be buying more pomelos at every price than they were buy when their incomes were smaller. So we can show the shift as the demand curve moving outwards to its new position.

Now, the final question: what happens to the equilibrium? Does the equilibrium price go up or down? Ah, I tricked you, because this is international trade, remember? The price does not change. The price is given by the world. France is assumed to be a small country, so the price is always going to be \( P_W \), the price at which pomelos trade on the world market. What happens, as the demand curve shifts outward, is we move outward to a new equilibrium. The quantity of pomelos imported actually increases as the demand moves outward. That is, our new equilibrium occurs at the same price as before, only now, because of the increase demand associated with the increased income in France, the volume of imports has increased.

So with international trade, your three questions will be: who is affected directly by the change, which curve shifts and which way and finally, what happens to the pattern of trade? Do imports increase or decrease? Or do exports increase or decrease? You're now ready to try some more problems on your own.
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Analyzing International Trade Using Comparative Advantage

In the last lesson, we introduced the concept of comparative advantage and showed how two players with different opportunity costs could cooperate, specialize and trade and both be better off. In this lesson, we’ll give another illustration of the concept of comparative advantage. This one is a story about international trade and we’ll show how two countries with different opportunity costs for producing two products can specialize and trade and both be better off.

Let’s look first at the country of Pakistan and we’ll suppose that Pakistan uses one input, labor, to produce two outputs, two agriculture products, wheat and rice. We’ll begin with a description of Pakistan’s technology. Suppose that the unit labor requirement for producing one good, wheat, is two workers. In Pakistan, it takes two workers to produce one bushel of wheat. Suppose also that the unit labor requirement for rice is three workers. It takes three workers to produce one bushel of rice. The total amount of wheat that can be produced in Pakistan in a given period of time is 30 bushels of wheat, 60 workers divided by 2 workers per bushel of wheat equals a total of 30 bushels of wheat, the maximum wheat output possible in Pakistan. Suppose instead that all 60 workers are used to produce rice. Divide 60 workers by 3 workers per bushel of rice and you get a maximum output of 20 bushels of rice. Therefore, we’ve got the constraints on production possibilities in Pakistan, 60 workers, 2 workers per bushel or wheat, 3 workers per bushel of rice. We’re ready now to draw a production possibilities frontier for Pakistan’s economy.

But before I do that, let me go ahead and introduce a potential trading partner for Pakistan, and that is Malaysia. Malaysia is going to have a different technology and this different technology will become the basis for trade between Pakistan and Malaysia. Let’s suppose that in Malaysia it takes only one worker to produce a bushel of wheat or wheat. Notice that Malaysia has an absolute advantage in the production of wheat. Malaysia can produce wheat with fewer workers than it takes to produce wheat in Pakistan. Malaysia is therefore better at producing wheat, they can make more with less, and therefore we say Malaysia has an absolute advantage in the production of wheat. Likewise, it takes two workers to produce one bushel of rice in Malaysia, therefore we say that Malaysia also has an absolute advantage in the production of rice. It only takes two workers to produce a bushel of rice in Malaysia. It takes three workers to produce a bushel of rice in Pakistan. Because Malaysia can do more with less, we say that Malaysia has an absolute advantage.

Notice the way I’ve set up this example. I’ve cooked up a case where Malaysia has an absolute advantage in the production of both goods. Economists like examples that work like this. We like to show you that even though Malaysia is better at doing everything, even though Malaysia can produce more wheat and more rice with a given amount of labor than Pakistan, in the end we will find that it is still advantageous for Malaysia and Pakistan to cooperate and trade. Even though Malaysia has an absolute advantage in the production of each good, it will still turn out that Pakistan has a comparative advantage in something.

Now, let’s suppose then that these numbers represent technology in Malaysia. What is the opportunity cost for Malaysians of producing a bushel of rice? Well, if they produce a bushel of rice, they are going to need two workers to do so. And those 2 workers divided by 1 worker needed per bushel of wheat means that, in Malaysia, anytime you’re producing one bushel of rice, you are going up two bushels of wheat. The opportunity cost in Malaysia of producing one bushel of rice is two bushels of wheat. Now, in a minute, we’re going to compare Malaysia’s opportunity cost with Pakistan’s opportunity cost to calculate comparative advantage.

But first, let’s look at the constraints in the production possibilities in Malaysia. Suppose there are 60 Malaysian workers and they can spend their time either producing wheat or rice. What’s possible in Malaysia? If you take the 60 workers and divide by 1 worker needed per bushel of wheat, you get the total maximum wheat production possible in Malaysia is 60 bushels of wheat. 60 workers at 1 worker per bushel gives you a maximum output of 60 bushels of wheat. Likewise, if those 60 workers go into the production of rice instead, 60 workers divided by 2 workers per...
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Now, given these numbers, we can write out a table of the production possibilities for Pakistan and for Malaysia. Let’s look at those tables now. First, we’ll look at the production possibilities for Pakistan. If Pakistan has 60 workers, then it’s possible for Pakistan to produce any combination of wheat and rice given in this table. Pakistan can use all of its workers in wheat and produce no rice. Pakistan can produce 20 units of wheat, moving some workers into the production of rice. It can produce 15 and 10, 10 and 13-1/3 and so forth. Any of these combinations is possible. Remember anytime Pakistan wants to produce an extra unit of rice, it has to move three workers into the production of rice. Those are three workers that are not available for wheat production and 3 divided by 2 workers needed per bushel of wheat means that anytime Pakistan produces 1 extra bushel of rice, it’s giving up 1½ bushels of wheat that it might otherwise produce. So we will use the numbers in a moment when we draw the production possibilities frontier for Pakistan. Notice as you look at these numbers, these are the production possibilities. We’ll move this number over to the board and we’ll look at the production possibilities now for Malaysia.

Notice the numbers are bigger, because Malaysia has an absolute advantage. It is more productive than Pakistan with its labor. Here are all the possibilities, 60 and 0, 40 and 10, 20 and 20 – I say all, these are some. What I mean is all of these combinations are possible with 60 workers and Malaysia’s technology. Notice that the opportunity cost of producing 10 bushels of rice is 60 minus 40, or 20 bushels of wheat that Malaysia has to give up. As we saw before, anytime Malaysia wants to produce an extra bushel of rice, Malaysia has to give up two bushels of wheat. We’ll move these numbers now over to the board and use them whenever we plot the production possibilities frontier for Malaysia.

Let’s go ahead now and plot that production possibilities frontier. The first diagram we’ll let represent the production possibilities of Malaysia. The second set of axes we’ll let represent the production possibilities of Pakistan. Now, we’ve got to label the axes carefully, or the diagram doesn’t mean anything, so let’s put wheat on the vertical axis in each case and we will put rice on the horizontal axis in each diagram. Now we are ready to draw the production possibilities frontiers, and we have two options. The first option is to plot points directly from the schedules that are over on the board. That’s easy enough to do, so we can start with Malaysia’s. Malaysia, if they produce only wheat, can produce up to 60 bushels of wheat, so I’ll go up here to the point 60. That leaves them no labor for producing rice, so we have this point, 60 and 0. If they use all of their labor to produce rice, they can produce 30 bushels of rice and no wheat, so that would be this point, 30 and 0, on the horizontal axis. And then we could just go through and plot other combinations, like 40 and 10, 20 and 20, 10 and 13-1/3 and so forth on down. Once we have plotted all of these points, we can connect them in the diagram and draw the production possibilities frontier. Now, I didn’t go through and plot all of those points, because I don’t want to make my diagram too cluttered, but it’s clear to you that you can plot all of these points and then just connect them with a straight line. Notice the production possibilities frontier will be a straight line in this case. You’d find that out if you had plotted all of the points. What does it mean? What does it mean that the production possibilities frontier for Malaysia is a straight line? It means that the opportunity cost is constant. Anytime Malaysia wants to produce an extra bushel of rice, it has to give up 2 bushels of wheat. If Malaysia wants to move one more bushel of rice outward in the horizontal axis, then it has to move down two bushels of wheat. And that doesn’t matter whether it’s producing its first bushel of rice, its tenth or its thirty bushel of rice. Every bushel of rice in Malaysia has the same opportunity cost of two bushels of wheat. That’s why the slope of Malaysia’s production possibilities frontier is constant at -2. There is no increasing opportunity cost. Opportunity cost is constant for Malaysia, and that means that all resources that are used to produce wheat and rice are equally well suited to the production of either good. There is no kind of specialization or special characteristics of resources. All resources are equally well suited and that’s why the opportunity cost is constant and the production possibilities frontier is a straight line.

Alternatively, if we hadn’t wanted to use the numbers and plot the points from over in the diagram, we could have used the formula for Malaysia’s production possibilities frontier. This is the formula that I used to get those numbers to begin with. Before I started this example, I wrote down this formula, because it’s what I wanted my production possibilities frontier to look like. If I’d given you this formula to begin with, you could have simply plotted the equation. Here’s the formula for Malaysia’s production possibilities frontier. Wheat is equal to 60 minus 2 times the amount of rice that Malaysia produces. I’ll move this equation now over to the board, and you can see that the equation is what I’ve drawn here in this diagram, that the vertical intercept is at the point of 60, the maximum wheat production that Malaysia can turn out if it uses all 60 of its workers to produce wheat. The horizontal intercept is going to be 30. If you plug in 30 for R, the rice production, you get zero wheat left over to be produced. If all workers are in rice, you get
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30 units of rice produced. And the slope of this line is negative 2. That’s the coefficient on rice in the formula. Anytime Malaysia wants to produce one more bushel of rice, it gives us 2 units of wheat. So the slope of this line is negative 2, and I’ll go ahead and write that in. Negative 2 is the slope of Malaysia’s production possibilities frontier.

I can use the same technique now to derive the production possibilities frontier for Pakistan. I know what the end points are. The end points are going to be 30 bushels of wheat if Pakistan uses all of its labor to produce wheat. I got this number from over in the table. Also, if it uses its labor to produce only rice, then we get 20 bushels of rice, so there’s the other end point. You could plot some of the intermediate points and you’d see that they lie on a straight line, or you could simply connect the two dots at the end and get the production possibilities frontier for Pakistan. So let me draw this line in carefully. There’s the production possibilities frontier for Pakistan. The end points tell us about the maximum production that’s possible if Pakistan completely specializes in one good or the other; that is, the maximum wheat production Pakistan can get is 30 bushels of wheat and the maximum rice production that Pakistan can get is 20 bushels of rice. I could get the same information if I used the formula for Pakistan’s production possibilities frontier. Wheat is equal to 30 bushels; that’s the maximum production, minus 3 over 2 times the amount of rice production. Remember negative 3/2 or negative 1½ is the opportunity cost in Pakistan of producing another bushel of rice. Anytime Pakistan adds 1 unit of rice to its output, it does so by giving up 1½ bushels of wheat. So the slope of the curve here is going to be negative 3/2. That’s the opportunity cost of rice, measured in terms of wheat that Pakistan would have to give up. Again, notice in Pakistan’s case that we have the production possibilities frontier being a straight line, indicating that all resources being used in Pakistan are equally well suited to the production of rice or wheat.

So here we have our situation. Here are Malaysia’s production possibilities and here are Pakistan’s production possibilities. If now these two countries wanted to produce independently of each other, if we had them separated so that they can’t trade, then we could pick a point on each production possibilities frontier and call that the consumption point in the separated economies. Let’s suppose that Malaysia cannot trade with Pakistan. If Malaysia cannot trade with Pakistan, then all of the consumption possibilities lie on this curve, too. If Malaysia is going to eat some combination of wheat and rice, then it has to make that combination of wheat and rice for itself. And let’s suppose that the mix that they choose is a mix like 20 and 20; that is, Malaysia chooses to produce, at this point right here, with equal quantities of wheat and rice produced. So here we have 20 units of rice, 20 bushels of rice produced in Malaysia, and 20 bushels of wheat produced in Malaysia. This combination 20 and 20 is one of Malaysia’s production possibilities and it’s the production possibility that we are going to imagine that Malaysia chooses if they have to produce on their own.

We can say the same then about Pakistan. Pakistan has this table of production possibilities and if it wants to operate by itself without trade, it’s got to choose some point on this line and that would be its consumption. So let’s suppose that Pakistan chooses this point right here, which would be at 15 and 10 – I’m going to imagine that Pakistan chooses to produce and consume 10 bushels of rice and to produce and consume 15 bushels of wheat. So the black dots in each of these diagrams represent the pattern of production and consumption when the two economies operate independently of each other.

Now, let’s show how, by cooperating, Pakistan and Malaysia can improve their situation. How, by cooperating, Pakistan and Malaysia can produce more wheat and more rice than they are producing operating independently. First, let’s notice how much that they are producing together when they’re operating independently. Malaysia’s producing 20 bushels of wheat, Pakistan is producing 15, for a total wheat production of 35 bushels. Malaysia is producing 20 bushels of rice, Pakistan 10, for a total rice production of 30 bushels. Let’s see now how, by cooperating, specializing and trading, we can increase the quantity of agricultural goods that the two countries have available. Let’s look at an example.

In Malaysia, the opportunity cost of one bushel of rice is two bushels of wheat. The same amount of labor that will produce these two bushels of wheat would otherwise produce this one bushel of rice. So the opportunity cost can be represented by this ratio: one bushel or rice always costs two bushels of wheat in Malaysia. In Pakistan, on the other hand, one bushel of rice costs only one and one-half bushel of wheat, or we could write this a different way: the opportunity cost of two bushels of rice in Pakistan is three bushels of wheat. The same labor that could produce three bushels of wheat would otherwise be producing two bushels of rice. Now, we can show here that there is a possibility of gain from trade. Notice that the opportunity cost of producing two bushels of rice, for instance, is lower in Pakistan than it is in Malaysia. If Malaysia wants to produce two bushels of rice, it’s going to be giving up four bushels of
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**Analyzing International Trade Using Comparative Advantage**

The opportunity cost in Malaysia is two bushels of wheat for one bushel of rice. In Pakistan, on the other hand, if they want to produce two bushels of rice, it’s only giving up three bushels of wheat. The opportunity cost of rice in Pakistan is lower than in Malaysia. Therefore, we know, by definition, Pakistan has a comparative advantage in the production of rice, because it can produce rice at a lower opportunity cost than can Malaysia. These are the numbers that are in the production possibilities frontier equation. Malaysia’s slope is -2; that is, two bushels of wheat for every bushel of rice. Pakistan’s slope is negative 3/2; that is, one and a half bushels of wheat for very bushel of rice. Now that we know that Pakistan has a comparative advantage in the production of rice, we can tell a story whereby Malaysia and Pakistan cooperate to increase their wealth. Here’s the way the story works.

Since Pakistan has a comparative advantage in the production of rice, Malaysia is going to try to find some way to get Pakistan to want to produce rice and send it to Malaysia instead. Malaysia wants to specialize in the direction of wheat; Pakistan would specialize in the direction of rice. Here’s a story that I think will make this comparative advantage comparison clear.

Let’s suppose that Malaysia wants to try to make things good for itself. What it will do then is it will cut back its production of rice by two units. So get these two bushels of rice off the board and replace it with four bushels of wheat. That’s what Malaysia can produce instead. Now, Pakistan down here is producing three bushels of wheat, but remember Pakistan has a comparative advantage in rice, so anything that allows Pakistan to reduce its wheat production is going to increase wealth for these two economies operating together. So let’s have Malaysia send these three bushels of wheat down to Pakistan, which then allows Pakistan not to have to produce these three bushels of wheat. Instead, Pakistan can devote its labor to rice production and increase its rice output by two units. So now that Pakistan has someone else producing wheat for it, Pakistan can produce two extra bushels of rice, which it then sends to Malaysia. Notice now we’re back were we started; Pakistan has three bushels of wheat, which now Malaysia is producing and sending to it, and Malaysia has two bushels of rice, which it got from Pakistan, but we now have one extra bushel of wheat. This extra bushel of wheat was created by specialization and trade. This bushel of wheat did not exist before. We’re back where with started with one extra bushel of wheat. That’s what happens when two countries specialize in trade. Let’s suppose now that, since Pakistan has a comparative advantage in the production of rice, that we have Pakistan produce all of the rice for the two economies. And let’s suppose that, in addition, we have Malaysia produce twelve bushels of rice and spend its remaining labor on wheat. With this particular production of specialization and trade, we can now see that both countries can be better off. Let’s look back at our diagram.

Here we have Pakistan specialized according to its comparative advantage, producing 20 bushels of rice. Now, these 20 bushels of rice are available for trade, so Malaysia can now change its pattern of production and specialize in the direction of wheat. We’re going to have Malaysia cut back its production to 12 bushels of rice and that leaves 12 times 2, is 24 subtracted from 60, is 36 bushels of wheat that Malaysia can produce. So here’s a new point on Malaysia’s production possibilities frontier. If Malaysia produces here at this orange point and Pakistan produces here at this orange point, we can see that they have created more wheat and more rice for their combined economy. Let’s add up the totals. Pakistan is producing 20 bushels of rice; Malaysia is producing 12 bushels of rice, for a total of 32 bushels of rice. They were only producing 30 bushels before. That’s two extra bushels of rice created by trade. Let’s look at wheat production. While Pakistan is not producing any wheat, Malaysia is producing 36 bushels of wheat. 36 is 1 more bushel than we were producing before, when the economies were operating independently and producing only 35 bushels of wheat. By specialization, according to comparative advantage, we have created an additional two bushels of rice and an additional one bushel of wheat. These two economies now can agree to trade in such a way that both of them are better off. They can find some ratio of trading rice for wheat that makes them both better off than they were before. Those extra two bushels of rice and extra one bushel of wheat are available to be divided between Malaysia and Pakistan. And the rate of trade that they will agree on is somewhere between the slopes of their production possibilities frontier. Pakistan is quite happy to trade with any terms of trade that give it more than one and one-half bushels of wheat per bushel of rice. Malaysia is happy to trade with any terms of trade that give it less than two bushels of wheat per bushel of rice. So the two economies can now agree upon a particular price of wheat in terms of rice that will allow them both to be better off. By specializing, they have created more wheat and rice together than they could have created separately. And this is the basis of their gains from trade. Notice each country produced more of the goods in which they had comparative advantage, more of the product for which its opportunity cost was relatively low.
I was about to eat this orange and it occurred to me to wonder where it had come from. Did this orange grow in Florida? Workers from Florida tended the trees, picked the orange, boxed the oranges and sent them to the supermarket? If so, my purchase of this orange provided jobs for people in Florida in the US economy. What if this orange came from Mexico, on the other hand? The workers in Mexico tended the trees, picked the oranges and boxed them. My purchase of this orange created employment for workers in Mexico. Now, the difference is that if this orange was produced in the US economy, my purchase of it stimulated the US economy by creating demand for a product that's produced here. And if wages are sticky, that is, if they don't tend to adjust downward very quickly, then if I move my consumption of products from oranges produced in Florida to oranges produced in Mexico, I may have created unemployment in Florida by causing workers who originally tended trees in Florida to no longer have jobs. This is a concern. Now, of course, as a consumer, I want to buy my oranges from wherever the oranges are least expensively produced; that is, I'm looking for the country that produces oranges with comparative advantage, where the sun shines a lot, where the workers are industrious and where they know something about orange production, because those are the workers that are going to be able to get the oranges on my table at lowest price. However, if my microeconomic sense leads me to buy oranges where the price is lowest and the cost of production is lowest, then, on the other hand, I've got the macroeconomic concern of unemploying workers in the US, who were previously producing oranges and who can't compete with foreign competition.

Now, in a microeconomic classic view of the world, wages and prices would all adjust and the workers who previously made oranges would find new jobs, maybe in the software industry or producing automobiles or something like that. But if we're in a macroeconomic world, where wages and prices don't adjust instantly, then my shift of consumption from domestically produced products to imports creates a period of adjustment that is unemployment and cost to the domestic economy. This is a question that is answered in open economy macroeconomics, the approach to macroeconomics that focuses on our country embedded in a larger world economy, where we import goods from abroad and export goods to foreigners.

We're now going to begin a series of discussions about open economy macroeconomics and see what difference it makes when your conscious of the fact that your economy, your country is only one part of a larger world, a larger world with which your economy interacts.

Now, we've already had a taste of open economy macroeconomics when we considered net exports. Let's begin with the notion of exports. Exports are goods and services that are produced in our economy that are purchased by people in other countries. So the good thing about exports is they provide employment for local resources and they create income for local resources, which ends up being spent and re-spent in your economy through the multiplier effect. So exports are good, because they are demand for local production, they create income for local resources, and they have a multiplier effect in the domestic economy.

Imports, on the other hand, are good because they provide goods and services for people in your economy. They are good and services that are purchased from abroad. So if I import an orange, the good thing about that is I get to enjoy an orange; that is, my standard of living goes up if I can buy an orange inexpensively from Mexico. On the other hand, the more of my income I spend on imported goods and services, the more I'm creating jobs for people in Mexico, which is great for them, but is not so good for the people in Florida, who might otherwise have produced this orange. So imports are good because they increase your satisfaction from goods and services, but they're costly in a macroeconomic sense, because it's income that's leaking out of your domestic economy, and therefore it's reducing the multiplier effect, because you're creating multiplier consequences in some other country, not in your own.

Now, the difference between exports and imports is what we call in macroeconomics net exports. Net exports is the difference between what you're selling to foreigners and what you're buying from them. Net exports is adding to the domestic demand. Net exports is the net addition to domestic demand from your foreign trade. So international trade then has a macroeconomic consequence through net exports. The difference between what you're sending foreigners and what you're buying from them is demand for your locally produced products. This is creating income in your economy and, through the multiplier effect, creating more consumption, more income and so forth, leading your domestic economy to grow.

Now, let's look at how we show net exports in the diagram that represents aggregate spending. This is the diagram we used when we were building Keynes' model of the economy, but you can see that it applies generally to – even in the more sophisticated aggregate demand/aggregate supply model, there's some notion of spending somewhere. We
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start with consumer spending. It's an upward-sloping line that has here an intersect representing autonomous spending, and the slope of this consumption function is the marginal propensity to consume. Remember the marginal propensity to consume is the amount of each additional dollar of income that a household spends on consumer goods and services. So, for example, if the marginal propensity to consume is 90% or .9, then out of every additional dollar of income that the household gets, a horizontal movement, that household will spend 0.90, the vertical movement or the rise. So rise over run, the slope of this line is the marginal propensity to consume.

Now, lets add on to this consumption function some other autonomous components of spending that are not influenced by income; that is, we’re going to shift the line upward in a parallel fashion, but we’re not going to change its slope. So if we add on investment spending and government spending, we shift the aggregate expenditure line upward. We've added some more components of autonomous spending and we get this line right here. Now, this is how things would look in a closed economy. This is all the spending that's done as a function of income if business and government and consumers are all registering their demand in the economy. Notice, I haven't added foreigners yet. I haven't added any foreign spending. This is our spending line, aggregate expenditure, in a closed economy.

