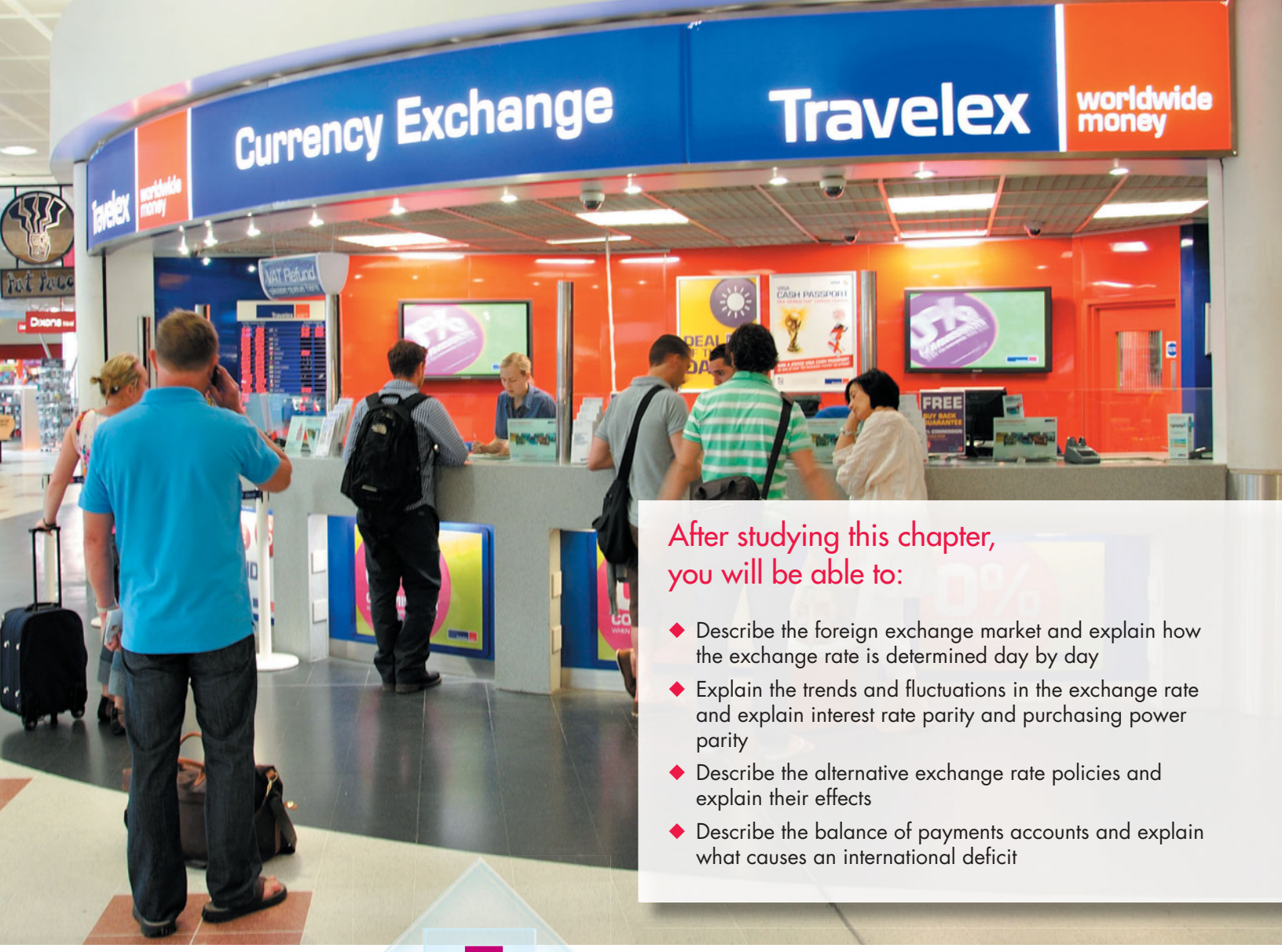


After studying this chapter, you will be able to:

- Describe the foreign exchange market and explain how the exchange rate is determined day by day
- Explain the trends and fluctuations in the exchange rate and explain interest rate parity and purchasing power parity
- Describe the alternative exchange rate policies and explain their effects
- Describe the balance of payments accounts and explain what causes an international deficit

26

THE EXCHANGE RATE AND THE BALANCE OF PAYMENTS

The dollar ($), the euro (€), and the yen (¥) are three of the world's monies and most international payments are made using one of them. But the world has more than 100 different monies.

In October 2000, one U.S. dollar bought 1.17 euros, but from 2000 through 2008, the dollar sank against the euro and by July 2008 one U.S. dollar bought only 63 euro cents. Why did the dollar fall against the euro? Can or should the United States do anything to stabilize the value of the dollar?

Every year since 1988, foreign entrepreneurs have roamed the United States with giant virtual shopping carts and loaded them up with Gerber, Firestone, Columbia Pictures, Ben & Jerry's, and Anheuser-Busch, all of which are now controlled by Japanese or European companies. Why have foreigners been buying U.S. businesses?

In this chapter, you're going to discover the answers to these questions. In *Reading Between the Lines* at the end of the chapter, we'll look at a risky investment strategy that exploits interest rate differences and the foreign exchange market.

The Foreign Exchange Market

When Wal-Mart imports DVD players from Japan, it pays for them using Japanese yen. And when Japan Airlines buys an airplane from Boeing, it pays using U.S. dollars. Whenever people buy things from another country, they use the currency of that country to make the transaction. It doesn't make any difference what the item is that is being traded internationally. It might be a DVD player, an airplane, insurance or banking services, real estate, the stocks and bonds of a government or corporation, or even an entire business.

Foreign money is just like U.S. money. It consists of notes and coins issued by a central bank and mint and deposits in banks and other depository institutions. When we described U.S. money in Chapter 25, we distinguished between currency (notes and coins) and deposits. But when we talk about foreign money, we refer to it as foreign currency. **Foreign currency** is the money of other countries regardless of whether that money is in the form of notes, coins, or bank deposits.

We buy these foreign currencies and foreigners buy U.S. dollars in the foreign exchange market.

Trading Currencies

The currency of one country is exchanged for the currency of another in the **foreign exchange market**. The foreign exchange market is not a place like a downtown flea market or a fruit and vegetable market. The foreign exchange market is made up of thousands of people—importers and exporters, banks, international investors and speculators, international travelers, and specialist traders called *foreign exchange brokers*.

The foreign exchange market opens on Monday morning in Sydney, Australia, and Hong Kong, which is still Sunday evening in New York. As the day advances, markets open in Singapore, Tokyo, Bahrain, Frankfurt, London, New York, Chicago, and San Francisco. As the West Coast markets close, Sydney is only an hour away from opening for the next day of business. The sun barely sets in the foreign exchange market. Dealers around the world are in continual contact by telephone and computer, and on a typical day in 2010, around $3 trillion (of all currencies) were traded in the foreign exchange market—or more than $600 trillion in a year.

Exchange Rates

An **exchange rate** is the price at which one currency exchanges for another currency in the foreign exchange market. For example, on September 1, 2010, $1 would buy 84 Japanese yen or 79 euro cents. So the exchange rate was 84 yen per dollar or, equivalently, 79 euro cents per dollar.

The exchange rate fluctuates. Sometimes it rises and sometimes it falls. A rise in the exchange rate is called an *appreciation* of the dollar, and a fall in the exchange rate is called a *depreciation* of the dollar. For example, when the exchange rate rises from 84 yen to 100 yen per dollar, the dollar appreciates, and when the exchange rate falls from 100 yen to 84 yen per dollar, the dollar depreciates.

Economics in Action on the next page shows the fluctuations in the U.S. dollar against three currencies since 2000.

Questions About the U.S. Dollar Exchange Rate

The performance of the U.S. dollar in the foreign exchange market raises a number of questions that we address in this chapter.

First, how is the exchange rate determined? Why did the U.S. dollar appreciate from 2000 to 2002 and then begin to depreciate?

Second, how do the Fed and other central banks operate in the foreign exchange market? In particular, how was the exchange rate between the U.S. dollar and the Chinese yuan fixed and why did it remain constant for many years?

Third, how do exchange rate fluctuations influence our international trade and international payments? In particular, could we eliminate, or at least decrease, our international deficit by changing the exchange rate? Would an appreciation of the yuan change the balance of trade and payments between the United States and China?

We begin by learning how trading in the foreign exchange market determines the exchange rate.

An Exchange Rate Is a Price

An exchange rate is a price—the price of one currency in terms of another. And like all prices, an exchange rate is determined in a market—the *foreign exchange market*.

The U.S. dollar trades in the foreign exchange market and is supplied and demanded by tens of

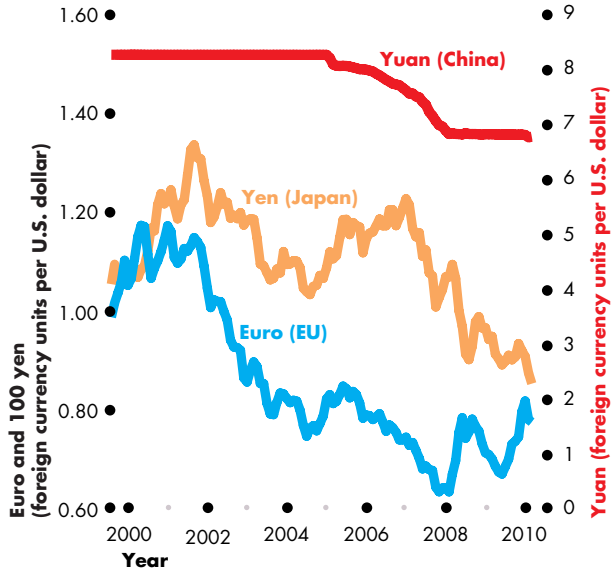
Economics in Action

The U.S. Dollar: More Down than Up

The figure shows the U.S. dollar exchange rate against the three currencies that feature prominently in U.S. imports—the Chinese yuan, the European euro, and the Japanese yen—between 2000 and 2010.

Against the Chinese yuan, the dollar was constant before 2005 and then started to depreciate. Against the European euro and the Japanese yen, the dollar appreciated before 2002 and then mainly depreciated but staged a brief appreciation against the yen in 2005–2007.

Notice the high-frequency fluctuations (rapid brief up and down movements) of the dollar against the euro and the yen compared to the smooth changes against the yuan. Think about why that might be, and we'll check your answer later in this chapter.



The U.S. Dollar Against Three Currencies

Source of data: Pacific Exchange Rate Service

thousands of traders every hour of every business day. Because it has many traders and no restrictions on who may trade, the foreign exchange market is a *competitive market*.

In a competitive market, demand and supply determine the price. So to understand the forces that determine the exchange rate, we need to study the factors that influence demand and supply in the foreign exchange market. But there is a feature of the foreign exchange market that makes it special.

The Demand for One Money Is the Supply of Another Money

When people who are holding the money of some other country want to exchange it for U.S. dollars, they demand U.S. dollars and supply that other country's money. And when people who are holding U.S. dollars want to exchange them for the money of some other country, they supply U.S. dollars and demand that other country's money.

So the factors that influence the demand for U.S. dollars also influence the supply of European Union euros, or Japanese yen, or Chinese yuan. And the factors that influence the demand for that other country's money also influence the supply of U.S. dollars.

We'll first look at the influences on the demand for U.S. dollars in the foreign exchange market.

Demand in the Foreign Exchange Market

People buy U.S. dollars in the foreign exchange market so that they can buy U.S.-produced goods and services—U.S. exports. They also buy U.S. dollars so that they can buy U.S. assets such as bonds, stocks, businesses, and real estate or so that they can keep part of their money holding in a U.S. dollar bank account.

The quantity of U.S. dollars demanded in the foreign exchange market is the amount that traders plan to buy during a given time period at a given exchange rate. This quantity depends on many factors, but the main ones are

1. The exchange rate
2. World demand for U.S. exports
3. Interest rates in the United States and other countries
4. The expected future exchange rate

We look first at the relationship between the quantity of U.S. dollars demanded in the foreign exchange market and the exchange rate when the other three influences remain the same.

The Law of Demand for Foreign Exchange The law of demand applies to U.S. dollars just as it does to anything else that people value. Other things remaining the same, the higher the exchange rate, the smaller is the quantity of U.S. dollars demanded in the foreign exchange market. For example, if the

price of the U.S. dollar rises from 100 yen to 120 yen but nothing else changes, the quantity of U.S. dollars that people plan to buy in the foreign exchange market decreases. The exchange rate influences the quantity of U.S. dollars demanded for two reasons:

- Exports effect
- Expected profit effect

Exports Effect The larger the value of U.S. exports, the larger is the quantity of U.S. dollars demanded in the foreign exchange market. But the value of U.S. exports depends on the prices of U.S.-produced goods and services *expressed in the currency of the foreign buyer*. And these prices depend on the exchange rate. The lower the exchange rate, other things remaining the same, the lower are the prices of U.S.-produced goods and services to foreigners and the greater is the volume of U.S. exports. So if the exchange rate falls (and other influences remain the same), the quantity of U.S. dollars demanded in the foreign exchange market increases.

