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

9

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 8, 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

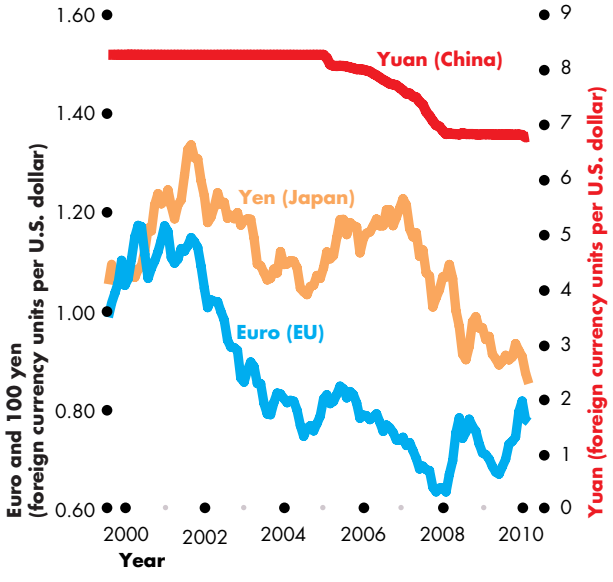
Economics in Action

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.

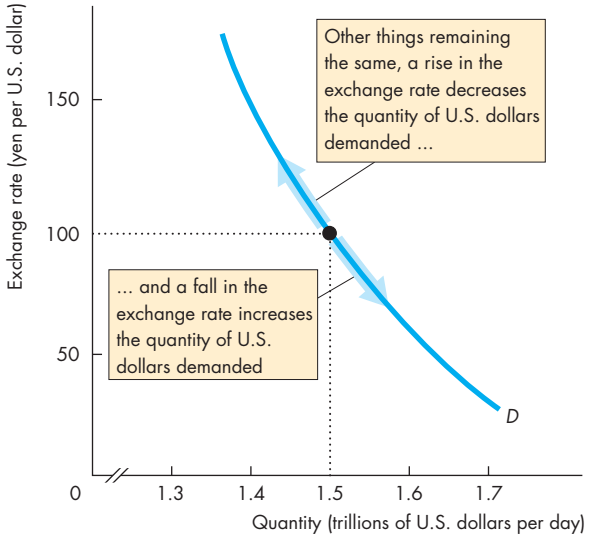
The lower the exchange rate today, other things remaining the same, the greater is the expected profit from holding U.S. dollars and the greater is the quantity of U.S. dollars demanded in the foreign exchange market today.

Demand Curve for U.S. Dollars

Figure 9.1 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 9.1 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

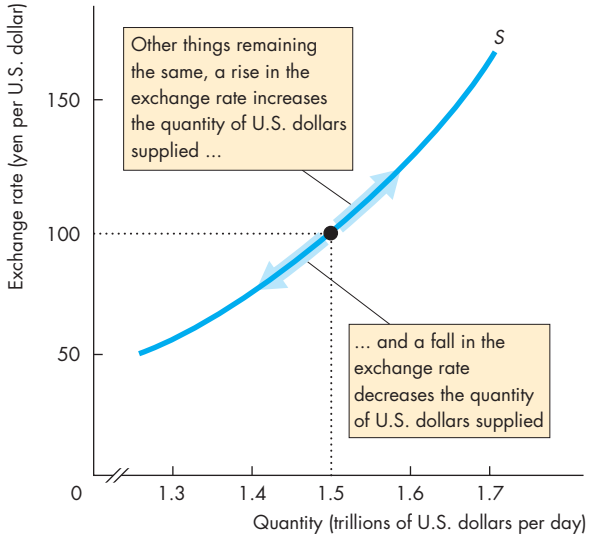
Imports Effect The larger the value of U.S. imports, the larger is the quantity of U.S. dollars supplied in the foreign exchange market. But the value of U.S. imports depends on the prices of foreign-produced goods and services *expressed in U.S. dollars*. These prices depend on the exchange rate. The 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 9.2 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 9.2 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. 222–224), we examine the effects of alternative actions that the Fed or another central bank might take in the foreign exchange market.

Figure 9.3 shows the demand curve for U.S. dollars, *D*, from Fig. 9.1 and the supply curve of U.S. dollars, *S*, from Fig. 9.2, and the equilibrium exchange rate.

