

PROFESSIONAL DEVELOPMENT

AP<sup>®</sup> Economics  
Markets

Special Focus

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# Introduction

**David A. Anderson and Paul G. Blazer**

The goal of this special focus project is to support the proper labeling of economics graphs and reinforce the understanding of critical concepts that underlie these labels and graphs. When Richard Rankin suggested the development of materials for this purpose, I embraced the idea wholeheartedly, because disastrous economics free-response answers begin time and again with disastrous graphs. As a result of engagement with the assembled resources and activities, students will be able to construct and feel comfortable with many of the central graphs of introductory economics.

In their approach to economic problem solving, it is naturally tempting for students to contemplate “punting” on graph mastery to focus on the intuitively appealing topical applications. The trouble is that correct answers to important questions are gleaned quickly from accurate graphs, yet prove elusive for those who bypass graphical solutions. In other words, the seemingly hard path of struggling to learn the graphs is actually the easiest and most reliable line of attack. As a foundation for economic literacy, there is no alternative.

The economics dream team of Eric Dodge, Woodrow Hughes, Pamela Schmitt, and Shaun Waldron has assembled these materials for the benefit of workshop leaders, instructors, and students. Each of these authors is also a star teacher with years of experience teaching the principles of economics, and each has graded thousands of free-response AP<sup>®</sup> Economics questions. I think you will find their explanations to be thorough, insightful, and useful to anyone seeking greater comfort with the key graphs of economics.

I would also like to thank James Chasey of the College of DuPage and Bruce Johnson of Centre College for their excellent comments on earlier drafts of this project; Richard Rankin of the Iolani School for being the motivating force; and Lien Diaz and William Tinkler of the College Board for their kind and competent oversight.

## Summary of Content

These materials have been carefully composed so they can be used at different levels by workshop leaders, AP teachers, and students. The following questions may be used to ascertain the reader's grasp of important content concepts explored in these Special Focus materials:

- Why is it appropriate to place the nominal interest rate rather than the real interest rate on the vertical axis of the money market graph?
- What curves related to the foreign exchange market between Country A and Country B will shift if Country A falls into a recession and Country B does not?
- Why is the short-run aggregate supply curve upward sloping?
- What is the specific connection between the demand for goods and the demand for labor?

Summaries of each specific content area follow.

### **The Markets for Money and Loanable Funds**

In the first section, Eric Dodge walks users through the graphs for money and loanable funds markets. With the support of these materials, facilitators on any level will want to stress when to use the money market graph rather than the loanable funds graph, and emphasize that the nominal interest rate is determined in the money market whereas the real interest rate drives the loanable funds market. These are difficult concepts about which readers will relish clarity. The exposition begins with a straightforward delivery of the most important distinctions. The remainder of this section explains the more rigorous side of these topics for those who want greater depth of knowledge. Readers are also treated to a refresher on a broad array of macroeconomic issues, as is necessary to tie the relevant content together without demanding uncomfortable leaps of faith.

### **The Foreign Exchange Market**

Woodrow Hughes has written an easily digestible essay on the foreign exchange market, replete with real-world examples and user-friendly explanations. This will help facilitators convey when to shift which line(s) for which country, and when multiple shifts are appropriate. Useful comparisons between the foreign exchange market and the standard market for a consumption good allow users to transfer their familiarity with goods markets to the less familiar markets for foreign currency. The included

exercise reinforces distinctions between the various types of curve shifts and tests for an understanding of how shifts affect currency appreciation or depreciation.

### **Supply, Demand, Aggregate Supply, and Aggregate Demand**

Readers will appreciate Shaun Waldron's side-by-side comparison of the macro and micro sides of supply and demand. The piece demystifies axis labels and curves and juxtaposes them to emphasize similarities and differences between the two models. An exercise prompts users to consider whether specified changes affect supply, demand, aggregate supply, or aggregate demand.

### **Factor Markets**

Pamela Schmitt's piece focuses on factor market graphs, linkages between factor and product market graphs, and how and why to properly label these graphs. This section provides a numerical example of supply and demand in factor markets and allows users to follow changes in product demand through to see how they affect factor markets at the source of the product.





# Reconciling the Markets for Money and for Loanable Funds

## **Eric Dodge**

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Most students of economics find the coverage of supply and demand, particularly in micro markets, both intuitive and useful. Teachers have very little trouble coming up with everyday examples that students can relate to, and the local newspaper is chock full of useful current events that demonstrate how the “real world” often supports the theory. When the students begin their macro studies with aggregate supply and demand, the intuition and tools learned with micro supply and demand become invaluable. As a result, students are usually pretty good at adapting micro supply and demand to the AD/AS model. But when the course turns to more esoteric topics, even those that continue to rely on supply and demand analysis, many students hit the wall. For example, some economics teachers find it challenging to explain to their classes the difference between the money market and the market for loanable funds. In particular, it isn’t always clear why the vertical axes are labeled with different measures of the interest rate.

When students find themselves confused about the money market and the market for loanable funds, it’s often difficult to articulate exactly what it is that creates the confusion. I believe that much of the confusion can be traced to the textbook treatment of the different macroeconomic models (classical and Keynesian) and the foundations on which they are based. It might be helpful, then, to briefly summarize the underpinnings of these two schools of thought and to compare and contrast perspectives on how the macro economy works in the short run and in the long run.<sup>1</sup>

There are three key macroeconomic variables that play a role in the economy: the level of output, the price level, and the interest rate. The role of each variable in the

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1. For coverage of these models at the introductory level, see Mankiw’s *Principles of Economics* (3rd) as well as Krugman and Wells’s *Economics*. At the intermediate level, see Mankiw’s *Macroeconomics* (5th).

model depends upon whether the model assumes a long-run (classical) or a short-run (Keynesian) perspective. It is the long-run and short-run differences that provide for different treatments of the interest rate.

## **A Brief Summary of the Classical View**

1. Output is determined by a production function that combines a nation's capital stock, labor force, and technology to produce GDP. While nominal output might fluctuate in the short run, in the long run, real output will tend toward the natural level of output, or full-employment output.
2. For any given level of output, savings must equal investment. Both savers and investors, each with a long-run horizon, respond to changes in the *real* interest rate. If the real interest rate rises, savers (private and public) can expect a higher long-run return (after adjusting for inflation) on every dollar saved, so savings rises. But a higher real interest rate decreases the long-run profitability of every dollar invested. This is because most investment projects require the firm to borrow funds from a bank, and even if a firm does not have to borrow funds to finance projects, higher real interest rates impose a higher opportunity cost for the use of their own funds. Thus, private investors decrease their levels of investment at higher real interest rates. There is only one real interest rate that equates the dollars saved with the dollars invested, and the market for loanable funds shows how this real interest rate is determined.
3. The money market serves to balance the quantity of money demanded with the quantity of money supplied. The Quantity Theory of Money tells us that the value of money is simply the number of goods that can be bought with one dollar. If  $P$  is the price of a basket of goods and services measured in dollars, then the value of \$1, or the "price" of money in the money market (the number of baskets that exchange for \$1), is  $\$1/P$ . This school of thought, assuming a constant velocity of money and constant level of output, concludes that changes in the money supply will have a direct impact on the price level, and thus affect the value of each dollar. However, changes in the money supply will not impact the level of output because it has not changed the fundamental macroeconomic production function. In the long run, this is why the classical economists draw the AS curve as vertical.

In the short run, many of the above assertions do not hold. Output does fall below full employment and prices do not always quickly rise and fall with changes in the money supply. It is for the short-run view of the economy that the Keynesian model is used.

## **A Brief Summary of the Keynesian View**

1. The price level is assumed to be relatively fixed in the short run. This is where the concept of “sticky prices” comes from. Because the price level is not changing, there is essentially no difference between the nominal and real rates of interest.
2. For a given (and steady) price level, the nominal interest rate serves as the device to clear the money market. Keynes’s Theory of Liquidity Preference tells us that, while money supply is fixed by the central bank, money demand is inversely related to the nominal interest rate. Holding money as a liquid asset is a very short-term strategy, and in the short term, the price level will remain fixed. Therefore, if the nominal interest rate rises, it increases the opportunity cost of holding money as an asset, and thus decreases the quantity of dollars demanded. There is only one nominal interest rate at which the quantity of money demanded equals the fixed (drawn as vertical) money supply.
3. Output in the economy is determined by the equilibrium of the downward-sloping aggregate demand curve and the upward-sloping aggregate supply curve. The nominal interest rate, determined in the money market, plays a key role in determining aggregate demand. With the price level constant, a lower nominal interest rate prompted by an expansion in the money supply would increase investment, shifting the aggregate demand curve outward. In this way, monetary policy does have a short-run impact on the level of real GDP, and a minimal impact on the price level.

## **A More Rigorous Approach**

This section goes beyond the AP<sup>®</sup> level in several respects. However, a better understanding of this more advanced material may demystify concepts and assertions that are covered in AP Economics and reinforce more basic knowledge.

## The Classical Model

With the above generalizations in mind, we might take a look at each macro model in a little more depth. Let's begin with the macro markets for goods and services. The economy produces goods and services subject to a production function. The production function captures how producers combine the fixed size of the labor force,  $\bar{L}$ , with the fixed stock of capital equipment,  $\bar{K}$ ; adds a dash of technological know-how; and produces a fixed quantity of "stuff." The classical assumption of full employment of labor and capital means that the economy's output is fixed at the full-employment level of GDP,  $\bar{Y}$ :

$$\bar{Y} = F(\bar{L}, \bar{K}).$$

Following the idea of the circular flow, and assuming a closed economy (no exports or imports), this national output is also national income and is consumed (or spent) by the private and public domestic sectors, or

$$\bar{Y} = C + I + G.$$

Consumption ( $C$ ) is an increasing function of disposable income ( $Y - T$ ), where  $T$  is the level of net taxes. Net taxes are the difference between taxes paid to the government and transfer payments received from the government.