Now, let’s look at what a difference an open economy makes. The first component of the open economy is going to be exports, and we’re going to imagine that exports are autonomous; that is, they don’t depend on income. Why would that be? Because exports are the demand of foreigners, people in other countries, who want to buy goods from our economy. They don’t care what our income is in this country. Our income doesn’t influence their demand. Their demand depends on their income. And since their income isn’t in this picture, then showing exports is just another upward parallel shift in the line. The line shifts upward, parallel again, and we just added on another autonomous component of spending, exports.

Now, this is only half the story. This is what foreigners are buying from us. Now what we have to subtract from this picture is what we’re buying from them. Why are we subtracting it? We’re subtracting it, because our imports are already written in this picture; that is, our imports are either purchase by consumers when they import oranges from Mexico, or by businesses when they import computers from Canada, or by the government whenever it imports concrete from Columbia. So what we do is we look at the fact that imported goods are already registering in consumer spending, business spending and government spending. So if we want to find the total demand for domestically produced products, we have to subtract imports from this total spending in our economy.

Now, we’re going to make an assumption about imports, and that is that imports depend on the level of income; that is, every time your income goes up by a dollar, consumers spend part of that extra dollar on imported goods. So let’s suppose that that number is 10%. So for every dollar’s worth of additional income that a household gets, they're going to spend 0.10 of it on imported goods. Now, what that does is, if we want to now look at this line as representing the demand for domestically produced goods and services, we have to reduce the slope of this line by 10%. So we reduce the slope. Previously, the slope of this line was 90%, now it’s 90% minus 10%, or 80%. What we've done is we've subtracted imports, because of every dollar that households get in income, they're going to spend 0.90, but they're only spending 0.80 of it on domestically produced goods and services. The remaining 0.10 is going outside our economy as spending on imports and that has to be subtracted, because imports are goods that are not produced in our economy, not creating income for local factors of production.

So there you have it. The curve gets a flatter slope and the intersection point with the spending equals income line. The intersection point with the equilibrium line is now going to be at a point closer to the origin, because we moved right here from an economy with no imports to an economy with imports. And the spending abroad, the fact that some of our goods and services are purchased from abroad, reduces the amount of production that domestic factories have to do to keep up with demand. Remember what we’re looking for here is the amount of local production and income that is needed to support the spending plans of the economy. And the more people are importing, the less has to be produced domestically to give us an equilibrium.

So in an open economy what you get is a flatter aggregate expenditure line, because the more people are inclined to import, the less domestic production needs to be done to keep up with demand. This then raises the question of the multiplier. What is the multiplier like in an economy with imports? Well, remember the multiplier says that whenever I buy an orange from Florida, I'm creating income from Florida orange workers. They then spend the money on compact discs and haircuts and T-shirts and those merchants, in turn, go out and spend this new income on other consumer goods and services. But if I imported this orange from Mexico, there is no multiplier effect in the US
There’s a multiplier effect in Mexico, but we’re not studying Mexico’s economy, so we can ignore that. The multiplier effect in the US economy is lost when the good is imported rather than produced domestically. So think about then the effect that imports have on the multiplier. It’s a kind of leakage. Every dime that’s spent on imported goods is a dime that’s lost to the multiplier process in this economy. It’s a dime that doesn’t become local income and therefore isn’t passed on in local spending. To see how imports affect the multiplier, let’s start with a closed economy multiplier. Remember that it comes from a geometric sequence. When you spend a dollar, you create a dollar’s worth of income for someone else, who spends a fraction of that, and the fraction is equal to the marginal propensity to consume. Then the person who gets his money spends a fraction if it. So you get 1 plus the marginal propensity to consume plus MPC\(^2\), and so forth. And when you add up all of this infinite sequence, you get a number that converges to 1 over 1 minus the marginal propensity to consume. So if the marginal propensity to consume is 90% of each additional dollar, then the multiplier is 1 over 1 minus 90%, or 1 over 10%, which is 10.

Now, in an open economy, you get an additional leakage at each step in this story. So, for instance, if I go to the store to buy some flowers, the flower merchant gets a dollar from me. The flower merchant then is inclined to spend 90% of the dollar’s worth of income, but he’s only inclined to spend some of it on locally produced goods. Suppose the marginal propensity to import, or MPM, is 10%. That means that the flower merchant wants to spend 90% of the money that I gave him. We have to subtract 10% of that amount, which is the amount that he’s going to spend on imported goods. The multiplier is the money that he spends that goes to someone locally. So here we have MPC minus MPM. He’s only spending 0.80 of my original dollar that I gave him on locally produced goods. So 0.80 goes to someone else, say the ice cream merchant that the flower merchant buys ice cream from. Then he gets 0.80, of which he spends 90%, but only 80% on locally produced goods. Maybe he buys a T-shirt from the merchant next door, as well as spending some of the money on imported oranges. So what you get then is a geometric sequence with 1 plus 80% plus 80%\(^2\) and so forth. It’s just like the previous story only the number is smaller. It’s reduced by the amount of money that flows out of the economy in the form of imports. So the new multiplier for the open economy is 1 over 1 minus this sum, and the sum is the marginal propensity to consume minus the amount that’s spent on imported goods, the marginal propensity to import. Exactly the same idea, a geometric sequence, a chain reaction, everybody playing their role a step in the story, only this time we’re reducing the amount passed on at each stage by the amount that’s spent on imported goods. So the multiplier is smaller in this case; 1 over 1 minus 90% minus 10%, or 80%. 1 minus 80% is 20%. The multiplier was just reduced down to 5, 1 over 20% is 5, so our open economy multiplier is smaller than the closed economy multiplier, because when people spend money outside of your economy, they are reducing the multiplier effect. They’re reducing the amount of income that’s created for local factors of production at each stage, and that reduces local demand for goods and services.

So there you have it. In an open economy, the multiplier is smaller, because imported goods, while they’re good for your standard of living, will shrink domestic income, because they reduce the multiplier effect. More income goes abroad to foreign countries and that’s great for the foreign countries. However, from a macroeconomist point of view, you get a smaller punch now from increased government spending whenever people in your economy are inclined to spend a chunk of their extra income on imported goods.

Now, we’re going to consider foreign trade more broadly and look at how economists do the accounting of imports and exports and what this means for measuring economic activity.
We've now come to our discussion of balance of payments accounting. A lot of students find balance of payments accounting difficult and tedious, but I think it's actually very interesting and, if you'll stick with me, I think I can convince you of that.

In order to understand balance of payments accounting, begin with one insight: it's all about the supply and demand for dollars. Remember our discussion of the foreign currency market? We had foreigners who demanded dollars, so that they could buy stuff from the United States, and we had US nationals who were supplying dollars as they bought foreign currency, so they could buy goods, services and investments from abroad. Well, in the end, all this has to balance out. The supply of dollars has to equal the demand for dollars in the end, and that's really what balance of payments account is recording – the supply and the demand for dollars.

Now, whenever we're talking about the supply and demand for dollars, we're talking about international transactions. So begin with this important insight. Keep it in mind, because it's the key to understanding balance of payments accounting. Every international transaction involves an exchange of money for value. Now, we can look at this transaction from either perspective, but they're both there. Say, for instance, I'm importing an apple from Mexico. What I'm doing is I'm supplying US dollars to get Mexican pesos to buy an apple. So the apple is the value that's coming into my economy and the money is going out. This is what happens when we import goods and services, value comes in and money goes out. This dollar is being supplied to the foreign exchange markets as I bring an apple into the economy.

Well, what else can we do that would accomplish the same thing? Maybe I buy a bond that represents an IOU of a British company. If I'm buying this asset from Britain, then a dollar is going. I'm supplying US dollars to the foreign currency market even as I'm importing a British investment. So money out and value in. On the other hand, suppose I am exporting, I'm producing rulers, and I'm exporting these to China. What's happening then is someone in China somewhere is exchanging the Chinese currency for US dollars to pay for the rulers that are coming from my factory in Indiana. So value is going out and money is coming in. After you’ve added up all of these transactions, there’s so much money going out, so much money coming in and, in the end it has to balance out somehow. So that's what balance of payments accounting is. It's all about balancing money going out and money coming in by looking meticulously – you might even say tediously – at all of the ways in which money flows out of an economy and flows in.

Now, if we do this accounting in a logical and orderly way, we can get some other information about international trade and about the economy along the way. So what I'm going to do now is make a list of all the ways in which money and value flow between the US and the rest of the world. I'm going to look at our balance of payments accounting and, along the way I'm going to be able to answer questions that are interesting to macroeconomists. We're concerned about employment and output and consumption and all of that stuff in the US economy. So when we do balance of payments accounting, we start with the most concrete transactions at the top of the ledger and we work our way down to more and more abstract transactions. You'll see what I mean very shortly.

So let's look at the first way in which value and money flow in the economy, and that is in trade for merchandise; that is, goods. So, on the plus side over here, our balance of payments is increased whenever we export goods. Think of this plus as representing an increase in demand for US dollars, because when value flows out of our economy in the form of goods, like these grapes, money is flowing in; that is, someone somewhere has to demand a dollar in order to buy grapes from a California farm. So we have merchandise flowing out of the economy and dollars flowing in. The plus means a demand for dollars. Over here, on the minus side of the ledger, we have the imports of goods and services. So when we import grapes from France, dollars are flowing out of our economy as someone is trying to buy French francs to bring these grapes in from Bordeaux. So dollars flowing out, the supply of dollars, as we buy French francs, in exchange for value; that is, grapes that are flowing. So everything on this side of the ledger is value flowing out, money flowing in, everything on this side of the ledger is money flowing out, value flowing in.

Now, if you look at the sum total of all of the merchandise that is being exported from our economy and all of the merchandise that’s being imported into our economy, this what we call the balance of trade on goods, or the merchandise balance of trade. So in the United States, for instance, we import a lot more goods than we export, so we have a merchandise trade deficit. We'll be looking at those numbers in just a minute. So above the line, if we look at only the most concrete transactions, we get our merchandise trade deficit or, if this number were bigger, it would be a merchandise trade surplus.
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Let’s now think about another way in which money and value flow in our economy, and that’s going to be services. So here’s our export of services. We export services any time a foreigner comes to the United States and stays in a hotel. What they’re doing is they are buying our services, so we’re exporting them to someone in France, even though that person in France came here to get it. Also, we export services when we provide banking services or insurance services or any kind of services to a foreigner. That’s an export of services. So what’s happening is their demanding dollars to pay for those services and we’re giving them something of value. So value flowing out and money flowing in. On the other side, whenever we import services — if you go to Germany and stay in a hotel and you’re a US national, you’re importing services from Germany, just like I’m doing if I use a British bank or an insurance company that is Italian. I’m importing services from a foreign company. Now, if we add up goods and services on the export side and the import side, we can draw a line and everything above this line gives us the balance of trade on goods and services. In the United States, the balance of trade on goods and services is, in fact, still negative; that is, we are a net importer of goods and services. We import more than we export. Once again, value coming in over here and money going out, over here money coming in and value going out.

Let’s look at other ways in which money and value are traded in our economy, and that’s going to be in terms of interest. Think about this as a special kind of service. If you lend someone money, then you are exporting the use of capital. So if we are exporting the use of capital and interest payments are coming back into our economy, then that’s a kind of payment for services. So over here, on the plus side of the ledger, we have the export of capital services, which are paid for with interest payments that are coming back into our economy. And since people who borrow money from US nationals have to pay interest in US dollars, we have an increase in demand for US dollars, in order to pay these interest payments. So these are interest payments flowing into our economy from money that we have lent to foreigners. On the other side, we have interest payments that are flowing out of our economy. Once again, money flowing out because value is flowing in. The value that’s flowing in is the use of capital. Someone has lent us money, which we’re using to do business with. And we are paying them interest, which means we have to take our dollars, send them into the foreign currency market, get the foreign currency and pay them interest in the currency of their own country.

So there you have it. Here’s another thing that can be imported and exported, and that is transfer payments. Now here we have money that is flowing into our economy, as usual, on this side of the ledger. This is the money that people are sending their relatives and friends in the United States. So you can think of this, since we’re over here on the export side of the picture, think of this as us exporting thank-you notes in exchange for the money that our friends and family are sending us into the United States, an increased demand for dollars so that people can send transfer payments to their friends in the US, and we’re exporting them value in the form of a thank-you note. On the other side of the ledger, you’ve got transfer payments that we are sending people abroad. So, once again, a supply of dollars, as we buy Mexican pesos to give to our friends and relatives in Mexico, we’re importing thank-you notes from them.

All right, these are all of the ways in which goods and services, interest payments and thank-you notes are being traded in the economy. Over here dollars are flowing in. Over here, dollars are flowing out. And if we draw a line and look at everything above the line here, we have what’s called the current account balance. This is the current account, the demand for goods, services, the payment of interest and transfer payments. Add them together and you get what’s called the current account balance. In the United States we have a current account deficit. That means, on net, our imports of goods, services, capital service and thank-you notes, or our payment of transfer payments, adds up to be greater than our exports. So we have net imports of value and that means lots of dollars are going overseas. There is a big supply of dollars.

Let’s move now to the next component of the balance of payments, because this is where everything begins to even out. We’re now moving to what’s called the capital account. Once again, everything on this side of the balance sheet represents value going out of our economy and dollars coming in, or an increase in demand for dollars. One thing that would cause an increase in demand for dollars is if foreigners want to buy bonds and stocks and other assets in the US economy. So the paper money or the paper assets go abroad and the US dollars that pay for them comes into our economy as I sell a bond, say to someone in Germany. So what we have over here on this side of the balance sheet is the increase in foreign ownership of US assets. So when a German or a Mexican or someone from Japan buys a bond that represents a claim on a US company or a share of stock in a US company, it shows up over here on this side of the balance sheet. This asset goes abroad, increasing the demand for dollars, which allows the foreigner to pay for it. Over here on this side of the balance sheet, we have exactly the flip side. This is US nationals who are acquiring claims on foreign companies. The bonds or the value is coming into the US economy as I buy a share of
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stock in a French company and the dollar goes out in the foreign exchange market as I buy the francs to pay for it. So over here, the supply of dollars as I acquire assets or claims on a foreign company.

Now, we’ve talked about the exchange of dollars for goods and the exchange of dollars for services. We’ve talked about the need for dollars to pay interest and dollars for transfer payments. We’ve even talked about how you need dollars if you want to acquire foreign assets. There’s one more reason why you might want dollars, and that is in order to buy foreign currency. And that’s going to be the final component of the demand for dollars that shows up in balance of payment accounting. Say, for instance, that the US government wants to acquire Mexican pesos to hold as official foreign exchange reserves. We then supply US dollars and buy Mexican pesos, which are then held by the Federal Reserve as part of its foreign exchange reserves. So they show up over here on this side of the balance sheet, where dollars are flowing out and value is flowing in, and we call this the US government’s holding of foreign assets. Foreign exchange shows right here, just like we were importing grapes from France or bonds from Germany. On the other hand, over here, if the Bank of England decides that it wants to hold more US dollars as part of its foreign exchange reserves, then what they’re doing is increasing the demand for dollars and, as usual, the demand for dollars shows up on this side of the balance of payments accounting sheet. So over here we have foreign governments increase holdings of US government assets, in particular, the holding of US dollars as part of their foreign exchange reserves.

So there you have it. Over here on this side, all the demand for US dollars that makes possible our exports of goods, our receiving of transfer payments, makes possible foreigners paying for the bonds and stocks they buy from US companies and their holding of US dollars. So over here on this side, all the demand for dollars. Over here on this side, all the supply of dollars. So, in equilibrium, the demand for dollars and the supply of dollars has to be equal. Now, it may be that whenever we do all of the addition here we wind up with the numbers not equal; that is, we may have made a mistake somewhere. So what we have to do is add a statistical discrepancy, and the statistical discrepancy is the fudge factor; that is, what it takes to make this balance in actual practice. So if it turns out that we wind up with a big negative number that’s not offset by a positive number, we put the fudge over here to indicate that we’ve somehow miscounted. There’s some positive stuff that we’ve missed, or else that we’ve just simply over counted the negative stuff. And once you put the fudge factor in, the balance of payments always balances. It always balances, due to a change in the exchange rate, due to the US government accumulating foreign exchange or foreign governments accumulating dollars. Something has to happen somewhere to make the supply of dollars equal to the demand for dollars every day, every week, every year. The balance of payments has to balance, because supply and demand have to be equal.

Now, let’s look at some actual numbers and see what happened in the balance of payments in the United States in a particular year. So here we have the numbers and you’ll remember the numbers are going to correspond to the T-accounts we were just looking at. So, at the top of the graph here, the top of this particular chart, we’ve got the most concrete stuff, goods exported and goods imported. And if we look at the quantity of exports, which is measured here in dollars, $682 billion worth of goods exported, and we subtract the goods imported, $888 billion worth, we wind up with net export of goods being negative. There is a merchandise trade deficit of $206 billion. The export of services, right down here, is greater than the import of services, so if we look at the net export of services here, we have a surplus of services exported of $87 billion. That gives us a net trade deficit of about $118 billion. If we take the export of goods and add it with the net export of services, we wind up with about negative $118 billion, and that’s the trade deficit of the United States in goods and services. See, every time we move down this chart, we can draw a line and give an interpretation to the sum of the numbers above the line.

So what does this mean? Well, it means that we’re importing an awful lot of stuff. We’re exporting services on net, but we’re importing so much merchandise that we still wind up with a trade deficits. Goods and services taken together is resulting in a net outflow of dollars into the world economy. And that would tend to cause the dollar to depreciate, unless there’s demand for dollars coming from something else somewhere on this chart. So let’s keep moving down the chart.

If we look at the income that we’re receiving on investments, it’s $242 billion. Look at the income that we’re paying on investments; that means the money we’re paying on the capital that we’ve borrowed from foreigners, $255 billion. So on net we’re paying out more interest than we’re receiving. The United States is a net borrower, so this is creating an increased supply of dollars as we pay more dollars out to pay interest on our debts.
And finally, the net transfer of money is going out of the economy; that is, we are paying more to our friends and relatives outside the US than we’re receiving from them, so that’s an additional supply of dollars out into the world economy. That’s what this negative sign means, a supply of dollars.

Overall, the balance on current account is negative $168 billion. All of this activity is resulting in a net outflow of US dollars from our economy into the world economy of $168 billion, and that, once again, is a big, big excess supply of dollars, which is going to tend to cause the dollar to depreciate, because it’s glutting the world markets. However, if you look below this line, down at the capital account, you see where some of the demand for dollars is coming from; that is, the change in private US assets abroad is $405 billion. These are the assets that we’re buying from foreigners. But on net, foreigners are buying a lot more bonds, stocks and other IOUs from us, $588 billion. So if you add in the change in government assets, both from foreigners and from the US government, that is, the foreign exchange that’s being accumulated by our respective governments, we get a big surplus on capital account. Even though we’re paying out a lot of dollars up here for goods and services, we’re receiving a lot of dollars down here as foreigners buy assets, both the private assets of companies and they accumulate US dollars in their foreign exchange reserves. So on net there’s a big demand for dollars below the line, which, to a large degree, offsets the big supply of dollars above the line. Well, of course, things don’t add up, so we’ve got this statistical discrepancy, which, as you look at it, is pretty big compared to all these other numbers. The fudge is a large factor here. But in the end, after you put the fudge in, the balance of payments is zero.

Now, balance of payments, once again, what are we talking about? We’re talking about the demand for dollars and the supply of dollars. And in any given year, it’s got to be equal and it’s going to be equal either by the adjustment of exchange rates or by governments deciding their going to hold the excess supply of dollars in their official foreign exchange reserves. And to a large measure, that’s what happens. Even though the US runs a big trade deficit, what happens is foreigners take all those dollars that we’re spending on their goods and services and they send them right back to our economy as they buy stocks and bonds, or else they just choose to hold them in their official foreign exchange reserves. In the end, the big oversupply of dollars that results from our trade deficit is countered by a big demand for dollars, as foreigners want to buy assets of the US companies and the US government. Balance of payments is about the supply and demand for dollars. When the balance of payments gets out of whack, it’s got to be compensated for by an adjustment in exchange rates or by official foreign exchange transactions by the governments involved.
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Trade Balances

If you read the newspaper and listen to the radio, you'll frequently hear stories about the trade deficit. The trade deficit is at record levels, and often this fact is announced with some alarm, as if you should be concerned. Well, what is the trade deficit and is it something we should worry about? We're going to discuss now what the trade deficit is, what its relationship is to the rest of the economy and how particular government policies can influence the trade deficit. Let's begin with a simple definition.

The trade deficit is simply the excess of imports of goods and services over exports of goods and services. So for instance, if our economy is spending $3 billion importing goods and services and we're only exporting $2 billion worth of goods and services, we've got a trade deficit. It's the excess of imports over exports. Now, the first question to ask yourself is, "How are we able to import more than we export," because our exports presumably are paying for our imports. That's the way the current account works. However, it's possible that foreigners are lending us the money that enables us to buy more of their stuff than they're buying of our stuff. It is likely that this deficit on the current account is offset by a surplus on the capital account. Foreigners sell us stuff in exchange for our IOUs and what makes this all work out is that foreigners acquire our IOUs. They are lending us the money that makes it possible for us to run a trade deficit. So foreigners acquire our assets as we import more from them than we export to them. The current account deficit is offset by a capital account surplus.

So this helps put the trade deficit in perspective. The trade deficit is simply our borrowing from foreign countries, so that we can buy more from them than they buy from us. Now, is that bad? Well, like any debt, it can be one of two stories. First of all, think about your own trade deficit. You're running a trade deficit. You are spending more money than you're taking in. You are buying more than you're selling right now, and the way you're doing it is you're taking out student loans. Well, is that a good thing? Absolutely, because you're using this money to invest in human capital, which is going to make you more productive in the long-run and enable you to pay back the loans with interest and still have a lot of good stuff left over. So whenever you're running a deficit or acquiring debt in order to invest in productive capacity, that's a good business move. On the other hand, suppose you were borrowing money to drink a lot of French champagne and play a lot of pinball. That might be fun, but you're setting up trouble, because, in the long-run, you're not going to have any additional productive capacity with which to pay off those debts. What you're doing is you are spending the money you borrow on pure consumption in that case, and therefore you're setting up a situation where, in the long run, you're going to have to default or experience a lot of pain to pay off this debt. So debt is good if it's financing the creation of productive capacity. If debt is being used to acquire assets that make it possible for you to repay the debt, that's good. But if you're wasting the money, that's bad. Think about all the people right now who are running up their credit cards to buy consumer goods and services. The concern is that they're acquiring a lot of debt that they're not going to be able to pay off and the inevitable result is bankruptcy. On the other hand, small businesses that borrow money to invest in a taco stand, for instance, that's going to make a profit and allow them to pay off the debt, by all means, they should borrow the money, because, if they didn't, the taco stand wouldn't get opened and the productive capacity would never happen. The opportunity would be lost.