To see the exports effect at work, think about orders for Boeing's new 787 airplane. If the price of a 787 is $100 million and the exchange rate is 90 euro cents per U.S. dollar, the price of this airplane to KLM, a European airline, is €90 million. KLM decides that this price is too high, so it doesn't buy a new 787. If the exchange rate falls to 80 euro cents per U.S. dollar and other things remain the same, the price of a 787 falls to €80 million. KLM now decides to buy a 787 and buys U.S. dollars in the foreign exchange market.

Expected Profit Effect The larger the expected profit from holding U.S. dollars, the greater is the quantity of U.S. dollars demanded in the foreign exchange market. But expected profit depends on the exchange rate. For a given expected future exchange rate, the lower the exchange rate today, the larger is the expected profit from buying U.S. dollars today and holding them, so the greater is the quantity of U.S. dollars demanded in the foreign exchange market today. Let's look at an example.

Suppose that Mizuho Bank, a Japanese bank, expects the exchange rate to be 120 yen per U.S. dollar at the end of the year. If today's exchange rate is also 120 yen per U.S. dollar, Mizuho Bank expects no profit from buying U.S. dollars and holding them until the end of the year. But if today's exchange rate is 100 yen per U.S. dollar and Mizuho Bank buys U.S. dollars, it expects to sell those dollars at the end of the year for 120 yen per dollar and make a profit of 20 yen per U.S. dollar.

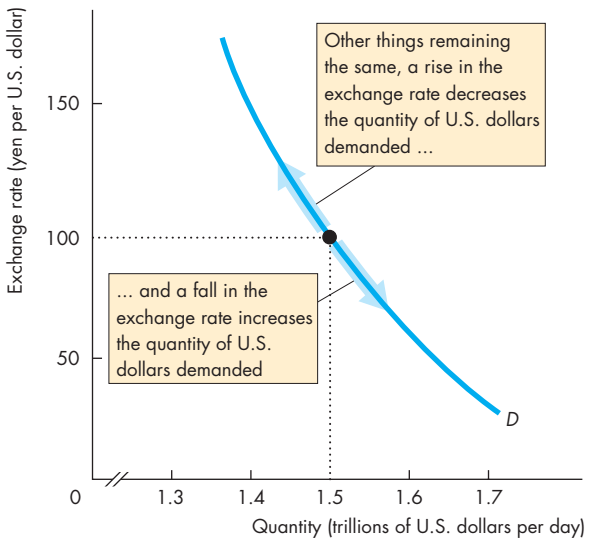
The lower the exchange rate today, other things remaining the same, the greater is the expected profit from holding U.S. dollars and the greater is the quantity of U.S. dollars demanded in the foreign exchange market today.

Demand Curve for U.S. Dollars

Figure 26.1 shows the demand curve for U.S. dollars in the foreign exchange market. A change in the exchange rate, other things remaining the same, brings a change in the quantity of U.S. dollars demanded and a movement along the demand curve. The arrows show such movements.

We will look at the factors that *change* demand in the next section of this chapter. Before doing that, let's see what determines the supply of U.S. dollars.

FIGURE 26.1 The Demand for U.S. Dollars



The quantity of U.S. dollars demanded depends on the exchange rate. Other things remaining the same, if the exchange rate rises, the quantity of U.S. dollars demanded decreases and there is a movement up along the demand curve for U.S. dollars. If the exchange rate falls, the quantity of U.S. dollars demanded increases and there is a movement down along the demand curve for U.S. dollars.

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Supply in the Foreign Exchange Market

People sell U.S. dollars and buy other currencies so that they can buy foreign-produced goods and services—U.S. imports. People also sell U.S. dollars and buy foreign currencies so that they can buy foreign assets such as bonds, stocks, businesses, and real estate or so that they can hold part of their money in bank deposits denominated in a foreign currency.

The quantity of U.S. dollars supplied in the foreign exchange market is the amount that traders plan to sell during a given time period at a given exchange rate. This quantity depends on many factors, but the main ones are

1. The exchange rate
2. U.S. demand for imports
3. Interest rates in the United States and other countries
4. The expected future exchange rate

Let's look at the law of supply in the foreign exchange market—the relationship between the quantity of U.S. dollars supplied in the foreign exchange market and the exchange rate when the other three influences remain the same.

The Law of Supply of Foreign Exchange Other things remaining the same, the higher the exchange rate, the greater is the quantity of U.S. dollars supplied in the foreign exchange market. For example, if the exchange rate rises from 100 yen to 120 yen per U.S. dollar and other things remain the same, the quantity of U.S. dollars that people plan to sell in the foreign exchange market increases.

The exchange rate influences the quantity of dollars supplied for two reasons:

- Imports effect
- Expected profit effect

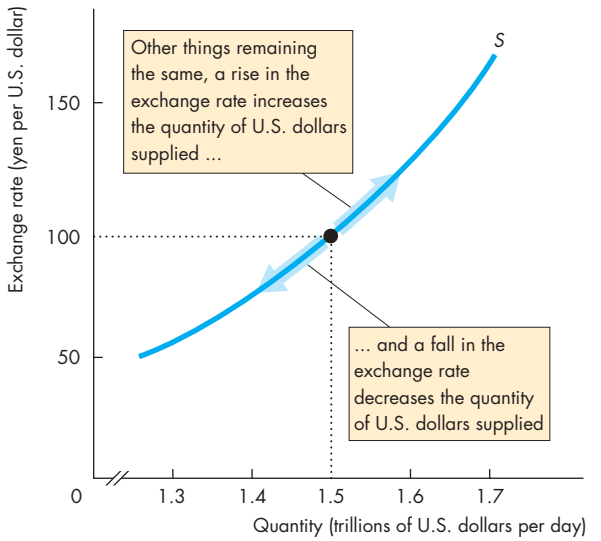
Imports Effect The larger the value of U.S. imports, the larger is the quantity of U.S. dollars supplied in the foreign exchange market. But the value of U.S. imports depends on the prices of foreign-produced goods and services *expressed in U.S. dollars*. These prices depend on the exchange rate. The higher the exchange rate, other things remaining the same, the lower are the prices of foreign-produced goods and services to Americans and the greater is the volume of U.S. imports. So if the exchange rate rises (and other influences remain the same), the quantity of U.S. dollars supplied in the foreign exchange market increases.

Expected Profit Effect This effect works just like that on the demand for the U.S. dollar but in the opposite direction. The higher the exchange rate today, other things remaining the same, the larger is the expected profit from selling U.S. dollars today and holding foreign currencies, so the greater is the quantity of U.S. dollars supplied.

Supply Curve for U.S. Dollars

Figure 26.2 shows the supply curve of U.S. dollars in the foreign exchange market. A change in the exchange rate, other things remaining the same, brings a change in the quantity of U.S. dollars supplied and a movement along the supply curve. The arrows show such movements.

FIGURE 26.2 The Supply of U.S. Dollars



The quantity of U.S. dollars supplied depends on the exchange rate. Other things remaining the same, if the exchange rate rises, the quantity of U.S. dollars supplied increases and there is a movement up along the supply curve of U.S. dollars. If the exchange rate falls, the quantity of U.S. dollars supplied decreases and there is a movement down along the supply curve of U.S. dollars.

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Market Equilibrium

Equilibrium in the foreign exchange market depends on how the Federal Reserve and other central banks operate. Here, we will study equilibrium when central banks keep out of this market. In a later section (on pp. 628–630), we examine the effects of alternative actions that the Fed or another central bank might take in the foreign exchange market.

Figure 26.3 shows the demand curve for U.S. dollars, *D*, from Fig. 26.1 and the supply curve of U.S. dollars, *S*, from Fig. 26.2, and the equilibrium exchange rate.

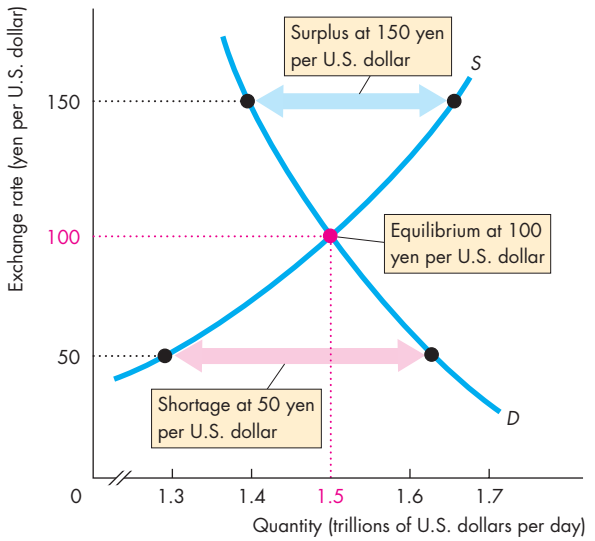
The exchange rate acts as a regulator of the quantities demanded and supplied. If the exchange rate is too high, there is a surplus—the quantity supplied exceeds the quantity demanded. For example, in Fig. 26.3, if the exchange rate is 150 yen per U.S. dollar, there is a surplus of U.S. dollars. If the exchange rate is too low, there is a shortage—the quantity supplied is less than the quantity demanded. For example, if the exchange rate is 50 yen per U.S. dollar, there is a shortage of U.S. dollars.

At the equilibrium exchange rate, there is neither a shortage nor a surplus—the quantity supplied equals the quantity demanded. In Fig. 26.3, the equilibrium exchange rate is 100 yen per U.S. dollar. At this exchange rate, the quantity demanded and the quantity supplied are each $1.5 trillion a day.

The foreign exchange market is constantly pulled to its equilibrium by the forces of supply and demand. Foreign exchange traders are constantly looking for the best price they can get. If they are selling, they want the highest price available. If they are buying, they want the lowest price available. Information flows from trader to trader through the worldwide computer network, and the price adjusts minute by minute to keep buying plans and selling plans in balance. That is, the price adjusts minute by minute to keep the exchange rate at its equilibrium.

Figure 26.3 shows how the exchange rate between the U.S. dollar and the Japanese yen is determined. The exchange rates between the U.S. dollar and all other currencies are determined in a similar way. So are the exchange rates among the other currencies. But the exchange rates are tied together so that no profit can be made by buying one currency, selling it for a second one, and then buying back the first one. If such a profit were available, traders would spot it, demand and supply would change, and the exchange rates would snap into alignment.

FIGURE 26.3 Equilibrium Exchange Rate



The demand curve for U.S. dollars is *D*, and the supply curve of U.S. dollars is *S*. If the exchange rate is 150 yen per U.S. dollar, there is a surplus of U.S. dollars and the exchange rate falls. If the exchange rate is 50 yen per U.S. dollar, there is a shortage of U.S. dollars and the exchange rate rises. If the exchange rate is 100 yen per U.S. dollar, there is neither a shortage nor a surplus of U.S. dollars and the exchange rate remains constant. The foreign exchange market is in equilibrium.

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REVIEW QUIZ

1. What are the influences on the demand for U.S. dollars in the foreign exchange market?
2. Provide an example of the exports effect on the demand for U.S. dollars.
3. What are the influences on the supply of U.S. dollars in the foreign exchange market?
4. Provide an example of the imports effect on the supply of U.S. dollars.
5. How is the equilibrium exchange rate determined?
6. What happens if there is a shortage or a surplus of U.S. dollars in the foreign exchange market?

You can work these questions in Study Plan 26.1 and get instant feedback. myeconlab

Exchange Rate Fluctuations

You've seen (in the box on p. 619) that the U.S. dollar fluctuates a lot against the yen and the euro. Changes in the demand for U.S. dollars or the supply of U.S. dollars bring these exchange rate fluctuations. We'll now look at the factors that make demand and supply change, starting with the demand side of the market.

Changes in the Demand for U.S. Dollars

The demand for U.S. dollars in the foreign exchange market changes when there is a change in

- World demand for U.S. exports
- U.S. interest rate relative to the foreign interest rate
- The expected future exchange rate

World Demand for U.S. Exports An increase in world demand for U.S. exports increases the demand for U.S. dollars. To see this effect, think about Boeing's airplane sales. An increase in demand for air travel in Australia sends that country's airlines on a global shopping spree. They decide that the 787 is the ideal product, so they order 50 airplanes from Boeing. The demand for U.S. dollars now increases.

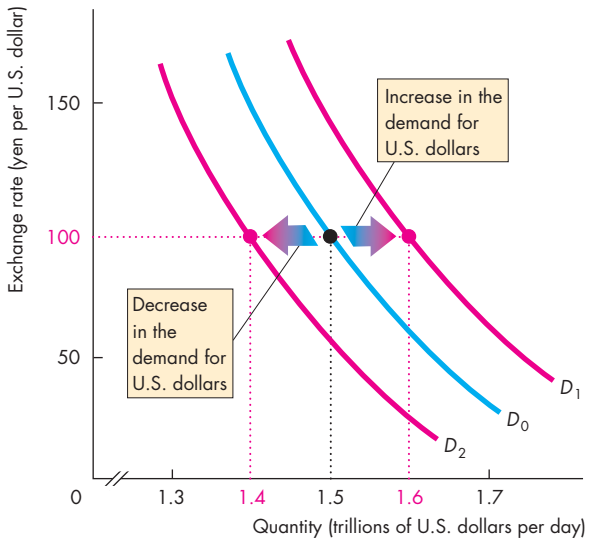
U.S. Interest Rate Relative to the Foreign Interest Rate People and businesses buy financial assets to make a return. The higher the interest rate that people can make on U.S. assets compared with foreign assets, the more U.S. assets they buy.