Investment ( $I$ ) is a decreasing function of the real interest rate ( $r$ ). It is useful to indicate that one variable is a function of another by placing the latter in parentheses after the former:  $I(r)$ . Because the real interest rate is the nominal rate minus expected inflation, the real rate is the true cost of borrowing for investment. As this real rate increases, investment decreases.

Government spending ( $G$ ) is funded by net taxes ( $T$ ), and both are assumed to be exogenous (not determined by the variables in this model).

With these assumptions in mind, and again placing in parentheses those variables that influence the variable just before the parentheses, the supply and demand for national output can be rewritten as

$$\bar{Y} = C(\bar{Y} - T) + I(r) = \bar{G}.$$

This states that the supply of national output,  $\bar{Y}$ , is equal to the demand for it,  $C + I + G$ , and the only variable not already determined is investment, which is a function of the real interest rate. The role of the real interest rate is easier to see if we look at the national income identity again, without some of the notation:  $Y = C + I + G$ . This can be solved for investment to become

$$Y - C - G = I.$$

On the left-hand side of the equation we have the difference between what is earned in the economy and what is spent by households and the government; in other words, national saving ( $S$ ). So this equation indicates that saving equals investment,  $S = I$ . There are two important components to national saving that can be identified by adding and subtracting net taxes on the left-hand (saving) side of the equation above:

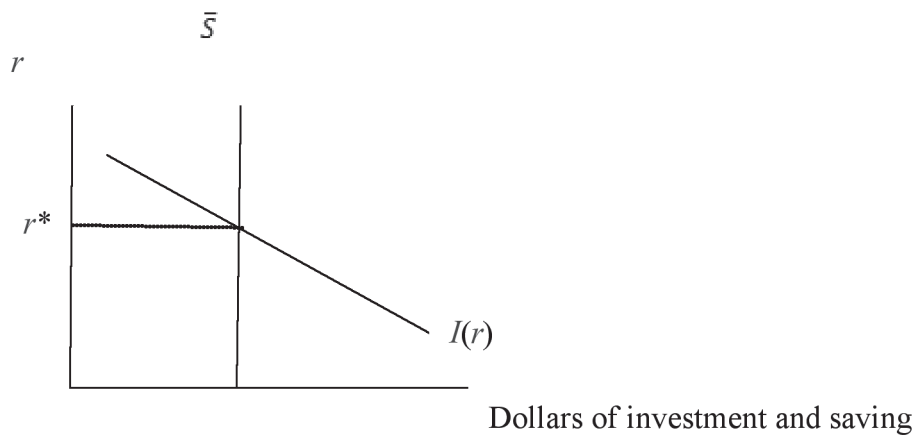
$$S = Y - C - G = (Y - T - C) + (T - G).$$

The  $(Y - T - C)$  term represents private saving and tells us how much money households have left over to save after we deduct taxes and consumption spending from income. The  $(T - G)$  term represents public saving and tells us how much the government saves after government spending is deducted from tax revenue. Public saving can be positive or negative. For example, if  $(T - G) < 0$ , there is a budget deficit, and the government is a net borrower.

Now, if we bring back our assumptions of fixed  $Y$ ,  $T$ , and  $G$ , the relationship between saving and investment can be restated as

$$\bar{Y} - C(\bar{Y} - \bar{T}) - \bar{G} = I(r) = \bar{S}.$$

In order for the market for goods and services to come to equilibrium, the fixed dollars of national saving,  $\bar{S}$ , must equal the dollars of private investment, and there is only one real interest rate at which this occurs. This equilibrium real interest rate,  $r^*$ , is determined in the hypothetical market for loanable funds. In this market for loanable funds, you have a demand relationship represented by the downward-sloping function  $I(r)$  and a supply relationship represented by  $\bar{S}$ . Note that the classical assumptions imply that supply is perfectly inelastic, but the equilibrium real interest rate would also be found in the market if the saving function were upward sloping.



So where do the money market and the nominal interest rates enter the picture? To answer this, we need to discuss the Quantity Theory of Money (QTM) in a little more detail.<sup>2</sup> According to the QTM, total spending in the economy is equal to the amount of money in circulation multiplied by the number of times each dollar is spent (velocity of money). In other words,

$$PY = MV,$$

where  $Y$  can either be thought of as the annual output or the annual number of transactions made in the economy, and  $P$  is the average price level or the price of an average transaction. Either way, the left-hand side is total spending, or nominal GDP, in a year. The money supply is  $M$ , and the velocity of money is  $V$ . Because output is assumed to be fixed by the production function and technology,  $Y$  is assumed to be fixed at  $\bar{Y}$ . And because the velocity of money is also viewed as constant at  $\bar{V}$ , any increase in the money supply ( $M$ ) must be reflected in an increase in the price level ( $P$ ). This important result directly connects the level of money in circulation to inflation.

The classical view of money demand is such that households hold money only insofar as to make transactions. What really matters isn't the amount of money a person holds, but how much "stuff" that money will purchase. A person's real money balances are equal to  $M/P$ , with  $P$  being the average price level. If  $\alpha$  is the fraction of each dollar of income ( $Y$ ) that each person wishes to hold, then money demand is represented as

$$\left(\frac{M}{P}\right)^d = \alpha Y$$

with superscript  $d$  simply indicating that this is demand. This equation tells us that as income rises, a person's real money balances, or money demand, will increase. But this is not the only determinant of money demand. Holding money incurs an opportunity cost in forgone interest. The interest rate that could be earned in a savings account or government bonds is the nominal interest rate. The Fisher equation tells us that the nominal rate of interest ( $i$ ) is equal to the sum of the real interest rate ( $r$ ) plus the expected inflation rate  $\pi^e$ . It is common notation to represent money demand as a function  $L(i, Y)$  because money is the most liquid of assets. Our money demand equation is then:

$$\left(\frac{M}{P}\right)^d = L(i, Y) = L(r + \pi^e, Y)$$

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2. Any intermediate macroeconomics textbook will provide a much more in-depth version of this story.

The level of money in circulation directly impacts the price level and the expectation of inflation. A higher expected inflation rate increases the nominal interest rate, which decreases the quantity of money demanded, and in turn increases the price level in the classical money market. The complexity of this money–price transmission is not insignificant, so it is important to communicate to students the importance of the market for loanable funds in the classical framework and the role that the nominal interest rate plays in the demand for money. But it is Keynes's Theory of Liquidity Preference that actually describes a larger role for money markets, and monetary policy in the macroeconomy.

### The Keynesian Model

The short-run view of the Keynesian economy assumes that the price level is fixed. After all, it does take time for prices to change, and so decision-makers in markets consider prices to be constant in the short run. The supply of money in circulation,  $M$ , is determined by the Federal Reserve, so  $M$  is treated as fixed. If  $P$  and  $M$  are both fixed, then the supply of real money balances  $\left(\frac{M}{P}\right)^s$  is also fixed and  $\left(\frac{M}{P}\right)^s = \frac{\bar{M}}{\bar{P}}$ . The supply of money is therefore drawn as vertical and not a function of interest rates.

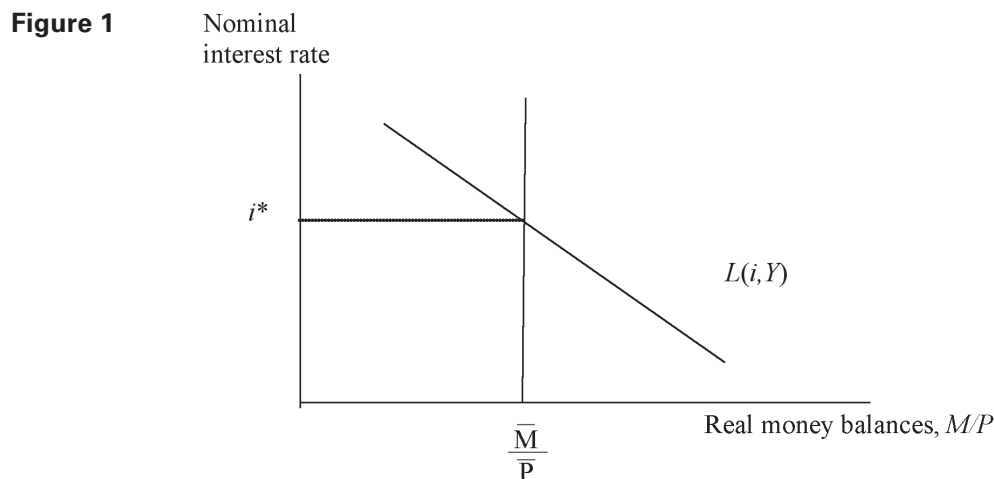
The demand for real money balances is still a function of the number of transactions that need to be made, and the opportunity cost of money—the nominal interest rate. It should be noted that, in the absence of expected inflation, the nominal interest rate is equal to the real interest rate. Again, held money is a liquid asset that earns no interest. Therefore, to hold money is necessarily to forgo the nominal interest rate ( $i$ ) that could be earned on money deposited in a savings account or used to purchase a Treasury bond or other interest-bearing assets. When the interest rate rises, the cost of holding money rises, and the quantity of real money balances demanded will fall.

The demand for real money balances can therefore be modeled as  $\left(\frac{M}{P}\right)^d = L(i, Y)$ .