So a trade deficit is only bad if it's used purely for consumption and not to create productive assets. If we're borrowing money so that we can put computers in our factories to increase our capacity in the long run to produce goods and services, the grade deficit is a good thing for our country. And that's why a lot of developing countries run trade deficits, because they are acquiring the investment goods that, in the long run, are going to make them productive.

Now, let's think a little bit more about the trade deficit and its connection to the rest of the economy. You've seen these two equations before, let's use them again. Here are all the ways in which you can use income: consumption, savings, or paying taxes. Here are all of the forms of aggregate expenditure that add up to make total income in the economy; consumer spending, business spending, government spending and the spending of foreigners, our net exports. Well, if we set Y equal to Y and rearrange these letters, we get this famous equation that we call savings equals investment; that is, all the money we save in our economy goes to one of three uses. It either goes to finance bending spending as we lend it to businesses; it either goes to finance government budget deficit whenever we lend it to the government; or if we lend it to foreigners, we enable foreigners to run a trade surplus. They can buy more from us than we buy from them. Now, you can see from this equation where a trade surplus is likely to come from, or the flip side is a trade deficit. If this number is less than zero, that means we are importing more than we're exporting and we're running a trade deficit.

So where does a trade deficit come from? What is it that's going to cause this number to fall into the big negative digits? What's going to create a big negative trade surplus or a trade deficit for our economy? Well, it can come from
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one of three sources. First of all, suppose the government runs a big budget deficit. If the government spends a lot more than it takes in in taxes, where are we going to get that money? The government starts borrowing money to run a deficit, driving up interest rates in our domestic economy as the government hogs a bigger share of the savings. Well, what happens? Foreigners start lending us money to take advantage of those higher interest rates. The capital flows into our economy and that enables us to run a trade deficit. In fact, we can't run a trade deficit unless foreigners are lending us money. And foreigners can't lend us money without us running a trade deficit. So the trade deficit is the flip side of capital inflows. When foreigners are lending us money, they are doing so by allowing us to run a trade deficit. And that can happen if the government runs a big budget deficit. In fact, the government budget deficit and the trade deficit are twins. They happen together.

Well, what else could create a trade deficit? A trade deficit could occur if our economy is booming and businesses want to borrow a lot of money. They're going to drive up interest rates in our economy as everybody issues bonds to try to finance new factories and the acquisition of equipment. Well, the way businesses are going to get that finance is by foreigners lending us the money. As interest rates start to rise in our economy, foreigners lend us money to take advantage of the higher interest rates. Think about if as businesses importing the computers and equipment and tools that they need from abroad. That's where they get it whenever they have a sudden surge in demand for business expenditure.

And finally, it can happen if our domestic savings falls. If people in the United States decide that they don't want to save money, as has happened in recent months with the stock market booming and everybody wanting to spend this new-found wealth - people are spending more than they're making right now in income. And the way they're doing that is drawing down their savings and borrowing money. And they're borrowing from foreigners lending it to us, because people in the US aren't saving. The savings that makes the economy run right now is coming from foreigners that are buying stock and bonds in US companies.

So the trade deficit then is related to all of these other components of the macroeconomy. When the government runs a bigger budget deficit, when the demand for business spending is pumped up or when our domestic savings falls, any of these three developments is reflected in an increase in the trade deficit. If we're not saving in our economy or people want more savings than we've got, it's got to come from somewhere, and the most likely source is going to be foreigners.

Now, how can we adjust the trade deficit. Suppose we get concerned that the trade deficit is too big and we're borrowing too much money relative to what we can service in the long run. Well, here are some ways of adjusting the trade deficit. First of all, the government could run a smaller budget deficit. If the government runs a smaller budget deficit, then we don't need as much savings in our economy to meet the demand for business savings. Therefore, the trade surplus can increase and that is precisely what will happen. If we discouraged business spending, which would certainly be a bad thing for our economy, well, we probably would get a smaller trade deficit as well. And finally, if we encourage consumers in our economy to save a larger share of their income through tax advantages on 401K plans and individual retirement accounts, then that can be reflected, too, in needing to borrow less money from foreigners, which causes the trade deficit to shrink. Policy can also address the trade deficit directly. Imagine a policy where we impose tariffs and quotas on the imports of goods and services. This will discourage imports and therefore decrease them relative to exports, shrinking the trade deficit. This would show up with consequences elsewhere in the macroeconomy. Also, think about a policy in which the monetary authority, like the Federal Reserve, pumped a bunch more dollars in the world economy, causing the dollar to depreciate on world markets. When the dollar depreciates, that's going to discourage people in the United States from importing goods and services, because their prices will rise in US dollars, as it takes more dollars to buy a unit of foreign currency. Depreciation will also encourage foreigners to buy more of our goods, increasing exports, as it takes less foreign currency now to buy a US dollar and therefore get the products from our economy. So a depreciation of the dollar will lead to more exports and fewer imports, therefore the trade deficit will shrink as a result of the depreciation of the dollar. Again, that shows up with consequences for the rest of the macroeconomy.

Think for a moment about the consequences of depreciation. If the dollar becomes less valuable, then, until our purchasing patterns change, we're going to end up spending more money for our imports and making less off of our exports. Now, of course, in time, we're going to respond to these changes in dollar prices by buying less of the foreign goods and foreigners will start buying more of our goods. But until that happens, we're going to wind up spending more US dollars than before to get our imports and receiving less for our exports. In the short-run, our trade expenditure.
deficit is going to get worse when the dollar depreciates. We spend more dollars on imports, even though we’re importing the same quantity of goods as before. This effect is called the J-curve, and let’s see how it would look in a diagram.

On the vertical axis, I’m measuring our trade surplus. So when that number gets smaller, we’ve got a trade deficit. Whenever the number gets bigger, we’re running a bigger surplus. And here’s time being measured on the horizontal axis. And let me put one other benchmark in this picture; let’s put zero, which represents balanced trade. So if we’re below the zero line, we have a trade deficit and if we’re above the zero line, we have a trade surplus. Consider what would happen then following a point in time, at which the Federal Reserve makes the dollar very plentiful in world markets, which leads to depreciation of the dollar, the dollar loses value. What happens immediately is people are still going to be importing the same quantity of goods and services as before. They’ve got contracts with suppliers overseas, it takes them time to find substitutes, and therefore, in the short-run, there is relatively inelastic demand for imported goods. The same with foreigners; they’re going to continue to buy the same quantity of our exports as before, even though the prices are changing, because of the depreciation of the dollar. What happens in the short-run is we’re spending more on imports than before, because the dollar price has gone up since the depreciation. Foreigners then are spending the same on our exports and our trade deficit gets worse. In the short-run, the trade deficit gets worse; it’s only after a certain period of time that people can begin to change their behavior. Once you see that imports are getting more expensive because of the depreciation of the dollar, you’re going to stop buying imports and start buying domestically produced goods instead. On the other hand, foreigners see that our exported goods, after the depreciation, are much less expensive to them in terms of their local currency, so they start loading up on our exports. What starts to happen after this change in behavior is the trade deficit starts moving in the other direction. We import less, foreigners buy more of our exports, and our trade balance moves in the direction of surplus. Look what happens; we get a J-shaped curve. Before people can change their behavior, the depreciation of the dollar increases our expenditure on imports because of a change in prices. However, after behavior changes, we start buying less imported goods and foreigners start buying more of our exports, so that the trade balance improves. And eventually, we may go above the zero line and actually wind up with a trade surplus, where we started with a trade deficit. The J-curve effect says that, in the short-run, the trade deficit gets worse after a depreciation, because of people’s need to pay more for their imports. But in the long run, the change in their behavior makes the trade deficit smaller.

So this is the situation then with the trade deficit. The trade deficit arises because we’ve created a situation in our economy where we need to borrow money from foreigners, either because of the government budget deficit, a boom in business spending, or the fact that our own local residents are saving less. We can address the situation through policy, policies that increase savings, reduce the government budget deficit or encourage businesses to borrow less. Or we can address the trade deficit directly either through policy, like tariffs and quotas that discourage imports, or through a depreciation of the dollar that, in time, will move us toward a trade surplus, even though, in the short-run, they make the trade deficit worse.

Is the trade deficit a bad thing? The answer is it depends on what you’re spending the money on. If you’re borrowing to invest in productive capacity, it’s like borrowing on a student loan or borrowing to start a business. But if you’re just borrowing to waste the money, like credit card debt for consumer goods, then you’re setting up a situation where you’re going to be in trouble. This is why many developing countries run trade deficits. They have an opportunity to invest in productive capacity and increase their common wealth in the long run. But good policy is one that avoids trade deficits when the money is merely being spent for consumption goods.
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Suppose you're in Mexico City and you want to buy a bottle of water. At the store, you'll see a sign posted that says, "A bottle of water costs 20 pesos," but you've got US dollars, because you're traveling on vacation from California. The first thing you have to do is trade your US dollars for Mexican pesos to spend in the store. And the exchange rate at which you can do that at the American Express office or at the airport is $2.00 US equals 20 pesos. Get your 20 pesos, take them to the store and then buy your water. What you've just done is a combination transaction. You did a purchase of a good and service in Mexico, but first you had to get the local currency, so you did a foreign exchange transaction.

Foreign exchange is a transaction in which you trade one currency for another. And this brings up the price involved in such a transaction, which is called the foreign exchange rate. The foreign exchange rate is the rate at which one currency is traded for another. What we're going to do now is begin a series of discussions, in which we look at the market in which one currency, say US dollars, is traded for another currency, say Mexican pesos. What's actually being traded? How is the price at which this trade is conducted being determined? And why does it matter? I find that the most difficult things about foreign exchange discussions are just the definitions and the notation. So what I’m going to do first is explain what we’re talking about when we used terms like appreciation, depreciation, foreign currency and foreign exchange.

Let's begin by asking what is the foreign exchange market? Well, you did a kind of retail transaction when you went to the airport and traded your green US dollars for these paper Mexican pesos. Most foreign exchange transactions, however, are wholesale transactions. They are done in very, very large quantities. Suppose you are a Mexican businessman who lies in Guadalajara and you are going to be in the business of cellular telephone imports from the United States. You import cellular telephones that are manufactured in California and you sell them to clients in Guadalajara. Suppose then that you need US dollars in order to do this transaction. After all, the company in California is not going to take Mexican pesos, because they have to pay their workers in dollars. Therefore, you need US dollars to do this transaction.

So the first thing you need to do is acquire US dollars. Since you're in Guadalajara and you sell these telephones to Mexicans for pesos, you have pesos and you want to get dollars. This means you're going to do a foreign exchange transaction. Now, since you're in business, you're going to be doing a lot of these transactions, so you're going to get a better price by doing them at a wholesale rate. Most foreign exchange transactions are wholesale transactions done between banks and large financial institutions. So let’s do an example then of how that might work.

There’s a bank in California that operates in the same market as the company that manufactures the cellular telephones. There’s a bank in Guadalajara that operates in the same market as your business, where you sell the telephones. So here’s what you’re going to do: you need 1 million US dollars in order to purchase a year’s shipment worth of cellular telephones, so what you’d like to do is get a bank account in California with 1 million US dollars deposited in it. That way, you could write checks on that account to write to the company that’s going to be shipping you the telephones. You have pesos in your bank in Guadalajara, so you call the bank and say, "Exchange my Guadalajara bank account, or take some of the pesos out of it, and buy me a bank account in California, so that I can do the transaction there."

What your bank will then do is take the money out of the Guadalajara account, exchange it with a California bank and then send you a notice that you now have $1,000,000.00 on deposit in California. The rate at which this transaction occurs, the rate at which peso are exchanged for dollars in this transaction, is called the foreign exchange rate, or the dollar-peso exchange rate. And let’s suppose, for the sake of our example, that 10 million pesos can be exchanged for 1 million US dollars today on the foreign exchange market. Now, there are lots of players in this market and, if you weren't getting the best deal between your Mexican bank and the bank in California, you could go to a bank in Chicago or a bank in London. And, because they're all competing, the foreign exchange rate is pretty much the same, regardless of who you're dealing with, because of the pressures of supply and demand.

Now, if you need the money today and you call the bank and say, "We need it by 5:00 in California," this is what's called a spot transaction. A spot transaction trades dollars for pesos right now. On the other hand, if you know that you're not going to need the US dollars for three months or six months and you want to go ahead and lock in an exchange rate today so that you don’t face the risk of fluctuating currency prices, you can do what’s called a forward transaction. A forward transaction is a contract that’s entered into today, in which two parties agree to exchange currency at a given rate on some given date in the future. A forward contract is typically one that’s entered into between two parties for an amount that they choose on a date that they choose in the future. Forward contracts are a...
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way of sharing risk. People who enter forward contracts want to protect themselves against the uncertainty created by fluctuating currency prices.

Now to the tricky matter of notation. e is going to be the symbol we use to foreign exchange rate, but what does that mean? We're going to say that the foreign exchange rate is the number of units of foreign currency you can buy with one unit of domestic currency. So if we're talking about the exchange rate from the perspective of someone in the United States, it's the number of pesos you that can buy with 1 US dollar. So, for instance, if you can buy 10 pesos with $1.00, as in the example we just gave, then the exchange rate is 10, 10 pesos to the dollar. Now, the foreign exchange rate from the point of view of Mexico would be just exactly the opposite. It would be the number of dollars you could buy with 1 peso. So, take the reciprocal of that number and you get 1 over 10; that is, one-tenth of a US dollar or one dime per peso. In general, it's always true that the exchange rate from the point of view of Mexico is going to be the reciprocal of the exchange rate from the point of view of the United States; that is, the dollar per peso ratio is always the reciprocal of the peso per dollar ratio. That's why, when you look at the Wall Street Journal or the New York Times report on foreign currency prices, the foreign exchange table that appears on the newspaper every business day, you'll see in one column that it's reported as dollars per peso and in another column it's reported as pesos to the dollar. And you can look at the numbers very quickly and see that they are reciprocals of one another.

So there you have it. That's the way the foreign exchange rate is written and that's what it refers to. Now, the last question for this discussion is: why should you care? And let's look at an example that makes very clear that the exchange rate determines the cost of doing business across international boundaries. And let's go back now to the perspective of that businessman in Guadalajara, who is important cellular telephones from California.

Let's suppose that the price in US dollars of one cellular telephone is 100. 100 US dollars is the price at which you can buy a cellular telephone in California. Let's suppose at time zero, the beginning of our example that 10 pesos trade for 1 US dollar. That's the exchange rate. Now, if that's the case, then, in Guadalajara, the price of the camera in US dollars times the number of pesos that it takes to get one 1 US dollar determines the cost to that businessman of importing the telephone in pesos, his local currency. So $100.00 times 10 pesos to the dollar means that the Guadalajara businessman has to pay 1,000 pesos to get the cellular telephone.

Now, suppose instead that the exchange rate changes at e₁ to be 12 pesos to the dollar. Before we look at the implications, let's get clear on a matter of definition. If the exchange rate goes from 10 pesos to the dollar to 12 pesos to the dollar, we say that the Mexican peso has depreciated with respect to the US dollar. That means that it takes now more pesos than before to buy $1.00. That is, the peso has lost value. If that's the case then, what happens is you end up paying more pesos than before to import something from the United States and, in fact, to get $100.00 to buy the cellular telephone, the businessman now has to spend 12 pesos to the dollar times $100.00, or 1,200 pesos. Whenever your currency depreciates, you have to pay more to import goods from abroad. However, let's suppose that at e₂ the exchange rate is 8 pesos to the dollar. Now we say that the peso has appreciated. It takes fewer pesos to get 1 US dollar, or 1 US dollar buys fewer pesos. So if the peso appreciates, then we wind up spending 8 pesos to the dollar time $100.00. At time 2, it takes only 800 pesos to import the same cellular telephone. If your country's currency appreciates, then you spend less of your local currency to import goods from abroad.

So, from the perspective of the Mexican importer, when the Mexico peso appreciates, then he is in a good situation, because he spends less of his local currency to import a good from abroad. On the other hand, if the peso depreciates with respect to the dollar, he's in a bad position, because he has to spend more of his local currency, in order to import the cellular telephone from the United States.

Now, who then, in general, likes for their country's currency to become stronger? If you are importing goods from abroad, you like for your local currency to be strong. That means you can spend less of it on foreign goods and get more. On the other hand, if you are a businessman in Mexico who produces cellular telephones in Mexico City, you like for the peso to depreciate, because that means it's more costly for your friend in Guadalajara to import phones from California. He's got to raise the price in the local market to 1,200 pesos to cover the cost. That allows you in Mexico City to charge a higher price for the competing cellular telephones that you are making, and that's good for your business. So an industry that is competing with imports in Mexico likes for the Mexican peso to depreciate. That makes it harder to import competition into the country. Meanwhile, the people who live in the United States who are sending cellular telephones to Mexico, they like for the Mexico peso to appreciate. That's because their clients in
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Mexico are then able to import these hundred dollar cellular telephones with less pain. The California imports become more competitive in Mexico when the Mexican peso appreciates.

So there you have it. The foreign exchange rate determines the price of doing business across international boundaries. Whenever you live in Mexico and the peso depreciates, it’s more expensive to import goods from abroad, and therefore local producers have a competitive edge. On the other hand, when the peso appreciates, it’s easy to import goods from abroad and local competitors face stiffer competition from people importing stuff from the United States.

Now, we’re going to consider what causes the foreign exchange rate to appreciate or depreciate; that is, what sets the price at which dollars can be exchanged for pesos. And, as usual with any price, it boils down to supply and demand. So we’ll consider where the supply and demand for foreign exchange come from. But first, we’re going to look at the relationship between exchange rates and prices across international boundaries to see how the cost of living influences the foreign exchange rate in the very long run.
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We’re discussing foreign currency and the role that it plays in international trade. Last time we introduced two important concepts: the first was the nominal exchange rate, the rate at which one currency can be traded for another. We said in our example that with $2.00 US, you could buy 20 Mexican pesos, which makes the nominal exchange rate 10 pesos per $1.00 US. The second concept we introduced was the way in which foreign currency influences the cost of brining in goods from abroad. For instance, if $100.00 will buy you a cellular telephone in California and it takes 10 Mexican pesos to buy $1.00 US, then, for a Mexican businessman to import a cellular telephone from California, he’s got to spend 1,000 pesos or 10 pesos to the dollar times $100.00 for the cellular telephone.

Now, we can combine these two ideas, the nominal exchange rate and the prices in the two countries to come up with a concept of the real exchange rate. The real exchange rate tells you the rate at which goods and services in one country can be converted into goods and services in another country; that is, just as the nominal exchange rate tells you how you can trade currency, one currency for another, the real exchange rate tells you how you can trade goods and services, one set of goods and services for the similar goods and services in another country.

Now, to figure out how this conversion works, you need three pieces of information: you need the price level in the home country, you need the nominal exchange rate and the price level in the foreign country. This allows us to construct a real exchange rate and here’s the formula for the real exchange rate. The real exchange rate between the United States and Mexico is going to be equal to the price level in the United States multiplied by the number of pesos that it takes to get a US dollar divided by the price level in Mexico. Now, I’ve just given you some math. You’re probably wondering right now, “What’s the intuition of this formula? How should I think about it?” Well, think about it this way: suppose you are in the United States and you are selling oranges and you know that there are people in Mexico that produce oranges that are going to be competing with you for business in the Mexican market. Think about the way the typical person in Mexico is going to decide whether to buy domestic oranges or oranges imported from the Unites States. What they’re going to be doing is comparing the price level in Mexico, which tells you the price of buying oranges measured in pesos – say, oranges cost 5 pesos per orange in Mexico – compared with what it would cost them to import the oranges from the United States. Say oranges cost $1.00 a piece in the United States and it’s 10 pesos to the dollar. So 10 pesos to the dollar times $1.00 an orange is 10 pesos to bring an orange in from the United States. What the real exchange rate is doing is it’s comparing the cost of living, if you will, or the cost of buying goods and services in Mexico, with the cost of importing them from the United States to see which is higher. When the real exchange rate changes, what changes is the relative cost of buying stuff in one economy versus the other.

Now, let’s do a simple example with simple numbers to try to make this very, very clear. Suppose it costs $1.00 in the United States to get an orange. So $1.00 per one US orange. We have a nominal exchange rate of 10 pesos to the dollar and 5 pesos gets you one Mexican orange. What’s the real exchange rate: that is, what is the rate at which US oranges convert into Mexican oranges? Well, let’s simplify this mathematics. Let’s see, we’ve got dollars here in the numerator and dollars here in the denominator, upstairs in this fraction, so this dollar sign cancels with this, in order to get rid of those units. Let’s see, we’ve got pesos upstairs in this fraction and pesos downstairs, so these peso cancel with these. Now, what I’ve got then is 10 times 1 per US orange over 5 per Mexican orange. And if I flip the denominator and multiply, I get 10 over 5, or 2 Mexican oranges per US orange. So what we’ve just calculated is if oranges are the only good traded between the United States and Mexico, then the real exchange rate between the United States and Mexico is 2 Mexican oranges trade for 1 US orange. That is, if you had an orange in the United States, it’s worth $1.00. So you can take that dollar and you can trade it for what? 10 Mexican pesos. Then take those 10 Mexican peso to Mexico and what can you buy? At 5 pesos per orange, you can now afford to buy two oranges in Mexico. Well, if this situation seems unbalanced, it’s because it is. The real exchange rate is 2; that is, the cost of living is lower in Mexico, your money goes further in Mexico, which tells you what? That Mexicans are probably going to be inclined to buy their oranges from Mexican producers, because the real exchange rate is such that Mexican purchasing power, Mexican oranges, are a bargain. Who wants to give up two Mexican oranges just to get one orange from Florida? That is, if we assume that the oranges are exactly the same in Mexico as they are in the US. Forget about pesticides, forget about the different sizes and forget about the different colors. If it’s exactly the same good, then in this case the real exchange rate points out that you get a better deal in Mexico than you get in the US.

Now, this is what the real exchange rate is about. Whenever a country’s real exchange rate appreciates, then its purchasing power is increasing relatively to other countries. So, for instance, in this case, if the exchange rate were to go to, instead of 10 pesos to the dollar, only 5 pesos to the dollar – so, in that case, what’s happening? The Mexican
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peso is appreciating. Then suddenly, if we redo the calculations, one US orange trades for one Mexican orange, so the real exchange rate has changed. Whenever the Mexican peso appreciates, then the real exchange rate, from the point of view of Mexicans appreciates and importing stuff from the US looks like a better bargain.