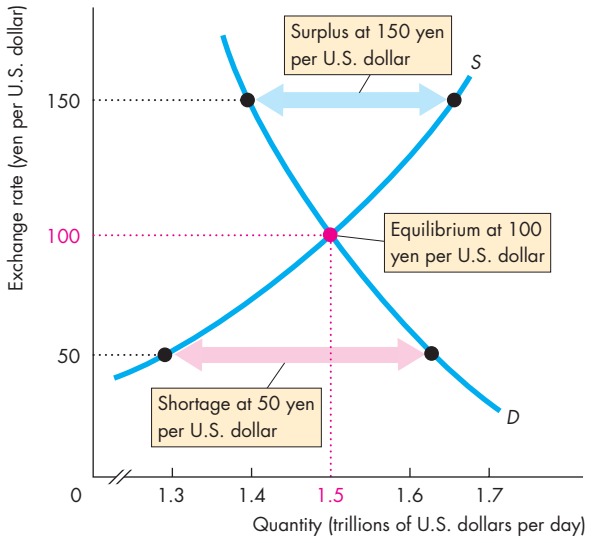
The exchange rate acts as a regulator of the quantities demanded and supplied. If the exchange rate is too high, there is a surplus—the quantity supplied exceeds the quantity demanded. For example, in Fig. 9.3, if the exchange rate is 150 yen per U.S. dollar, there is a surplus of U.S. dollars. If the 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. 9.3, 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 9.3 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 9.3 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 9.1 and get instant feedback. myeconlab

Exchange Rate Fluctuations

You've seen (in *Economics in Action* on p. 213) 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.

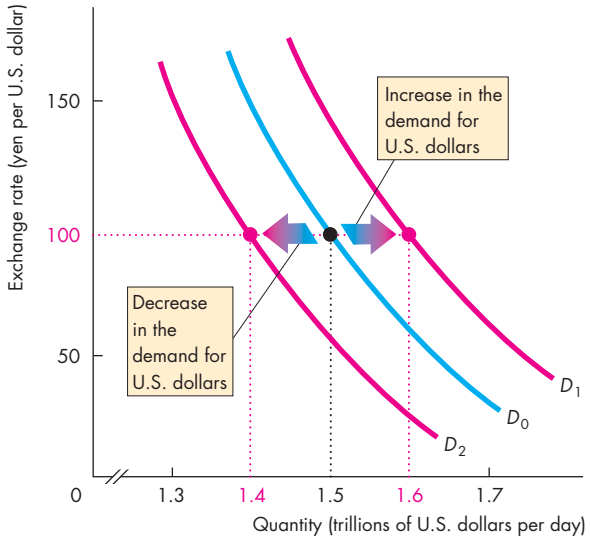
U.S. Interest Rate Relative to the Foreign Interest Rate People and businesses buy financial assets to make a return. The higher the interest rate that people can make on U.S. assets compared with foreign assets, the more U.S. assets they buy.

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 9.4 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 9.4 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.

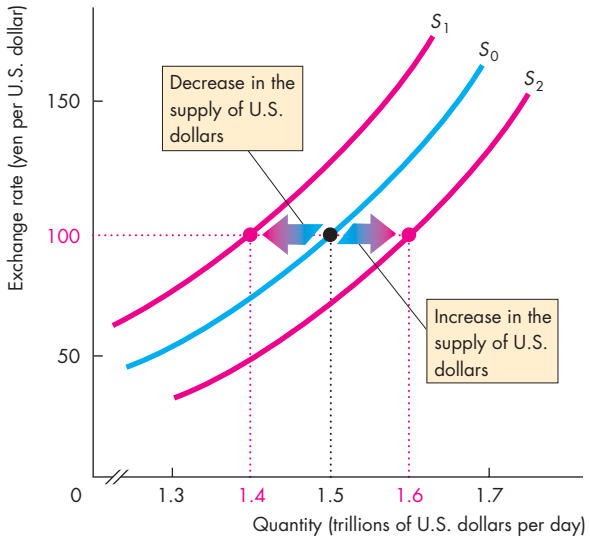
With a higher U.S. interest rate differential, people decide to keep more of their funds in U.S. dollar assets and less in foreign currency assets. They buy a smaller quantity of foreign currency and sell a smaller quantity of dollars in the foreign exchange market.

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 9.5 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 9.5 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

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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.

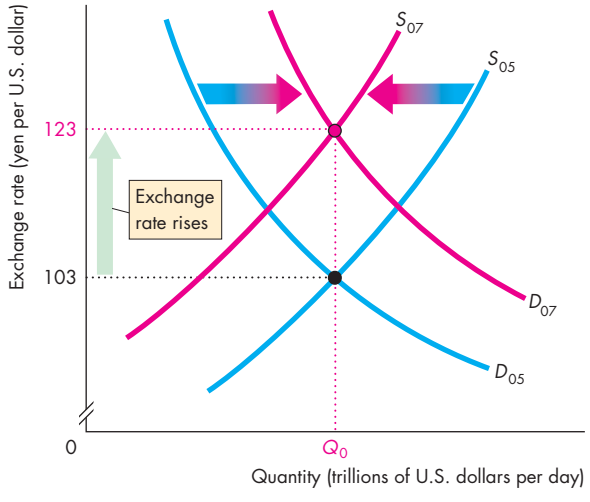
During 2005 and 2006, the Federal Reserve raised the interest rate, but the interest rate in Japan barely changed. With an increase in the U.S. interest rate differential, funds flowed into the United States. Also, currency traders, anticipating this increased flow of funds into the United States, expected 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.