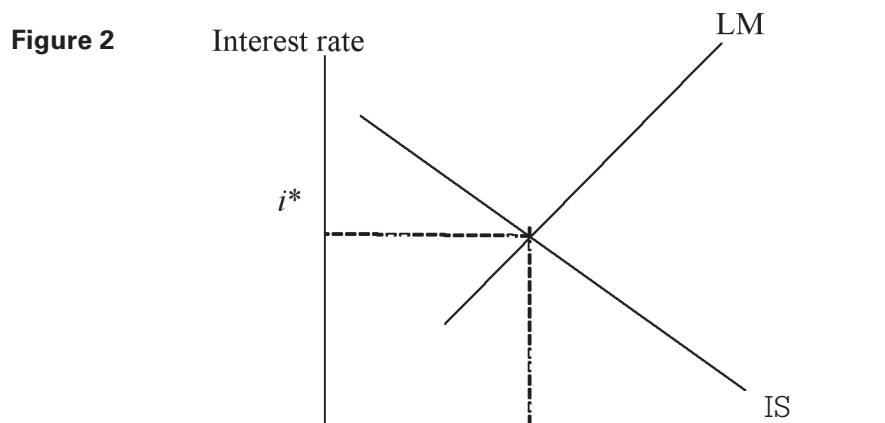
With these assumptions, the Keynesian money market can be portrayed with the nominal interest rate on the vertical axis and the quantity of real money balances,  $M/P$ , on the horizontal axis. As you can see in the figure below, there is one nominal interest rate,  $i^*$ , that equilibrates the money market.

At interest rates below  $i^*$ , there exists a shortage of real money balances. Needing money for transactions, consumers sell other assets, like bonds, which decreases the demand for bonds, lowers the price of bonds, and increases the interest rate. At interest rates above  $i^*$ , there exists a surplus of real money balances. Seeking

alternative investments for surplus money, consumers might purchase bonds, which increases the demand for bonds, raises the price of bonds, and lowers the interest rate.



It is in the larger context of the IS-LM model where the roles of the money market and the nominal interest rate are more fully developed. The short version is that increases in national income increase the money demand function and therefore increase the equilibrium interest rate. In this way, one can trace a positive relationship (the LM curve) between income and interest rates. At the same time, the Keynesian aggregate expenditure model (a.k.a. the “Keynesian cross”) determines equilibrium in the market for goods and services. An exogenous (determined by forces outside the model) increase in the interest rate causes a decrease in autonomous (not determined by real income levels) investment, shifting the aggregate expenditure function downward, and thus decreasing national income. In this way, one can trace a negative relationship (the IS curve) between income and the interest rate. It is the intersection of the IS and LM curves that illustrates the simultaneous equilibrium in the goods market and the money market, and this only occurs at one interest rate,  $i^*$ , and one level of national income,  $Y^*$ .





In this model, contrary to the classical model of the long-run economy, an increase in the money supply *will* affect output, but *will not* affect the price level. In the money market graph on the previous page, one can see that a rightward shift in the vertical money supply function will decrease the equilibrium interest rate. This shifts the LM curve downward, decreasing the equilibrium interest rate and increasing national income. In the AD/AS model, this is reflected as a rightward shift in AD. In the horizontal portion of the AS curve, which was the focus of Keynesian analysis, the price level remains fixed despite the shift in AD.

## Conclusion

The difference between the market for loanable funds and the money market is borne out of differences in both philosophy and perspective. The classical economists take a long-term philosophical view of the economy, and in this long-term view, the price level is not constant. If the price level is not constant, then inflation drives a wedge between the nominal rate of interest and the real rate. In the long run, output is determined by the national production function and, with necessary assumptions of exogenous government spending, taxes, and consumption, we can see that saving must equal investment for the economy to be in equilibrium. Therefore, the only component of national income that is not exogenously determined is investment, because this is a function of the real, or inflation-adjusted, rate of interest. In the market for loanable funds, there is one real interest rate at which the level of national saving is equal to the level of investment, and at this interest rate the economy is in equilibrium at the full employment level. Under these assumptions, the Quantity Theory of Money shows us that any increase in the money supply will only serve to increase the price level. An increase in inflation, which increases the nominal interest rate, but not the real rate, will therefore not increase investment, saving, or output. This philosophy and long-term perspective must therefore place very little emphasis on the role of monetary policy in influencing national income.

The Keynesian view is more of a short-term perspective. In the short term, prices are assumed to be fixed, so there is no need to make the distinction between the nominal and the real interest rates. The Theory of Liquidity Preference shows us that the money market determines the nominal interest rate, and the level of national income can directly affect that rate through its impact on money demand. Meanwhile, the market for goods determines the level of national income, and the interest rate can inversely affect income through investment. Together, the goods market and the money market come to equilibrium at a unique combination of the nominal interest

**SPECIAL FOCUS:** Markets

rate and income. Under these assumptions, an increase in the money supply does directly increase national income, but does not impact the price level. This philosophy and short-term perspective allows for a role for monetary policy in influencing national income.

# Foreign Exchange Markets

**Woodrow W. Hughes Jr.**

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Most ideas in economics follow a logical and common-sense pattern. Young children, while not being able to define what opportunity cost is, still have a basic understanding of the concept without ever being in an economics classroom. But there are exceptions to almost every rule. Foreign exchange markets and the prices of other currencies seem, to many, to be counterintuitive when first encountered. With the increased role of international trade and finance in the United States and the world, a basic understanding of this market is essential for those interested in purchasing imports, selling exports, or traveling to a different country; in other words, to just about everyone.

For some time, I struggled with this idea of the foreign exchange market, but when the light bulb finally came on that this was nothing more than a supply and demand problem, the struggle became much less intense. The language of the foreign exchange market will still sometimes create difficulties, but employing the supply and demand framework to explain this market goes a long way to alleviate these difficulties.

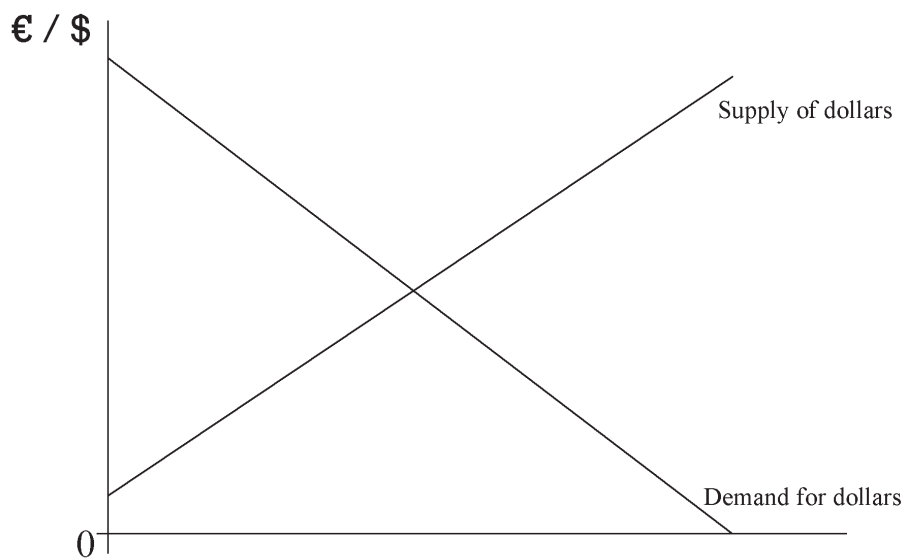
I like to start a discussion of the foreign exchange market by having students think of a currency just as any other commodity that can be measured in terms of units of output or “stuff.” Having students see that dollars, euros, and yen can be thought of as mere pieces of paper helps them understand that we are dealing with just another good, like soft drinks, pizza, and cars, that can be analyzed using our basic tool of supply and demand analysis.

Foreign exchange markets exist because two nations do not use the same currency, so it becomes necessary to trade one currency for another. Just like in any other market, there is an equilibrium price—the exchange rate—and an equilibrium quantity of the commodity—in this case, a currency. On the diagram below, the

horizontal axis is labeled with the currency. I generally use the United States dollar and write out the word “dollar” instead of using the dollar sign (\$) because the latter is often used to show the price of the good. This labeling seems to reinforce the idea that we are talking about the dollar as a commodity and not as a price. It is also important to emphasize that the horizontal axis represents the quantity of dollars that are demanded and supplied in the market, not the monetary value of some commodity.

The vertical axis is used for the price of each dollar traded. In most instances, I use the euro as the currency being used to buy or sell the dollar. Instead of writing “Price” on the vertical axis, I like to use “euro per dollar” or “€ / \$.” This way, students seem to have a better understanding that, again, we are talking about the value of a commodity—the dollar—and that it takes a given number of euros to purchase each dollar.

**Figure 1**



Where does the demand for dollars come from? In an international setting, who wants United States dollars? The demand comes from three different sources. First, foreigners who wish to buy goods and services from the United States will demand dollars. As a producer in the United States, I want to receive payment in the currency I can spend in my country—the dollar. So while I will gladly sell my product to foreigners, accepting their currency creates additional hassles for me, so I agree to sell my product only in exchange for dollars. Foreigners who wish to visit the United States and spend time

and money in the United States will need dollars to gain admittance to Disney World, to pay for hotel rooms, to eat lunch at the local barbecue place, and so on.

Second, foreigners who wish to invest in the United States will need dollars to make those investment purchases. Whether it be capital investments or financial investments, United States dollars will be required to make those purchases. If I represent a United States firm selling bonds to finance a building project, I need United States dollars to pay the building contractors. If the United States Treasury is selling securities, the Treasury wants dollars in exchange for these securities. If United States banks are offering relatively high interest rates on certificates of deposit or other financial investments, foreigners may wish to deposit funds into United States banks, and these banks would like to receive these deposits in dollars.

The third source of demand for dollars would be people in foreign countries who wish to make gifts to United States residents. While I am very grateful for monetary gifts from any source, I would prefer that those gifts be in a highly useable form, i.e., United States dollars. So before my great-aunt in Western Europe sends me a monetary gift for my birthday, she will go down to her bank and purchase dollars to send to me. International gift-giving is not the largest segment of the foreign exchange market, but it does have its role. Beyond gifts from the citizens of other countries, many workers from the United States live and work in foreign countries and require dollars to send home to friends and family.

How do euro holders, for example, obtain dollars? They go down to their local bank or foreign exchange office and trade in euros at the current exchange rate to get dollars. By demanding dollars, the importers of United States goods, purchasers of U.S investments, and givers to United States residents supply euros into the foreign exchange market. Likewise, when United States residents buy goods from Europe or take European vacations, they demand euros and pay for them by supplying dollars into the foreign exchange market. When United States investors buy euro-denominated bonds, they demand euros and pay for them by supplying United States dollars. When United States residents remit payments to family members in Europe, they trade in dollars to send euros to Europe.