Notice there’s another way to get appreciation of the real exchange rate, and that would be if oranges in the United States were to become less expensive. Suppose instead of being $1.00 per orange, they were only 0.50 per orange. So if the price of oranges were dropping in the US, then the peso would be appreciating in real terms, because you can buy more US stuff with a Mexican peso than you could before.

One final way to get the Mexican peso to appreciate in real terms would be if the price of oranges in Mexico were to go up; that is, if Mexican oranges got more expensive, then you’d be able to trade fewer Mexican oranges to get one US orange.

So the real exchange rate changes anytime the price of goods domestically changes, the price of goods abroad changes or the nominal exchange rate changes, because the real exchange rate is all about the relative cost of doing business in the two countries. When your country’s real exchange rate appreciates, good in your economy become less competitive abroad. When your country’s real exchange rate depreciates, then goods in your country become more competitive abroad, and it can happen if the price of your goods falls, if the price of foreign goods increases, or if your nominal exchange rate changes.

Now, we’re going to move on to the concept of purchasing power parity, and that is the exchange rate at which the cost of living in two economies is equal.
We’re ready now to discuss the determinants of the foreign exchange rate; that is, how do supply and demand determine the price of foreign currency? Before we go into an explicit look at supply and demand, let’s consider a force that moves the foreign exchange rate in the very long run. In the very long run, economists imagine that exchange rates adjust to equilibrate the cost of living across international boundaries. If countries find that their goods and services have become very expensive, then what they’ll begin to do is import goods and services from abroad instead. That action will end up changing prices and exchange rates to the point at which the cost of living is brought in to equality across international boundaries. We call this phenomenon purchasing power parity. Purchasing power parity refers to a situation in which the purchasing power of your income in one country is the same as it is in another country, if you convert your income at the going nominal exchange rate. Prices and exchange rates are in relation such that the cost of living is the same in Mexico as it is in the US. Now, purchasing power parity is a sophisticated concept, so we’re going to build it up in bite-size chunks.

Let’s start with what economists call the Law of One Price, and that is the supposition that a particular good, say oranges, that are freely tradable across international boundaries should have the same price whether you import them from Mexico or buy them locally in the United States. Here’s a statement of the Law of One Price: the price of oranges in the US multiplied by pesos per dollar, the nominal exchange rate, should equal the price of oranges abroad in Mexico. Otherwise, you would image that arbitrage, trade across international boundaries, would eventually bring these prices and exchange rates into this relationship. We’ll talk about how that arbitrage works in just a moment, but let’s first use some simple numbers to make sure we’re clear on the concept of the Law of One Price.

If an orange sells for $1.00 in the United States and the peso per dollar exchange rate is 10 pesos per US dollar, then the Law of One Price says that multiply $1.00 by 10 pesos to the dollar, this orange should be selling for 10 pesos in Mexico. If not, what’s going to happen? Well, suppose that this orange, instead of selling for 10 pesos, were only selling for 5 pesos. So oranges are relatively inexpensive in Mexico. What’s going to happen? Everyone is going to start buying their oranges from Mexico, including people who live in Texas, California and Nebraska. So what’s going to happen? The reduction in demand for US oranges is going to cause the price of oranges to fall in the United States. The increase demand for oranges from Mexico is going to cause the price of oranges to rise in Mexico. Meanwhile, because all of these people in the United States are converting US dollars into Mexican pesos, the peso is going to appreciate from 10 pesos to the dollar, to 8 pesos, to 6 and so forth. So what happens, as demand shifts for the relatively low-priced Mexican oranges, the numbers on this side of the equal side are going to fall, and the number on this side is going to rise, until we have equilibrium established, as in the equation that I’ve written here. So one way of solving the problem would be for the price of Mexican oranges to be bid up from 5 pesos per orange to 10 pesos. That would give you one price for oranges, whether they bought in the US or bought in Mexico.

Now, what would keep the Law of One Price from holding? I can think of four things. First of all, what if trade were blocked between the US and Mexico? Tariffs and quotas could keep this equation from holding. The second thing that could keep this arbitrage from happening is if oranges have different qualities in the two countries, so that people like Mexican oranges better or they like US oranges better. If these are not the same goods across international boundaries, then they wouldn’t be selling for the same price. Another thing that could keep trade from bringing this equation into equilibrium would be transportation costs, the high cost of shipping oranges from one country to another. And finally, there could be taxes or other things that would cause the price to be different in the two countries, taxes or regulations. So trade barriers, differences in quality, transportation costs, this is the kind of stuff that causes oranges to have different prices across the international boundary.

Now, let’s now go from the Law of One Price applied to oranges to what’s called purchasing power parity. Purchasing power parity is the same idea as the Law of One Price, only now instead of just talking about oranges, we’re talking about a basket of goods and services that represents the cost of living. So suppose the cost of living, oranges, insurance, automobiles, medical care, education in the United States cost $1,000.00 a month. $1,000.00 to buy the cost of living in the US. Well, convert that cost of living into pesos, 10 pesos per dollar, then the cost of living would be 10,000 pesos in Mexico if it’s going to be equal to the cost of living in the United States. Well, this is almost never true. If you look at actual real-world data, purchasing power parity almost never holds across international boundaries. Why is that? It’s because of transportation costs, trade barriers, differences in quality and finally, because these indexes that we use to measure the cost of living include different goods in the US than they do in Mexico. The typical Mexican family consumes a different bundle of goods than the typical family in the United States. Therefore, the Cost of Living Index, if you compare the US cost of living with the Mexican cost of living, is not directly comparable, because the bundles represent different goods and services. So this is what we call absolute purchasing
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power parity. Absolute purchasing power parity is the law of one price applied to the cost of living, just like our story with oranges. Still, in the long-run, you would imagine that if the cost of living was a lot higher in the United States than in Mexico, people in the US would start importing more stuff from Mexico and would put pressure on the government to lower trade barriers and, in the long-run, this equation would be something that the economy would approach. Well, typically, that’s true. Typically, economies do move in the direction in the long run, given time, toward purchasing power parity, toward an alignment of prices and exchange rates that satisfies this equation. But it takes a long time to get there and anytime you look at the actual data, you’ll find that most economies do not satisfy this equation.

Well, one equation the economies do tend to satisfy is relative purchasing power parity. Relative purchasing power parity refers not to price levels, but the way in which prices change; that is, the differences in rates of inflation across economies. So go back to the Law of One Price equation that says that the cost in the US with nominal exchange rate applied, and take the rate of change on both sides, that is, how are things changing. Well, there’s a simple mathematical principle that says that if you have a product of two numbers, the rate of change of a product of two numbers is equal to the rate of change of the first number plus the rate of change of the number that it’s multiplied by. So in this case, as far as Mexicans are concerned, the rate of change of importing goods from the United States is equal to the rate of change of the exchange rate plus the rate of inflation in the United States. Now, what happens when you look at the data is that relative purchasing power parity, that is, rates of change of prices and exchange rates, tends to explain the data pretty well. If you look at the inflation rate in the United States and the inflation rate in Mexico, the difference between those two inflation rates usually tells you the rate at which the currency price is changing. If the inflation rate in the United States is 10% and the inflation rate in Mexico is 20%, then 20%, Mexico’s inflation rate, minus 10%, the US inflation rate, leaves 10%, which is typically the rate at which the Mexican peso is depreciating. Think about it this way: if you’re in a country that has very rapid inflation, what are people doing? They’re trying to avoid inflation by buying goods from abroad. So if you avoid inflation by buying goods from abroad, you’re taking your local currency and buying up foreign currency so you can buy these cheaper goods from countries where there’s less inflation. But, as everybody does that, dumping their local currency to buy foreign currency, they wind up driving up the price of foreign currency, causing the local currency to depreciate with respect to the foreign currency. So counties that have rapid inflation typically experience depreciation of their currency as people in the country try to avoid the inflation by buying foreign currency so they can import less expensive goods from abroad. And what ends up happening is the currency typically depreciates at the rate at which the local inflation rate exceeds the foreign inflation rate, or to write it another way, the rate at which the Mexican peso depreciates is equal to the difference between Mexico’s inflation rate and the inflation rate in the United States. So if Mexico’s inflation rate is 10% and the US inflation rate is 4%, then the Mexican peso will be depreciating at an annual rate of 6% according to relative purchasing power parity. And relative purchasing power parity is a much better match, a much better theory for explaining the data than is absolute purchasing power parity. Even through the absolute price levels don’t satisfy that equation, the rate at which these variables change does tend to satisfy this equation.

Now, let’s get on then to a famous measure of purchasing power parity called the Big Mac Index. Here is a product, the Big Mac hamburger, that’s pretty much the same wherever in the world you buy it. Dallas, Mexico City, Tokyo, London, wherever you buy it, this is the same product. So we could look at the dollar price of a Big Mac across international boundaries to get a sense of whether purchasing power parity is satisfied or not. So let’s take an example. Suppose in the United States a Big Mac costs $2.50, so that’s the price level from this equation. And suppose that, in Mexico City, you can buy this same Big Mac for 25 pesos, that’s the Mexican price. Well, the exchange rate that would give you purchasing power parity, the exchange rate that makes the Mexican Big Mac have the same price as the US Big Mac, would be 25 pesos per Big Mac divided by $2.50 per Big Mac gives you 10 pesos to the dollar. So if these are the prices of Big Macs in the two countries, then this is the exchange rate that would make them have the same price for someone who lived in Texas, whether he bought his Big Mac in Dallas or took his dollars, bought pesos, and bought the Mexico City Big Mac. This is the purchasing power parity exchange rate. Now, it turns out that the actual exchange rate between the US and Mexico will very rarely satisfy this equation. Purchasing power parity is rarely satisfied. However, if the peso were trading at 8 pesos to the dollar today, then we would say that the peso is overvalued; that is, we’re getting too many dollars per peso relative to the purchasing power parity exchange rate. And the peso would be expected to depreciate towards the purchasing power parity level in the long run. That means if you’re a currency trader and you want to know what’s going to happen to the peso-dollar exchange rate over time, use the Big Mac standard as a measure of where things might be going. Use purchasing power parity as a long-run target, because in the long run, arbitrage is going to take us toward that exchange rate. So if we have 8 pesos to the dollar today, that means the peso is too strong, it’s overvalued, and it’s going to tend to depreciate.
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towards 10 pesos to the dollar, the purchasing power parity exchange rate. On the other hand, if we’ve got 12 pesos to the dollar today, the peso is undervalued, it’s too weak and, in the long-run, the peso is going to be expected to appreciate towards 10 pesos to the dollar. Now, the British magazine *The Economist* publishes the Big Mac Standard every year and shows how foreign currency prices are lining up with purchasing power parity. So, for example, in the United States, when this table was printed this year, a Big Mac was selling for a price of $2.44 a sandwich. In Israel, given the exchange rate between the Israeli shekel and the US dollar, if you converted your US dollars into Israeli shekels, the price you end up paying for a Big Mac in Israel is $3.50. The shekel price multiplied by shekels per dollar means you need $3.50 to get the shekels to buy that Big Mac in Tel Aviv. In Britain, too, you’d end up paying more for the Big Mac. That means the British pound is overvalued, it needs to depreciate to make the London price of a Big Mac equal to the price of a Big Mac in Dallas. On the other hand, if you were in the Philippines, you’d be able to get a Big Mac for the equivalent of $1.36. That means the Philippine peso is undervalued. It needs to appreciate to make the price of the sandwich in Manila equal to the price of the sandwich in Dallas. Now, an undervalued currency is expected to appreciate, so foreign currency traders will look at this measure of purchasing power parity and say, “Whoa! The Philippine peso is undervalued, therefore, in the long-run, it’s going to be expected to appreciate, and therefore we might want to go ahead and buy Philippine pesos now and hold them, waiting for the price to rise, so we can make some money off of currency appreciation.”

Anyway, the Big Mac Index is kind of a convenient way of incorporating purchasing power parity into a nice readable journalistic form. Purchasing power parity refers to the relative cost of living in two countries, using the exchange rate for the conversion. The Big Mac Index is just a simple form of that. When the Big Mac costs the same in the United States as it does in Mexico, with given prices of Big Macs in the two countries and the going nominal exchange rate, then we say we have purchasing power parity between the US and Mexico. On the other hand, when that equation is not satisfied, then we can make predictions about whether the peso is expected to appreciate or depreciate in the long-run. Purchasing power parity is a long-run target for the exchange rate. It’s where the exchange rate tends to go with the arbitrage of goods and services over time. But at any given day, purchasing power parity is unlikely to be satisfied, because the economy is moving toward that long-run equilibrium, although it never quite gets there.
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Mexico, Mexicans move their shopping towards the United States. And to buy goods and services in the US, you've the US relative to prices in Mexico. So if labor productivity increases in the United States or if labor productivity falls in the United States, then what happens is that competition among firms with more productive workers lowers prices in relative to the United States, Mexicans move their shopping into the US and that means buying more dollars at any less expensive goods and services from the United States. So if the price level or the inflation rate in Mexico rises States. An increase in Mexican prices for goods and services leads Mexicans to buy dollars as they attempt to buy goods, services and investments in the United States. So let's make a list.

Now, the final question we want to ask is "What would cause the demand curve for dollars to shift?" At any given exchange rate, say, at an exchange rate of 10 pesos to the dollar, what would cause Mexicans to increase the quantity of dollars that they demand? What would lead the demand curve to shift outward, representing a larger quantity of dollars demanded by Mexicans at any given exchange rate? At any given exchange rate, what makes Mexicans want to buy more US dollars? The answer is anything that makes the US a relatively attractive place to buy goods, services and investments. So the demand curve for dollars represents the behavior of Mexicans and its downward sloping. Now, the final question we want to ask is "What would cause the demand curve for dollars to shift?" At any given exchange rate, say, at an exchange rate of 10 pesos to the dollar, what would cause Mexicans to increase the quantity of dollars that they demand? What would lead the demand curve to shift outward, representing a larger quantity of dollars demanded by Mexicans at any given exchange rate? At any given exchange rate, what makes Mexicans want to buy more US dollars? The answer is anything that makes the US a relatively attractive place to buy goods, services and investments. So let's make a list.

First of all, an increase in the US interest rates relative to the interest rates in Mexico causes Mexicans to shift their dollars into the US market to buy bonds and stocks here. So an increase in the rate of return on investment. Higher interest rates increase the demand for dollars. Next, prices -- suppose there's inflation in Mexico relative to the United States. An increase in Mexican prices for goods and services leads Mexicans to buy dollars as they attempt to buy less expensive goods and services from the United States. So if the price level or the inflation rate in Mexico rises relative to the United States, Mexicans move their shopping into the US and that means buying more dollars at any given exchange rate. Also, taxes -- if taxes rise in Mexico relative to the United States, then Mexicans try to avoid the taxes by buying goods that are imported from the United States. Labor productivity -- if labor productivity increases in the United States, then what happens is that competition among firms with more productive workers lowers prices in the US relative to prices in Mexico. So if labor productivity increases in the United States or if labor productivity falls in Mexico, Mexicans move their shopping towards the United States. And to buy goods and services in the US, you've
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got to buy more dollars first. So the demand for dollars increases, if labor productivity increases in the US. Expectations – if Mexicans expect that the peso is going to depreciate or the US dollar is going to appreciate, then they want to buy the good asset now, the asset that’s going to increase in value. So an expectation that the peso is going to depreciate or the dollar is going to appreciate leads Mexicans to buy more dollar-denominated assets now or simply to hold dollars and wait for their price to rise. So the expectation of peso depreciation increases the demand for dollars. And finally, trade barriers – if trade barriers are lowered on US imports, if Mexicans can now import goods from the US without having to pay tariffs on them, they’re going to be inclined to buy more US goods and services at every exchange rate. With the tariffs gone, the price of bringing those goods into the country is lower for Mexicans, and therefore they're like to do more of it.

Now, here’s a little pneumonic device to help you to remember how to shift the curve. Think of this graph as a football field with the two end zones. The end zone over here, at the vertical axis, we'll call it HOME, and out this direction, we're moving toward AWAY. So this is kind of like a game field in a small town in American, where you've got a football field and one end is called home and the other is called away, where the visitors score. Well, anything that leads Mexicans to want to do more of their shopping and investing in a foreign country causes them to move their money away from the vertical axis. So the demand curve for the foreign currency shifts out. On the other hand, if Mexico becomes a more attractive place, Mexicans move their money home, the curve shifts toward the HOME axis. So the demand curve of dollars shifts out when Mexicans want to do more of their shopping in the US, away, and it shifts in if they want to keep more of their shopping and investing at home.

Now, let’s look at the supply curve for US dollars. The supply curve for US dollars is going to represent people who supply dollars in this market. Who’s that going to be? It’s going to be people who have dollars to start with, US nationals. So US nationals are going to be the supply curve and the quantity, once again, is on the horizontal axis and the price, pesos per dollar, is on the vertical axis. Typically, we draw a supply curve for dollars like any supply curve, as upward sloping. As the price of dollars increases, the quantity supplied increases. People in the United States are going to be more inclined to buy goods, services and investments from Mexico as the Mexican peso depreciates. Think about this blue curve now. It represents the behavior of US nationals who want to buy goods, services and investments in Mexico, because the supply curve for dollars is the same thing as the demand curve for pesos. You supply dollars in order to get pesos that you use for your shopping and investing in Mexico. So the supply curve of dollars, which is the demand of US nationals for pesos, you supply your dollars to get pesos and you're more likely to do that if you're getting a lot of pesos for your dollar, so that Mexican shopping and investing looks like a bargain to you. So when the peso depreciates and you get lots of pesos for each dollar, then you're inclined to do a lot of shopping in Mexico, so you supply a lot of dollars to this market to buy goods, services and investments in Mexico, where things appear to be a very, very good buy. On the other hand, if the peso appreciates and the dollar depreciates, you keep more of your money at home. You do less shopping in Mexico and more in the United States, because the currency in Mexico has become expensive, making investing and shopping in Mexico less attractive. So the slope of this curve represents the tendency of US nationals to do more shopping in Mexico when the peso has depreciated and less shopping and investing in Mexico when the peso has appreciated or become expensive.

The final question to answer is “At any give exchange rate, say, 10 peso to the dollar, what’s going to cause the supply curve for dollars to shift outward?” What's going to cause US nationals to want more pesos and to supply more dollars at any give exchange rate? So if the exchange rate stays at 10 pesos to the dollar, what's going to cause people who live in the United States to decide they want to do more business in Mexico and therefore they need to buy more pesos? Well, first, if interest rates rise in Mexico, people want to invest more money there, so they've got to get more pesos. That means selling more dollars. So higher interest rates in Mexico shift out the supply curve for dollars. Prices – if prices rise in the United States or the inflation rate in the United States increases relative to the inflation rate in Mexico, people in the United States look for less expensive goods, so they import stuff from Mexico, which means supplying dollars and buying pesos. Taxes – if taxes increase in the US, then a bigger supply of dollars, as people in the US try to buy stuff from Mexico. What about labor productivity? If labor productivity increases in Mexico, then the price of goods and services produced in Mexico falls, making Mexico a better bargain, which means people in the US are going to buy more pesos to import that stuff from Mexico. Also tariffs – if we lower tariffs on goods and services from Mexico, say NAFTA, which allows us to buy goods and services at lower prices, because we don’t have tariffs and quotas that jack-up the price of imports from Mexico, then we’re going to buy more stuff from Mexico, because the price is lower. And that means you’ve got to get more pesos first, so the supply of dollars increases as people supply dollars to get pesos to do that business in Mexico. And finally, expectations – if you think the dollar is going to depreciate, then you're going to move your money into pesos to avoid losing
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If you think the peso is going to appreciate, hold pesos now to take advantage of the rise in the price of that asset. The expectation of peso appreciation increases the demand for pesos, which is the same thing as the supply of dollars, because you supply dollars anytime you buy pesos.

Well, there you have it, a shift in the curve. And you can think about this as Americans, people who live in the US, thinking about whether they want to do their business at home or whether they want to do their business away. The more you want to do business in Mexico, the supply curve shifts out, away from this axis, because you’re going to supply more dollars at any given exchange rate to do more business in Mexico. The more you want to keep your money at home, the more the US appears to be an attractive place to buy goods, services and investments, the more the supply curve shifts in towards the vertical axis.

So there you have it. The demand curve for dollars is the behavior of Mexicans. The supply curve of dollars is the behavior of US nationals. Now we’re ready to put them together and let supply and demand determine the exchange rate. And we’ll talk about the ways in which the supply and demand tool in equilibrium can be used to make predictions about how the exchange rate will respond to some other change in the economic environment.
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Once you've developed a supply and demand tool, you can use the curves to predict the price in a market. Now that we have a demand for US dollars and a supply for US dollars, we can put the two curves together in a diagram and find out the equilibrium exchange rate and how it would be affected by changes in the economic environment.

Let's start by putting the two curves together. Remember the demand for dollars represents the behavior of Mexicans, who want dollars in order to buy goods, services and investments in the US. When the dollar appreciates, Mexicans find shopping in the US expensive and demand a smaller quantity of dollars. When the dollar depreciates, shopping in the US is a bargain and the quantity of dollars demanded increases. The supply curve represents the behavior of US nationals. When the dollar appreciates, US nationals find shopping in Mexico a bargain and therefore demand more goods, services and investments. Whenever the dollar depreciates, US nationals keep their money at home. Now, once you've got the demand and supply together, you can find the exchange rate at which the quantity of dollars demanded equals the quantity of dollars supplied. Then you've got price and quantity that give you equilibrium, like in any other supply and demand diagram.

Suppose now that we have an exchange rate that's not the equilibrium. Suppose we take this exchange rate here, e'. Maybe here our equilibrium is 10 pesos to the dollar. What happens at 8 pesos to the dollar? Well, Mexicans are very excited about shopping in the US, because it looks like a big bargain, so the quantity of dollars demanded is very large at that exchange rate. The quantity of dollars supplied, on the other hand, is quite small, because US nationals aren't getting such a good deal. With fewer dollars supplied than demanded, we have excess demand for dollars, which pushes up the price of dollars, which we call appreciation. As the dollar appreciates or the peso depreciates, Mexicans do less shopping in the US, US nationals want to do more shopping in Mexico and the market converges on this equilibrium. On the other hand, if we had an exchange rate like 12 pesos to the dollar, then US nationals are very excited about supplying dollars, because Mexico is a bargain for shopping and investing. On the other hand, Mexican nationals are uninterested, because they're not getting such a good deal, so they don't demand nearly as many dollars. We've now got excess supply in this market, excess supply of dollars, which causes the price of dollars to fall, which we call a depreciation of the dollar or an appreciation of the peso. As the peso appreciates, Mexicans want to do more shopping in the US, so the quantity of dollars demanded moves along this line as the quantity of dollars supplied moves back along the blue line, as US nationals decide they're less interested as the dollar depreciates, until finally equilibrium is restored. Once again, this is the situation with any supply and demand diagram. The stable place is where the curves cross.