What matters is not the *level* of the U.S. interest rate, but the U.S. interest rate minus the foreign interest rate—a gap that is called the **U.S. interest rate differential**. If the U.S. interest rate rises and the foreign interest rate remains constant, the U.S. interest rate differential increases. The larger the U.S. interest rate differential, the greater is the demand for U.S. assets and the greater is the demand for U.S. dollars in the foreign exchange market.

The Expected Future Exchange Rate For a given current exchange rate, other things remaining the same, a rise in the expected future exchange rate increases the profit that people expect to make by holding U.S. dollars and the demand for U.S. dollars increases today.

Figure 26.4 summarizes the influences on the demand for U.S. dollars. An increase in the demand for U.S. exports, a rise in the U.S. interest rate differential, or a rise in the expected future exchange rate increases the demand for U.S. dollars today and shifts the demand curve rightward from D_0 to D_1. A decrease in the demand for U.S. exports, a fall in the U.S. interest rate differential, or a fall in the expected future exchange rate decreases the demand for U.S. dollars today and shifts the demand curve leftward from D_0 to D_2.

FIGURE 26.4 Changes in the Demand for U.S. Dollars



A change in any influence on the quantity of U.S. dollars that people plan to buy, other than the exchange rate, brings a change in the demand for U.S. dollars.

The demand for U.S. dollars

Increases if:

- World demand for U.S. exports increases
- The U.S. interest rate differential rises
- The expected future exchange rate rises

Decreases if:

- World demand for U.S. exports decreases
- The U.S. interest rate differential falls
- The expected future exchange rate falls

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Changes in the Supply of U.S. Dollars

The supply of U.S. dollars in the foreign exchange market changes when there is a change in

- U.S. demand for imports
- U.S. interest rate relative to the foreign interest rate
- The expected future exchange rate

U.S. Demand for Imports An increase in the U.S. demand for imports increases the supply of U.S. dollars in the foreign exchange market. To see why, think about Wal-Mart's purchase of DVD players. An increase in the demand for DVD players sends Wal-Mart out on a global shopping spree. Wal-Mart decides that Panasonic DVD players produced in Japan are the best buy, so Wal-Mart increases its purchases of these players. The supply of U.S. dollars now increases as Wal-Mart goes to the foreign exchange market for Japanese yen to pay Panasonic.

U.S. Interest Rate Relative to the Foreign Interest Rate The effect of the U.S. interest rate differential on the supply of U.S. dollars is the opposite of its effect on the demand for U.S. dollars. The larger the U.S. interest rate differential, the *smaller* is the supply of U.S. dollars in the foreign exchange market.

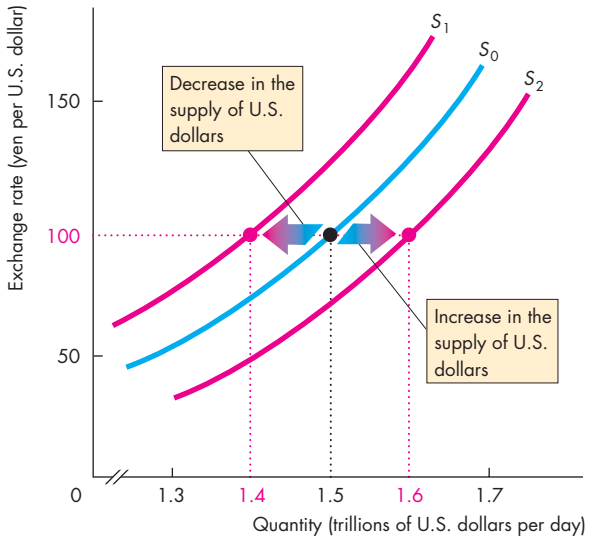
With a higher U.S. interest rate differential, people decide to keep more of their funds in U.S. dollar assets and less in foreign currency assets. They buy a smaller quantity of foreign currency and sell a smaller quantity of dollars in the foreign exchange market.

So, a rise in the U.S. interest rate, other things remaining the same, decreases the supply of U.S. dollars in the foreign exchange market.

The Expected Future Exchange Rate For a given current exchange rate, other things remaining the same, a fall in the expected future exchange rate decreases the profit that can be made by holding U.S. dollars and decreases the quantity of U.S. dollars that people want to hold. To reduce their holdings of U.S. dollar assets, people must sell U.S. dollars. When they do so, the supply of U.S. dollars in the foreign exchange market increases.

Figure 26.5 summarizes the influences on the supply of U.S. dollars. If the supply of U.S. dollars decreases, the supply curve shifts leftward from S_0 to S_1. And if the supply of U.S. dollars increases, the supply curve shifts rightward from S_0 to S_2.

FIGURE 26.5 Changes in the Supply of U.S. Dollars



A change in any influence on the quantity of U.S. dollars that people plan to sell, other than the exchange rate, brings a change in the supply of dollars.

The supply of U.S. dollars

Increases if:

- U.S. import demand increases
- The U.S. interest rate differential falls
- The expected future exchange rate falls

Decreases if:

- U.S. import demand decreases
- The U.S. interest rate differential rises
- The expected future exchange rate rises

myeconlab animation

Changes in the Exchange Rate

If the demand for U.S. dollars increases and the supply does not change, the exchange rate rises. If the demand for U.S. dollars decreases and the supply does not change, the exchange rate falls. Similarly, if the supply of U.S. dollars decreases and the demand does not change, the exchange rate rises. If the supply of U.S. dollars increases and the demand does not change, the exchange rate falls.

These predictions are exactly the same as those for any other market. Two episodes in the life of the U.S. dollar (next page) illustrate these predictions.

Economics in Action

The Dollar on a Roller Coaster

The foreign exchange market is a striking example of a competitive market. The expectations of thousands of traders around the world influence this market minute-by-minute throughout the 24-hour global trading day.

Demand and supply rarely stand still and their fluctuations bring a fluctuating exchange rate. Two episodes in the life of the dollar illustrate these fluctuations: 2005–2007, when the dollar appreciated and 2007–2008, when the dollar depreciated.

An Appreciating U.S. Dollar: 2005–2007 Between January 2005 and July 2007, the U.S. dollar appreciated against the yen. It rose from 103 yen to 123 yen per U.S. dollar. Part (a) of the figure provides an explanation for this appreciation.

In 2005, the demand and supply curves were those labeled D_{05} and S_{05}. The exchange rate was 103 yen per U.S. dollar.

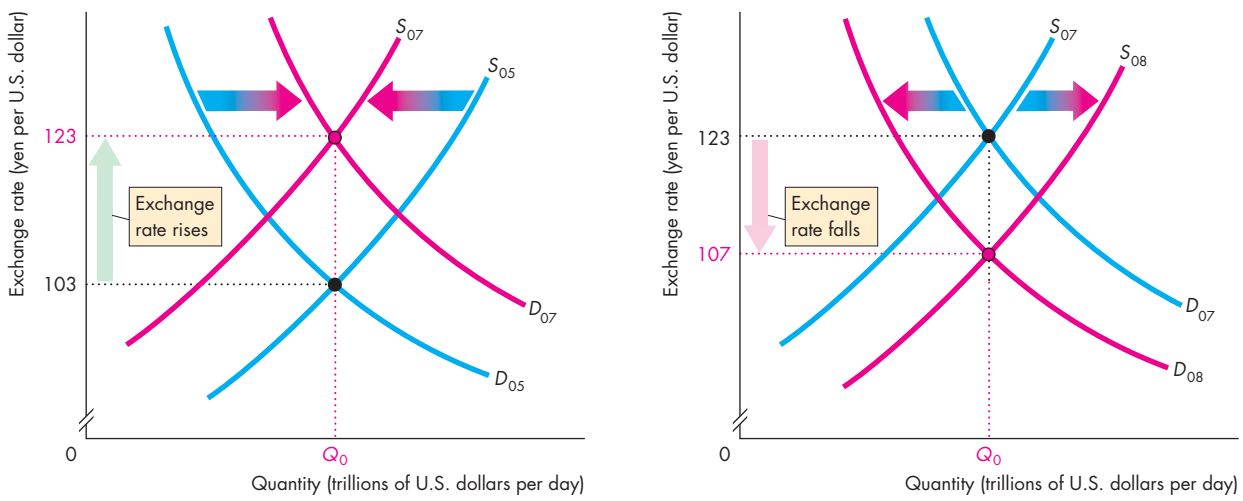
During 2005 and 2006, the Federal Reserve raised the interest rate, but the interest rate in Japan barely changed. With an increase in the U.S. interest rate differential, funds flowed into the United States. Also, currency traders, anticipating this increased flow of funds into the United States, expected the dollar to appreciate against the yen. The demand for U.S. dollars increased, and the supply of U.S. dollars decreased.

In the figure, the demand curve shifted rightward from D_{05} to D_{07} and the supply curve shifted leftward from S_{05} to S_{07}. The exchange rate rose to 123 yen per U.S. dollar. In the figure, the equilibrium quantity remained unchanged—an assumption.

A Depreciating U.S. Dollar: 2007–2008 Between July 2007 and September 2008, the U.S. dollar depreciated against the yen. It fell from 123 yen to 107 yen per U.S. dollar. Part (b) of the figure provides a possible explanation for this depreciation. The demand and supply curves labeled D_{07} and S_{07} are the same as in part (a).

During the last quarter of 2007 and the first three quarters of 2008, the U.S. economy entered a severe credit crisis and the Federal Reserve cut the interest rate in the United States. But the Bank of Japan kept the interest rate unchanged in Japan. With a narrowing of the U.S. interest rate differential, funds flowed out of the United States. Also, currency traders expected the U.S. dollar to depreciate against the yen. The demand for U.S. dollars decreased and the supply of U.S. dollars increased.

In part (b) of the figure, the demand curve shifted leftward from D_{07} to D_{08}, the supply curve shifted rightward from S_{07} to S_{08}, and the exchange rate fell to 107 yen per U.S. dollar.



The Rising and Falling U.S. Dollar

Fundamentals, Expectations, and Arbitrage

Changes in the *expected* exchange rate change the *actual* exchange rate. But what makes the expected exchange rate change? The answer is new information about the *fundamental influences* on the exchange rate—the world demand for U.S. exports, U.S. demand for imports, and the U.S. interest rate relative to the foreign interest rate. Expectations about these variables change the exchange rate through their influence on the expected exchange rate, and the effect is instant.

To see why, suppose news breaks that the Fed will raise the interest rate next week. Traders now expect the demand for dollars to increase and the dollar to appreciate: They expect to profit by buying dollars today and selling them next week for a higher price than they paid. The rise in the expected future value of the dollar increases the demand for dollars today, decreases the supply of dollars today, and raises the exchange rate. The exchange rate changes as soon as the news about a fundamental influence is received.

Profiting by trading in the foreign exchange market often involves *arbitrage*: The practice of buying in one market and selling for a higher price in another related market. Arbitrage ensures that the exchange rate is the same in New York, London, and all other trading centers. It isn't possible to buy at a low price in London and sell for a higher price in New York. If it were possible, demand would increase in London and decrease in New York to make the prices equal.

Arbitrage also removes profit from borrowing in one currency and lending in another and buying goods in one currency and selling them in another. These arbitrage activities bring about

- Interest rate parity
- Purchasing power parity

Interest Rate Parity Suppose a bank deposit earns 1 percent a year in Tokyo and 3 percent a year in New York. Why wouldn't people move their funds to New York, and even borrow in Japan to do so? The answer is that some would, in an activity called the "carry trade" (see *Reading Between the Lines* on pp. 636–637). The New York deposit is in dollars and the Tokyo deposit is in yen. So a change in the exchange rate brings risk to borrowing in one currency and lending in another. If investors *expect* the yen to appreciate by 2 percent a year and they buy and hold yen for a year they will earn 1 percent interest and *expect* a 2 percent return from the higher yen. The total *expected* return is 3 percent, the same as on U.S. dollars in New York.

This situation is called **interest rate parity**, which means equal rates of return. Adjusted for risk, interest rate parity always prevails. Funds move to get the highest *expected* return available. If for a few seconds a higher return is available in New York than in Tokyo, the demand for U.S. dollars increases and the exchange rate rises until the expected rates of return are equal.

Purchasing Power Parity Suppose a memory stick costs 5,000 yen in Tokyo and $50 in New York. If the exchange rate is 100 yen per dollar, the two monies have the same value. You can buy a memory stick in either Tokyo or New York for the same price. You can express that price as either 5,000 yen or $50, but the price is the same in the two currencies.

The situation we've just described is called **purchasing power parity**, which means *equal value of money*. If purchasing power parity does not prevail, powerful arbitrage forces go to work. To see these forces, suppose that the price of a memory stick in New York rises to $60, but in Tokyo it remains at 5,000 yen. Further, suppose the exchange rate remains at 100 yen per dollar. In this case, a memory stick in Tokyo still costs 5,000 yen or $50, but in New York, it costs $60 or 6,000 yen. Money buys more in Japan than in the United States. Money is not of equal value in the two countries.