This interaction within the foreign exchange market creates not one, but two different markets for currencies. In one market the dollar is the commodity and its price is in terms of euros per dollar; in the other market, the euro is the commodity and its price is in terms of dollars per euro. These markets are tied together through the demand for one currency creating a supply of the other currency. As the vertical

Figure 2

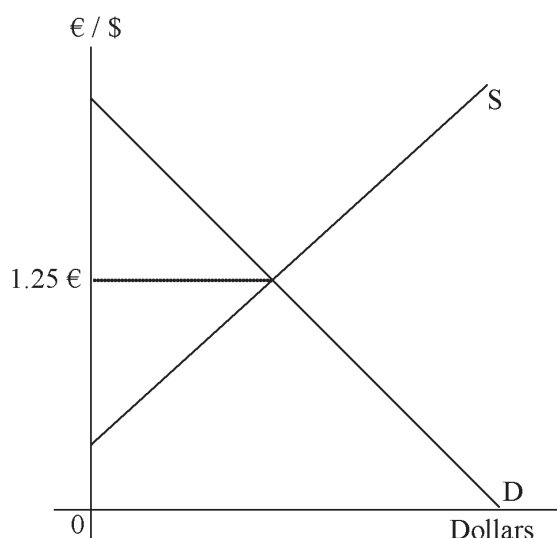
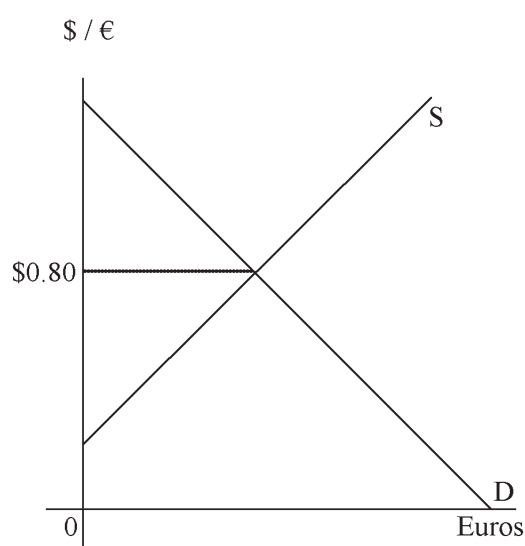


Figure 3



axes show, the prices of the currencies—the exchange rates—are reciprocals of each other. If the exchange rate between the euro and the dollar is € 1.25 per dollar, then the dollar price of a euro must be the inverse of that,  $\$1.00/\text{€ } 1.25 = \$0.80$ , or 80 cents for each euro.

So we have an equilibrium price for each currency, but what happens if something changes and affects the price of one currency or the other? Why do exchange rates change or fluctuate? The easy answer is that either the supply of a currency has changed or the demand for a currency has changed, or both supply and demand have changed. Suppose the demand for dollars increases or shifts to the right. How does this affect our markets? Remember it is markets, plural, because the markets for euros and dollars are linked: the demand for one creates a supply of the other. So if the demand for dollars rises, this means that foreigners want more United States dollars, and the only way they can get those dollars is to supply more of their own currency into the foreign exchange market. If the demand for dollars rises, the euro price for each dollar will go up from 1.25 euros per dollar to, say, 1.33 euros per dollar. In this case, the dollar will become more valuable in that it will take more euros to purchase one piece of paper called a dollar. When the dollar becomes more valuable, the dollar is said to have appreciated in value.

Since the markets for dollars and euros are linked together, there must be something going on in the euro market as well. If more dollars are being demanded, then European residents will be willing to supply more euros to buy United States dollars. This causes the supply curve of euros to shift to the right, driving the dollar price of euros down. The euro is becoming less valuable, in terms of dollars, so the

euro is said to be depreciating. It now takes fewer dollars to purchase one piece of paper or round coin called a euro. To achieve equilibrium in the euro market, the dollar price of a euro would have to fall to \$0.75 per euro. This dollar price per euro is the reciprocal of the 1.33 euro price per dollar.

So what makes the demand for a currency change? We have already seen some of the rationales for changes in exchange rates, but let's be more specific in relation to our three categories of demanders. Why would European residents demand more dollars? One reason is that European income levels may rise relative to the income levels in the United States. In general, imports tend to be normal goods, so that when income rises, the demand for imports will also rise. In order to buy more imports, Europeans will need additional dollars, driving the demand for dollars higher. As a result, the dollar will appreciate and, because the supply of euros will increase, the euro will depreciate in value. Another reason for an increased demand for dollars by Europeans would be if the United States inflation rate is lower than the inflation rate in Europe. If prices are rising more slowly in the United States than in Europe, where would consumers want to buy "stuff"? All else being equal, they would prefer to buy where prices are lower—in this case, the United States. This increases the demand for the dollar, shifting the demand curve for dollars to the right, and causing the dollar to appreciate in value. Simultaneously, United States importers and other consumers now find that United States goods are cheaper relative to European imports and will shift from European goods to United States goods. This will reduce the supply of dollars in the foreign exchange market since fewer euros are needed to buy European goods. As a result, the dollar will appreciate in value.

As in the previous case, the euro will depreciate because of the increase in the supply of euros as Europeans trade in euros in exchange for dollars. And why are Europeans trading in euros for dollars? Because United States prices are lower than European prices, so Europeans prefer to buy fewer domestic goods and more United States goods. Simultaneous changes are occurring on the demand side for euros. Consumers around the world now view United States goods as relatively less expensive than European goods, so these international shoppers shift their purchases from Europe to the United States. This decreases the demand for euros, causing a depreciation of the currency. The bottom line is that differences in inflation rates will affect the markets for both currencies, in this case the dollar and the euro. Furthermore, both sides of the market—supply and demand—will be affected by inflation rate differentials.

Tastes and preferences can also play a role in foreign exchange markets. If Europeans take a fancy to United States goods, the demand for these goods will increase, imports into Europe will rise, and Europeans will demand more dollars to pay for these more highly valued goods. This causes the dollar to appreciate in value relative to the euro, and the euro will depreciate in value relative to the dollar.

Investors are quite sensitive to differences in interest rates, preferring higher returns to lower returns, *ceteris paribus*. If real interest rates in the United States rise relative to those in Europe, financial capital will flow from Europe to the United States. But in order to invest in the United States, European investors will need dollars. This increases the demand for the dollar, driving its price higher so the dollar appreciates in value. At the same time, United States investors will see the higher real rate of return on financial assets in their home country and will invest fewer funds abroad. In our supply and demand model, this means that the supply of United States dollars is reduced. This reduction in the supply of dollars also drives the price of the dollar higher. In other words, the dollar will appreciate in value. The effects of an increased demand for the dollar combined with a decreased supply of dollars results in the price of the dollar rising or appreciating in value.

In the market for euros, the supply of euros will rise as European investors trade in euros to get dollars to invest in the United States. This reduces the dollar price of the euro so that its exchange rate falls or the euro depreciates. At the same time, investors, looking for the highest returns, make decisions about where to invest in financial assets. If the choice is between European assets and United States assets, investors will select the dollar-denominated assets of the United States. This reduces the demand for the euro, driving its price down. In other words, the euro depreciates in value, reinforcing the falling price caused by the increased supply of euros. Here again we see that both markets, the dollar and the euro, will experience simultaneous changes in both supply and demand.

Investors are also sensitive to the potential for default, wanting to preserve their financial capital investment. In a highly mobile market such as foreign exchange, investors can move funds easily across international borders seeking not only higher returns, but also safety of principal. One might argue that the United States financial environment is one of the safest markets in the world, attracting funds from all over the globe during any actual or anticipated problems, either economic or political, in other areas of the world. So if there is a financial meltdown in some area of the world, investors are likely to withdraw funds from those areas and move those funds to the



United States, increasing the demand for the United States dollar and causing the dollar to appreciate in value.

If more people in Europe decide to send gifts to people in the United States, this will increase the demand for United States dollars, causing the dollar to appreciate relative to the euro. In the euro market, this will show up as an increase in the supply of euros, causing the euro to depreciate in value compared to the dollar.

In all of the above cases, if the direction of the change in demand is reversed, then all directional changes are also reversed. So if the “euro zone” is experiencing a recession while the United States’s economy is growing, the demand for dollars will fall due to a reduced level of imports resulting from the decline in European income levels. This reduction in demand causes the dollar to depreciate in value. At the same time, there will be a reduction in the supply of euros, causing the euro to appreciate in value. The following table summarizes the impact on the demand for and the supply of the dollar and whether the dollar appreciates or depreciates.

<b>Situation</b>	<b>Demand for Dollars</b>	<b>Supply of Dollars</b>	<b>Dollar</b>
Higher income growth rate overseas	Increases		Appreciates
Higher inflation rate overseas	Increases	Decreases	Appreciates
Higher real interest rates overseas	Decreases	Increases	Depreciates
Greater demand for U.S. exports	Increases		Appreciates

*Note: For inflation and interest rates, both demand and supply would change.*

### **Exercise**

The following table has several different situations that would affect the foreign exchange market for dollars. Indicate whether there is an increase or a decrease in the demand for dollars, an increase or a decrease in the supply of dollars, or an uncertain effect. Also indicate whether the dollar appreciates or depreciates.

<b>Situation</b>	<b>Demand for Dollars</b>	<b>Supply of Dollars</b>	<b>Dollar</b>
The Federal Reserve System aggressively fights inflation, reducing inflation relative to most nations.			

**SPECIAL FOCUS: Markets**

<b>Situation</b>	<b>Demand for Dollars</b>	<b>Supply of Dollars</b>	<b>Dollar</b>
The United States economy experiences a recession relative to Europe.			
The European Union sees its real interest rates rise compared with those of the United States.			
Crisis in the Middle East causes panic in the world's financial markets, with the pursuit of stability being the most influential outcome.			
The European Parliament reduces taxes, spurring economic growth in the euro zone.			