Now, the next step is what happens when one of the curves shifts? This is what we call comparative statics exercises. What happens when a change in the economic environment leaves Mexicans to demand a larger quantity of dollars at any given exchange rate? What's going to cause that to happen? First of all, review the catalog of factors that increase the demand for dollars: higher interest rates in the US, lower prices in the US, higher labor productivity in the US, and Mexican government lowering trade barriers against imports from the United States. Any of these things that occur make the US a more attractive place for Mexicans to do their shopping and investing, and therefore Mexicans demand a larger quantity of dollars at every exchange rate. The demand curve shifts outward.

When the demand curve shifts outward, then, at the original exchange rate, e*, we now have a larger quantity of dollars demanded than is supplied on the blue curve, excess demand for dollars. This leads to an adjustment, the price of the dollar rises, that is, the dollar appreciates, until equilibrium is reestablished with an exchange rate featuring more pesos to the dollar. So if Mexicans want more dollars, they're dumping more pesos into the foreign exchange market. Pesos are glutting the market, the price of pesos is falling, which means that the dollar is becoming more valuable in terms of pesos. Or think of it another way: excess demand for dollars drives up the price of dollars, leading to dollar appreciation until equilibrium is reestablished with an appreciated dollar or a depreciated peso.

The same thing is true if the supply curve shifts. Suppose the supply curve were to shift outward. Something changes in the economy, leading US nationals to want to offer more dollars for sale in exchange for pesos at any given exchange rate. If that occurs, then, at the original exchange rate, we've got excess supply of dollars. The quantity of dollars supplied relative to the quantity demanded is now too big. We have excess supply. And as in any case of excess supply, the price is going to fall to get rid of the glut. What happens then is the dollar depreciates. The exchange rate moves in this direction, fewer pesos to the dollar, until a new equilibrium is established at e**, with the dollar depreciated. So if US nationals are dumping their dollars on the market to buy more Mexican goods, then they're going lead to depreciation of the dollar. This will happen if interest rates are higher in Mexico, inflation is lower.
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in Mexico or if the US lowers trade barriers against imports from Mexico, or of taxes in the US lead people to seek to import goods from Mexico instead.

Now, the typical situation is going to be that both curves will shift simultaneously. Why is that? Because most of the changes in the environment are going to change the position of Mexicans, as well as US nationals, in this market. For instance, suppose interest rates rise in the US. If interest rates in the US rise, that means that everyone, whether you're a Mexican or a US national, is going to get a better return on dollar-denominated stocks and bonds in the US market. So what's going to happen in that case? Well, first of all, Mexicans are going to want to get a piece of this action by buying US securities, and they're going to have to first buy dollars to get them. So the demand curve for dollars will shift outwards, meaning that, at any given exchange rate, Mexicans want to buy more dollars than before. Well, what's going to happen on the other side of the market? US nationals say, "Whoa, now that you can get a higher return on US investments, we want to keep our money at home." So the supply of dollars shifts inward, meaning that US nationals now want fewer dollars at any given exchange rate, because they want to buy their own securities rather than Mexican securities. What happens in this case is the supply curve shifts inward, the demand curve shifts outward and, at the original exchange rate, we've got this huge excess demand for dollars, which is going to be the case, because the US has become a more attractive place to invest. Everybody wants dollars, so the sellers are holding onto them at the same time as buyers are trying to get more. The result then will be this big change in the price, that is, a very, very large appreciation of the dollar. The price of the dollar in pesos goes up until equilibrium is reestablished at an exchange rate of $1\times e$.

So there you have it. We can't be sure which direction the quantity is going to move. It could be decreasing or increasing, depending on the relative magnitude of these shifts. But what is unambiguous is that an increase in the US interest rate is going to lead to an appreciation of the dollar.

Now, you can imagine another situation, in which taxes in the US increased, so that the curves shift in the opposite direction. Americans want to buy more Mexican products, Mexicans want to keep their money at home, and the dollar depreciates. Typically, any comparative statics exercise you do, any story you tell, is going to involve the shifting of both the red curve and the blue curve simultaneously. The only difference would be if there is a change that affects only one side of the market. For instance, suppose the United States lowers tariffs and quotas against imports from Mexico. In that case, it's going to be only the blue curve that shifts, because only US nationals are affected. The equilibrium exchange rate will adjust, but the original change, the reduction in trade barriers, affects only the people whose behavior is described on the blue curve, not the red curve. But, as a rule, inflation changes, interest rate changes, changes in labor productivity, all of those are going to create opportunities for people on both sides of the border, and therefore both the red curve and the blue curve will shift.

Now, everything that I've done here assumes that we're dealing with a free market for foreign exchange; that is, a market where the only people who are involved are private buyers and sellers, people who are shopping and investing. But what if the government gets involved in this market and doesn't like the direction that the free market is taking the exchange rate? What if the government decides to oppose the direction that the market is going? The government, or more specifically, the central bank of any country, has a big stock of foreign exchange reserves that it can use in order to influence the exchange rate. Kind of like you, if you had a big pot of money and wanted to influence the price of apples, could go out and buy up apples anytime you wanted to push up the price, or sell apples anytime you wanted to depress the price. You can always influence the price of one good or service by buying or selling a lot of it. Well, this is what happens in the foreign exchange markets. The central banks of particular countries have big stocks of foreign currency that they can buy and sell, in order to influence the price. What I've just drawn right here, when the government stays out of the game, is what's called a floating exchange rate, an exchange rate that moves with shifts in supply and demand, changes in the free market. On the other hand, if the government gets involved and has a target for the exchange rate, we have what is often called a fixed exchange rate. A fixed exchange rate doesn't necessarily mean that someone can just declare that the exchange rate is going to be 10 pesos to the dollar and it's going to stay there. But it does mean that the government can take action to try to keep the exchange rate at a target that it determines.

Let's suppose that Mexico decides that it wants a peso-dollar exchange rate equal to 10 pesos to the dollar. I'm going to use the subscript here "O" to represent official. That's the official fixed exchange rate. Now, let's suppose that interest rates rise in the United States, and when they do, the demand for dollars is going to increase as Mexicans try to invest in the United States. At the same time that the supply of dollars is shrinking due to US nationals wanting to

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So, at this exchange rate, if you're a US national, it means that you get 10 pesos per dollar, which is very, very attractive. Americans are going to buy lots of Mexican products. If you're a Mexican national, it means that you get 10 pesos per dollar, which is not very attractive. Mexicans are going to buy fewer US goods. So the supply curve is going to shift inwards, the demand curve is going to shift outwards, and the result is this huge excess demand for dollars, which is going to drive the price up. Now, you can imagine another situation, in which taxes in the US increased, so that the curves shift in the opposite direction. Americans want to buy more Mexican products, Mexicans want to keep their money at home, and the dollar depreciates. Typically, any comparative statics exercise you do, any story you tell, is going to involve the shifting of both the red curve and the blue curve simultaneously. The only difference would be if there is a change that affects only one side of the market. For instance, suppose the United States lowers tariffs and quotas against imports from Mexico. In that case, it's going to be only the blue curve that shifts, because only US nationals are affected. The equilibrium exchange rate will adjust, but the original change, the reduction in trade barriers, affects only the people whose behavior is described on the blue curve, not the red curve. But, as a rule, inflation changes, interest rate changes, changes in labor productivity, all of those are going to create opportunities for people on both sides of the border, and therefore both the red curve and the blue curve will shift.

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Exchange Rates

Floating and Fixed Systems

keep their money at home – that is, if the market is left to its own devices, we’re going to have an excess demand for dollars at that exchange rate and we’re going to have a new exchange rate that represents an appreciation of the dollar or a depreciation of the peso. Now remember when the peso depreciates, it becomes more expensive for Mexicans to import goods from abroad. So if the government of Mexico wants to spare its investors and consumers that cost, it can try to push the exchange rate back to the official level. What’s it going to do? Well, look what’s happening. Mexicans want to buy more dollars at the same time that US nationals want to sell fewer. So what happens is the Bank of Mexico enters the market with an official foreign exchange transaction. What it does is supply more dollars to the market by selling dollars for pesos and giving the market what it wants. Since the market wants more dollars, the Bank of Mexico simply sells the dollars and takes all of those orphaned, unwanted pesos into its own vaults. When that happens, the increase in supply, due to this official action, creates excess supply at the exchange rate of 12 pesos to the dollar and pushes the market price back down to the official target. So by supplying dollars to a market that’s hungry for dollars, the Bank of Mexico pushes the price back to the level where the government of Mexico wants to keep the exchange rate. This is what’s called a fixed exchange rate and it’s maintained by the bank of that country selling dollars when the market wants them and buying up dollars when the market doesn’t. By buying and selling dollars, the Bank of Mexico keeps the exchange rate at the announced target.

Now, what’s the limit on this activity? Well, if the Bank of Mexico wants to sell dollars anytime the market wants it, they’d better have dollars to sell, which means their foreign exchange reserves have to be sufficient to oppose the direction the market is trying to take. If the market is going in a direction of depreciation of the peso, the Mexican bank has got to have enough dollars to sell to keep the price from changing; otherwise, they’re stuck and they’ve got to accept the market change, or else declare their currency in convertible; that is, simply shut the borders and not allow any further trade.

So, what we’re going to do next is look at a particular instance from recent history, in which Mexico went from a fixed exchange rate to a floating exchange rate. Why did they have the fixed exchange rate to begin with? What problems did it create? What was the end of the story when they found it unsustainable?
We've looked how supply and demand in the market for foreign exchange determines the exchange rate. We've also considered that the government might choose to play a role in the foreign exchange market of its country. When we think about the foreign exchange markets, they fall along a continuum. At one end of the continuum is a completely free market, in which the government stays out and the exchange rate is determined by the interaction of private supply and private demand. We might call this a floating exchange rate, one that moves completely with the private free market. At the other end is an exchange rate that is completely fixed by its central bank or government. A fixed exchange rate is announced by the government and the government buys and sells foreign currency in order to keep the price of its domestic currency exactly where it wants it. Now, no country in the world has a completely free market or a completely fixed exchange rate. The truth for every country is that they lie somewhere along a continuum between the two. Most countries have what's called a managed float. The exchange rate floats freely with movements in supply and demand, but the government will occasionally execute official foreign exchange transactions to try to move the exchange rate in a direction that it wants.

Now, why would the government want to do that? What's the advantage of a fixed exchange rate? Can a fixed exchange rate work? What consequences does it have and when does it breakdown? We're going to answer these question now in the context of consider the case of Mexico in 1993 and 1994, a famous example of a fixed exchange rate that seemed to work so well that it failed. But first, let's consider the most famous example of fixed exchange rates in the 20th Century, the Bretton-Woods Agreement.

Following World War II, the most important economies in the world met in New Hampshire to negotiate a fixed exchange rate system, one in which all of the countries agreed to maintain their currency’s price within a certain range for fixed rates, so that traders in all of the countries would be able to rely on fixed rates when they made long-term investments and committed to contracts. The Bretton-Woods system of fixed exchange rates worked relatively well, up until the early 1970’s, when rapid increases in the price of oil sparked inflation and put countries in the difficult position of choosing whether to maintain fixed exchange rates or try to fight inflation at home. Finally, the system just broke down and, since the mid-1970’s, most of the important economies of the world have had exchange rates that floated relatively freely. Smaller economies, like Mexico, however, sometimes find it advantageous to fix their exchange rate with that of a larger trader partner. Let’s look at what happened in 1993, when Mexico endeavored to do that.

In January of 1993, Mexico announced that it would have a fixed exchange rate of 3 pesos to 1 US dollar. The intention of this fixed exchange rate policy was to allow Mexican importers of capital goods and services from the United States to rely on an exchange rate that made it profitable for them to do the investments and put in place the capital equipment that would allow them to take advantage of the North American Free Trade Agreement, which was shortly to kick in. Mexico was afraid that if the peso depreciated too much, capital investment would become unprofitable and its factories would be ill prepared to take advantage of newly arriving export opportunities to the United States. So the Bank of Mexico announced that it would do what it took to keep the peso at 3 pesos to the dollar.

Now, meanwhile, Mexican businesses see that these business opportunities are coming, so they want to buy a lot of capital goods and services. Mexican citizens see that the economy is improving and they want to spend some of this anticipated wealth on imported goods. In 1993, you start to see Mexican citizens shopping at Walmart, buying goods imported from the United States at reasonable prices with wealth that they’re anticipating getting through the booming economy that NAFTA is creating. So what’s happening in 1993 is that the demand for US dollars is increasing as the economy of Mexico grows and the businesses opportunities created by NAFTA are sparking investment. So, with the increased demand, there’s going to be a tendency then for the equilibrium exchange rate to go up to something more like 3½ pesos to the dollar and the quantity of dollars traded to increase. Now, this is at odds with the policy announced by the Bank of Mexico. The Bank of Mexico doesn’t want this appreciation of the dollar, because they think it’s bad for investment. Therefore, what the Bank of Mexico does is supply additional dollars to meet the demand for dollars, the increased demand, at the old price of 3 pesos to the dollar. The increase in supply can be called an official foreign exchange intervention. Look what’s happening: the consumers and businesses of Mexico want more dollars and they’d just as soon get them at the old price. But, at the old price, there would be excess demand, which would push up the price of dollars. So the government, rather than letting the price rise, increases the supply of dollars so that we get equilibrium back at the original price of 3 pesos to a dollar. This is how a fixed exchange rate works.
Now, what’s going to happen here is that the government is eventually going to run out of dollars if it keeps supplying dollars every period to people who are hungry for dollars at 3 pesos to the dollar. So what the Bank of Mexico declared into 1993 was that they would change the peg; that is, the fixed exchange rate changed from 3 pesos to the dollar to 3.3 and, eventually, up to 3.5 pesos to the dollar. So what we got here was a managed float. Notice the price of the peso changed, but it changed according to government decision. The government allowed the peso-dollar price to adjust. This is called a managed float. So now there’s no need for further official action, because now that the target has been redefined, we’re sitting right where the market wants us.

Now, things are going along fine, until there’s a disaster. The candidate Collosio for Presidency of Mexico, he represents the PRI, the leading party in Mexico, is assassinated in Tijuana. And, all of a sudden, Mexicans, as well as people in the United States, fear that Mexico is about to enter a period of political instability that’s going to be bad for investment and bad for the overall health of Mexico’s economy. So now we get two big adjustments; first, we get people in the US now less willing to invest money in Mexico, and therefore the supply curve of US dollars shifts in. At the same time, Mexicans decide that they want to put more of their money in safe havens, and therefore they demand more dollars, so that they can put some in savings accounts in the United States, just in case there’s a disaster. Well, notice now that at the target of 3.5 pesos to the dollar, we’ve got this huge excess demand for dollars, as Mexicans want a lot and US nationals are afraid to supply them, because of the political instability. And the only way to eliminate this excess demand would be for there to be a huge depreciation of the peso, maybe up to something more like 6 pesos to the dollar. Well, that's totally at odds with the government’s target. And therefore, what happens is the Bank of Mexico makes up for the excess demand by shifting the official supply curve way, way out here, so that, along the new demand curve, we get an intersection at the price that they want, 3.5 pesos to the dollar. Now eventually, they let that managed float take us up to something more like 4 pesos to the dollar, but they're still holding on there to the notion that they can set a price that the market doesn’t want. The market wants 6 pesos to the dollar, but the government wants 3.5. They keep pumping dollars into the market, keep buying up those orphaned pesos, filling the coffers of the Bank of Mexico with pesos, coughing up dollars, until finally, in November of 1994, it becomes apparent that they're about to run out of dollars. They’re down to $4 billion left. They started with $25 billion in January of 1993. In November of 1994, they're practically out. So what do they do? They simply declare there’s going to be no more official support for the peso. And whenever they take off the official support, guess where we go? Bam! Exactly where the market wants us, 6 pesos to the dollar. And it happens precipitously, which means that if you owned a mutual fund in Mexico, it lost 40% of its value in a couple of days, a big, big change because of depreciation of the peso.

Now, notice this is a situation in which the success of Mexico created a failure. Mexicans, anticipating new wealth, wanted to spend on imports, wanted to spend on capital goods, increase their demand for dollars and, when they did, they pushed the peso to a point to where the government could not support an announced exchange rate target. And Mexico then went through a period of great economic turmoil over this. Inflation, high interest rates; taking advantage of NAFTA was set back. The same thing happened in Thailand in 1997. The same thing happened in Europe, in Britain, in 1992. Trying to defend a fixed exchange rate against where the market is trying to take it ultimately becomes unsupportable. And then currency speculators go at you. They see that you're exchange rate is about to shoot up to 6 pesos to the dollar, so they start selling it early, which just makes it harder, because it causes pressure for the exchange rate to go ahead and change.

So there you have it. A fixed exchange rate, a floating exchange rate and, in between, we've got things like managed floats and adjusting pegs and the government is playing some role. Now, ultimately, it’s impossible for the government to totally oppose the market. Nobody has enough foreign exchange reserves to keep the exchange rate from going where the market wants it. $1.2 trillion worth of foreign currency are traded every business day around the world and no government has that much in foreign exchange reserves. No government could oppose the movement of its exchange rate, if that’s where the market wanted to take it. However, in the meantime, governments can nudge this way, that way, try to suggest what they want to do, but they can’t fight the market indefinitely, as Mexico learned, as Thailand learned. But an effort to maintain a fixed exchange rate can do some good, if it's for the short-run and it's not too far away from the actual market equilibrium.
Consider the way in which government policy can influence trade. In particular, let's think about the government budget and the way in which budget deficits can influence the trade deficit. Let's start with a familiar equation that shows all of the uses of income and the equilibrium condition that spending equals income, rearrange the letters and you get our familiar equation, savings equals investment. All the savings in the economy can either be linked to businesses, linked to the government or linked to foreigners.

Now, let's consider then the way in which the government budget deficit is related to the trade deficit. Suppose the government decides to run a bigger deficit, that is, increase government spending relative to taxes. If the government is going to run a bigger deficit, it's got to borrow more money. That means issuing more treasury securities. The government is now competing for the scarce pool of savings and it's going to be driving up the price of savings, that is, pushing up the interest rates. So one effect of the bigger budget deficit is going to be a higher interest rate. Now this higher interest rate is going to have some consequences for international trade. The first is the direct consequence that foreigners want to lend us more money when our interest rate is high relative to the rest of the world. So foreign savings flows into our economy; that is, a capital account surplus. Now remember from balance of payments accounting, the flip side of a capital account surplus is a current account deficit. The thing that makes it possible for us to borrow money from foreigners is that we're going to start buying more from them than they're buying from us. That is a trade deficit. So the way we borrow money from foreigners is we start importing more stuff from them than they are buying of our exports. So the flip side of the government budget deficit is going to be a reduction in the trade surplus, or ultimately a growing trade deficit. That's the direct effect of the interest rate.

The other thing that happens is the higher interest rate makes foreigners want to buy more of our stocks and bonds, increasing the demand for dollars. When the demand for dollars rises relative to the supply, the exchange rate is going to change. The US dollar is going to appreciate with respect to foreign currencies. As the US dollar appreciates, then what begins to happen is people in the United States find that buying goods from foreigners is a bargain. We start spending our stronger dollars on imports so imports increase. Foreigners, meanwhile, find that it's unattractive to buy goods and services from the US, because the appreciation of the dollar makes our goods and services relatively expensive. So exports are reduced, imports are increased and that gives us a bigger trade deficit. So two channels connecting the government budget deficit with the trade deficit; the first is the interest rate and the second is the exchange rate.

Now, let's consider then the way in which the government budget deficit and the trade deficit are related to the stocks of debt that stand behind them. Let's think first about the budget deficit. Each year's budget deficit is that year's addition to the national debt. Every year that we run a budget deficit, the government is issuing more government bonds to pay for that year's government excess of spending over revenue. The outstanding stock of government bonds is the national debt, which is about $5 trillion. Every year that the US Federal Government runs a budget deficit, it's adding to the national debt, the outstanding stock of government bonds. Every year that the government runs a budget surplus, it can buy back some of that debt and reduce the outstanding national debt, reduce the outstanding stock of government bonds. Just as the budget deficit is each year's addition to the national debt, the trade deficit is each year's addition to our foreign debt. Before the 1970's and 1980's, the United States was the world's biggest creditor nation. We had lent lots and lots of money to foreign countries by running balance of payments surpluses by running trade surpluses year after year. As we exported more than we imported, we were lending other people money. Then after the 1980's, with the US trade deficit occurring year after year at larger and larger levels, we started borrowing more and more money from abroad, until the US nowadays is the world's biggest debtor nation. Your foreign debt is the amount of corporate and government bonds from your country that are held by foreigners. And every year that you run a trade deficit, foreigners are lending you money. If you run a trade deficit year after year, you're going to be lent money by foreigners year after year, until your foreign becomes larger and larger. So each year's trade deficit is that year's addition to the outstanding foreign debt, where the total amount of your country's debt or assets that is held by foreigners.

So as we add to the national debt, we are typically adding to the foreign debt, because the government budget deficit usually creates a trade deficit. The two deficits are like twins. If total savings and total business spending doesn't change, then the way we get extra savings in our economy when the government wants more is we suck it in from abroad. We get foreigners to lend it to us and the mechanisms that make that happen are changes in the interest rate and changes in the exchange rate.
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**Government Budget Deficits and Trade**

Take a look at some statistics from January of the year 2000. You can see that, in that month, the United States ran a trade deficit with trading partners China, Japan, Canada and Germany. You can also see that, in the same month, the US had trade surpluses with the Netherlands, Australia, Switzerland, Belgium, Egypt and Turkey. Now if you take all of the countries with which we run trade deficits, add up the amounts of those deficits and add up the amounts of the surpluses from the countries with which we have surpluses, you'll find that the US has a big net deficit with the world as a whole. If you take all of the countries in the world, the US, Canada, Mexico and so forth, you'll find that the trade deficits and the trade surpluses, when added together, sum to zero. For every dollar worth of trade surplus that a country has, some other country somewhere else has a trade deficit, because the sum of deficits and surpluses has to equal zero. Deficits are about countries that import more than they export and the flip side is that capital is flowing into those countries as they borrow the money that allows them to run a trade deficit. Surpluses are about exporting more than you import and those countries are lending money as they lend money to their trading partners, making it possible for the partners to buy more of their country’s exports than the particular country is importing.