If all (or most) prices have increased in the United States and not increased in Japan, then people will generally expect that the value of the U.S. dollar in the foreign exchange market must fall. In this situation, the exchange rate is expected to fall. The demand for U.S. dollars decreases, and the supply of U.S. dollars increases. The exchange rate falls, as expected. If the exchange rate falls to 83.33 yen per dollar and there are no further price changes, purchasing power parity is restored. A memory stick that costs $60 in New York also costs the equivalent of $60 ($60 \times 83.33 = 5{,}000$) in Tokyo.

If prices rise in Japan and other countries but remain constant in the United States, then people will expect the U.S. dollar to appreciate. The demand for U.S. dollars increases, and the supply of U.S. dollars decreases. The exchange rate rises, as expected.

So far we've been looking at the forces that determine the *nominal* exchange rate—the amount of one money that another money buys. We're now going to study the *real* exchange rate.

The Real Exchange Rate

The **real exchange rate** is the relative price of U.S.-produced goods and services to foreign-produced goods and services. It is a measure of the quantity of the real GDP of other countries that a unit of U.S. real GDP buys.

The real Japanese yen exchange rate, *RER*, is

$$RER = (E \times P)/P^*,$$

where E is the exchange rate (yen per U.S. dollar), P is the U.S. price level, and P^* is the Japanese price level.

To understand the real exchange rate, suppose that each country produces only one good and that the exchange rate E is 100 yen per dollar. The United States produces only computer chips priced at $150 each, so P equals $150 and $E \times P$ equals 15,000 yen. Japan produces only iPods priced at 5,000 yen each, so P^* equals 5,000 yen. Then the real Japanese yen exchange rate is

$$RER = (100 \times 150)/5{,}000 = 3 \text{ iPods per chip.}$$

The Short Run In the short run, if the nominal exchange rate changes, the real exchange rate also changes. The reason is that prices and the price levels in the United States and Japan don't change every time the exchange rate changes. Sticking with the chips and iPods example, if the dollar appreciates to 200 yen per dollar and prices don't change, the real exchange rate rises to 6 iPods per chip. The price of an iPod in the United States falls to $25 (5,000 yen ÷ 200 yen per dollar = $25).

Changes in the real exchange rate bring short-run changes in the quantity of imports demanded and the quantity of exports supplied.

The Long Run But in the long run, the situation is radically different: In the long run, the nominal exchange rate and the price level are determined together and the real exchange rate does *not* change when the nominal exchange rate changes.

In the long run, demand and supply in the markets for goods and services determine prices. In the chips and iPod example, the world markets for chips and iPods determine their *relative* price. In our example the relative price is 3 iPods per chip. The same forces determine all relative prices and so determine nations' relative price levels.

In the long run, if the dollar appreciates prices *do* change. To see why, recall the quantity theory of money that you met in Chapter 25 (pp. 606–607).

In the long run, the quantity of money determines the price level. But the quantity theory of money applies to all countries, so the quantity of money in Japan determines the price level in Japan, and the quantity of money in the United States determines the price level in the United States.

For a given real exchange rate, a change in the quantity of money brings a change in the price level *and* a change in the exchange rate.

Suppose that the quantity of money doubles in Japan. The dollar appreciates (the yen depreciatates) from 100 yen per dollar to 200 yen per dollar and all prices double, so the price of an iPod rises from 5,000 yen to 10,000 yen.

At the new price in Japan and the new exchange rate, an iPod still costs $50 (10,000 yen ÷ 200 yen per dollar = $50). The real exchange rate remains at 3 iPods per chip.

If Japan and the United States produced identical goods (if GDP in both countries consisted only of computer chips), the real exchange rate in the long run would equal 1.

In reality, although there is overlap in what each country produces, U.S. real GDP is a different bundle of goods and services from Japanese real GDP. So the relative price of Japanese and U.S. real GDP—the real exchange rate—is not 1, and it changes over time. The forces of demand and supply in the markets for the millions of goods and services that make up real GDP determine the relative price of Japanese and U.S. real GDP, and changes in these forces change the real exchange rate.

REVIEW QUIZ

1. Why does the demand for U.S. dollars change?
2. Why does the supply of U.S. dollars change?
3. What makes the U.S. dollar exchange rate fluctuate?
4. What is interest rate parity and what happens when this condition doesn't hold?
5. What is purchasing power parity and what happens when this condition doesn't hold?
6. What determines the real exchange rate and the nominal exchange rate in the short run?
7. What determines the real exchange rate and the nominal exchange rate in the long run?

You can work these questions in Study Plan 26.2 and get instant feedback. myeconlab

Exchange Rate Policy

Because the exchange rate is the price of a country's money in terms of another country's money, governments and central banks must have a policy toward the exchange rate. Three possible exchange rate policies are

- Flexible exchange rate
- Fixed exchange rate
- Crawling peg

Flexible Exchange Rate

A **flexible exchange rate** is an exchange rate that is determined by demand and supply in the foreign exchange market with no direct intervention by the central bank.

Most countries, including the United States, operate a flexible exchange rate, and the foreign exchange market that we have studied so far in this chapter is an example of a flexible exchange rate regime.

But even a flexible exchange rate is influenced by central bank actions. If the Fed raises the U.S. interest rate and other countries keep their interest rates unchanged, the demand for U.S. dollars increases, the supply of U.S. dollars decreases, and the exchange rate rises. (Similarly, if the Fed lowers the U.S. interest rate, the demand for U.S. dollars decreases, the supply increases, and the exchange rate falls.)

In a flexible exchange rate regime, when the central bank changes the interest rate, its purpose is not usually to influence the exchange rate, but to achieve some other monetary policy objective. (We return to this topic at length in Chapter 31.)

Fixed Exchange Rate

A **fixed exchange rate** is an exchange rate that is determined by a decision of the government or the central bank and is achieved by central bank intervention in the foreign exchange market to block the unregulated forces of demand and supply.

The world economy operated a fixed exchange rate regime from the end of World War II to the early 1970s. China had a fixed exchange rate until recently. Hong Kong has had a fixed exchange rate for many years and continues with that policy today.

Active intervention in the foreign exchange market is required to achieve a fixed exchange rate.

If the Fed wanted to fix the U.S. dollar exchange rate against the Japanese yen, the Fed would have to sell U.S. dollars to prevent the exchange rate from rising above the target value and buy U.S. dollars to prevent the exchange rate from falling below the target value.

There is no limit to the quantity of U.S. dollars that the Fed can *sell*. The Fed creates U.S. dollars and can create any quantity it chooses. But there is a limit to the quantity of U.S. dollars the Fed can *buy*. That limit is set by U.S. official foreign currency reserves because to buy U.S. dollars the Fed must sell foreign currency. Intervention to buy U.S. dollars stops when U.S. official foreign currency reserves run out.

Let's look at the foreign exchange interventions that the Fed can make.

Suppose the Fed wants the exchange rate to be steady at 100 yen per U.S. dollar. If the exchange rate rises above 100 yen, the Fed sells dollars. If the exchange rate falls below 100 yen, the Fed buys dollars. By these actions, the Fed keeps the exchange rate close to its target rate of 100 yen per U.S. dollar.

Figure 26.6 shows the Fed's intervention in the foreign exchange market. The supply of dollars is S and initially the demand for dollars is D_0. The equilibrium exchange rate is 100 yen per dollar. This exchange rate is also the Fed's target exchange rate, shown by the horizontal red line.

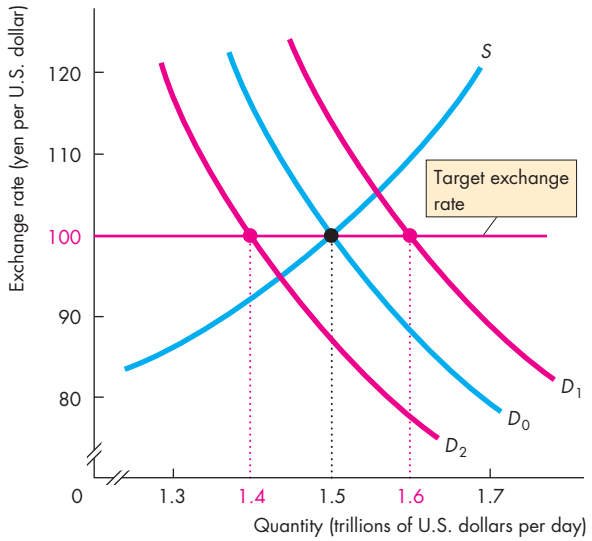
When the demand for U.S. dollars increases and the demand curve shifts rightward to D_1, the Fed sells $100 billion. This action prevents the exchange rate from rising. When the demand for U.S. dollars decreases and the demand curve shifts leftward to D_2, the Fed buys $100 billion. This action prevents the exchange rate from falling.

If the demand for U.S. dollars fluctuates between D_1 and D_2 and on average is D_0, the Fed can repeatedly intervene in the way we've just seen. Sometimes the Fed buys and sometimes it sells but, on average, it neither buys nor sells.

But suppose the demand for U.S. dollars *increases permanently* from D_0 to D_1. To maintain the exchange rate at 100 yen per U.S. dollar, the Fed must sell dollars and buy foreign currency, so U.S. official foreign currency reserves would be increasing. At some point, the Fed would abandon the exchange rate of 100 yen per U.S. dollar and stop piling up foreign currency reserves.

Now suppose the demand for U.S. dollars *decreases permanently* from D_0 to D_2. In this situation, the Fed

FIGURE 26.6 Foreign Exchange Market Intervention



Initially, the demand for U.S. dollars is D_0, the supply of U.S. dollars is S, and the exchange rate is 100 yen per U.S. dollar. The Fed can intervene in the foreign exchange market to keep the exchange rate close to its target rate (100 yen in this example). If the demand for U.S. dollars increases and the demand curve shifts from D_0 to D_1, the Fed sells dollars. If the demand for U.S. dollars decreases and the demand curve shifts from D_0 to D_2, the Fed buys dollars. Persistent intervention on one side of the market cannot be sustained.

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cannot maintain the exchange rate at 100 yen per U.S. dollar indefinitely. To hold the exchange rate at 100 yen, the Fed must *buy* U.S. dollars. When the Fed buys U.S. dollars in the foreign exchange market, it uses U.S. official foreign currency reserves. So the Fed's action decreases its foreign currency reserves. Eventually, the Fed would run out of foreign currency and would then have to abandon the target exchange rate of 100 yen per U.S. dollar.

Crawling Peg

A **crawling peg** is an exchange rate that follows a path determined by a decision of the government or the central bank and is achieved in a similar way to a fixed exchange rate by central bank intervention in the foreign exchange market. A crawling peg works like a fixed exchange rate except that the target value changes. The target might change at fixed intervals (daily, weekly, monthly) or at random intervals.

The Fed has never operated a crawling peg, but some prominent countries do use this system. When China abandoned its fixed exchange rate, it replaced it with a crawling peg. Developing countries might use a crawling peg as a method of trying to control inflation—of keeping the inflation rate close to target.

The ideal crawling peg sets a target for the exchange rate equal to the equilibrium exchange rate

Economics in Action

The People's Bank of China in the Foreign Exchange Market

You saw in the figure on p. 619 that the exchange rate between the U.S. dollar and the Chinese yuan was constant for several years. The reason for this near constant exchange rate is that China's central bank, the People's Bank of China, intervened to operate a *fixed exchange rate policy*. From 1997 until 2005, the yuan was pegged at 8.28 yuan per U.S. dollar. Since 2005, the yuan has appreciated slightly but it has not been permitted to fluctuate freely. Since 2005, the yuan has been on a crawling peg.

Why Does China Manage Its Exchange Rate? The popular story is that China manages its exchange rate to keep its export prices low and to make it easier to compete in world markets. You've seen that this story is correct *only in the short run*. With prices in China unchanged, a lower yuan–U.S. dollar exchange rate brings lower U.S. dollar prices for China's exports. But the yuan–U.S. dollar exchange rate was fixed for almost 10 years and has been managed for five more years. This long period of a fixed exchange rate has long-run, not short-run, effects. In the long run, the exchange rate has no effect on competitiveness. The reason is that prices adjust to reflect the exchange rate and the real exchange rate is unaffected by the nominal exchange rate.

So why does China fix its exchange rate? The most convincing answer is that China sees a fixed exchange rate as a way of controlling its inflation rate. By making the yuan crawl against the U.S. dollar, China's inflation rate is anchored to the U.S. inflation rate and will depart from U.S. inflation by an amount determined by the speed of the crawl.

The bottom line is that in the long run, exchange rate policy is monetary policy, not foreign trade policy. To change its exports and imports, a country must change its comparative advantage (Chapter 2).

How Does China Manage Its Exchange Rate? The People's Bank pegs the yuan at 7 yuan per U.S. dollar by intervening in the foreign exchange market and buying U.S. dollars. But to do so, it must pile up U.S. dollars.

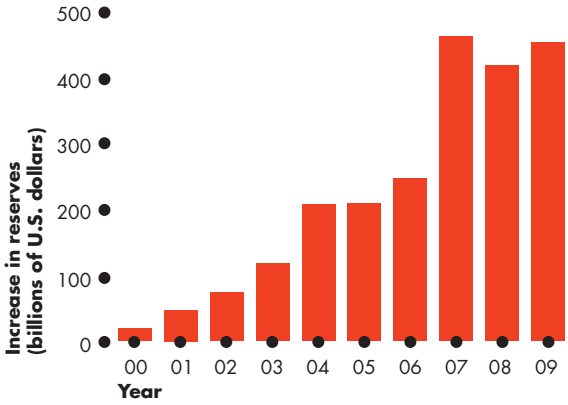
Part (a) of the figure shows the scale of China's increase in official foreign currency reserves, some of which are euros and yen but most of which are U.S. dollars. You can see that China's reserves increased by more than $400 billion in 2007, 2008, and 2009.