<b>Situation</b>	<b>Demand for Dollars</b>	<b>Supply of Dollars</b>	<b>Dollar</b>
The Federal Reserve System aggressively fights inflation, reducing inflation relative to most nations.	(Demand for dollars increases)	(Supply of dollars decreases)	(Appreciates)
The United States economy experiences a recession relative to Europe.		(Supply of dollars decreases)	(Appreciates)
The European Union sees its real interest rates rise compared with those of the United States.	(Demand for dollars decreases)	(Supply of dollars increases)	(Depreciates)
Crisis in the Middle East causes panic in the world's financial markets, with the pursuit of stability being the most influential outcome.	(Demand for dollars increases)		(Appreciates)
The European Parliament reduces taxes, spurring economic growth in the euro zone.	(Demand for dollars increases)		(Appreciates)

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# Product and Factor Markets

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The firm operates in two types of markets. In the first, the *product market*, the firm produces units of a good or service. The firm can produce in an industry that is perfectly or monopolistically competitive, in an oligopoly, or as a monopoly. In the second type of market, the *factor market*, the firm hires inputs such as land, labor, capital, or entrepreneurial resources.

This section will first describe how perfectly competitive firms in the product market choose the optimal level of output. It will then describe how firms hiring a single input—labor—in a perfectly competitive factor market choose the optimal quantity of labor. Special attention will be given to graphs and labeling.

## **The Perfectly Competitive Product Market**

A profit-maximizing perfectly competitive firm produces the quantity that equates marginal cost and marginal revenue ( $MC = MR$ ). A unique outcome of this profit-maximizing rule is that in a perfectly competitive industry, marginal revenue equals price ( $MR = P$ ). This results because there are many firms in the industry and each firm is small in size, therefore each individual firm has no impact on price (i.e., firms are price takers).

### **A. The perfectly competitive industry**

For example, assume industry supply and demand for umbrellas are given in the following table below:

**Table 1**

Price	Quantity Demanded (in thousands)	Quantity Supplied (in thousands)
\$4	260	20
\$8	220	40
\$12	180	60
\$16	140	80
\$20	100	100
\$24	60	120
\$28	20	140

From the table above, the equilibrium price for umbrellas is \$20 and the equilibrium number of umbrellas is 100,000.

**B. A perfectly competitive firm: Uncle Um's umbrella company**

Further assume one umbrella firm, Uncle Um's umbrella company, faces the following production cost per day:

**Table 2**

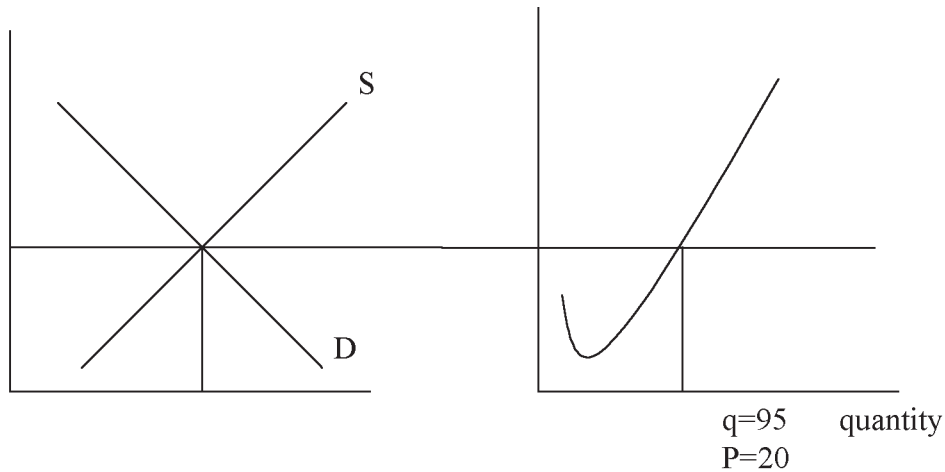
Quantity	Total Cost	Marginal Cost $MC = \frac{\text{change in TC}}{\text{change in Q}}$	Total Revenue $TR = P \cdot Q = 20 \cdot Q$	Marginal Revenue $MR = \frac{\text{change in TR}}{\text{change in Q}} = P$
0	\$700	—	0	—
10	\$900	$\frac{900 - 700}{10 - 0} = \frac{200}{10} = 20$	\$200	$\frac{200 - 0}{10 - 0} = \frac{200}{10} = 20$
25	\$1,100	$\frac{1100 - 900}{25 - 10} = \frac{200}{15} = 13\frac{1}{3}$	\$500	$\frac{500 - 200}{25 - 10} = \frac{300}{15} = 20$
50	\$1,300	$\frac{1300 - 1100}{50 - 25} = \frac{200}{25} = 8$	\$1,000	$\frac{1000 - 500}{50 - 25} = \frac{500}{25} = 20$
70	\$1,500	$\frac{1500 - 1300}{70 - 50} = \frac{200}{20} = 10$	\$1,400	$\frac{1400 - 1000}{70 - 50} = \frac{400}{20} = 20$
85	\$1,700	$\frac{1700 - 1500}{85 - 70} = \frac{200}{15} = 13\frac{1}{3}$	\$1,700	$\frac{1700 - 1400}{85 - 70} = \frac{300}{15} = 20$
95	<b>\$1,900</b>	$\frac{1900 - 1700}{95 - 85} = \frac{200}{10} = 20$	<b>\$1,900</b>	$\frac{1900 - 1700}{95 - 85} = \frac{200}{10} = 20$
100	\$2,100	$\frac{2100 - 1900}{100 - 95} = \frac{200}{5} = 40$	\$2,000	$\frac{2000 - 1900}{100 - 95} = \frac{100}{5} = 20$
101	\$2,300	$\frac{2300 - 2100}{101 - 100} = \frac{200}{1} = 200$	\$2,020	$\frac{2020 - 2000}{101 - 100} = \frac{20}{1} = 20$

The profit-maximizing decision by the firm is to choose to produce where marginal cost equals marginal revenue. The firm will produce 95 umbrellas because  $MC = 20 = MR$  at a quantity of 95. Notice that  $MC$  also equals  $MR$  at a quantity of 10. However, all of the units between 10 and 95 result in  $MR$  in excess of  $MC$ , so the firm would not want to stop at a quantity of 10 and forgo the profits to be made on the next 85 units. More generally, if  $MR$  equals  $MC$  at two different quantities, the firm will choose the second quantity as long as  $MC$  is below  $MR$  for the units in between the two quantities, as with a standard  $MC$  curve that falls and then rises. If  $MC$  never equals  $MR$  because  $MC$  skips from being below  $MR$  for one unit to being above  $MR$  for the next, the firm will choose the last quantity for which  $MC$  is below  $MR$ .

To further apply this example, the firm would be making zero economic profit (or “normal” profit) because total costs equal total revenue ( $TC = 1900 = TR$ ). Another way to see this is to note that the average total cost ( $ATC$ ) is equal to the price. Although  $ATC$  is not found in the table, it can be easily calculated at the profit-maximizing quantity as

$$ATC = \frac{TC}{Q} = \frac{1900}{95} = 20 = MC = 20.$$

We can illustrate this situation using side-by-side graphs of the industry and the firm:



*Note: It is important to label which graph represents the firm and which represents the industry. It is also important to have the price line continue from the industry graph to the firm graph and label it as  $MR = P = Demand$  in the firm graph.*

## The Perfectly Competitive Factor Market

For this example we will examine labor as the factor of production. Therefore, this can either be called a factor market or a labor market.

To understand the labor market, we need to determine where the demand from labor comes from.

### A. The derived demand for labor

The demand for any factor of production (here, labor) is a derived demand because the demand for that factor is directly related to the demand for the good or service produced by that factor. Several relevant terms come into play:

1. *Marginal Product of Labor* ( $MP_{Labor}$ ): The additional output produced by hiring an additional worker.
2. *Marginal Revenue Product* (*MRP*): The additional revenue a firm receives when hiring an additional unit of the factor (here, labor). This is the  $MP_{Labor}$  multiplied by the price of the product.
3. *Marginal Resource Cost* (*MRC*): The additional cost of hiring one more unit of the factor. For a perfectly competitive labor market this is the market wage rate.

So in the factor market, a perfectly competitive firm determines the profit-maximizing number of workers to hire where  $MRP = MRC$ .

### B. A perfectly competitive firm: Uncle Um's umbrella company

Continuing with our previous example, assume the market wage rate for umbrella makers is \$200 a day. This can be calculated by combining the two tables (each additional worker raises the total cost by \$200). In a perfectly competitive labor market, the market wage comes from labor supply and labor demand. Recall the product's price is \$20.