So trade and capital flows are intimately linked. A country that’s running a trade deficit is borrowing money, and the sum of borrowings year after year adds up to that country’s foreign debt. A country that is running a trade surplus becomes a creditor to the world and, over time, if it runs a surplus year after year, it becomes a net creditor, a lender, to the rest of the world. So trade and finance are linked in this way.
Consider a situation where a country has a demand for a particular product, maybe this is oil, and a supply of the same product. Demand decreases as the price rises, and the quantity supplied domestically increases as the price rises. Now if this were a closed economy, the price would be set at the point where supply and demand cross. But let's suppose for a moment that this is an open economy, an economy that trades with the rest of the world. And the price of this good is set in world markets and, as far as this particular small country is concerned, the world price is a given. That means you can buy all the oil that you want at $20.00 a barrel and any oil that you produce you can only sell at the world price of $20.00 a barrel, because everyone else could buy oil at that price, and therefore you can't charge more. If you have a price that's set in world markets, then your customers and your country are going to buy the amount where the world price touches the domestic demand curve, right here, the quantity demanded domestically. And this world price touches the domestic supply curve here, which tells you the amount that you're local suppliers are going to find it profitable to produce. The difference between domestic demand and the quantity supplied domestically, this is the volume of imports in your country. So people want to buy this much more oil in this small country than the producers in that small country are making. At a price of $20.00 a barrel, this is the volume of imports.

Now, international trade is a great thing, because look at all the advantage that customers get. A lot more people can afford oil in this situation than could if the economy were closed and the price were higher. So what happens now, whenever the government decides to enact a tariff or a quota, that is, to reduce the volume of trade to allow domestic suppliers to charge a higher price for their product, we have to add the tariff or the effect of the quota onto the world price. Let's consider first the tariff. A tariff is a tax on imports of this good. So if a tariff is imposed, then everyone who imports oil into this economy has to pay the world price plus the tariff on top of that. They have to pay the tariff to the government to bring the oil into the economy. That means that the domestic price of oil rises from $20.00 a barrel to $20.00 a barrel plus the tariff. Maybe the tariff is $5.00 a barrel, making the total price for oil now $25.00, if you want to bring a barrel into the country. Well, since imports are now costing you $25.00 a barrel domestic producers can also charge $25.00 a barrel for their own production, because they don't have to worry about foreign competition. The overall price of oil in this economy then rises to $25.00 a barrel, the world price plus the tariff.

Now, at this higher price for oil, we get two effects: the first effect is the quantity of oil demanded shrinks because of the higher price. So the quantity demanded domestically with the tariff is going to be less than the quantity demanded domestically originally, without the tariff. Also, now that you can charge a higher price for oil, more of the domestic suppliers are interested in producing oil and bringing it to market. So the quantity supplied domestically increases at the same time that the quantity demanded domestically shrinks. The overall volume of imports, notice, is smaller than it was before. We had a large volume of imports at the low price and a small volume of imports after the tariff is added on. Now, with tariffs, we wind up then with much less demand for imports. With less demand for imports, there is less demand for foreign currency. So the domestic currency of this country is in shorter supply on world markets. People don't need to buy foreign currency to import oil, and therefore they keep the domestic currency at home, doing their shopping and their oil purchases at home. Because there's less supply of the domestic currency, the domestic currency is going to tend to appreciate in the world markets for foreign exchange. What happens then is the tariff, by restricting international trade, creates a shortage of this country's currency in world markets. By creating a shortage of this country's currency, it leads to an appreciation of this country's currency. Remember a short supply means a higher price. Therefore, tariffs, by shrinking the engagement of a country with the world markets, by reducing the supply of that country's currency in world markets for foreign exchange, leads to an appreciation of that country's currency.

Let's consider now the way that a quota would work, because it's quite similar. The way a quota works is slightly different. Instead of adding a price onto the world price, the quota says that only a given amount is allowed to be imported into the country. So if this country put a quota on oil imports, say a quota equal to this amount right here, the amount that we wind up having imported in equilibrium, then what happens is this quota creates a shortage of oil in the country. Remember there's excess demand at the world price if the government will only allow this small amount to be imported. So what happens is the price of oil is bid up, because of the shortage, until the quota just fits comfortably between the demand curve and the supply curve. Finally, when this country is only importing the amount that the government will allow under the quota, then the price that we have is the price that gives us equilibrium. So rather than having a tariff, what we have is a new higher price in this economy, because of the artificially created
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shortage, due to the quota. Because the government has restricted trade in oil, the price rises in this economy. It’s the same thing, it’s exactly the same phenomenon. Now this country is importing less oil and, because it’s importing less oil, less of its foreign exchange is going to be going into the world markets, therefore, an appreciation. So an appreciation of your foreign currency overall is going to incline foreigners to buy less from your economy. And it’s going to incline people from your economy to want to spend more on imported goods in other markets that aren’t being distorted by tariffs and quotas.

So these are the effects then of trade policy on the trade deficit. If the government imposes tariffs and quotas, they tend to shrink the trade deficit; however, they also tend to lead to appreciation of your currency, which is going to cause people to want to import more from other markets. So then the government may have to go in and slap tariffs and quotas on those other markets, as well. All in all, there’s a connection between trade policy, the value of your foreign exchange, and your overall trade deficit. This is a microeconomic approach to the connection between government policy and foreign trade.
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**Hot Topic: Winners and Losers in NAFTA**

We’re here at the Laredo Bridge, an important link between the United States and Mexico, and a great place to think about the way in which these two economies are becoming more tightly integrated. The people crossing this bridge are mainly doing so for commercial reasons, to buy and sell things. And the easier it is to cross this border, the more likely they are to engage in this economic activity.

Economic integration refers to changes in government policy that make it easier for people to do business across international boundaries. An important aspect of economic integration is trade liberalization, the reduction of tariffs, the elimination of quotas, changes that make it easier for people to buy and sell things across international boundaries.

A good case study in the effects of economic integration has been looking at what’s happened in the United States and Mexico following the enactment of the North American Free Trade Agreement. NAFTA was implemented in January of 1994 and, since that time, trade between the US, Canada, and Mexico has increased by 70%. Lots of jobs have been created, factories have been built along the Mexican border, taking advantage of opportunities to ship goods duty-free to the US. New businesses have been started in the US to send stuff to the Mexican market. Economic growth has followed economic integration, but it’s not without its costs. Let’s consider the ways in which NAFTA is changing lives on both sides of this border.

Some critics claim that rapid economic growth is now damaging the environment, that the quality of the air and the quality of water along the border and in Northern Mexico has been jeopardized by the rapid growth in new factories and new jobs. Others are concerned that the workers along the border are not being paid fairly or are being mistreated, the usual concerns about relations between labor and capital. And, in general, there’s the overall concern about the way in which our way of life is changing as we become more tightly integrated with our neighbor to the south. One big concern is traffic. Are our roads and bridges in the Southern US going to be able to handle all of these trucks bringing goods from NAFTA-inspired businesses northward?

In general, though, NAFTA has been a huge boom for both the US and for Mexico. Lots of jobs created, prices falling and prosperity expanding. And really the big beneficiary has been Mexico. Mexico’s economy is only 5% the size of the US. Mexico is economically smaller than Los Angeles, therefore the US has kind of absorbed Mexico as if we just added another state, no huge change to our economy. Although some critics say that 200,000 jobs have been lost in the US as a result of NAFTA, probably those people found employment in other industries, in industries that may not have existed without the opportunities created by this freer trade. Meanwhile, foreign investors from Asia, as well as investors in the United States, have put a lot of capital into Northern Mexico, building factories, training workers, and creating jobs. And exports from Northern Mexico into the United States have increased by about 140% since NAFTA was enacted. These new jobs and new prosperity are undoubtedly leading to political stability in Mexico, which is a great thing for the United States to have along its southern border.

Well, in general, economic growth brings with it certain concerns, concerns about the environment, concerns about labor, concerns about changes in our way of life. And all of these ultimately become political questions. As the US and Mexico become more and more tightly integrated economically, the next thing that becomes necessary is ever more political cooperation to resolve some of the environmental and labor problems, political problems that are going to crop up along the border as result of this economic activity. NAFTA has definitely been good for business, but business isn’t always a clear good for society. Sometimes rapid growth in business means changes that people have to cope with socially and politically. And NAFTA, like most other changes in business, has brought mixed blessings: economic integration, changes in government policy that set in process economic growth, and economic growth requires social and political adjustments.
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Government Policies

Political Instability and Trade

We've been considering the role that government plays in the open economy and one of our questions is “How does government policy influence the important economic indicators?” Now we’re going to consider how the government can influence the interest rate and the exchange rate in a country by the attitude and the policies that it adopts towards investment in that country.

You’ll remember this diagram, in which we explained the interest rate as the price that’s set in the market where loanable funds are supplied by savers and demanded by people who are investing in businesses. The interaction of demand and supply determines the equilibrium interest rate and the quantity of funds lent. Now, think about the position of the people who are lending money in this economy. They're interested in a return, a return that comes from the profits of the businesses they invest in. Now, one of the things that can influence the profitability of business is the attitude that the government takes. We've talked about the government's taxes of business and government’s regulation of business, but now let’s talk about something a little more dramatic.

What about the role that the government plays in maintaining a stable political climate? A stable political climate is good for the economy, but if political instability threatens the profitability of business, then lenders are going to be concerned that their money is not safe in this economy. Owning stocks and bonds in this economy is risky, because things could happen to their investments that would not allow the people who have borrowed the money to repay it with interest, as they've expected. Let's think for a moment about things that can go wrong whenever you've invested in a foreign country.

One thing that could happen is that political instability could lead to vandalism and your factory may be destroyed by an act of vandals. And the government may choose, or not be able, to protect your property. Another thing that could happen is, if the political climate becomes unstable, labor may go on strike and your factory may be chained up or sidelined and not produce any profits for you. Another thing that can happen is that the government may change its attitude toward foreign investment. You've invested in a foreign country, hoping to get profits from that business, but then the government decides that, once the factory is built, it wants to have it as its own revenue-producing device. Therefore, it seizes the factory or nationalizes it and all of the revenue becomes profit of the government. If any of these things happen, vandalism, the inability or unwillingness of the government to protect property rights, government seizure of capital or labor strikes, then all of a sudden your investment is no longer as profitable as you expected and may, in fact, be worthless.

So when the risk rises that political instability could reduce the profitability of investment in an economy, the rational response of lenders is to reduce the quantity of funds they supply at any given interest rate. We show this in the diagram as an inward shift in the supply curve for loanable funds. Now, there are two ways to interpret this inward shift; at any give interest rate now, lenders are willing to supply a smaller quantity of funds for fear of losing their investments. Another way of thinking of this is, to get any given quantity of loanable funds, lenders have to receive a higher interest rate to compensate them for the risks that they are taking. Now, when the supply curve for loanable funds moves inward at the original interest rate, we have an excess demand for loanable funds, a smaller quantity supply that is demanded at the going interest rate. What happens then is the bidding mechanism pushes the interest rate up, causing some borrowers to be unable to get funds at interest rates that are profitable for them and causing them to no longer undertake investment projects. So borrowers drop out of the market and the higher interest rate compensates some lenders, leading them to stay in even in spite of the political instability. The end result is that the equilibrium interest rate in this market rises from \( i_0 \) to \( i_1 \), and the overall quantity of funds lent shrinks from \( L_0 \) to the smaller quantity, \( L_1 \). So when there’s political instability, interest rate will rise in a country and the capital markets will shrink. In the extreme case, everyone takes their money out of this market and there’s no money available for borrowers at any interest rate. So that’s the consequence in the market for loanable funds.

Let’s think now about what happens in the market for foreign exchange. People in this economy – suppose that this is a country in Central America and its currency is the peso, and this exchange rate here is pesos per dollar, and we’re talking about the market in which dollars are exchanged for pesos. Now suppose political instability develops in this country and people are concerned that their investments may lose value. What happens then is that the demand for dollars increases as the residents of this country try to shift their money from peso denominated investments to a safe haven, dollar denominated investments in the United States. The demand curve shifts outward, meaning that, at any given exchange rate, the residents of this foreign country want to get more dollars to protect their investments. So the outward shift in the demand curve represents an increase demand for dollars. On the other hand, we now have a reduction in the supply of dollars as people are less interested in buying these pesos, because they don’t want to
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Invest in this country for fear of political instability. The fear of political instability reduces the quantity of pesos demanded, which, as you remember, is the same thing as the quantity of dollars supplied in this market. The supply curve shifts inward, meaning that, at any given exchange rate, traders will supply a smaller quantity of dollars, because of their fear of risk. Well, what’s going to happen in this case, at the original exchange rate, look we’ve got a huge excess demand for dollars. Everybody wants to get into dollars to protect their assets. Well, what’s going to happen, to eliminate the excess demand, is the bidding mechanism kicks in and causes the price of dollars to rise. The dollar appreciates and the peso depreciates until a new equilibrium is established with an exchange rate $e_1$. Remember this is pesos per dollar, so $e_1$ represents more pesos per dollar than before. The peso depreciates.

Now imagine if you had investments in pesos and you saw everyone heading for the exits. Everyone is dumping their pesos, the peso is depreciating, the price of the peso is falling, so any investments you’re holding in pesos are depreciating or losing value before your eyes. You’re fear that this process will continue would lead you then, too, to do the same thing. You try to get your dollars out of this economy before it’s too late, before everything completely collapses. And as everyone acts on this psychology, the peso continues to depreciate. People continue to sell and a frenzy develops, in which psychology takes over and leads the currency to irrationally depreciated levels.

Now, how can you reverse this process? How do you stop the process whereby political instability creates very high interest rates in a country and depreciation of that country’s currency? How do you get people, once again, to be willing to hold capital denominated in this country’s currency and to make investments in the economy? Well, think about the problems that caused the capital flight to begin with. Think about what caused people to want to get out. If the government can reestablish law and order – I mean, that’s certainly going to be helpful, because that creates a good climate for business. So as long as there is political instability that threatens the value of property, you can expect this process to continue. Another thing is that the government needs to establish a reputation for respect for the property rights in that country. It’s not so bad that a government choose to own factories. The problem is when there is uncertainty about whether your investments will remain your property or whether they could be confiscated. As long as this risk is present, people are going to ask for a premium on their investments to protect them against this possibility. And finally, to the extent that workers are content with the way in which labor and management relations are allowing them to supply their factor of production in the process, they’re going to be willing to work for their wages. On the other hand, whenever workers are feeling unfairly treated or whenever strikes become a political tool to achieve other objectives, then your productivity of your factories is at risk. So everything that creates political stability, as a rule, tends to add to the value of investments in an economy and make lenders willing to supply funds at lower interest rates and allows people to be willing to hold the currency of that country as part of their investment strategy.

So there you have it. Political instability means high interest rates and depreciating currency for a country, as people begin to take their money out of the country for fear of having their investments confiscated or seeing them lose value. Political stability, on the other hand, has the opposite results: interest rates remain lower and the currency remains stronger.
Demonstrators in Seattle say that the World Trade Organization is a conspiracy that undermines the power of laborers to demand fair wages and good conditions and it threatens the environment. Demonstrators in Washington, D.C. say that there is a global conspiracy on the part of corporations to co-op the international monetary fund and the World Bank and the World Trade Organization to become their own puppets, and therefore to hurt workers and the environment in their pursuit of profits. Is it true? Is the World Trade Organization a conspiracy, and how would you evaluate this claim?

Well, let’s first talk about international trade, which in some measure is inherently confrontational. That is, when a country lowers its tariffs and dismantles its quota and allows free trade in goods and services, customers in that country always benefit from access to imports because the imports themselves and the competition on domestic industries lowers prices. In the United States when we someday get rid of our quotas on sugar imports and textile imports, all of us customers will be able to sugar and clothing at lower prices. On the other hand, the producers who compete with imports love the tariff and quota protection because it allows them to charge higher prices and make higher profits. And if you work for a factory that produces clothing and you’ve learned how to operate those machines and you’ve got your own human capital invested in that particular business, then you’re happy for the tariffs and quotas that keep you from losing your job.

So as consumers, we like free trade; as producers we typically don’t. There’s this inherent conflict within a society about trade liberalization. On the whole, however, trade liberalization increases the market, allows more specialization according to comparative advantage, and overall increases the size of the pie. The world economy has grown so rapidly since World War II largely due to its integration, the dismantling of tariff and quota barriers, free trade, and lowering in the cost of communication and transportation, which have made trade easier to do. Trade has increased the wealth of the world and has allowed a lot of countries to rise out of poverty, notably Japan, Korea, we could go on and on. However, the period of transition from being a closed economy with tariffs and quotas to being an open economy that has free flow of goods and services and competition, that can be a troublesome period for an economy and socially disruptive.

So, what does the World Trade Organization have to do with any of this? The World Trade Organization was formed in January of 1995 as a successor to the general agreement on trade and tariffs. The general agreement on trade and tariffs, also called the GAT, was a regular meeting of the countries of the world that saw that by cooperating and negotiating together, they could get everyone to lower their tariffs and quotas at once. That is, “I’ll lower mine if you’ll lower yours,” and therefore each country suffered a little bit but not as much as if they’d tried to do this unilaterally. There was cooperation to dismantle trade barriers. However, it was a regular meeting of countries without anybody to, on a regular basis, implement and enforce its agreements. It would be kind of as if Congress got together and made laws but there was no Executive Branch – no president, no army, no police force – to actually enforce the rules. So the World Trade Organization as the successor to the GAT is actually the first step towards the creation of some kind of international authority that can actually punish offenders and make sure that the agreements are implemented.

So, of course, anytime you put a face on something, you now have someone to point at and blame for things. So when the World Trade Organization is created, it automatically is going to draw fire because now there is someone to blame for globalization and the adjustment costs associated with international trade.

Well, what exactly is the World Trade Organization doing? The World Trade Organization has four sets of rules that it enforces of all of its members. If you’re a country and you belong to the World Trade Organization, then you are expected to first of all accord national treatment to imported goods. That is, regulate goods that are imported into your country the same way that you regulate domestically produced goods so that you don’t show favoritism. The second thing that you’re expected to do is to accord most-favored-nation status to all of the other members of the World Trade Organization. That is, you charge them the same tariffs on imported goods that you charge everyone else. So within the World Trade Organization, you can’t pick one country and give them favored access to your economy and another not. The third thing that you have to do as a member of the World Trade Organization is you have to eliminate quotas and other non-tariff barriers. That is, any barriers that don’t operate as taxes on imports – that’s what a tariff is, a tax on imports – but rather some other kind of restriction on trade, those have to be dismantled because trade barriers have to be rendered transparent – easy to see, easy to understand, and by the same logic easy, then, to negotiate downwards over time. The fourth thing that you have to do as a member of the World Trade Organization is agree that your governments will not restrict their purchases to domestically produced goods. That is, the government of California, for instance, can’t pass a rule saying that it’s only going to buy goods produced in California, but rather that
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Criticism. And the lack of transparency of course engenders suspicion, and therefore the countries are under scrutiny and in there. All of this is being done in secret. If you have nothing to hide, then let us come in and watch.” So the secrecy talked about in there. You know, it looks like a conspiracy. The doors are shut, we can't hear, there's not T.V. cameras in there. Well, this doesn’t sit well with the protesters in Seattle and Washington who say, “We want to know what's being discussed in there. You know, it looks like a conspiracy. The doors are shut, we can't hear, there's not T.V. cameras in there. All of this is being done in secret. If you have nothing to hide, then let us come in and watch.” So the secrecy and the lack of transparency of course engenders suspicion, and therefore the countries are under scrutiny and criticism.

Now what all kinds of trade does the World Trade Organization seek to regulate? All trade in manufactured goods. They want to regulate trade in agricultural products, but that's more sensitive because there are some countries that subsidize their farms and don't want to stop, although other countries view these subsidies as unfair advantages for the farmers. Services – the World Trade Organization increasingly seeks to regulate services; that is, trade in financial services, banking, insurance, telecommunications, computer services, and so forth. Also intellectual property – the World Trade Organization want to seek to have its members observe the patent restrictions of other countries. Developing countries don't like this. They don't want to have to observe patent restrictions. Rich countries are already way down the road toward economic prosperity; they'd like to catch up by being able to quickly copy and imitate the best-practiced technologies without having to pay money that they don't have to get patent rights. So the enforcement of intellectual property rules is something that works to the advantage of rich countries and in some cases to the detriment of poor countries, although, of course, if those rights aren't enforced, then people will stop innovating and there won't be inventions for poor countries to copy. So it's controversial and it's complex. Also, rules about the regulation of food quality. The sanitary and FIDO sanitary standards – the SPS Agreement – covers food safety issues ranging from pesticide to hormone-treated beef and all of this kind of stuff, and these rules are designed so that a country can't say, “We're not going to import goods from your country because we don't think they're clean.” As long as everyone agrees what the standards are, then those rules can be applied evenly across the board.

Now, what's the problem with the World Trade Organization? Why is it that protesters are out in the street calling it a demonic force? Well, first of all, there is concern that the World Trade Organization’s rules prevent countries from being able to hold one another accountable for so-called fair-trade practices. In particular the concern is that some countries actually subsidize their domestic industries to make them more competitive internationally. That is, if the European farmers are subsidized by their governments, they're able to export their agricultural products at lower prices than, say, U.S. farmers or Canadian farmers can, and therefore their farmers have an unfair advantage in international competition. The World Trade Organization says then you can't block imports of European products because that would be discriminatory, and yet the U.S. and Canada might like to do that to punish those countries for their unfair subsidies of their farmers. So what happens then is countries lose the ability to punish other countries that are engaging in unfair trade practices. So whenever people in the United States claimed that Japanese semiconductor factories were selling their products below cost, what they wanted to do then was to put a ban on the imports of Japanese semiconductor factories into the United States, but the World Trade Organization would not permit that because that kind of ban would be counter to the kind of trade protection that it allows. Therefore, that kind of action would be rendered illegal. So if you're a member of the WTO, you no longer have the ability to use blocked trade as a tool to encourage another country to stop subsidizing or enabling its own industries to dump their products at low cost into your market and therefore create unfair competition for your domestic producers. So that's one controversy, that the WTO doesn't prohibit dumping. Now in principle, it should. It should go to countries and say, “Look, we agree that this isn’t a good policy. This is damaging industries in other countries.” But once again you see we're getting there at the tension between producers and consumers because as a consumer, I have nothing but thanks to any country that subsidize their farms and don't want to stop, although other countries view these subsidies as unfair advantages for the farmers. Services – the World Trade Organization increasingly seeks to regulate services; that is, trade in financial services, banking, insurance, telecommunications, computer services, and so forth. Also intellectual property – the World Trade Organization want to seek to have its members observe the patent restrictions of other countries. Developing countries don't like this. They don't want to have to observe patent restrictions. Rich countries are already way down the road toward economic prosperity; they'd like to catch up by being able to quickly copy and imitate the best-practiced technologies without having to pay money that they don't have to get patent rights. So the enforcement of intellectual property rules is something that works to the advantage of rich countries and in some cases to the detriment of poor countries, although, of course, if those rights aren't enforced, then people will stop innovating and there won’t be inventions for poor countries to copy. So it's controversial and it’s complex. Also, rules about the regulation of food quality. The sanitary and FIDO sanitary standards – the SPS Agreement – covers food safety issues ranging from pesticide to hormone-treated beef and all of this kind of stuff, and these rules are designed so that a country can’t say, “We’re not going to import goods from your country because we don't think they're clean.” As long as everyone agrees what the standards are, then those rules can be applied evenly across the board.