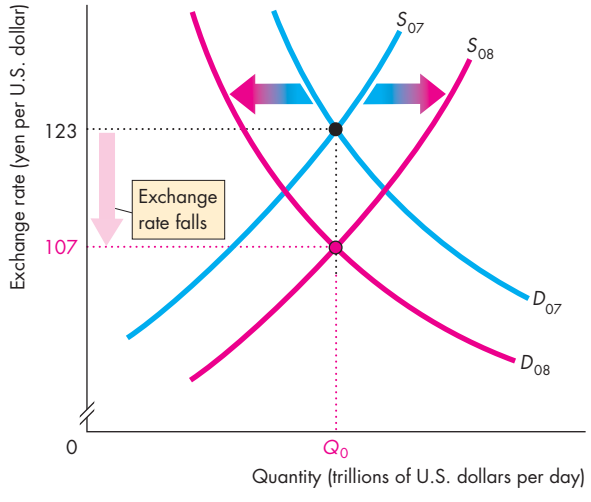
A Depreciating U.S. Dollar: 2007–2008 Between July 2007 and September 2008, the U.S. dollar depreciated against the yen. It fell from 123 yen to 107 yen per U.S. dollar. Part (b) of the figure provides a possible explanation for this depreciation. The demand and supply curves labeled D_{07} and S_{07}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



(a) 2005–2007



(b) 2007–2008

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. 230–231). 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 8 (pp. 200–201).

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 9.2 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 14.)

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 9.6 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.

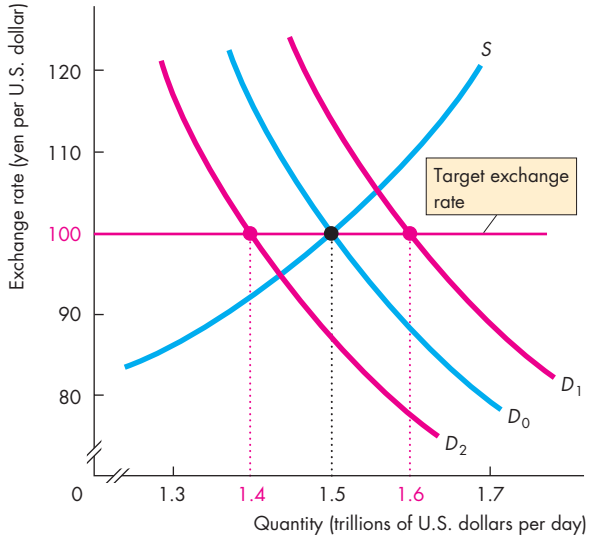
When the demand for U.S. dollars increases and the demand curve shifts rightward to D_1, the Fed sells $100 billion. This action prevents the exchange rate from rising. When the demand for U.S. dollars decreases and the demand curve shifts leftward to D_2, the Fed buys $100 billion. This action prevents 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 9.6 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. 213 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.

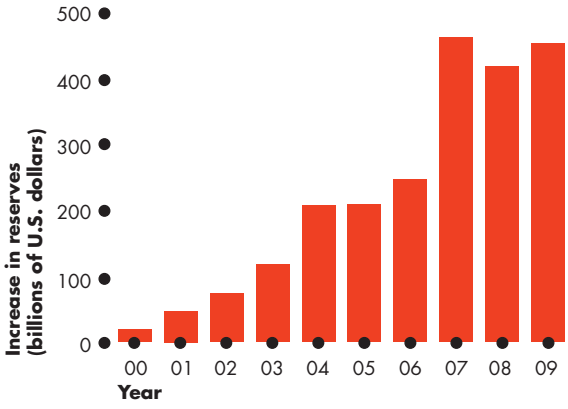
Part (a) of the figure shows the scale of China's increase in official foreign currency reserves, some of which are euros and yen but most of which are U.S. dollars. You can see that China's reserves increased by more than $400 billion in 2007, 2008, and 2009.

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).