Additional information on Uncle Um's production cost per day is given in the following table:

**Table 3**

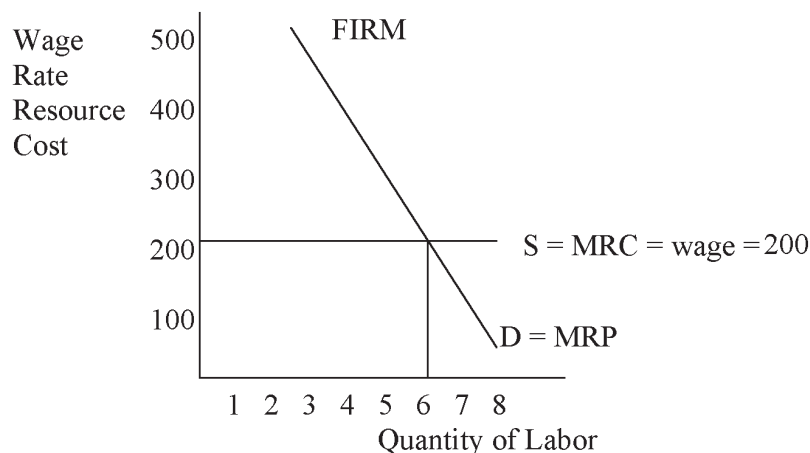
<b>Labor (# of workers)</b>	<b>Quantity</b>	<b>Marginal Product of Labor</b> $MP_{\text{Labor}} = \frac{\text{change in Quantity}}{\text{change in Labor}}$	<b>Marginal Revenue Product</b> $MRP = P * MP_{\text{Labor}}$	<b>Marginal Resource Cost</b> $MRC = \text{wage}$
0	0	—	0	-
1	10	$\frac{10 - 0}{1 - 0} = \frac{10}{1} = 10$	\$200	\$200
2	25	$\frac{25 - 10}{2 - 1} = 15$	\$300	\$200
3	50	$\frac{50 - 25}{3 - 2} = 25$	\$500	\$200
4	70	$\frac{70 - 50}{4 - 3} = 20$	\$400	\$200
5	85	$\frac{85 - 70}{5 - 4} = 15$	\$300	\$200
<b>6</b>	<b>95</b>	$\frac{95 - 85}{6 - 5} = 10$	<b>\$200</b>	<b>\$200</b>
7	100	$\frac{100 - 90}{7 - 6} = 5$	\$100	\$200
8	101	$\frac{101 - 100}{8 - 7} = 1$	\$20	\$200

The profit-maximizing decision by the firm is to hire until marginal resource cost equals marginal revenue product. The firm will hire six workers (producing 95 umbrellas) because  $MRC = 200 = MRP$  when six workers are hired.

Note once again that there are actually two quantities at which the optimality condition is met: one and six workers, but every worker between the first and the second quantity that meets the condition creates more additional revenue than additional cost ( $MRP > MRC$ ), so the firm will continue to hire until the second

quantity, at which  $MRC = MRP$ , in order to receive the net benefits from the additional five workers.

**C. Showing the supply and demand of labor for Uncle Um's umbrella company graphically**



*Note: The wage rate is determined by supply and demand conditions in the labor market. Be sure to correctly label all axes as well as supply and demand for labor for Uncle Um's.*

**Summary**

The Uncle Um's umbrella company example illustrates the interconnectedness of factor markets and product markets. The demand for umbrella makers is closely tied to the demand for umbrellas, the link coming through the price for umbrellas established in the product market. As umbrella prices rise, so does the value of additional umbrella makers, quantified by the marginal revenue product: the price per umbrella times the additional umbrellas made by another worker. The “derived demand” for umbrella makers is similar to that for every type of factor used to produce virtually every type of product. The demand for land increases when the demand for products made using land, such as corn, increases. The demand for buildings increases when the demand for products made using buildings, such as restaurant meals, increases. Awareness of these connections is often rewarded on the AP Economics Exams, and properly drawn and labeled graphs are the key to conveying that awareness.

## Exercises

The following exercises emphasize the linkages between the product market and the factor market.

- A. Assume that the weather conditions have been very dry, decreasing the demand for umbrellas. However, there are no changes in Uncle Um's costs or in the labor market for workers that can be hired to make umbrellas (leaving the market wage at \$200).

Specifically, the new supply and demand in the umbrella market is given by:

**Table 1**

Price	Quantity Demanded (in thousands)	Quantity Supplied (in thousands)
\$4	110	20
\$6	90	30
\$8	70	40
\$10	50	50
\$12	30	60
\$14	10	70
\$18	0	80

- Find the equilibrium price and quantity of umbrellas produced in the industry.
  - Find the profit-maximizing price and quantity of umbrellas produced by Uncle Um's. Show the results graphically using side-by-side graphs of the umbrella industry and Uncle Um's umbrella company.
  - Find the optimal number of workers to hire. Show the results graphically.
- B. Assume that the weather conditions have been very dry, decreasing the demand for umbrellas. Still there are no changes in Uncle Um's costs. However, now the labor market for workers has changed, creating a new market wage of \$100.

Supply and demand in the umbrella market are still given by:

**Table 2**

<b>Price</b>	<b>Quantity Demanded (in thousands)</b>	<b>Quantity Supplied (in thousands)</b>
\$4	110	20
\$6	90	30
\$8	70	40
\$10	50	50
\$12	30	60
\$14	10	70
\$18	0	80

1. Find the profit-maximizing price and quantity of umbrellas produced by Uncle Um's. Show the results graphically using side-by-side graphs of the umbrella industry and Uncle Um's umbrella company.
2. Find the optimal number of workers to hire. Show the results graphically.

## Answers

A.

**Table 1**

<b>Price</b>	<b>Quantity Demanded (in thousands)</b>	<b>Quantity Supplied (in thousands)</b>
\$4	110	20
\$6	90	30
\$8	70	40
<b>\$10</b>	<b>50</b>	<b>50</b>
\$12	30	60
\$14	10	70
\$18	0	80

- Find the equilibrium price and quantity of umbrellas produced in the industry.

**Price = \$10**

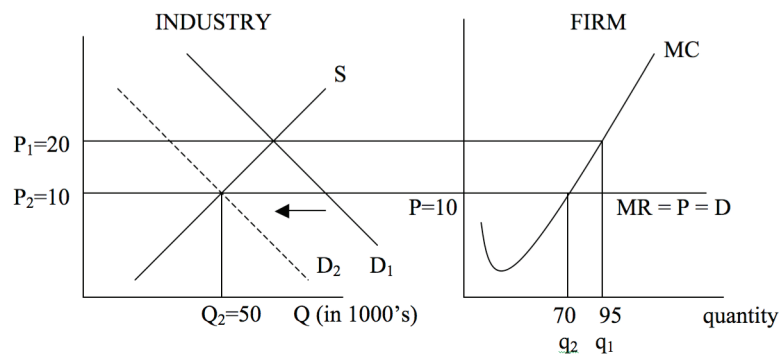
**Quantity = 50**

- Find the profit-maximizing price and quantity of umbrellas produced by Uncle Um's. Show the results graphically using side-by-side graphs of the umbrella industry and Uncle Um's umbrella company.

**To maximize profit, Uncle Um's should produce 70 umbrellas at the market price of \$10.**

Table 2

Quantity	Total Cost	Marginal Cost	Total Revenue	Marginal Revenue
0	\$700	-	0	-
10	\$900	\$20	\$100	\$10
25	\$1,100	\$13.3	\$250	\$10
50	\$1,300	\$8	\$500	\$10
<b>70</b>	<b>\$1,400</b>	<b>\$10</b>	<b>\$700</b>	<b>\$10</b>
85	\$1,700	\$13.3	\$850	\$10
95	\$1,900	\$20	\$950	\$10
100	\$2,100	\$40	\$1,000	\$10
101	\$2,300	\$200	\$1,010	\$10



- Find the optimal number of workers to hire.

***The optimal number of workers to hire is now four because that is where the  $MRP = MRC$ .***

**Table 3**

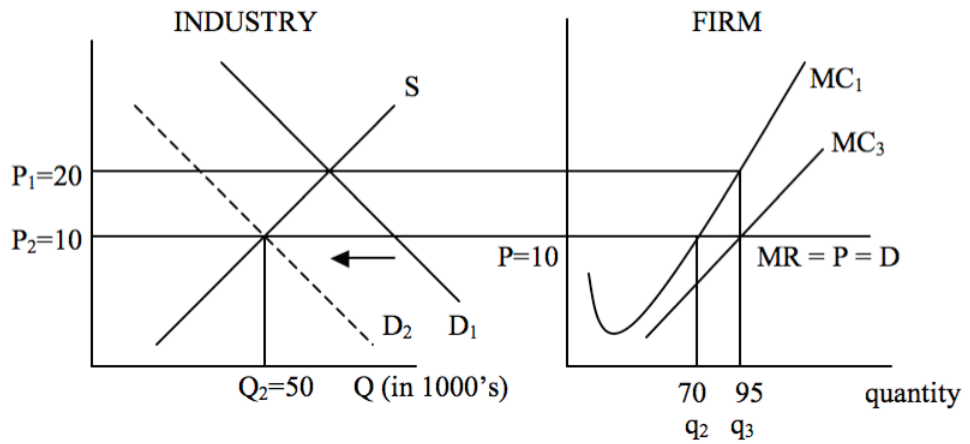
Labor (# of workers)	Quantity	Marginal Product of Labor	Marginal Revenue Product	Marginal Resource Cost
0	0	-	0	-
1	10	10	\$100	\$200
2	25	15	\$150	\$200
3	50	25	\$250	\$200
<b>4</b>	<b>70</b>	<b>20</b>	<b>\$200</b>	<b>\$200</b>
5	85	15	\$150	\$200
6	95	10	\$100	\$200
7	100	5	\$50	\$200
8	101	1	\$10	\$200

B. The equilibrium market price and quantity have not changed. Therefore,  $P = \$10$ . However, the variable costs have changed.

- Find the profit-maximizing price and quantity of umbrellas produced by Uncle Um's. Show the results graphically using side-by-side graphs of the umbrella industry and Uncle Um's umbrella company.
- Find the optimal number of workers to hire. Show the results graphically.