Another problem with the World Trade Organization is that it operates in secret. That is, the countries that send representatives to the WTO are scared to some extent that if they liberalize their trade and open their markets without tariffs and quotas, their domestic producers are going to rise up and vote the government out of office or in some other way make their lives hard. So if you were a politician whose government was being represented at the World Trade Organization, you’d like for these negotiations to be held behind closed doors so that your domestic producers didn’t get wind of the fact that they may be about to lose their quota protection.

Well, this doesn’t sit well with the protesters in Seattle and Washington who say, “We want to know what's being talked about in there. You know, it looks like a conspiracy. The doors are shut, we can't hear, there's not T.V. cameras in there. All of this is being done in secret. If you have nothing to hide, then let us come in and watch.” So the secrecy and the lack of transparency of course engenders suspicion, and therefore the countries are under scrutiny and criticism.
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On the other hand, the politicians argue, “If you make us talk about this in the open, then we don’t have the political will to stand up to these powerful special interests in our countries, and we can’t do what’s good in the long run for the economy if we have to bear the short-run political cost.” So there’s another problem with the whole thing. Are we going to have transparency or are we not?

However, there’s also a final concern, and this one is the most serious. That is, who’s really to benefit from the operations of the World Trade Organization? Is the liberalization of trade in the long run going to be most beneficial to consumers or most beneficial to businesses? Right now, multi-national corporations and large businesses benefit from trade liberalization because they get to send their goods freely wherever people are willing to pay for them. Of course, the people who are paying lower prices in those countries get the benefit of good products at lower prices, too, but they’re also other costs of trade. I mean, think about this: In our own country businesses pollute and damage the environment, and therefore we have a government that regulates pollutions. Businesses are inclined to try to organize in ways that get them labor at the lowest costs. They want to bust up unions, they want to hire workers and put them in dangerous conditions at low wages. And we don’t have that kind of government regulation on the international level. That is, the world economy is, to a large extent, still completely unregulated. Therefore, pollution can occur as a result of international trade. Labor exploitation can occur as a result of the profit opportunities created by the world economy, and people blame that on the World Trade Organization. If we’re going to have more trade, we’re going to have more activity that goes beyond the power of the existing governments, and that’s going to create the Wild West again…it’s going to create a jungle in which all kinds of abuses can occur.

However, an economist says, “Well, then, if what we need is some kind of governmental body, isn’t the World Trade Organization trying to be that?” And maybe this is where the protesters are on to something. Maybe what the protesters are saying is that it’s not so much that the World Trade Organization needs to be abolished or that globalization couldn’t occur, but it’s just that we need the kind of transparency and accountability that we all expect from a good government if we’re going to have international trade – that is, an economy that is truly global in scope needs some kind of government regulation that’s truly global in scope. There are all kinds of suspicions and prejudices about global government, too, so all of that gets triggered by this.

But the idea that the World Trade Organization is a conspiracy, it’s kind of funny that the very people who are concerned often about protecting labor and protecting the environment are opposed to the first steps to create some kind of international authority that might actually do that very thing. And if you look at the records, corporations that operate in less-developed countries often have a much better record of protecting human rights in those countries and protecting the environment in those countries than do the governments of those countries themselves. So in some cases, one power – that is, a corporation – may actually be better than the existing power – the corrupt government – that’s already there. It’s complex, but the issue is what are we really concerned about? Are we concerned, then, about the rights of workers, the environment, and the prospects for citizens in countries that are poor to get access to food, clothing, and other goods at low prices? If we are, then we should be in favor of organizations that exert their power to protect those interests, and perhaps the World Trade Organization could be such an organization if it were properly accountable and if it were properly transparent and participatory.

I think this is what’s happening right now is the World Trade Organization is undergoing an adolescence as the first step towards some kind of international regulatory authority. It’s going to be subject to all kinds of questions and criticism and protest, and perhaps in the end the protesters voices will lead to the kind of accountability and participation that will make for an authority that can give us some kind of regulation to improve working conditions internationally, raise standards of living, and protect the environment. But it does require diligence, and it requires a willingness to participate, ask hard questions, expend ourselves, and to support the kinds of efforts that may be faltering and inadequate at first but eventually turn into something really worthwhile.
We have been discussing the macro economy as if it were the sum of impersonal forces. That is individuals each acting in their own self-interest, supply and demand, loanable funds, goods and other things. And, prices result from the interaction of supply and demand without anybody really being in charge. That is the economy has a kind of self-regulating character. Now, this was Adam Smith’s idea back in 1776 when he wrote the Wealth of Nations. It was his contention that there was no need for central planning because the self-interest in choices of buyers and sellers would lead to prices that brought about the right amount of the right kinds of goods and services.

Now, there is another tradition of economic thinking that is associated with Karl Marx. It was Marx’s view that the outcome in the economy could be improved upon by central planning. That if you left things to the impersonal forces of the market you got an outcome that was inhuman and inefficient. And, therefore, that some kind of central planning could improve upon the impersonal forces of the market.

Well, let’s see, nowadays, how an economist thinks about the continuum between a completely laissez-faire free market and a completely directed central market. That is central planning that has some kind of director at its head. Let’s start with what every economy has to deal with. An assortment of individuals each of whom has their own particular wants and needs. People want hamburgers, people want vacations, people want medical care, and also, these individuals represent different kinds of skills. There are people who are good at carpentry, people who are good at solving math problems, people who are good at childcare, people who are good at building houses. And, in addition to the human capital or skills that people carry around in their heads there is all kinds of physical capital, machines, factories and the like. So, here you have a collection of individuals with their tools. Each of whom has their own particular want and each of whom has their own particular abilities.

Now, how do these people cooperate in such a way as to specialize and trade and create wealth? After all, if you are left to your own devices and have to be self-sufficient you are going to live at a subsistence level and be relatively poor. On the other hand, if you cooperate with others and specialize and trade, wealth grows. So, how do we make that happen? Well, think for a moment about the amount of information that has to be transferred in the process of creating an outcome where people are specialized in trading. First of all, people have to communicate their wants. So, each of these individuals has to make their wants known in some way to all of the others. An expression of wants or a registering of their preferences that information has to somehow be collected. Also, what has to be collected is information about people’s relative abilities at different kinds of tasks. Maybe I am relatively good at writing stories and you are relatively good at baking bread and so forth. But, how are we going to find out whose skills are relatively good? How are we going to find out who can bake bread with the lowest opportunity cost? And, whose going to have comparative advantage in teaching?

Now, once all of this information has been expressed it has to be somehow collated, some were organized, sorted through and then a plan has to be arrived at. What does each person in this economy going to do? How is each particular unit of capital going to be employed? So, once some kind of master plan has been formulated then communication has to go in the other direction. Everybody has got to be told what their role is in the master plan, how they are supposed to act, and what actions they are supposed to carry out. So, you are supposed to become a waiter, and you’re supposed to become a chemist, and you’re supposed to become a butler, and you’re supposed to become an accountant and this plan is going to make the pie the biggest for our society. Create the biggest chunk of wealth that we can then distribute among us.

Now, the question is, how are we going to get this done? Every economy has to solve this problem by collecting information, creating a plan, and then coordinating the individual agent that is telling everyone what their role is in the plan. And then motivating them to carry out their role in the plan. No matter what kind of economy you’ve got its got to solve these problems.

Now, the idea in Marxist economics is that you get a better outcome with some kind of direction at the top of this pyramid. That is, we are going to put a central planner here and his or her role is to collect the information from all of the individuals in this economy and find out what they want. Find out what their skills are. Collect information about the tools and capital that are available to them. And formulate a master plan, and you can see that he is really thinking.

So, what he is going to do then is communicate this information back to the individuals involved. He is going to tell them what their role is that he is going to coordinate their actions. And, he is going to motivate them to carry these
actions out. Now, this is a pretty good scheme. I mean, this is the way most families run. This is the way clubs run. Maybe this is the way things run for you at work. But you can see immediately there is quite a bit of cost associated with this system. First of all, this guy has to come up with some scheme for getting all of these people to reveal truthfully their preferences and their abilities.

Now, how do you get people to tell the truth? The first thing I think when somebody asks me what I’m good at is, what do they want and how can I work this question to my advantage? I may not always be inclined, even though I am a basically truthful person, to tell someone information that I think is not their business. Right now many of us are filling out census forms and mailing them back and we’re suspicious about what is going to be done with this information. Imagine if the government was asking you, what are you good at, what do you want, this is potentially a problem. But, suppose we can solve that problem. Suppose we can get all of these individuals to truthfully communicate their abilities and their desires. And, suppose they know themselves well enough to be able to express that on paper or in some kind of multiple choice form.

Well, then this guy has to figure out first of all what is the master plan. Wow, how are you going to figure out how to put all these pieces of the puzzle together and come up with a job for everybody? And, once you do that and tell everybody what their job is, how are you going to get them to carry it out? Maybe you are going to use threats. Maybe you are going to use coercion. Maybe you are going to use bribery. What is it? Maybe you are going to use encouraging coaching, fatherly talk. Who knows? But, still there is a lot of problems to be solved here, the collection of information, the formulation of the plan, and, the motivation of the individuals to play their role.

Plus, there’s another problem, because once we have a face on this economy, everyone is going to start to appeal to this guy as if he were Santa Claus, right? Because you are going to call him up and say, I really don’t like being a waiter any more, I want to be a coal miner or an artist and in the meantime, I want to be paid twice as much. Well, if there is somebody to appeal to you are going to find yourself spending some of your time in what we call influence activities. That is, trying to get this guy to change his mind rather then you working harder to make your money the old fashioned way.

So, you can see then that all kinds of problems arise when you take economic activity and personalize it rather than making it purely commercial. Because now, I mean it is kind of human nature to want to give responsibility to somebody else for something, we can give him the responsibility. And, imagine sometimes how we treat our parents whenever we don’t get what we want. Well, that’s what starts to happen and productive activity in the economy gets diverted in this kind of influence activity.

This is why economists are suspicious of central planning. It is not so much that central planning can’t, in many cases, improve over the free market outcome. Remember the case of people standing up at the football game, you just need somebody with a bullhorn on the 50-yard line saying, sit down, already you are not accomplishing anything. However, if we let more and more of economic activity be directed by one person, we get the problem of miscommunication, the difficulty of collecting and collating information, and the problem of a face, which then leads to influence activities.

Now, free market economists, on the other hand, believe that these two roles, coordination and motivation, can be better served by the impersonal price mechanism. Everybody looks at the prices. The prices that you can get for providing different services and you let the price be your guide. I find out that I can make a lot more money as a teacher than I can as an accountant so I can figure my human capital according to that employment. And, look what the price does? It coordinates. It tells me where to go. It tells me where I can make the most profit. And, it motivates me. Because, if I work hard I get bonuses, I get a salary, I get to keep my job and maybe get a raise. So, the price serves those two roles. It gives me information about where my resources are best employed. And, it gives me an incentive to work harder.

So, what happens then is all of these individuals by being willing to supply their abilities and demanding the products created by other people, interact through the impersonal forces of supply and demand. And, the prices that are set in equilibrium guide people into jobs where they are going to make the most money and be able to use their talent in ways that most give other people the things that they want.
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  Now, don't get me wrong, I'm not saying that either one of these extremes is a desirable outcome. Because, either one of these extremes has problems associated with it. Whenever you try to do everything impersonally then you have got externalities. You get monopoly. You get problems with information whenever people don't reveal accurately the quality of the products that they are trading. And, you get all kinds of wealth effects. I mean, the market doesn't redistribute income. So, the market has its own set of problems. But, as far as coordination and motivation the reason that free market economists are fans of the market is because it accomplishes these tasks. When it does with the least amount of influence activity, the least amount of corruption and the most reliable transfer of information people are going to accurately communicate their abilities and their desires in the market because they are immediately rewarded for doing so.

  So, when we discuss centrally planned economies we are talking about some kind of real world economy that is closer to the extreme of central planning then what many of us are used to who live in the United States. But, the truth is, if you work for a big corporation you are part of a centrally planned economy. If you work for a university you are part of a centrally planned economy. And you can notice by the way business works, by the way bureaucracy works, by the frustrations sometimes that people feel when they feel like things have become personal rather than commercial. That there are costs associated with the benefits of having one person's directional intelligence over the process of resource allocation.

  So, we are going to continue this discussion by talking about some real world instances of centrally planned economies. And, you will see these ideas coming up as we look at the stories.
International Focus

**Transition Economies**

**Policies to Change to Market Systems**

Around 1990 the countries of the former communist block began a period of transition from centrally planned economy to market based economies. Now, ten years later, these economies many of them are still in transition and you wonder what is taking them so long? Isn’t the market-based system simply much better than a communist system? Doesn’t central planning lead to all kinds of inefficiency and trouble. So, why wouldn’t a country that had central planning simply throw over their centrally planned economy and move directly to a market based system with all of its advantages? The answer is that is takes a lot of time and effort to get from the system that is driven by a central planner to one in which the centralized choice creates all of the benefits of a free market. The period of transition can take time because it is difficult. And, there are certain things that have to be accomplished along the way.

So, let’s consider now the steps in transition from central planning to a free market. Remind yourself what a centrally planned economy looks like. There is a director over the economy who conducts the planning. And, the planning is designed to get individuals in the economy to use their labor, their capital, their entrepreneurial skills, and their raw materials so as to produce that basket of goods and services that could be distributed among the people in the economy and lead to the greatest level of satisfaction. This planning is usually communicated to individuals through a set of prices that are announced to the economy that are supposed to coordinate and motivate people to produce the things that the economy wants. So, by announcing the price of shoes, the price of televisions, the price of fruits and vegetables the government directs people’s labor to one industry or another as there is need for this particular product.

Typically, what happens in the centrally planned economy is that capital is nationalized. That is, it is owned by the collective or by the government. So, that the profits from factories that are owned by the state and from the use of tools all goes to the government. And, can be used then to pay for public goods, like national defense and roads, and bridges, and schools and so forth. So, a centrally planned economy is one that is characterized by prices that are announced to coordinate and motivate and nationalized capital so that the profits become the property of the government and can be used to buy things for people in the economy.

Another thing that happens in centrally planned economies is that typically the money supply is under the direct control of the government. That is, if the government needs to run a deficit it can print money to pay for the excess of its expenditures over its revenue. So, the government can use the money supply as a tool of finance if it needs to run a deficit.

Now, let’s begin to move from a system characterized by planning to one that is characterized by free market interaction of buyers and sellers. How do we get to a free market? Well, let’s suppose that there is a peaceful revolution in this country and the individuals decide that they want to move to a system characterized by competition. They want the freedom as individuals to decide how to use their labor and tools.

How are we going to get there? Well, the first thing that has to happen is now that the planner is gone we need a new way of coordinating and motivating the individuals in this economy. What is going to get them out of bed in the morning, working, using their skills to create things that other people value? What is going to get them making that pie that creates value in this economy?

The answer is we are going to give them a stake in the economy by privatizing capital. That is, rather than the collective owning the capital now individuals are going to own capital. She is going to own her tools, he’s going to own his tools and we all are going to own shares in these factories so that when they make profits we get return. Meanwhile, since I now own my own tools, and my own skills, and my own labor and I could invest them as I want, I’m going to do so in a way that maximizes a profit on those skills. That is, I’m going to look for the employment of my time and talent that gives me the biggest paycheck the biggest return that I can get. So, the interaction of supply and demand, a a depersonalized way is going to guide people to use their talent in ways that create things that other people value. So, the planner is being replaced in his role as coordinator and motivator by prices that are going to be determined by the interaction of supply and demand.

Now, that’s the next thing that we have to be concerned about. After the privatization of capital provides people with motivation the next thing we are concerned about is who is going to be announcing the prices. So, the second concern is deregulation of prices. Prices used to be announced by the central planner. Now they are going to be determined by the interaction of supply and demand in a decentralized way. If there aren’t enough fruits and vegetables being produced the price is going to go up because we have excess demand. That is going to leave more
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People in the economy to decide to start raising fruits and vegetables and that is going to push the price back down. But, in the meantime, the higher price determined by the shortage will start guiding people into that industry rather than a planner calling you up and saying why don’t you become a farmer. The high price of fruits and vegetables draws you into agriculture. So, the deregulation of prices then allows supply and demand to start guiding people in the use of their talents and their resources. So, now we have factories that are privatized so that individuals have a stake in the economy. We have prices that represent the inner play of supply and demand. That is a way of collating information about what people want and what their skills are and through prices that can direct people.

The third thing is the money supply. The government now is in a particularly tough situation because they used to make a lot of money off of these factories and they don’t own them any more. So, how are they going to pay for the army, and roads, and bridges, and education and stuff like that, which the government provides? The answer is at first they are going to start cranking up the money presses, printing a lot of paper money. And, that is going to create all kinds of havoc in this economy. Because with the money supply expanding rapidly to take the place of the government previous sources of revenue we are at risk for inflation. Remember, too much money chasing too few goods and prices can go haywire. Well, that’s bad for the economy because if prices start going haywire these individuals down here don’t know where the best use of their time and talent is. They can’t rely on prices to coordinate and motivate their use of their resources. So, what happens in this case then is the government has to get its monetary policy under control. Typically, what a government can do is it can create an independent monetary authority like the Federal Reserve Bank in the United States. And, say, look, your job is to control the money supply so that price’s remain stable and reliable sources of information. So, once that happens, then the government can no longer use the money supply as a way of financing its deficits. Then it has to start issuing bonds, kind of like in the United States we issue Treasury Bonds to pay for the national deficit and the debt.

Well, this opens a whole new can of worms, because maybe there isn’t even a system of financial institutions in this country. Maybe people aren’t used to buying and selling bonds and stock and things like that. They may have no habit for this kind of activity. There may not be well-established banks, and trading houses, and investment bankers and all those things we take for granted in the United States. So, now they have to come up with a set of financial institutions and financial markets that will support this kind of activity, because if the government is going to be able to run a deficit, they have to have someone to sell their bonds to. That means people have to have intermediaries in which to buy bonds, or banks in which to deposit their money so that the banks can go and buy the bonds. That is, people need a set of institutions that support savings, borrowing, and the sharing of risk. So, there you have it. It’s a problem.

How do we get from a system in which a central planner directs the allocation of resources in the economy to one in which the market, through competition, and the individual profit maximizing behavior of all of these people, creates the big pie that we associate with free market. How do we get there? Well, there are four sets of problems that have to be resolved. Problem number one is property right’s. That is how do people get used to owning property? These people before didn’t have property. The factories were owned by the government. The land was owned by the government. The tools were owned by the collective. So, now what we have to do is create a system in which individuals can own their own house, their own land, shares in factories, their own tools so that they may have a stake in using these resources to maximize profit and value. So, we need a system of contracts, and lawyers, and enforcement and all these things, once again, that we take for granted in capitalist economies. There needs to be a set of institutions that teaches people about their property rights, that enforces their property rights and allows them then to trade property, to buy and sell it in a way that has low transaction cost.

Second set of concerns is the lack of mature banking and financial system. We need a system of banks. We need a system of financial institutions. We need people to be able to buy and sell bonds and shares of stock. That is, if you are going to own capital you have got to understand how the institution works through which you do that. I need to be able to buy stock or invest through a mutual fund or things like that. So, the institutions have to arise that facilitate borrowing and lending and the sharing of risk. And, lower the transaction cost of doing that. Now, people have to learn how to interact with such a system.

The third set of problems is the problem of no standard accounting system. These people have been relying before on information from the government about how hard to work and where to use their resources. And, that’s where they got their paycheck. Now, they are all interacting with each other, doing deals with each other. Which means they need a common language for doing these deals. And, that is what the accounting system is about, how we are going
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to communicate charges to one another, what kind of monetary units we’re going to use, how we do contracts and how we convey the information that is associated with business.

The fourth set of problems is insurance. That is, I don’t want to bear all the risk of running in business myself. I want to be able to sell some of the shares to someone else and to ensure myself against catastrophe. Once the insurance institutions arise then the individuals are much more likely to enter into businesses. Much more likely to employ their labor in capital and go all out and try to create value.

So, as an economy makes transition from central planning to competition all of these things have to happen. The privatization of capital, prices being deregulated and determined by markets, the money supply, now not so much a matter of government finance as a matter of maintaining price stability, perhaps being run by an independent monetary authority, and all of the players in the economy have to get used to interacting in this new way. And that means institutions arising to support this kind of interaction, whether it is the institutions associated with property rights, the institutions associated with finance, or the institutions associated with risk sharing.

So, there you have it. Property rights and these institutions are big change in the lives of people who have previously relied on central government planning. So, the transition period is not quite so simple, because it means that everyone is having to change the way they think about business and the way they interact with one another.
We have been talking about the distinction between free market economies and centrally planned economies. But, rather then persist in theory let's talk now about history. The 20th century saw a huge experiment in central planning as several large and important economies turned away from market driven allocation of resources towards central planning.

What happened? Well, Karl Marx believed that the communist revolution would start in mature capitalist's economies. And, yet, in 1917 the first really important communist revolution occurred in a futile agrarian state, Russia. Now, Karl Marx left relatively little detail about how a communist state should be run. But, the Bolsheviks, who took power in Russia, had their own ideas about how to move from a system characterized by the centralized competition to one characterized by central planning. They believed, first of all, that it would be effective only if capital were nationalized. That is, if land and tools were owned by the collective and by the state so that the profits of enterprise were owned by the government and could be distributed equitably among the people in the society. And, remember the Bolsheviks really believed that their way of running the economy was going to raise the standard of living for Russians.

Now, as the 20th century unfolded more and more economies came under the sway of this idea. First of all, Russia consolidated Central Asian and Eastern Europe into the Soviet Union. Then the Chinese communist revolution occurred in 1949 so that China became a communist economy of its own, then Cuba in the 1950s. So, that by the 1950s and 1960s we had this experiment running in the world with some economies on the planning track and others on the laissez-faire free market track.