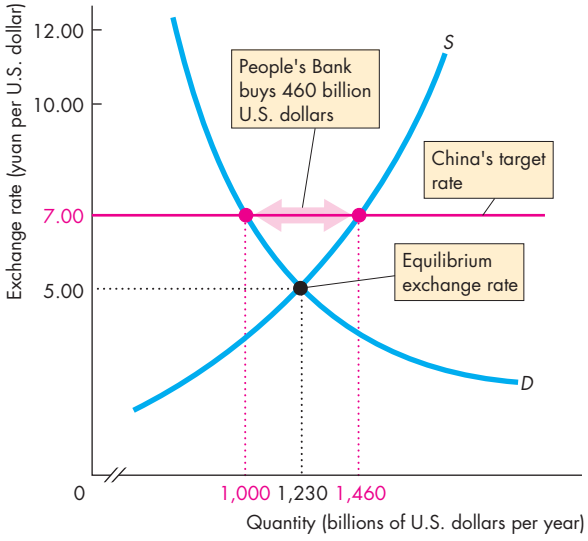
The consequence of the fixed (and crawling peg) yuan exchange rate is that China has piled up U.S. dollar reserves on a huge scale. By mid-2006, China's official foreign currency reserves approached $1 trillion and by the end of 2009, they exceeded $2 trillion!

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 9.3 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 9.1 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 9.1 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 9.1 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.

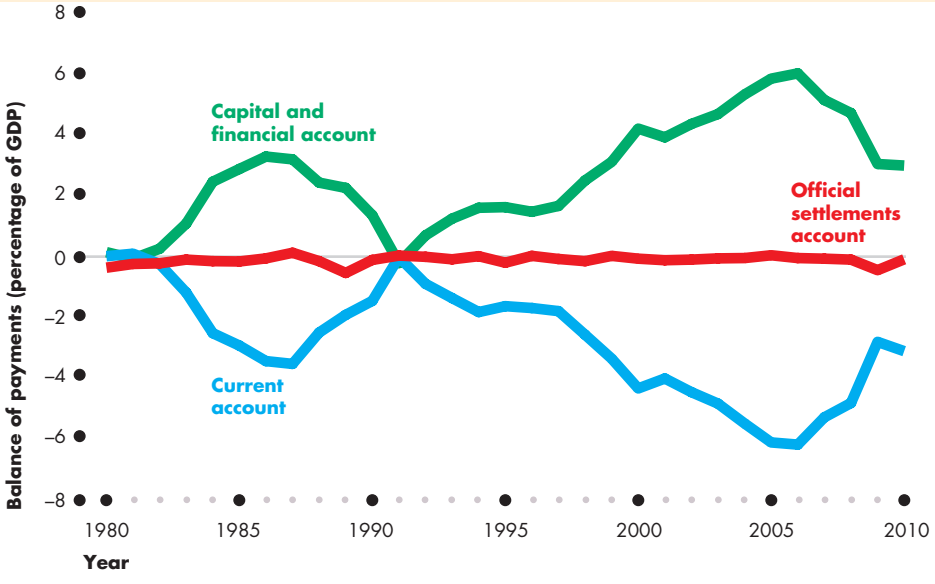
Economics in Action

Three Decades of Deficits

The numbers that you reviewed in Table 9.1 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 7 about the flows of funds that finance investment. Table 9.2 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 9.2 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 9.1 on p. 225.

Economics in Action

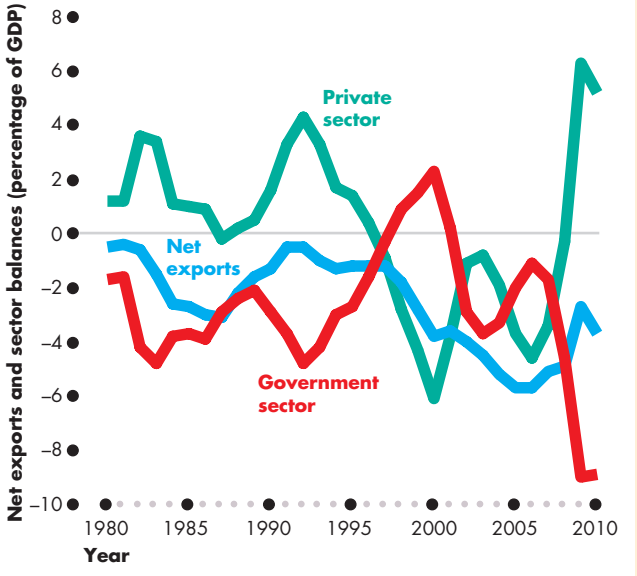
The Three Sector Balances

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 9.4 and get instant feedback. myeconlab

Reading Between the Lines on pp. 230–231 looks at risky trading that exploits the U.S. interest rate differential in the foreign exchange market.