***To maximize profit, Uncle Um's should now produce 95 umbrellas at the market price of \$10.***

Quantity	Total Cost	Marginal Cost	Total Revenue	Marginal Revenue
0	\$700	-	0	-
10	\$800	\$10	\$100	\$10
25	\$900	\$6.67	\$250	\$10
50	\$1,000	\$4	\$500	\$10
70	\$1,100	\$5	\$700	\$10
85	\$1,200	\$6.67	\$850	\$10
<b>95</b>	<b>\$1,300</b>	<b>\$10</b>	<b>\$950</b>	<b>\$10</b>
100	\$1,400	\$20	\$1,000	\$10
101	\$1,500	\$100	\$1,010	\$10







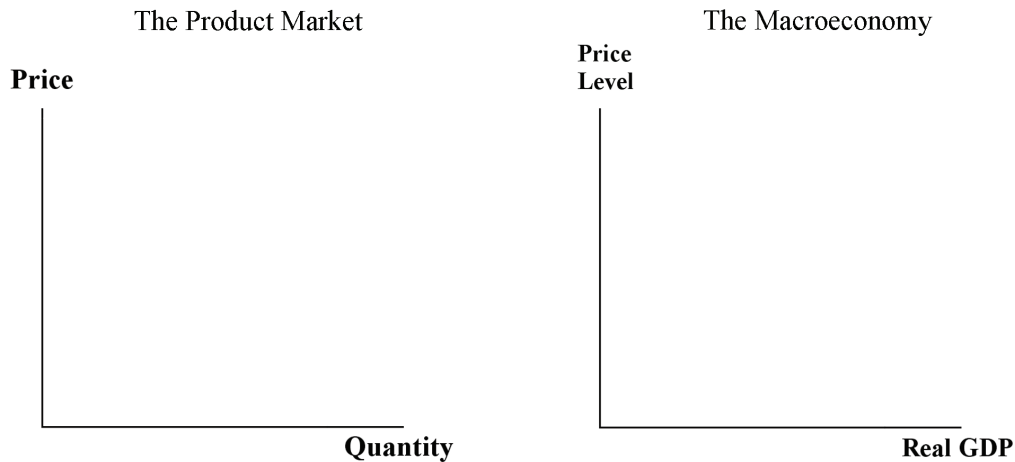
# Lesson: A Comparison of Graphs from Microeconomics and Macroeconomics

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In order to visualize how our macroeconomy works, it is helpful to have a graphical representation of the same, just as we do for an individual market in microeconomics. The basic concepts behind the supply and demand graph of microeconomics—including the determination of price and quantity at equilibrium where supply and demand intersect—apply similarly to the aggregate demand and aggregate supply graph of macroeconomics. However, there are important differences in vocabulary and logic that need to be emphasized. The comparisons below are designed to clarify the similarities and differences between these two models.

## The Axes



**“Price”** or “P” represents the amount of money that buyers are willing to pay and/or producers are willing to accept per unit for a given quantity of a particular good or service.

**“Quantity”** or “Q” represents the quantity of a particular good that is demanded and/or supplied.

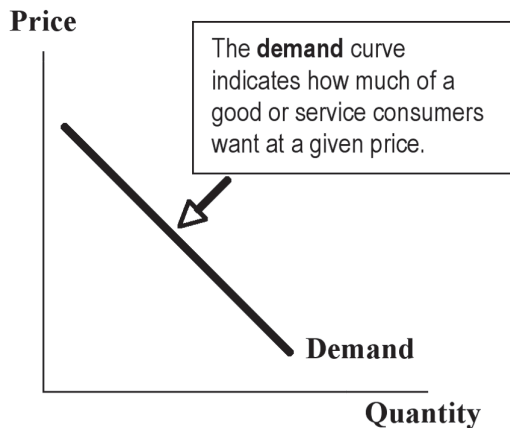
**“Price level”** or “PL” represents the overall price level for goods and services in an economy at a given point in time. The consumer price index and the GDP deflator are examples of measures of the price level.

**“Real GDP”** or “rGDP” represents the quantity of final goods and services; in essence, it is the output of an economy, adjusted for inflation.

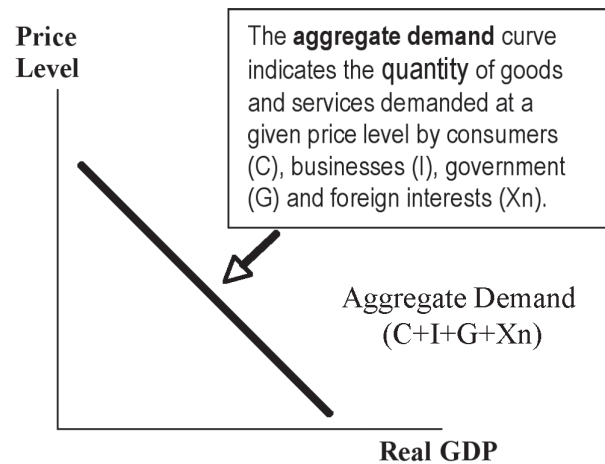
## Demand

Despite looking similar, the demand curves for these two models are based on different assumptions.

### THE PRODUCT MARKET



### THE MACROECONOMY



Why is this curve downward-sloping?

The quantity demanded of any good or service is determined by its price. Consumers react to prices depending upon:

- (1) **The income effect:** As the price falls, buyers feel as though they can afford more, and thus quantity demanded rises (and vice versa).
- (2) **The substitution effect:** As the price of good X rises, buyers substitute good Y for X, and thus the quantity demanded of X falls (and vice versa).
- (3) **Diminishing marginal utility:** As buyers increase their consumption of a good, the satisfaction received from consuming each additional unit falls; buyers will only buy additional units if the price falls accordingly.

Why is this curve downward-sloping?

- (1) **The interest rate effect:** As the PL rises, buyers need more dollars to purchase goods and services. The resulting increase in the demand for dollars means higher interest rates. Thus, since dollars cost more to borrow, investment decreases, and so the total amount of goods and services demanded falls (and vice versa).
- (2) **The wealth effect (or the real balances effect):** As the PL rises, buyers feel their purchasing power has fallen; they are "less wealthy." Thus, spending falls as PL rises, and vice versa.
- (3) **The foreign purchases effect:** When the PL in the United States rises relative to the PL in other countries, foreign demand for United States goods falls, as they become more expensive relative to goods from elsewhere. Thus, United States net exports fall (and vice versa).

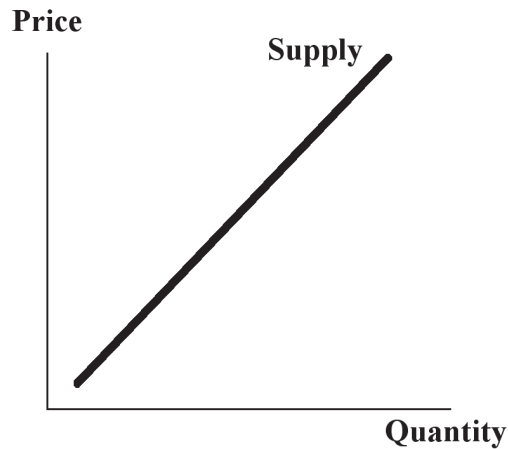
The key to understanding the difference between demand at the micro level and aggregate demand at the macro level is to remember that:

- (a) the micro graph shows the quantity of *one* good or service demanded at various prices, and
- (b) the macro graph shows the total quantity of *all* final goods and services demanded at various price levels.

## Supply

The supply and aggregate supply curves look similar as well, but there are a number of important distinctions.

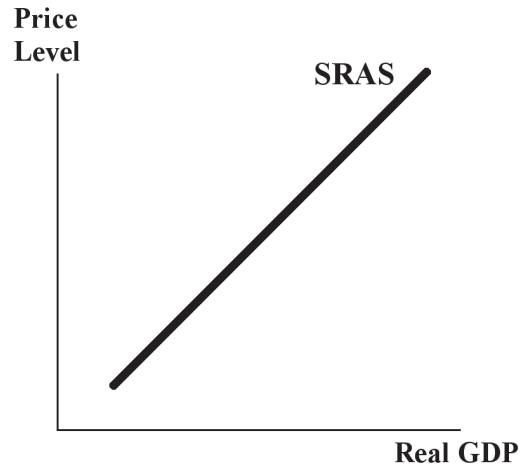
### THE PRODUCT MARKET



The **supply** curve indicates the quantity of a particular good or service, such as chocolate bars, that firms are willing to supply at each price.

The supply curve is upward-sloping because sellers are willing to provide greater quantities of a good or service to the market as price rises (and vice versa). As a firm's marginal costs increase with the production of each additional unit, it is only rational for that firm to want to receive more revenue for those additional units.

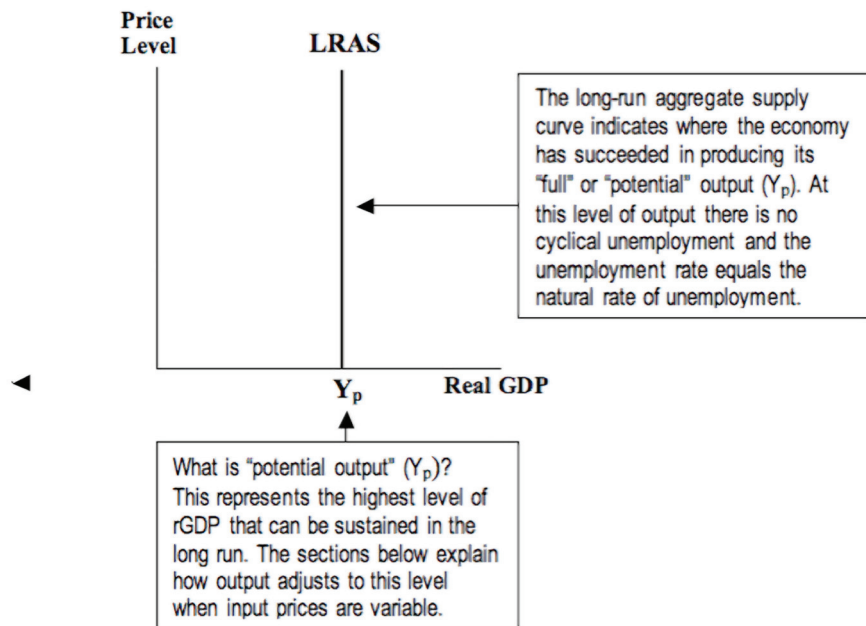
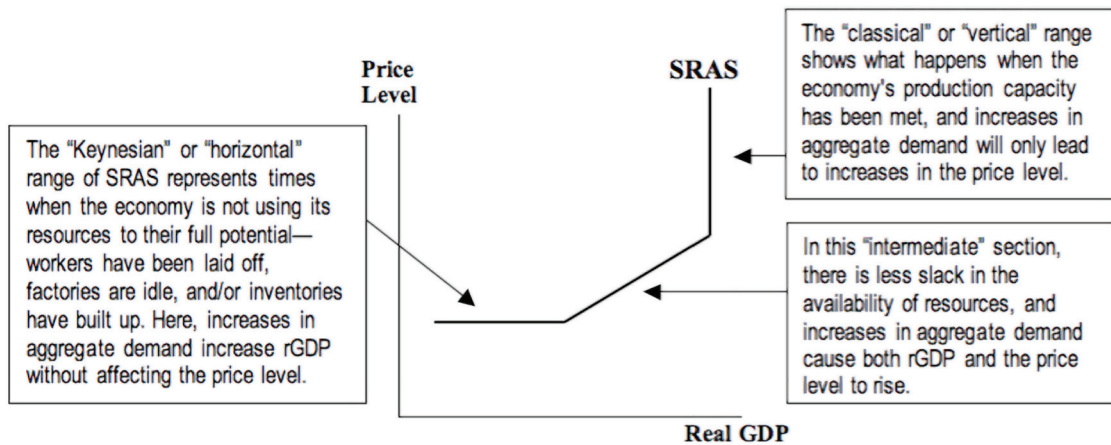
### THE MACROECONOMY