The demand and supply curves in part (b) of the figure illustrate what is happening in the market for U.S. dollars priced in terms of the yuan and explains why China's reserves have increased. The demand curve *D* and supply curve *S* intersect at 5 yuan per U.S. dollar. If the People's Bank of China takes no actions in the market, this exchange rate is the equilibrium rate (an assumed value).

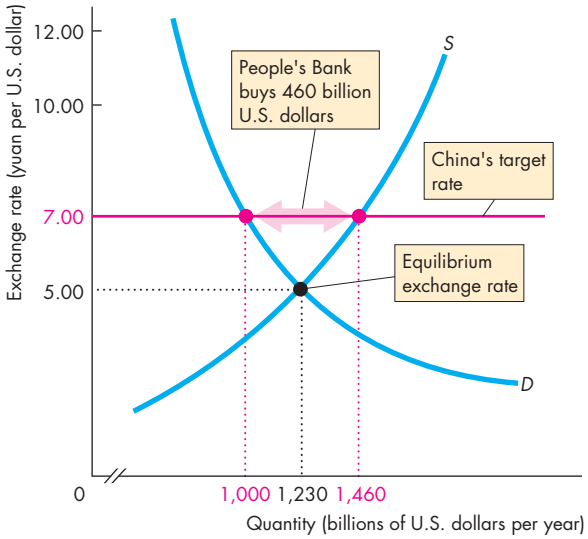
The consequence of the fixed (and crawling peg) yuan exchange rate is that China has piled up U.S. dollar reserves on a huge scale. By mid-2006, China's official foreign currency reserves approached $1 trillion and by the end of 2009, they exceeded $2 trillion!

If the People's Bank stopped buying U.S. dollars, the U.S. dollar would depreciate and the yuan would appreciate—the yuan–U.S. dollar exchange rate would fall—and China would stop piling up U.S. dollar reserves.

In the example in the figure, the dollar would depreciate to 5 yuan per dollar.



(a) Increase in U.S. dollar reserves



(b) Pegging the yuan

China's Foreign Exchange Market Intervention

on average. The peg seeks only to prevent large swings in the expected future exchange rate that change demand and supply and make the exchange rate fluctuate too wildly.

A crawling peg departs from the ideal if, as often happens with a fixed exchange rate, the target rate departs from the equilibrium exchange rate for too long. When this happens, the country either runs out of reserves or piles up reserves.

In the final part of this chapter, we explain how the balance of international payments is determined.

REVIEW QUIZ

1. What is a flexible exchange rate and how does it work?
2. What is a fixed exchange rate and how is its value fixed?
3. What is a crawling peg and how does it work?
4. How has China operated in the foreign exchange market, why, and with what effect?

You can work these questions in Study Plan 26.3 and get instant feedback.

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Financing International Trade

You now know how the exchange rate is determined, but what is the effect of the exchange rate? How does currency depreciation or currency appreciation influence our international trade and payments? We're going to lay the foundation for addressing these questions by looking at the scale of international trading, borrowing, and lending and at the way in which we keep our records of international transactions. These records are called the *balance of payments accounts*.

Balance of Payments Accounts

A country's **balance of payments accounts** records its international trading, borrowing, and lending in three accounts:

1. Current account
2. Capital and financial account
3. Official settlements account

The **current account** records receipts from exports of goods and services sold abroad, payments for imports of goods and services from abroad, net interest income paid abroad, and net transfers abroad (such as foreign aid payments). The *current account balance* equals the sum of exports minus imports, net interest income, and net transfers.

The **capital and financial account** records foreign investment in the United States minus U.S. investment abroad. (This account also has a statistical discrepancy that arises from errors and omissions in measuring international capital transactions.)

The **official settlements account** records the change in **U.S. official reserves**, which are the government's holdings of foreign currency. If U.S. official reserves *increase*, the official settlements account balance is *negative*. The reason is that holding foreign money is like investing abroad. U.S. investment abroad is a minus item in the capital and financial account and in the official settlements account.

The sum of the balances on the three accounts *always* equals zero. That is, to pay for our current account deficit, we must either borrow more from abroad than we lend abroad or use our official reserves to cover the shortfall.

Table 26.1 shows the U.S. balance of payments accounts in 2010. Items in the current account and the capital and financial account that provide foreign currency to the United States have a plus sign; items that cost the United States foreign currency have a minus sign. The table shows that in 2010, U.S. imports exceeded U.S. exports and the current account had a deficit of $436 billion. How do we pay for imports that exceed the value of our exports? That is, how do we pay for our current account deficit?

We pay by borrowing from the rest of the world. The capital account tells us by how much. We borrowed $1,408 billion (foreign investment in the United States) but made loans of $1,200 billion (U.S. investment abroad). Our *net* foreign borrowing was $1,408 billion minus $1,200 billion, which equals $208 billion. There is almost always a statistical discrepancy between our capital account and current account transactions, and in 2010, the discrepancy was $231 billion. Combining the discrepancy with the measured net foreign borrowing gives a capital and financial account balance of $439 billion.

TABLE 26.1 U.S. Balance of Payments Accounts in 2010

Current account	Billions of dollars
Exports of goods and services	+1,754
Imports of goods and services	–2,215
Net interest income	+167
Net transfers	–142
Current account balance	–436
Capital and financial account	
Foreign investment in the United States	+1,408
U.S. investment abroad	–1,200
Statistical discrepancy	231
Capital and financial account balance	+439
Official settlements account	
Official settlements account balance	–3

Source of data: Bureau of Economic Analysis (based on first quarter).

The capital and financial account balance plus the current account balance equals the change in U.S. official reserves. In 2010, the capital and financial account balance of $439 billion plus the current account balance of –$436 billion equaled $3 billion. Official reserves *increased* in 2010 by $3 billion. Holding more foreign reserves is like lending to the rest of the world, so this amount appears in the official settlements account in Table 26.1 as –$3 billion. The sum of the balances on the three balance of payments accounts equals zero.

To see more clearly what the nation's balance of payments accounts mean, think about your own balance of payments accounts. They are similar to the nation's accounts.

An Individual's Balance of Payments Accounts An individual's current account records the income from supplying the services of factors of production and the expenditure on goods and services. Consider Jackie, for example. She worked in 2010 and earned an income of $25,000. Jackie has $10,000 worth of investments that earned her an interest income of $1,000. Jackie's current account shows an income of $26,000. Jackie spent $18,000 buying consumption goods and services. She also bought a new house, which cost her $60,000. So Jackie's total expenditure was $78,000. Jackie's expenditure minus her income is $52,000 ($78,000 minus $26,000). This amount is Jackie's current account deficit.

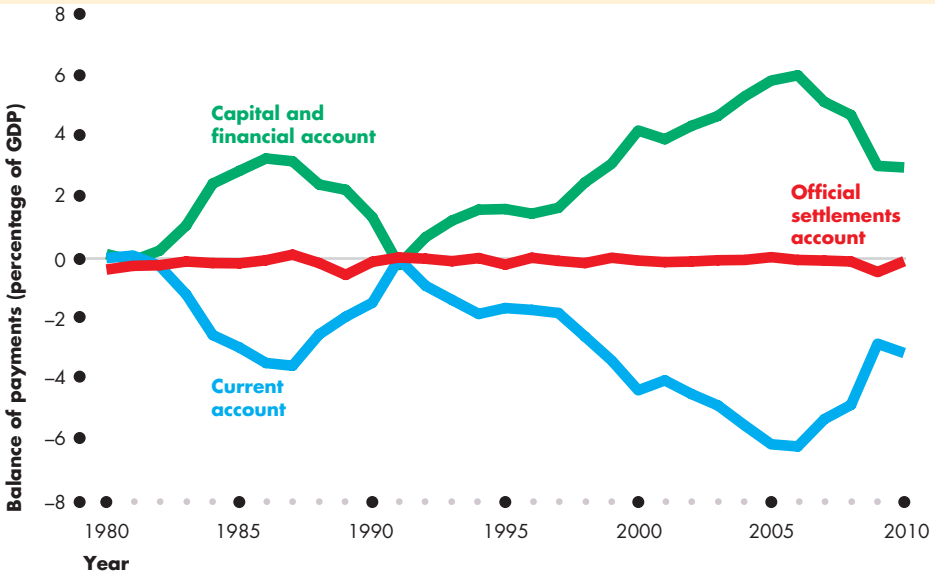
Economics in Action

Three Decades of Deficits

The numbers that you reviewed in Table 26.1 give a snapshot of the balance of payments accounts in 2010. The figure below puts that snapshot into perspective by showing the balance of payments between 1980 and 2010.

Because the economy grows and the price level rises, changes in the dollar value of the balance of payments do not convey much information. To remove the influences of economic growth and inflation, the figure shows the balance of payments expressed as a percentage of nominal GDP.

As you can see, a large current account deficit emerged during the 1980s but declined from 1987 to 1991. The current account deficit then increased through 2000, decreased slightly in 2001, and then increased through 2006 after which it decreased again but increased slightly in 2010. The capital and financial account balance is almost a mirror image of the current account balance. The official settlements balance is very small in comparison with the balances on the other two accounts.



The U.S. Balance of Payments

Source of data: Bureau of Economic Analysis.

To pay for expenditure of $52,000 in excess of her income, Jackie must either use the money that she has in the bank or take out a loan. Suppose that Jackie took out a loan of $50,000 to help buy her house and that this loan was the only borrowing that she did. Borrowing is an *inflow* in the capital account, so Jackie's capital account *surplus* was $50,000. With a current account deficit of $52,000 and a capital account surplus of $50,000, Jackie was still $2,000 short. She got that $2,000 from her own bank account. Her cash holdings decreased by $2,000.

Jackie's income from her work is like a country's income from its exports. Her income from her investments is like a country's interest income from foreigners. Her purchases of goods and services, including her purchase of a house, are like a country's imports. Jackie's loan—borrowing from someone else—is like a country's borrowing from the rest of the world. The change in Jackie's bank account is like the change in the country's official reserves.

Borrowers and Lenders

A country that is borrowing more from the rest of the world than it is lending to the rest of the world is called a **net borrower**. Similarly, a **net lender** is a country that is lending more to the rest of the world than it is borrowing from the rest of the world.

The United States is a net borrower, but it has not always been in this situation. Throughout the 1960s and most of the 1970s, the United States was a net lender to the rest of the world—the United States had a current account surplus and a capital account deficit. But from the early 1980s, with the exception of only a single year, 1991, the United States has been a net borrower from the rest of the world. And during the years since 1992, the scale of U.S. borrowing has mushroomed.

Most countries are net borrowers like the United States. But a few countries, including China, Japan, and oil-rich Saudi Arabia, are net lenders. In 2010, when the United States borrowed more than $400 billion from the rest of the world, most of it came from China.

Debtors and Creditors

A net borrower might be decreasing its net assets held in the rest of the world, or it might be going deeper into debt. A nation's total stock of foreign investment determines whether it is a debtor or a creditor. A **debtor nation** is a country that during its entire history has borrowed more from the rest of the world than it has lent to it. It has a stock of outstanding debt to the rest of the world that exceeds the stock of its own claims on the rest of the world. A **creditor nation** is a country that during its entire history has invested more in the rest of the world than other countries have invested in it.

The United States was a debtor nation through the nineteenth century as we borrowed from Europe to finance our westward expansion, railroads, and industrialization. We paid off our debt and became a creditor nation for most of the twentieth century. But following a string of current account deficits, we became a debtor nation again in 1986.

Since 1986, the total stock of U.S. borrowing from the rest of the world has exceeded U.S. lending to the rest of the world. The largest debtor nations are the capital-hungry developing countries (such as the United States was during the nineteenth century). The international debt of these countries grew from less than a third to more than a half of their gross domestic product during the 1980s and created what was called the "Third World debt crisis."

Should we be concerned that the United States is a net borrower and a debtor? The answer to this question depends mainly on what the net borrower is doing with the borrowed money. If borrowing is financing investment that in turn is generating economic growth and higher income, borrowing is not a problem. It earns a return that more than pays the interest. But if borrowed money is used to finance consumption, to pay the interest and repay the loan, consumption will eventually have to be reduced. In this case, the greater the borrowing and the longer it goes on, the greater is the reduction in consumption that will eventually be necessary.

Is U.S. Borrowing for Consumption?

In 2010, we borrowed $439 billion from abroad. In that year, private investment in buildings, plant, and equipment was $1,840 billion and government investment in defense equipment and social projects was $500 billion. All this investment added to the nation's capital, and increased productivity. Government also spends on education and health care services, which increase *human capital*. Our international borrowing is financing private and public investment, not consumption.

Current Account Balance

What determines a country's current account balance and net foreign borrowing? You've seen that net exports (*NX*) is the main item in the current account. We can define the current account balance (*CAB*) as

$$CAB = NX + \text{Net interest income} + \text{Net transfers}.$$

We can study the current account balance by looking at what determines net exports because the other two items are small and do not fluctuate much.