Well, what happened? First of all, let's look at growth rates. In the 1950s and the 1960s the economy of the Soviet Union grew at an annual rate of five or six percent. That was comparable with the growth rate in capitalist economies. In the 1970s the growth rate slowed to about two or three percent annually and in the 1980s one or two percent. And in the 1990s the economy of the former Soviet Union actually shrank at an annual rate of four percent.

So, what we see then is declining growth rates in the countries of the Soviet Union and the former Soviet Union as the 20th century comes to a close. But, on the other hand, growth rates in the rest of the world were also slowing in the 1970s and the 1980s. So, what's the difference? Well, the most important difference is that things in the Soviet Union began to become very difficult because of the lack of incentives for people to produce goods of high quality. What happened in the countries of the former Soviet Union is that first of all, the government was taking a huge chunk of the resources of the economy to take care of national defense. In the countries of the former Soviet Union there was a heavy commitment to expend it from military goods taking 15 to 20 percent of gross domestic product. While in the United States only six percent of GDP was being devoted to national defense.

So, people in the Soviet Union were poor to start with. The per capita GDP was lower. Plus, they were giving up a larger share of their output to keep the military equipped. And, of course, because of the tensions between the capitalist world and the communist world there was always the possibility of military conflict. And the Soviet Union felt it necessary to stick with the arms race, which took a bigger and bigger share of its budget. Meanwhile there is a lack of incentive on the part of individuals in the economy to produce high quality goods and services, because they are not being coordinated and motivated by the price system. But rather by the central planner, which as a rule didn’t give people as much incentive as the opportunity to make profits did.

The next thing you wind up with is shortages occurring both in consumer and capital goods in the Soviet Union. There are line that people have to stand in t get stuff because there is not enough stuff made because the price mechanism isn't working freely to guide the allocation of resources to goods that people really want. The central planner got it wrong a lot of the time. So, there were shortages of things that people really wanted. And, non priced competition, that is, standing in line, finding people who can get you the goods at some price, that is the informal market or the black market, begin to take a lot of resources of the economy. This stuff isn't taxed the government then has to work harder to get resources for military spending and that creates some problems.

Technology was a decade behind the technology US, Europe and Japan because people in Russia just didn't have anything to invest in their technology because they didn't own it. Their motives came from winning prizes or the fear that the government would fire them from their job as scientists. Not from the opportunity to own a share in something that they created that might be valuable. Therefore, the incentives to produce high quality innovation were just lower. Black markets developed from many products. And, finally, this two-class society emerged in which communist party
members and the people who were really especially valuable to the government and its objectives got very, very great rewards. Whereas, other people persisted in poverty which created all kinds of social strain.

So, meanwhile there was low agricultural productivity, which produced a drain on foreign currency. The Soviet Union has all of this productive land and yet people didn’t have an incentive to cultivate it and sell the products for export to create the foreign exchange that could pay for imports of capital goods and other things that the Soviet Union needed. So, the economy was just in trouble. And, the standard of living of people began to slip further and further behind the rest of the world. And, the government scrambled to keep up in the arms race at a time when overall gross domestic product was not growing rapidly.

By the late 1980s the dissatisfaction with the communist system produced Mikhail Gorbachev, a leader, who believed in glasnost and perestroika, a warming, an opening of the Soviet Union towards the ideas of the West. And the spirit of the age was that central planning had failed the people of the Soviet Union. And that indeed, perhaps replacing planning with the market would increase the standard of living and create more hope in the economy. So, Mikhail Gorbachev began to lead his country into an experiment in which market forces would be allowed to shape the country rather then relying on central planning. The first step was to privatize state owned factories. And, give the people of Russia an opportunity to own shares in their capital. The belief then that ownership would lead people to make decisions that increased the value of tools and created more profits was the belief that coordination motivation could come more effectively from the market then it could from a central planner.

Now, what happened after this was a period of profound upheaval. That is, in Russia now that the state ownership of factories had been relinquished the government no longer could rely on the profits of its state owned businesses to finance government spending on defense and roads and bridges and stuff like that. So, Russia turned then to printing money to pay for government spending. The excess of government revenue over taxes taken in was covered by printing money. And think there was not a well-organized system of tax collection the government had to lean heavily upon money printing to pay for its expenses. This sparked rapid inflation of the ruble. Prices began to go haywire. At a time when prices were being deregulated and allowed to be set by the interaction of supply and demand rapid increases in the supply of rubles caused prices to rise due to inflation. And, people became very confused. Why are prices going crazy? Oh, this must be because of capitalism.

Now, remember this was occurring in a country where there were not a lot of democratic institutions. There were not well functioning banks, there were not institutions for property ownership. There were just simply not the institutions that support capitalism that we all take for granted living in the United States. Therefore, we’ve got all of the law of the jungle. All of the wild energy of a free market laissez-faire economy loose in a country that doesn’t have the institutions to support it.

So, institutions began to arise on demand. One of them being the Mafia, the mob. After all, the mob will offer you some protection. It will protect your car, it will protect your person, it will protect your building and since we don’t have a police force and a system of property rights people were turning to anyone they could to protect themselves and their investments. So, the Mafia became kind of law and order on demand for the highest bidder.

See, this is the problem. If you turn market forces loose in a country without institutions then you get all kinds of weird things happening. We would have the same thing in this country if we hadn’t a well-organized system of property rights. The pressure of competition is the free market would lead to a demand for law and order just like there is a demand for ice cream. And, the Mafia would arise to provide protection to people who could afford it. So crime, organized crime in particular went kind of crazy in the Soviet Union in the early years of the 1990s.

What happened to economic growth? Well, it tanked the growth rate of the countries of the former Soviet Union in 1991 was negative 13.0 percent. And, negative 19.0 percent in 1992. And the numbers were negative until 1997 when there was a growth rate of one percent. But, then the following year financial turmoil in Russia lead to a growth rate of negative 5.0 percent. And, the inflation rate went nuts in 1992. The inflation rate was 1,353 percent at an annual rate. That is a crazy increase in prices because the printing of rubles was just out of control.

Now, what can we say about this? If you look at the countries that made the transition out of the eastern block. That is, from Soviet communism to capitalism, because the Czech Republic had a negative growth rate of 7.0 percent in 1992, but a positive growth rate of 5.0 percent in 1995. So, the Czech Republic seems to be making the transition in...
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an orderly way. But, think about the Czech Republic is a country that has a history of having had institutions that make it easier to do business in that country. Whereas, Russia didn’t have that because they went from the feudal agrarian society to centrally planned communism. Where the Czech Republic had a history of being a capitalist country before it fell under Russia’s influence after World War II. Hungary had a negative growth rate of 4.0 percent in 1992 and a positive growth rate of 1.5 percent in 1995. And the stories go on.

Well, what do we learn from this? Do we learn then that capitalism is a triumph and communism is a failure? Well, I think in same ways that conclusion is simply too simplistic, because we have lots of central planning even in capitalist countries. A firm is a centrally planned economy. There are all kinds of examples in which we don’t let the free market have full sway over the allocation of resources in an economy. But it does seem to be the case that the biggest experiment of the 20th century, which is Russia’s experiment with communism, failed to give people a standard of living that was comparable to other countries with similar resources as we enter the 21st century.

Now, it may be that communism was still the best that Russia could do, who knows. But, communism still subjected the Russian people to all kinds of abuses and horrors because of the concentration of power that it produced. But, if we go too far down this line we inevitably get into propaganda. I’ve got my capitalist propaganda because I was raised in a capitalist country. And, I can have an argument with someone whose got a communist background and we’re just going to be trading prejudices.

But, if we look at the facts what we can see is that in the Soviet Union central planning did create problems for that country. It slowed its growth rate and that the transition to a capitalist economy is still underway often with painful stops and starts as the people of Russia try to develop the institutions that support the free market exchange of goods and services.
Case Study: Successful Transition in the Czech Republic

Many countries that make the transition from communism to capitalism are thrown into turmoil. But, occasionally a country does it so smoothly and successfully that it’s worth notice. Consider the case of the Czech Republic. In 1989 Czechoslovakia had a quiet revolution from communism to a free market. And today the statistics are impressive. The gross domestic product in the Czech Republic grew by 4.5 percent in 1995 and is currently growing at 6.0 percent a year. Industrial production has been rising at a rate of more than 9.0 percent for two years in a row. Per capita income is already equal to that of Portugal, a member of the European community. And, inflation is occurring at a rate of less than 10.0 percent a year. Unemployment is the lowest of all European countries at 3.5 percent. And, the government is currently running a budget surplus and foreign capital is flowing into the country. How did this happen? What made Czechoslovakia’s transition smoother than that of other countries?

Let’s consider the things that economists would say that the Czech Republic has done correctly. The first thing was maintaining tight control of the money supply during a period where inflation was a huge risk. After Czechoslovakia underwent its quiet revolution, one of the first steps in the transition to a free market was the deregulation of prices. Prices which had been controlled by the government where customers had to go to state run retail stores and wait in long lines to buy low quality goods at fixed prices. That system was dismantled and prices were set by the interaction of supply and demand. Typically, when prices are deregulated in a former communist country there is a period of rapid inflation as built up inflation works its way through the system and prices increase rapidly. But, because Czechoslovakia maintained tight control of its money supply what happened was that there was a period of inflation at a rate of about 47.0 percent in the first six months of 1991. But, then by 1992 the inflation rate was down to 11.0 percent. And, today it is under 10 percent. So, tight control of the money supply helped avoid what is frequently a problem for countries in transition and that is, inflation.

Now, how was the government able to resist printing a lot of money? Well, the second key to success factor was control of the government budget deficit. Rather than continuing to subsidize the formerly state owned enterprises, Czechoslovakia, and then after 1993 the Czech Republic, sought subsidizing, cutoff government funds to these enterprises and therefore was no longer responsible for government revenue to what became the private sector. So, the government was able to reduce its expenses and therefore didn’t need to run a deficit. And, because it wasn’t running a deficit it didn’t need to print money and therefore, inflation was averted.

Now, how did these enterprises do for capital if the government wasn’t funding them? The third factor was the transition to private ownership. The Czech Republic used a voucher system. It gave every household vouchers, which they could then use to bid for shares in enterprises that ere being sold from the government to the private sector. And, this is exactly what happened, people in Czechoslovakia and in the Czech Republic got ownership of formerly state run businesses. About 1,500 formerly state owned businesses were privatized and now owned by the shareholders who are citizens of the Czech Republic. Also, in addition to this, new enterprises were started. By 1993, there were one million unregistered private businesses. Many of these businesses were retail operations selling goods and services that were previously available only in government run stores. So, the privatization of capital proceeded smoothly. The government gave the vouchers, allowed the bidding, and created a system whereby the private citizens owned shares in the businesses.

Now, of course, they had incentives to regulate the businesses themselves, the shareholders to exert pressure on managers to make the businesses profitable. Now, it took time for this transition. And, certainly, unscrupulous managers in the meantime were able to take advantage of their position and take assets out of the business or use them for their own advantage before shareholders really learned how to exert their power. But, this is a matter of education. People in Czechoslovakia for a while had not been used to exerting shareholder power to make businesses run well. And, therefore, they had to learn how to do this.

Well, this brings us to the fourth key to success factor and that is trade liberalization. That is, competition was allowed both within the economy and tariffs and quotas were lowered so the foreign competition put extra stress on domestically owned businesses to increase their performance. Trade liberalization created the market as a coordinator and motivator for people to succeed rather then government coercion. So, those are the key success factors for the Czech Republic’s transition from communism to capitalism.

Why was it that Czechoslovakia was able to follow these steps so smoothly, whereas other countries stumbled along the way? Well, consider that underneath the economy there were things going on in that country among those people and with those resources that were unique. First of all, Czechoslovakia had been a capitalist country before its
Case Study: Successful Transition in the Czech Republic

Communist takeover after World War II. Therefore, the institutions were in place. People had a history of capitalism in that country. They understood the institutions of democratic capitalism. Even though it had been communist for a generation, it was very quick to learn how to use capitalist institutions and methods again, so, a history of capitalism. Also, it was thoroughly industrialized before the communist revolution. There were factories, there was industrial production, and they already had an industrial revolution.

Whereas, in Russia the Industrial Revolution had not occurred in 1917, when they became a communist country. So, the idea that industrialization could occur without central planning was already well taking root in Czechoslovakia. And, therefore, whenever they liberalized in the 1990s they could go back to their industrial base and their habits of industrial production. They also were heavily influenced by Western Europe because of their proximity to Western European countries, Austria, Germany, they were well-integrated into European economy all ready. And, they have since officially become a member of the European Union. So, their links to Western Europe were already established historically and culturally and now they have been cemented by a legal pact.

So, Czechoslovakia was different from other communist countries. Because of its integration with Europe, because of its history of democratic capitalism, because of its preexisting industrial base its movement to a capitalist free market economy was smoother. But, still, those four factors are going to be necessary for any country that wants to make the transition. Tight money in order to prevent inflation, government budget maintains balance, the liberalization of trade and the privatization of formerly state run enterprises. When a country can pull those off successfully, and it helps if you have had some experience with capitalism, then the transition from communism to the free market can run more smoothly.
In 1949, a revolution brought the communist party to power in China. The direction, however, that the Chinese economy took was different from the one taken by the Soviet Union largely due to the influence of its charismatic leader Mao Tse-tung. Mao Tse-tung’s objective was to change the way people thought and acted. Rather than using material incentives to bribe people to be productive, as the Soviet central planner’s did, as the capitalist economies do to the price system in the free markets. Mao Tse-tung believed that he could change people’s incentives by motivating them with appeals to politics and ideology that has changed people’s hearts and minds rather than bribe them to respond to their own material incentives.

Mao Tse-tung oversaw important efforts in Chinese history to change people’s motivations. The first was called the Great Leap Forward, which began in 1958, and lasted until about 1960. The Great Leap Forward actually turned out to be a period of great regression in China as government coercion replaced prices as a way of communicating to people what they were supposed to do to contribute to the productivity of the economy. Land was thieved and given to different people. People who had previously been factory workers were sent to work in agriculture. People who were academics were sent to work in factories. And, there was a vast misallocation of resources and great discontent. And, the economy slowly began breaking down. This effort was aborted in 1960.

But, a similar program was begun in 1965 called the Cultural Revolution. In the Cultural Revolution we had a similar situation. Rather than relying on economic and technical experts to advise the government about the way in which the economy should be organized, Mao Tse-tung and his advisors turned instead to people who had ideologically pure thoughts, that is, the custodians of communist thought, to advise them on how the economy should be run.

Once again, things were run on coercion. The army got involved, told people where to go and work. People were assigned to jobs that had very little to do with their comparative advantage, skills and abilities, or even desires in doing particular kinds of work. And, people who disagreed with party ideology were given especially onerous tasks to work in the fields or to do other hard labors, punishment.

So, during the Cultural Revolution and the Great Leap Forward Mao Tse-tung announced China departed from systems based on material incentives to systems based on ideology and politics. Both of them were in some important respects noble experiments to see if, in fact, human nature could be changed by appeal to people’s higher motives. But, when you are trying to run an economy that has a billion people in it, prices are probably going to much a much better job of coordinating and motivating people then coercion and government oversight. In the end, both of these experiments have been proven to be failures. Under both of these regimes the output of China declined precipitously.

Now, in 1978, after the death of Mao Tse-tung, Deng Xiaoping became the leader of China. And, he had much more faith in markets as a catalyst for economic development. What began to happen, Deng Xiaoping’s assumption of power was a gradual movement of the Chinese economy towards a more market-based system.

First, collective farms were dismantled and peasants were given ownership rights. They were not actually allowed to own land this would be too ideologically far out for the Chinese system. But, instead, they were allowed to undertake long term leases in which they paid the government with a certain amount of agricultural output each year for the right then to own and cultivate the land. Everything that they produced beyond their required rent they were free to consume or to trade and to use the money that they acquired to better themselves, to start small craft oriented businesses and such like.

So, even though the ownership of capital was not freely a right for the citizens in China they were given opportunities to own the output that they produced with the capital and land that they leased from the government. And this was enough of an incentive to motivate people to seek work in which they were productive, and to work hard so that they could keep the output themselves.

What we saw happening after Mao Tse-tung’s death and Deng Xiaoping’s making available market incentives to the people of China, was the beginning of a period of very, very, rapid economic growth. From 1981 until 1992, the Chinese economy expanded at a rate of about 10.0 percent a year. Now that is a remarkably fast rate of economic growth. Compare that with the rate of economic growth in the US and other developed countries since World War II, which at its fastest when it was sustained was only around 3.0 percent. So, China was just exploding with economic growth during the 1980s and early 1990s.
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Alternative Systems

**Case Study: Post-Mao China**

In 1989, the Tiananmen Square revolt cast doubt on the future of China. Here we have a situation in which economic growth and the prosperity that it brought with it was then causing the people of China to clamor for political reform as well. And, asking for more freedoms and liberties that have been denied them under Mao, Tse-tung, and even under Deng Xiaoping. The army moved in quickly to suppress the revolt that began in Tiananmen Square and the rest of the world expressed dismay that China refused to liberalize its human rights and political freedoms for its citizens as its economy was growing. Nowadays there is still controversy about this. Should China be allowed to join the World Trade organization and have most favored nation status? That is, to be allowed to trade freely with preferential tariff rates with the developed countries. And, many people believe that is inappropriate until the Chinese government allows more political freedoms to its citizens.

The lesson I think we can learn from looking at what happened to China under Mao then under Deng Xiaoping is that whenever you allow market incentives in a society where they were previously absent, and people can be motivated by the price system and by the rewards that they can get whenever they are allowed to keep the produce of their own labor, then you see that people begin to be innovated. They look for opportunities and they work hard so that they can prosper.

Nowadays in China there is a very odd mix of politics that relatively tightly controlled and an economic situation that is rather freewheeling. Deng Xiaoping allocated certain chunks of the economy to what were called free enterprise zones. There were coastal cities and areas within some of the larger inland cities that were designated as free enterprise zones where people could start businesses, and, in some cases, even own capital and operate pretty much like any other city in the world that is outside of a communist government.

If you go to one of the large Chinese cities today and walk through its bustling economic areas you have no way of knowing whether you are in Hong Kong, which is very much a free market city, or whether you are in a city with more government control. Because, it is the economic incentives, not the flag that is flying, that determines how hard people are likely to work and how innovated they are likely to be. And, this is something we learned from looking at the case of China.
International Focus
Alternative Systems

*Case Study: Revolution and Reform in Mexico*

We consider economic development in a capitalist system. And, we talked about how communist central planning is an alternative. Now we’re going to consider another alternative economic system. This one inspired by the story of Mexico. The story begins in 1910, when the peasants agitate starting a revolution against the dictator, Porfirio Diaz, a revolution that continues until 1920. The previous economic system had been one of agricultural feudalism in which there were large land holdings and the peasants belonged to the land and the system had vast inequities. The landholders looked to Diaz to ensure their power. So when the peasants revolted there was a new constitution.

The Revolutionary Constitution of Mexico in 1917 had two important provisions that directed the economy. The first was the concentration of power in the hands of the new president, who had broad powers to actually direct economic development by fiat.

The second important provision of the Constitution was that economic development was to proceed in a way as to minimize the consequences for an equity. That is, development with some kind of fairness. Now, land reform proceeded immediately. That is, the large land holdings were broken up and shared more equitably among the peasants. And in the spirit of this land reform the next step was the nationalization of industry. Mexico then entered a period that we might call revolutionary nationalism. Where the government began to have more direct ownership of the economy. First the oil industry was nationalized in the 1930s. Then telecommunications, railroads, airlines and so forth until the government of Mexico effectively owned most of the important businesses in the country. By the early 1980s Mexico owned two thousand separate businesses, which were run and directed by the state.

Now, in the early days of this program it appeared highly successful. In the 1950s and the 1960s Mexico was directed by an agenda that could be called import substitution. That is, the country was protected from international economic competition by tariffs and quotas so that Mexico could have its own automobile production, its own manufacturers without the fear of being undercut by foreign imports. This was good in some sense because it provided a strong industrial base for Mexico that developed very quickly. The Mexican economy grew during the 1950s and the 1960s at an annual rate of 7.0 percent. So, Mexico’s program appears successful.

Then came the 1970s where consequences from the international economy began to bear directly on Mexico. First of all there was the crisis that was occasioned by high oil prices. High oil prices were good for Mexico, but the recession in the rest of the world was not. The state owned businesses became more and more dependent on subsidies, handouts from the government. And, after all of the easy to start businesses that had already been started Mexico’s efforts to get new industries involved even heavier subsidies and larger government budget deficits. Meanwhile businesses in Mexico begin borrowing heavily from abroad to support their development efforts, so that the foreign debt of Mexico balloons. In 1977, Mexico owed 30 billion dollars to foreigners. By 1982, Mexico owed more than 100 billion dollars. And this was the dark cloud on the horizon of Mexico’s program.

In the early 1980s rapid inflation began to push up interest rates, which raised Mexico’s debt service payment. And, this at the same time that oil prices were beginning to fall reducing Mexico’s revenues from abroad. These two forces conspired to create a huge debt crisis in 1982 where Mexico declared itself unable to pay its foreign debt.

Enter the international monetary fund with a program for restructuring Mexico’s economy. The deal is we’ll lend you money to pay your foreign debts, but only if you will get out of the situation that is going to require your future dependence on capital inflows from abroad. And, that is, first of all, get rid of that budget deficit which means cut subsidies to state owned enterprise and increase your tax base. The next thing you need to do says the IMF is privatizing all these state owned businesses so that they can once again be powered by the engine of competition rather than directed by the state.

So, Mexico began to do these things, cut the government budget deficit, increase the sources of tax revenue, cut subsidies to state owned enterprises and begin a massive program of privatization. By the early 1990s only about 200 businesses were still owned by the state of Mexico as opposed to 2,000 only 20 years earlier.

So, Mexico’s economy begins to liberalize. Tariffs and quotas are lowered, NAFTA is passed so that Mexico becomes more integrated with the economies of its North American trading partners. And, before you know it Mexico has moved into a period that we might call technocratic neoliberalism. That is, an economy that has liberal trade policies and is directed by very, very, well-educated economists like Miguel de la Madrid and Carlos Salinas, and Ernesto Zedillo the presidents of Mexico during the 1980s and the 1990s.
International Focus

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Today, Mexico’s economy looks more and more like a free market. Although they have had an experiment with a kind of revolutionary socialism during most of this century, it seems that the developments that have most helped Mexico’s economy in the last 15 years have been those movements away from central planning towards more market direction.

Now, all of those things that happened under central planning probably laid a good foundation for Mexico, and, were certainly important experiments. But, as Mexico’s economy liberalizes, prosperity increases.