The **short-run aggregate supply** curve indicates the quantity of final goods and services that producers are willing to supply at each price level in the short run.

In the short run, increases in prices are not met by proportional increases in wages because, among other reasons, wage contracts are negotiated only periodically. Thus, the cost of labor does not increase at the rate of price increases. As prices rise, the real (inflation adjusted) value of fixed nominal wages falls, profits per unit increase, and firms are willing to supply a larger quantity. This results in an upward-sloping short-run aggregate supply curve.

Sometimes it is easier for beginning students to understand the shape of short-run aggregate supply if the curve is separated into three distinct sections:

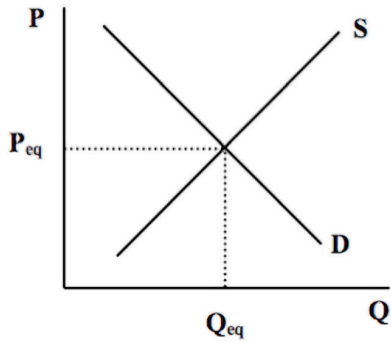


### What is the difference between the LRAS curve and the vertical section of SRAS?

SRAS becomes vertical at the output level that would exhaust available resources in the short run. LRAS is vertical at the "potential" or "full employment" level of output ( $Y_p$ ) at which there is no pressure on wages to change. Output could exceed  $Y_p$  in the short run, but in the long run, output beyond that level requires wage increases that shift SRAS to the left until SRAS intersects AD at the full employment level of output.

# Equilibrium

## THE PRODUCT MARKET

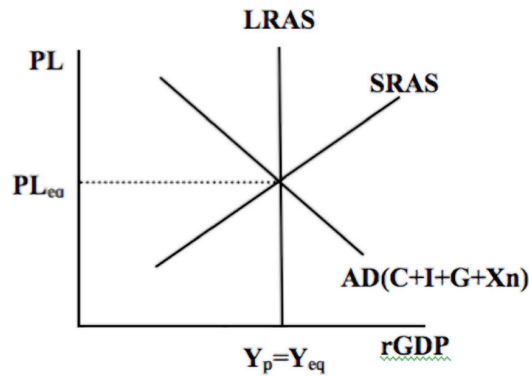


When the price equals  $P_{eq}$  in product market, buyers are willing to purchase the same quantity of output that sellers are willing to provide— $Q_{eq}$ . Thus, the market is in “equilibrium.”

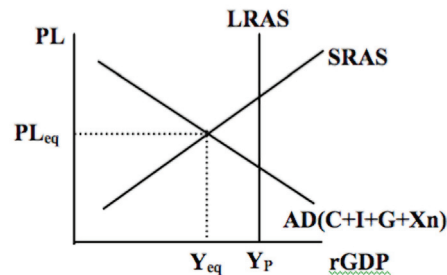
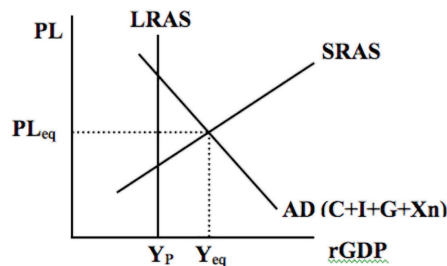
In the graph to the right, actual (short-run equilibrium) output is greater than potential output. The result is an “inflationary gap.” Unemployment is low and nominal wages tend to rise.

The bottom graph shows a “recessionary gap.” Actual output is less than potential output. The result is usually high unemployment and falling nominal wages.

## THE MACROECONOMY



At price level  $PL_{eq}$ , the macroeconomy depicted above is in long-run equilibrium. A short-run equilibrium exists whenever  $SRAS$  equals  $AD$ . At long-run equilibrium, actual output  $Y_{eq}$  also equals potential output  $Y_p$ .



How does an economy naturally recover from a recessionary or inflationary gap? When an economy faces a recessionary gap, prices and costs usually fall, causing the  $SRAS$  to shift outward until equilibrium reaches  $LRAS$  at a new, lower price level. For an inflationary gap,  $SRAS$  shifts inward as wages increase and producers react to rising input costs. Thus, the economy self-corrects until the equilibrium point reaches  $LRAS$  at a new, higher price level.

## Comparing Supply and Demand with Aggregate Supply and Aggregate Demand Student Worksheet

Read each of the situations below and indicate whether it is most appropriate to model the described change as a shift in supply, demand, aggregate supply, or aggregate demand.

### MICROECONOMICS OR MACROECONOMICS

	Supply	Demand	Situation	Aggregate Supply	Aggregate Demand
1			The price of a bushel of corn jumps as ethanol plants are built across the country to address the need for new sources of energy.		
2			In the 1930s, the government supported a number of back-to-work programs such as the Works Progress Administration and the Civilian Conservation Corps in an attempt to jump-start a sagging economy.		
3			The New York Red Bulls, who usually sell 15,000 tickets a game, sell 66,000 when the Los Angeles Galaxy and David Beckham come to town.		
4			The U.S. government's support of Israel in the Six Day War leads to OPEC reducing the amount of oil available to the United States, dramatically increasing production and transportation costs.		
5			A study by the American Medical Association shows that the constant wearing of heavy backpacks causes back pain.		
6			Because the value of the U.S. dollar is declining relative to other currencies, American exports have increased.		
7			As gas prices increase in reaction to skyrocketing oil prices, consumers are less inclined to purchase gas-guzzling SUVs.		
8			A housing market slump leads to a decrease in the purchase of related goods such as roofing, flooring, appliances, furniture, lighting, and power tools.		

	<b>Supply</b>	<b>Demand</b>	<b>Situation</b>	<b>Aggregate Supply</b>	<b>Aggregate Demand</b>
9			While reducing their carbon footprints, firms from Patagonia to Wal-Mart discover that new technology that improves energy efficiency and lowers emissions also lowers production costs.		
10			Congress passes a \$28 billion railroad development bill to provide high-speed Amtrak service between Detroit and Tampa.		
11			In order to prevent overfishing, the government enacts a ban on tuna fishing in the Pacific Ocean.		

**Comparing Supply and Demand with Aggregate Supply and Aggregate Demand Answer Key**

<b>MICROECONOMICS OR MACROECONOMICS</b>		
	<b>Situation</b>	<b>Answer</b>
1	The price of a bushel of corn jumps as ethanol plants are built across the country to address the need for new sources of energy.	The demand for corn increases as private firms and the government attempt to find new sources of energy.
2	In the 1930s, the government supported a number of back-to-work programs such as the Works Progress Administration and the Civilian Conservation Corps in an attempt to jump-start a sagging economy.	This represents an increase in government spending, so AD shifted right.
3	The New York Red Bulls, who usually sell 15,000 tickets a game, sell 66,000 when the Los Angeles Galaxy and David Beckham come to town.	People want to see this soccer player/celebrity play, so the demand for tickets increases when David Beckham is in town.
4	The U.S. government's support of Israel in the Six Day War leads to OPEC reducing the amount of oil available to the U.S., dramatically increasing production and transportation costs.	The shortage of oil affects most aspects of production and transportation in the United States, so AS shifts left as oil prices rise.
5	A study by the American Medical Association shows that the constant wearing of heavy backpacks causes back pain.	This news leads to a decrease in demand as people try to avoid suffering from back pain.
6	Because the value of the U.S. dollar is declining relative to other currencies, American exports have increased.	Foreign consumers buy U.S. goods because they are cheaper relative to their own products. Thus, AD shifts right.



	<b>Situation</b>	<b>Answer</b>
7	As gas prices increase in reaction to skyrocketing oil prices, consumers are less inclined to purchase gas-guzzling SUVs.	The demand for SUVs shifts left as the result of higher gas prices. It is also notable that the increased use of fuel-efficient cars causes a decrease in the demand for gasoline.
8	A housing market slump leads to a decrease in the purchase of related goods such as roofing, flooring, appliances, furniture, lighting, and power tools.	This widespread decrease in consumption results in a leftward shift in AD.
9	While reducing their carbon footprints, firms from Patagonia to Wal-Mart discover that new technology that improves energy efficiency and lowers emissions also lowers production costs.	The improvement in technology allows for decreased production costs, and therefore a rightward shift in AS.
10	Congress passes a \$28 billion railroad development bill to provide high-speed Amtrak service between Detroit and Tampa.	This represents an increase in government spending, so AD shifts right.
11	In order to prevent overfishing, the government enacts a ban on tuna fishing in the Pacific Ocean.	The supply of tuna available for purchase decreases with this new regulation.



## About the Editor

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