Net Exports

Net exports are determined by the government budget and private saving and investment. To see how net exports are determined, we need to recall some of the things that we learned in Chapter 24 about the flows of funds that finance investment. Table 26.2 refreshes your memory and summarizes some calculations.

Part (a) lists the national income variables that are needed, with their symbols. Part (b) defines three balances: net exports, the government sector balance, and the private sector balance.

Net exports is exports of goods and services minus imports of goods and services.

The **government sector balance** is equal to net taxes minus government expenditures on goods and services. If that number is positive, a government sector surplus is lent to other sectors; if that number is negative, a government deficit must be financed by borrowing from other sectors. The government sector deficit is the sum of the deficits of the federal, state, and local governments.

The **private sector balance** is saving minus investment. If saving exceeds investment, a private sector surplus is lent to other sectors. If investment exceeds saving, a private sector deficit is financed by borrowing from other sectors.

Part (b) also shows the values of these balances for the United States in 2010. As you can see, net exports were –$536 billion, a deficit of $536 billion. The government sector's revenue from *net* taxes was $1,698 billion and its expenditure was $2,993 billion, so the government sector balance was –$1,295 billion—a deficit of $1,295 billion. The private sector saved $2,598 billion and invested $1,839 billion, so its balance was $759 billion—a surplus of $759 billion.

Part (c) shows the relationship among the three balances. From the *National Income and Product Accounts*, we know that real GDP, *Y*, is the sum of consumption expenditure (*C*), investment, government expenditure, and net exports. Real GDP also equals the sum of consumption expenditure, saving, and net taxes. Rearranging these equations tells us that net exports is the sum of the government sector balance and the private sector balance. In the United States in 2010, the government sector balance was

TABLE 26.2 Net Exports, the Government Budget, Saving, and Investment

	Symbols and equations	United States in 2010 (billions of dollars)
(a) Variables		
Exports*	X	1,818
Imports*	M	2,354
Government expenditures	G	2,993
Net taxes	T	1,698
Investment	I	1,839
Saving	S	2,598
(b) Balances		
Net exports	$X - M$	1,818 – 2,354 = –536
Government sector	$T - G$	1,698 – 2,993 = –1,295
Private sector	$S - I$	2,598 – 1,839 = 759
(c) Relationship among balances		
National accounts	$Y = C + I + G + X - M$	
	$= C + S + T$	
Rearranging:	$X - M = S - I + T - G$	
Net exports	$X - M$	–536
equals:		
Government sector	$T - G$	–1,295
plus		
Private sector	$S - I$	759

Source of data: Bureau of Economic Analysis. The data are for 2010, average of first two quarters, seasonally adjusted at annual rate.

* The *National Income and Product Accounts* measures of exports and imports are slightly different from the balance of payments accounts measures in Table 26.1 on p. 631.

Economics in Action

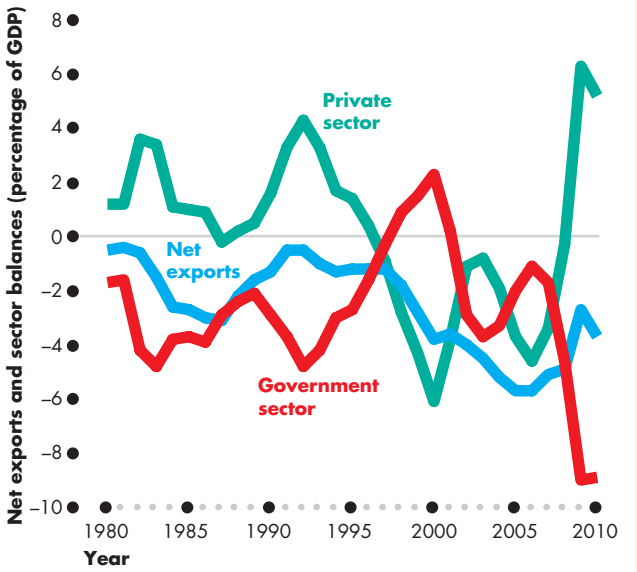
The Three Sector Balances

You've seen that net exports equal the sum of the government sector balance and the private sector balance. How do these three sector balances fluctuate over time?

The figure answers this question. It shows the government sector balance (the red line), net exports (the blue line), and the private sector balance (the green line).

The private sector balance and the government sector balance move in opposite directions. When the government sector deficit increased during the late 1980s and early 1990s, the private sector surplus increased. And when the government sector deficit decreased and became a surplus during the 1990s and early 2000s, the private sector's surplus decreased and became a deficit. And when the government deficit increased yet again from 2007 to 2009, the private sector deficit shrank and became a surplus.

Sometimes, when the government sector deficit increases, as it did during the first half of the 1980s, net exports become more negative. But after the early 1990s, net exports did not follow the government sector balance closely. Rather, net exports respond to the *sum* of the government sector and private sector balances. When both the private sector and the government sector have a deficit, net exports are negative and the combined private and government deficit is financed by borrowing from the rest of the world. But the dominant trend in net exports is negative.



The Three Sector Balances

Source of data: Bureau of Economic Analysis.

–$1,295 billion and the private sector balance was $759 billion. The government sector balance plus the private sector balance equaled net exports of –$536 billion.

Where Is the Exchange Rate?

We haven't mentioned the exchange rate while discussing the balance of payments. Doesn't it play a role? The answer is that in the short run it does but in the long run it doesn't.

In the short run, a fall in the dollar lowers the real exchange rate, which makes U.S. imports more costly and U.S. exports more competitive. A higher price of imported consumption goods and services might induce a decrease in consumption expenditure and an increase in saving. A higher price of imported capital goods might induce a decrease in investment. Other things remaining the same, an increase in saving or a decrease in investment decreases the private sector deficit and decreases the current account deficit.

But in the long run, a change in the nominal exchange rate leaves the real exchange rate unchanged and plays no role in influencing the current account balance.

REVIEW QUIZ

1. What are the transactions that the balance of payments accounts record?
2. Is the United States a net borrower or a net lender? Is it a debtor or a creditor nation?
3. How are net exports and the government sector balance linked?

You can work these questions in Study Plan 26.4 and get instant feedback. myeconlab

Reading Between the Lines on pp. 636–637 looks at risky trading that exploits the U.S. interest rate differential in the foreign exchange market.

The Dollar and "Carry Trade"

Dollar Faces Increasingly Strong Set of Headwinds

http://www.financialtimes.com
August 5, 2010

Only a few weeks ago, the dollar was powering toward its highest levels in four years, the beneficiary of widespread gloom about Europe's debt crisis and rising optimism about the U.S. recovery.

Since then, investors have soured on the world's largest economy. The dollar has tumbled 9 percent on a trade-weighted basis in two months, and yesterday fell to ¥85.29, within a whisker of a 15-year low. ...

A wave of weak economic data, including disappointing jobs figures, and expectations of further monetary easing by the U.S. Federal Reserve to head off the risk of a double-dip recession have been the main drivers of the dollar's fall. ...

As they pull money out of the greenback, investors are betting the recovery in other parts of the world will outpace that of the United States. Asian countries, expected to enjoy stronger growth than the debt-burdened west, have enjoyed strong inflows of funds. ...

The conditions are building, too, for a return of the dollar "carry trade", in which investors take advantage of low U.S. borrowing costs to invest in higher-yielding assets elsewhere. ...

One dollar "carry trade" has involved buying Indonesian bonds. Foreign ownership of Indonesian bonds has risen to a record, while bond yields—which move inversely to prices—have fallen to record lows. Tim Lee at Pi Economics, a consultancy, says the dollar carry trade may now be worth more than $750 billion. ...

In the longer term, the success of the dollar "carry trade" will depend on the U.S. economy remaining weak—but not too weak. ...

ESSENCE OF THE STORY

- Concern about Europe's debt crisis and optimism about U.S. real GDP growth brought an appreciation of the U.S. dollar.
- Disappointing jobs figures and expectations of further monetary easing by the Fed changed the outlook, ended the rise in the dollar, and lowered its value by 9 percent on average and close to a 15-year low against the Japanese yen (¥).
- Investors are pulling funds out of the U.S. dollar and moving them to the Asian currencies.
- The dollar "carry trade" is expanding and one estimate puts it at more than $750 billion.
- The longer term success of the dollar "carry trade" will depend on the U.S. economy remaining weak so that interest rates remain low.

ECONOMIC ANALYSIS

- The news article says the dollar will keep depreciating and U.S. interest rates will remain low, so the "carry trade" will be profitable.
- The *carry trade* is borrowing at a low interest rate in one currency, converting the funds to another currency to earn a higher interest rate, then converting the funds back to the original currency.
- Carry trade is profitable provided the interest rate difference doesn't get wiped out by a fall in the value of the currency with the higher interest rate.
- If the carry trade was persistently profitable, it would mean that *interest rate parity* did not hold.
- *Interest rate parity* (explained on p. 626) is a situation in which, adjusted for risk, expected rates of return are equal in all currencies.
- The "carry trade" was profitable in 2009 and 2010.
- Figure 1 shows that the Indonesian rupiah has *appreciated* against the U.S. dollar (the dollar has depreciated).
- Figure 2 shows the interest rates in Indonesia and the United States. Large investors can borrow at the U.S. commercial bill rate (almost zero) and small investors can borrow at an interest rate of about 2 percentage points above the prime lending rate.
- Large investors can buy and sell rupiah for a small percentage transaction fee. Small investors pay a large percentage transaction fee.
- Figure 3 shows the profit (and loss) from borrowing $100 and using the carry trade to earn the Indonesian interest rate.
- Because the Indonesian interest rate exceeds the U.S. interest rate *and the rupiah has appreciated*, the carry trade has been profitable.
- But the percentage rate of return has fallen, and it turned negative for small investors.
- Does the profitable carry trade mean that interest rate parity doesn't hold?
- It does not. Investing in Indonesian rupiah is risky. The rupiah might depreciate and wipe out the interest rate difference.
- The economic rear-view mirror is much clearer than the windshield.
- Expected returns are equal, but actual past returns are unequal. As people have increased investments in Indonesia, the "carry trade" profit has shrunk.

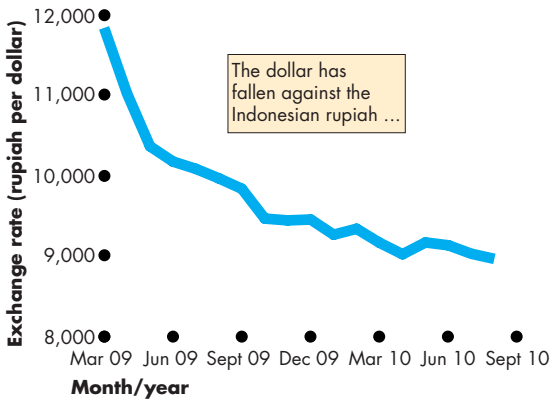


Figure 1 The falling dollar and rising Indonesian rupiah

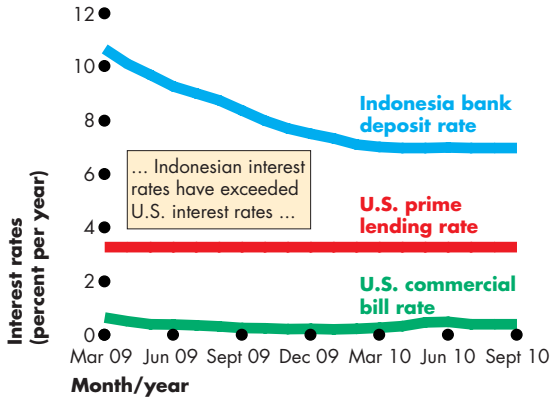


Figure 2 U.S. and Indonesian interest rates

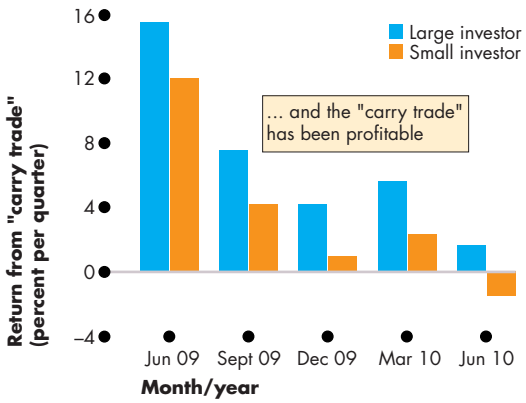


Figure 3 Profit from U.S.–Indonesian "carry trade"

SUMMARY

Key Points

The Foreign Exchange Market (pp. 618–622)

- Foreign currency is obtained in exchange for domestic currency in the foreign exchange market.
- Demand and supply in the foreign exchange market determine the exchange rate.
- The higher the exchange rate, the smaller is the quantity of U.S. dollars demanded and the greater is the quantity of U.S. dollars supplied.
- The equilibrium exchange rate makes the quantity of U.S. dollars demanded equal the quantity of U.S. dollars supplied.

Working Problems 1 to 6 will give you a better understanding of the foreign exchange market.

Exchange Rate Fluctuations (pp. 623–627)

- Changes in the world demand for U.S. exports, the U.S. interest rate differential, or the expected future exchange rate change the demand for U.S. dollars.
- Changes in U.S. demand for imports, the U.S. interest rate differential, or the expected future exchange rate change the supply of U.S. dollars.
- Exchange rate expectations are influenced by purchasing power parity and interest rate parity.
- In the long run, the nominal exchange rate is a monetary phenomenon and the real exchange rate is independent of the nominal exchange rate.

Working Problems 7 to 15 will give you a better understanding of exchange rate fluctuations.

Exchange Rate Policy (pp. 628–630)

- An exchange rate can be flexible, fixed, or a crawling peg.
- To achieve a fixed or a crawling exchange rate, a central bank must intervene in the foreign exchange market and either buy or sell foreign currency.

Working Problems 16 and 17 will give you a better understanding of exchange rate policy.

Financing International Trade (pp. 631–635)

- International trade, borrowing, and lending are financed by using foreign currency.
- A country's international transactions are recorded in its current account, capital account, and official settlements account.
- The current account balance is similar to net exports and is determined by the government sector balance plus the private sector balance.

Working Problems 18 and 19 will give you a better understanding of financing international trade.

Key Terms

Balance of payments accounts, 631
Capital and financial account, 631
Crawling peg, 629
Creditor nation, 633
Current account, 631
Debtor nation, 633
Exchange rate, 618
Fixed exchange rate, 628
Flexible exchange rate, 628
Foreign currency, 618
Foreign exchange market, 618
Government sector balance, 634
Interest rate parity, 626
Net borrower, 633
Net exports, 634
Net lender, 633
Official settlements account, 631
Private sector balance, 634
Purchasing power parity, 626
Real exchange rate, 627
U.S. interest rate differential, 623
U.S. official reserves, 631

STUDY PLAN PROBLEMS AND APPLICATIONS

myeconlab You can work Problems 1 to 19 in MyEconLab Chapter 26 Study Plan and get instant feedback.

The Foreign Exchange Market (Study Plan 26.1)

Use the following data to work Problems 1 to 3.
The U.S. dollar exchange rate increased from $0.89 Canadian in June 2009 to $0.96 Canadian in June 2010, and it decreased from 83.8 euro cents in January 2009 to 76.9 euro cents in January 2010.

1. Did the U.S. dollar appreciate or depreciate against the Canadian dollar? Did the U.S. dollar appreciate or depreciate against the euro?
2. What was the value of the Canadian dollar in terms of U.S. dollars in June 2009 and June 2010? Did the Canadian dollar appreciate or depreciate against the U.S. dollar over the year June 2009 to June 2010?
3. What was the value of one euro (100 euro cents) in terms of U.S. dollars in January 2009 and January 2010? Did the euro appreciate or depreciate against the U.S. dollar in 2009?

Use the following data to work Problems 4 to 6.
In January 2010, the exchange rate was 91 yen per U.S. dollar. By September 2010, the exchange rate had fallen to 84 yen per U.S. dollar.

4. Explain the exports effect of this change in the exchange rate.
5. Explain the imports effect of this change in the exchange rate.
6. Explain the expected profit effect of this change in the exchange rate.

Exchange Rate Fluctuations (Study Plan 26.2)

7. On August 3, 2010, the U.S. dollar was trading at 86 yen per U.S. dollar on the foreign exchange market. On September 13, 2010, the U.S. dollar was trading at 83 yen per U.S. dollar.
   a. What events in the foreign exchange market might have brought this fall in the value of the U.S. dollar?
   b. Did the events change the demand for U.S. dollars, the supply of U.S. dollars, or both demand and supply in the foreign exchange market?
8. Colombia is the world's biggest producer of roses. The global demand for roses increases and at the same time, the central bank in Colombia increases the interest rate. In the foreign exchange market for Colombian pesos, what happens to
   a. The demand for pesos?
   b. The supply of pesos?
   c. The quantity of pesos demanded?
   d. The quantity of pesos supplied?
   e. The exchange rate of the peso against the U.S. dollar?
9. If a euro deposit in a bank in Paris, France, earns interest of 4 percent a year and a yen deposit in Tokyo, Japan, earns 0.5 percent a year, everything else remaining the same and adjusted for risk, what is the exchange rate expectation of the Japanese yen?
10. The U.K. pound is trading at 1.54 U.S. dollars per U.K. pound. There is purchasing power parity at this exchange rate. The interest rate in the United States is 2 percent a year and the interest rate in the United Kingdom is 4 percent a year.
    a. Calculate the U.S. interest rate differential.
    b. What is the U.K. pound expected to be worth in terms of U.S. dollars one year from now?
    c. Which country more likely has the lower inflation rate? How can you tell?
11. You can purchase a laptop in Mexico City for 12,960 Mexican pesos. If the exchange rate is 10.8 Mexican pesos per U.S. dollar and if purchasing power parity prevails, at what price can you buy an identical computer in Dallas, Texas?
12. **When the Chips Are Down**
    The *Economist* magazine uses the price of a Big Mac to determine whether a currency is undervalued or overvalued. In July 2010, the price of a Big Mac was $3.73 in New York, 13.2 yuan in Beijing, and 6.50 Swiss francs in Geneva. The exchanges rates were 6.78 yuan per U.S. dollar and 1.05 Swiss francs per U.S. dollar.
    Source: *The Economist*, July 22, 2010
    a. Was the yuan undervalued or overvalued relative to purchasing power parity?
    b. Was the Swiss franc undervalued or overvalued relative to purchasing power parity?
    c. Do you think the price of a Big Mac in different countries provides a valid test of purchasing power parity?

13. The price level in the Eurozone is 112.4, the price level in the United States is 109.1, and the nominal exchange rate was 80 euro cents per U.S. dollar. What is the real exchange rate expressed as Eurozone real GDP per unit of U.S. real GDP?
14. The U.S. price level is 106.3, the Japanese price level is 95.4, and the real exchange rate is 103.6 Japanese real GDP per unit of U.S. real GDP. What is the nominal exchange rate?
15. **Dollar Hits 15-Year Low vs Yen**

    Today in Tokyo a dollar bought only 84.71 yen, the lowest since 1995. The dollar's weakness against the yen is making Japanese exports more expensive. Investors stepped up selling of U.S. dollars after the Federal Reserve announced yesterday only small steps aimed at shoring up the flagging U.S. economy. "Investors were unnerved by the Fed's statement. It just confirmed that the U.S. economic recovery is slowing," said a dealer at a Japanese bank in Tokyo.

    Source: *USA Today*, August 11, 2010

    On a graph of the foreign exchange market show the effects of

    a. Japanese exports becoming more expensive.

    b. Investors stepping up the sale of dollars.

Exchange Rate Policy (Study Plan 26.3)

16. With the strengthening of the yen against the U.S. dollar in 2010, Japan's central bank did not take any action. A leading Japanese politician has called on the central bank to take actions to weaken the yen, saying it will help exporters in the short run and have no long-run effects.
    a. What is Japan's current exchange rate policy?
    b. What does the politician want the exchange rate policy to be in the short run? Why would such a policy have no effect on the exchange rate in the long run?
17. **Double-Talking the Dollar**

    In the 1970s and 1980s, the United States was constantly buying and selling foreign currencies to change the value of the dollar, but since 1995 it has made only a few transactions and since 2000 none at all. The foreign exchange market is so huge, trying to manipulate the dollar is largely futile. A currency's value reflects an economy's fundamentals: How well a country allocates resources, how productive its workers are, how it contains inflation, etc., but for years on end, currencies can move in directions that seem to have little to do with fundamentals. They overshoot their correct values, in part because nobody is ever sure exactly what those correct values are.

    Source: *Time*, May 5, 2008

    a. How has U.S. exchange rate policy evolved since the early 1970s?

    b. Explain why "trying to manipulate the dollar is largely futile," especially in the long run.

    c. Explain why a currency can experience short-run fluctuations "that seem to have little to do with fundamentals." Illustrate with a graph.

Financing International Trade (Study Plan 26.4)

18. The table gives some information about the U.S. international transactions in 2008.

Item	Billions of U.S. dollars
Imports of goods and services	2,561
Foreign investment in the United States	955
Exports of goods and services	1,853
U.S. investment abroad	300
Net interest income	121
Net transfers	–123
Statistical discrepancy	66

    a. Calculate the current account balance.

    b. Calculate the capital and financial account balance.

    c. Did U.S. official reserves increase or decrease?

    d. Was the United States a net borrower or a net lender in 2008? Explain your answer.

19. **The United States, Debtor Nation**

    The United States is a debtor nation, and for most of the past 30 years it has been piling up large trade deficits. The current account has now reached a deficit of 6 percent of GDP, and must be financed by capital inflows. Foreigners must purchase large amounts of U.S. assets, or the current account deficit cannot be financed.

    Source: *Asia Times*, September 28, 2006

    a. Explain why a current account deficit "must be financed by capital inflows."

    b. Under what circumstances should the debtor nation status of the United States be a concern?

ADDITIONAL PROBLEMS AND APPLICATIONS

myeconlab You can work these problems in MyEconLab if assigned by your instructor.

The Foreign Exchange Market

20. Suppose that yesterday, the U.S. dollar was trading on the foreign exchange market at 0.75 euros per U.S. dollar and today the U.S. dollar is trading at 0.78 euros per U.S. dollar. Which of the two currencies (the U.S. dollar or the euro) has appreciated and which has depreciated today?
21. Suppose that the exchange rate fell from 84 yen per U.S. dollar to 71 yen per U.S. dollar. What is the effect of this change on the quantity of U.S. dollars that people plan to buy in the foreign exchange market?
22. Suppose that the exchange rate rose from 71 yen per U.S. dollar to 100 yen per U.S. dollar. What is the effect of this change on the quantity of U.S. dollars that people plan to sell in the foreign exchange market?
23. Today's exchange rate between the yuan and the U.S. dollar is 6.78 yuan per dollar and the central bank of China is buying U.S. dollars in the foreign exchange market. If the central bank of China did not purchase U.S. dollars would there be excess demand or excess supply of U.S. dollars in the foreign exchange market? Would the exchange rate remain at 6.78 yuan per U.S. dollar? If not, which currency would appreciate?

Exchange Rate Fluctuations

24. Yesterday, the current exchange rate was $1.05 Canadian per U.S. dollar and traders expected the exchange rate to remain unchanged for the next month. Today, with new information, traders now expect the exchange rate next month to fall to $1 Canadian per U.S. dollar. Explain how the revised expected future exchange rate influences the demand for U.S. dollars, or the supply of U.S. dollars, or both in the foreign exchange market.
25. On January 1, 2010, the exchange rate was 91 yen per U.S. dollar. Over the year, the supply of U.S. dollars increased and by January, 2011, the exchange rate fell to 84 yen per U.S. dollar. What happened to the quantity of U.S. dollars that people planned to buy in the foreign exchange market?
26. On August 1, 2010, the exchange rate was 84 yen per U.S. dollar. Over the year, the demand for U.S. dollars increased and by August 1, 2011, the exchange rate was 100 yen per U.S. dollar. What happened to the quantity of U.S. dollars that people planned to sell in the foreign exchange market?

Use the following news clip to work Problems 27 and 28.

Top U.S. Real Estate Markets for Investment

Rahul Reddy has been investing in Australian real estate for the last two years. Now, with the Australian dollar growing in strength and the American housing market strained, he's got his eye on real estate in Florida and California. Encouraged by a weak dollar and a belief in the resiliency of the U.S. economy, investors are seeking investment properties and development opportunities in the United States. "The United States is good for speculative higher-risk investments from our perspective because the strong Australian dollar will enable us to gain hold of real estate at prices we will probably not see for a long time," says Reddy. "The United States is an economic powerhouse that I think will recover, and if the exchange rate goes back to what it was a few years ago, we will benefit."

Source: *Forbes*, July 10, 2008

27. Explain why foreigners are "seeking investment properties and development opportunities in the United States."
28. Explain what would happen if the speculation made by Reddy became widespread. Would expectations become self-fulfilling?

Use the following information to work Problems 29 and 30.

Brazil's Overvalued Real

The Brazilian real has appreciated 33 percent against the U.S. dollar and has pushed up the price of a Big Mac in Sao Paulo to $4.60, higher than the New York price of $3.99. Despite Brazil's interest rate being at 8.75 percent a year compared to the U.S. interest rate at near zero, foreign funds flowing into Brazil surged in October.

Source: Bloomberg News, October 27, 2009

29. Does purchasing power parity hold? If not, does PPP predict that the Brazilian real will appreciate or depreciate against the U.S. dollar? Explain.
30. Does interest rate parity hold? If not, why not? Will the Brazilian real appreciate further or depreciate against the U.S. dollar if the Fed raises the interest rate while the Brazilian interest rate remains at 8.75 percent a year?

Exchange Rate Policy

Use the following news clip to work Problems 31 to 34.

U.S. Declines to Cite China as Currency Manipulator

The Bush administration has declined to cite China for manipulating its currency to gain unfair trade advantages against the United States. America's growing trade deficit with China, which last year hit an all-time high of $256.3 billion, is the largest deficit ever recorded with a single country. Chinese currency, the yuan, has risen in value by 18.4 percent against the U.S. dollar since the Chinese government loosened its currency system in July 2005. However, American manufacturers contend the yuan is still undervalued by as much as 40 percent, making Chinese products more competitive in this country and U.S. goods more expensive in China. China buys U.S. dollar-denominated securities to maintain the value of the yuan in terms of the U.S. dollar.

Source: MSN, May 15, 2008

31. What was the exchange rate policy adopted by China until July 2005? Explain how it worked. Draw a graph to illustrate your answer.
32. What was the exchange rate policy adopted by China after July 2005? Explain how it works.
33. Explain how fixed and crawling peg exchange rates can be used to manipulate trade balances in the short run, but not the long run.
34. Explain the long-run effect of China's current exchange rate policy.
35. **Aussie Dollar Hit by Interest Rate Talk**

    The Australian dollar fell against the U.S. dollar to its lowest value in the past two weeks. The CPI inflation rate was reported to be generally as expected but not high enough to justify previous expectations for an aggressive interest rate rise by Australia's central bank next week.

    Source: Reuters, October 28, 2009

    a. What is Australia's exchange rate policy? Explain why expectations about the Australian interest rate lowered the value of the Australian dollar against the U.S. dollar.
    b. To avoid the fall in the value of the Australian dollar against the U.S. dollar, what action could the central bank of Australia have taken? Would such an action signal a change in Australia's exchange rate policy?

Financing International Trade

Use the following table to work Problems 36 to 38.

The table gives some data about the U.K. economy:

Item	Billions of U.K. pounds
Consumption expenditure	721
Exports of goods and services	277
Government expenditures	230
Net taxes	217
Investment	181
Saving	162

36. Calculate the private sector balance.
37. Calculate the government sector balance.
38. Calculate net exports and show the relationship between the government sector balance and net exports.

Economics in the News

39. After you have studied *Reading Between the Lines* on pp. 636–637 answer the following questions.
    a. What is the "carry trade" and between what types of countries and currencies is it likely to take place?
    b. What are the risks in the "carry trade"?
    c. Is it possible to earn a profit in the "carry trade" in the long run? Explain why or why not.
    d. Explain how participating in the "carry trade" reduces the profit available to other traders.
    e. Define interest rate parity and explain its connection with the "carry trade."
    f. Define purchasing power parity and explain how this concept might be used in the "carry trade."

Expanding the Frontier

PART EIGHT

UNDERSTANDING MACROECONOMIC TRENDS

Economics is about how we cope with scarcity. We cope as individuals by making choices that balance marginal benefits and marginal costs so that we use our scarce resources efficiently. We cope as societies by creating incentive systems and social institutions that encourage specialization and exchange.

These choices and the incentive systems that guide them determine what we specialize in; how much work we do; how hard we work at school to learn the mental skills that form our human capital and that determine the kinds of jobs we get and the incomes we earn; how much we save for future big-ticket expenditures; how much businesses and governments spend on new capital—on auto assembly lines, computers and fiber cables for improved Internet services, shopping malls, highways, bridges, and tunnels; how intensively existing capital and natural resources are used and how quickly they wear out or are used up; and the problems that scientists, engineers, and other inventors work on to develop new technologies.

All the choices we've just described combine to determine the standard of living and the rate at which it improves—the economic growth rate.

Money that makes specialization and exchange in markets possible is a huge contributor to economic growth. But too much money brings a rising cost of living with no improvement in the standard of living.

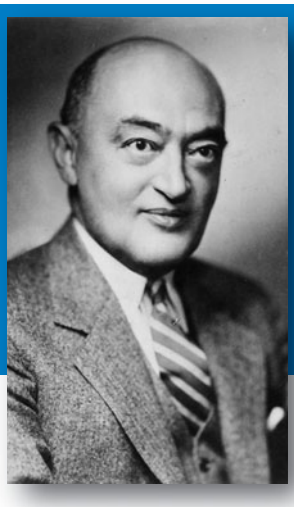
Joseph Schumpeter, *the son of a textile factory owner, was born in Austria in 1883. He moved from Austria to Germany during the tumultuous 1920s when those two countries experienced hyperinflation. In 1932, in the depths of the Great Depression, he came to the United States and became a professor of economics at Harvard University.*

This creative economic thinker wrote about economic growth and development, business cycles, political systems, and economic biography. He was a person of strong opinions who expressed them forcefully and delighted in verbal battles.

Schumpeter saw the development and diffusion of new technologies by profit-seeking entrepreneurs as the source of economic progress. But he saw economic progress as a process of creative destruction—the creation of new profit opportunities and the destruction of currently profitable businesses. For Schumpeter, economic growth and the business cycle were a single phenomenon.

"Economic progress, in capitalist society, means turmoil."

JOSEPH SCHUMPETER
Capitalism, Socialism, and Democracy



TALKING WITH Xavier Sala-i-Martin

What attracted you to economics?

It was a random event. I wanted to be rich, so I asked my mom, "In my family, who is the richest guy?" She said, "Your uncle John." And I asked, "What did he study?" And she said, "Economics." So I went into economics!

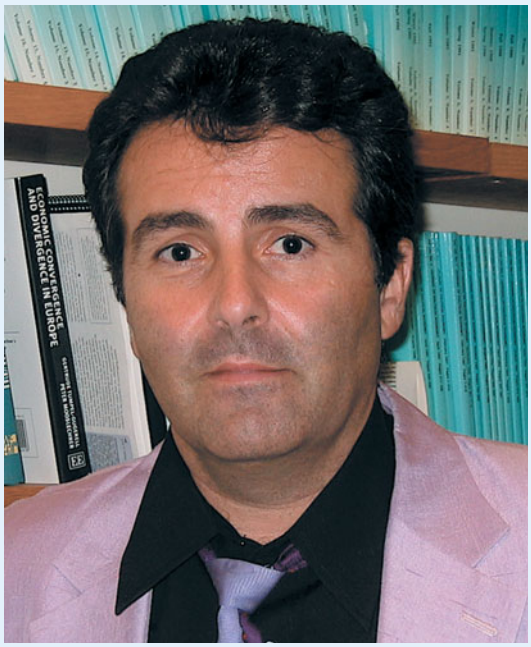
In Spain, there are no liberal arts colleges where you can study lots of things. At age 18, you must decide what career you will follow. If you choose economics, you go to economics school and take economics five years in a row. So you have to make a decision in a crazy way, like I did.

How did economic growth become your major field of research?

I studied economics. I liked it. I studied mathematical economics. I liked it too, and I went to graduate school. In my second year at Harvard, Jeffrey Sachs hired me to go to Bolivia. I saw poor people for the first time in my life. I was shocked. I decided I should try to answer the question "Why are these people so poor and why are we so rich, and what can we do to turn their state into our state?" We live in a bubble world in the United States and Europe, and we don't realize how poor people really are. When you see poverty at first hand, it is very hard to think about something else. So I decided to study economic growth. Coincidentally, when I returned from Bolivia, I was assigned to be Robert Barro's teaching assistant. He was teaching economic growth, so I studied with him and eventually wrote books and articles with him.

In your first research on economic growth, you tested the neoclassical growth model using data for a number of countries and for the states of the United States. What did you discover?

Neoclassical theory was criticized on two grounds. First, its source of growth, technological change, is exogenous—not explained. Second, its assumption of diminishing marginal returns to capital seems to imply that income per person should converge to the same level in every country. If you are poor, your marginal product should be high. Every cookie that you save should generate huge growth. If you are rich, your marginal product should be low. Every cookie you save should generate very little growth. Therefore poor countries should grow faster than rich countries, and convergence of income levels should occur. Convergence doesn't occur, so, said its critics, neoclassical theory must be wrong.



It turned out that it was this criticism that was wrong. Growth depends on the productivity of your cookies and on how many cookies you save. If you don't save any cookies, you don't grow, even if your marginal product is large.

Conditional convergence is the idea that income per person will converge only if countries have similar savings rates, similar technologies, and similar everything. That's what I tested. To hold every relevant factor equal, I tested the hypothesis using regions: states within the United States or countries that are similar. And once you're careful to hold other things equal, you see a perfect negative relationship between growth rates and income levels.

Growth through capital accumulation is very, very hard. Growth has to come from other things, such as technological change.

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Professor Sala-i-Martin was an undergraduate at Universitat Autonoma de Barcelona and a graduate student at Harvard University, where he obtained his Ph.D. in 1990.

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Michael Parkin talked with Xavier Sala-i-Martin about his work and the progress that economists have made in understanding economic growth.

As predicted by neoclassical theory, poor countries grow faster than rich countries if they are similar. So my research shows that it is not so easy to reject neoclassical theory. The law of diminishing returns that comes from Adam Smith and Malthus and Ricardo is very powerful. Growth through capital accumulation is very, very hard. Growth has to come from other things, such as technological change.

What do we know today about the nature and causes of the wealth of nations that Adam Smith didn't know?

Actually, even though over the last two hundred years some of the best minds have looked at the question, we know surprisingly little. We have some general principles that are not very easy to apply in practice. We know, for example, that markets are good. We know that for the economy to work, we need property rights to be guaranteed. If there are thieves—government or private thieves—that can steal the proceeds of the investment, there's no investment and there's no growth. We know that the incentives are very important.

These are general principles. Because we know these principles we should ask: How come Africa is still poor? The answer is, it is very hard to translate "Markets are good" and "Property rights work" into practical actions. We know that Zimbabwe has to guarantee property rights. With the government it has, that's not going to work. The U.S. constitution works in the United States. If you try to copy the constitution and impose the system in Zimbabwe, it's not going to work.

You've done a lot of work on distribution of income, and you say we've made a lot of progress. What is the evidence to support this conclusion?

There are two issues: poverty and inequality. When in 2001 I said poverty is going down, everyone said I was crazy. The United Nations Development Report, which uses World Bank data, was saying the exact opposite. I said the World Bank methodology was flawed. After a big public argument that you can see in *The Economist*, the World Bank revised their poverty numbers and they now agree with me that poverty rates are falling.

Now why is poverty falling? In 1970, 80 percent of the world's poor were in Asia—in China, India, Bangladesh, and Indonesia. China's "Great Leap Forward" was a great leap backward. People were starving to death. Now, the growth of these countries has been spectacular and the global poverty rate has fallen. Yes, if you look at Africa, Africa is going backwards. But Africa has 700 million people. China has 1.3 billion. India has 1.1 billion. Indonesia has 300 million. Asia has 4 billion of the world's 6 billion people. These big guys are growing. It's impossible that global poverty is not going down.

But what we care about is poverty in different regions of the world. Asia has been doing very well, but Africa has not. Unfortunately, Africa is still going in the wrong direction.

You've made a big personal commitment to Africa. What is the Africa problem? Why does this continent lag behind Asia? Why, as you've just put it, is Africa going in the wrong direction?

Number one, Africa is a very violent continent. There are twenty-two wars in Africa as we speak. Two, nobody will invest in Africa. Three, we in the rich world—the United States, Europe, and Japan—won't

let them trade. Because we have agricultural subsidies, trade barriers, and tariffs for their products, they can't sell to us.

Africans should globalize themselves. They should open, and we should let them open. They should introduce markets. But to get markets, you need legal systems, police, transparency, less red tape. You need a lot of the things we have now. They have corrupt economies, very bureaucratic, with no property rights, the judiciary is corrupt. All of that has to change.

They need female education. One of the biggest rates of return that we have is educating girls. To educate girls, they'll need to build schools, they need to pay teachers, they need to buy uniforms, they need to provide the incentives for girls to go to school, which usually is like a string. You pull it, you don't push it. Pushing education doesn't work. What you need is: Let the girls know that the rate of return on education is very high by providing jobs after they leave school. So you need to change the incentives of the girls to go to school and educate themselves. That's going to increase the national product, but it will also increase health, and it will also reduce fertility.

Returning to the problems of poverty and inequality, how can inequality be increasing within countries but decreasing globally—across countries?

Because most inequality comes from the fact that some people live in rich countries and some people live in poor countries. The big difference across people is not that there are rich Americans and poor Americans. Americans are very close to each other relative to the difference between Americans and people from Senegal. What is closing today is the gap *across* countries—and for the first time in history. Before the Industrial Revolution, everybody was equal. Equal and poor. Equally poor. People were living at subsistence levels, which means you eat, you're clothed, you have a house, you die. No movies, no travel, no music, no toothbrush. Just subsist. And if the weather is not good, one third of the population dies. That was the history of the world between 10,000 B.C. and today.

Yes, there was a king, there was Caesar, but the majority of the population were peasants.

All of a sudden, the Industrial Revolution means that one small country, England, takes off and there is 2 percent growth every year. The living standard of the workers of England goes up and up and up. Then the United States, then France, then the rest of Europe, then Canada all begin to grow.

In terms of today's population, one billion people become rich and five billion remain poor. Now for the first time in history, the majority of these five billion people are growing more rapidly than the rich guys. They're catching up quickly. The incomes of the majority of poor citizens of the world are growing faster than those of Americans.

What advice do you have for someone who is just beginning to study economics?

Question! Question everything! Take some courses in history and math. And read my latest favorite book, Bill Easterly's *White Man's Burden.** It shows why we have not been doing the right thing in the aid business. I'm a little bit less dramatic than he is. He says that nothing has worked. I think some things have worked, and we have to take advantage of what has worked to build on it. But I agree with the general principle that being nice, being good, doesn't necessarily mean doing good. Lots of people with good intentions do harm. Economic science teaches us that incentives are the key.

Question!
Question everything!

*William Easterly, *The White Man's Burden: Why the West's Efforts to Aid the Rest Have Done So Much Ill and So Little Good*. New York, Penguin Books, 2006.