CHAPTER 8

Foreign Exchange and International Financial Markets

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AFTER STUDYING THIS CHAPTER, YOU SHOULD BE ABLE TO:

1. Describe how demand and supply determine the price of foreign exchange.
2. Discuss the role of international banks in the foreign-exchange market.
3. Assess the different ways firms can use the spot and forward markets to settle international transactions.
4. Summarize the role of arbitrage in the foreign-exchange market.
5. Discuss the important aspects of the international capital market.

THE LOONIE TAKES FLIGHT

There's an old adage: Be careful of what you ask for. For many years, Canadian citizens bemoaned the fact that the Canadian dollar sold at a discount from the U.S. dollar. But in September 2007, the Canadian dollar reached parity with its southern neighbor's: one Canadian dollar equaled one U.S. dollar. By November, it took U.S. $1.10 to buy a loonie—the affectionate nickname for the Canadian one-dollar coin, which features a loon on one side. All told, in 2007, the loonie soared 24 percent against the U.S. dollar. With the exception of 2008–2009, when currency markets were impacted by the Global Recession, the U.S. dollar/Canadian dollar exchange rate has subsequently fluctuated ±5 percent around parity. In July 2013, for instance, it took $1.04 in Canadian money to buy $1.00 in U.S. money.

This was not always the case. In 2002, Canadians had to hand over 1.61 Canadian dollars to buy a U.S. dollar. But in the following five years the loonie rose to parity with the U.S. dollar. Much of the loonie's ascent is the result of the boom in commodity prices resulting from China's economic growth, which has benefited producers of raw materials such as Canada. And high oil prices have attracted enormous investments in Alberta's Athabascan tar sands, which contain an estimated 1.6 trillion barrels of oil, of which 350 billion barrels are judged to be recoverable. When commodity prices softened in the Global Recession of 2008–2009, the loonie fell in value against the U.S. dollar. Renewed global economic growth restored the loonie's luster. The value of the currencies of other commodity-rich countries, such as the Australian dollar, the Brazilian real, and the Chilean peso, have exhibited similar correlation with commodity prices.

The rising value of the loonie affects numerous individuals, firms, and markets on both sides of the border. Canadian consumers pay lower prices for goods made in the United States, and Canadian vacationers enjoy lower costs on their winter trips to Florida and Arizona. The increased value of the loonie may even affect who wins the World Series and the Stanley Cup. When the U.S. dollar was riding high, Canadian baseball and hockey teams were at a disadvantage because their ticket revenues were denominated in Canadian currency while their player costs were tied to the U.S. dollar. With the value of the loonie rising, this drawback is disappearing. The Toronto Blue Jay's costs, for example, are reduced U.S. $600,000 for every one cent rise in the value of the Canadian dollar, allowing them to bid more aggressively for free agents and offer higher salaries to retain key starters. Similarly, the seven Canadian teams in the National Hockey League had been at a decided disadvantage because of the low value of the Canadian dollar. Its recent rise, however, has allowed these teams to improve their locker rooms, offices, and training facilities to better match those of U.S.-based hockey teams, as well as compete for talented players.

But the high value of the loonie has a downside. As Chapter 2 noted, Canada's economy is export-oriented, and the vast majority of its exports are destined for the United States. Some economists estimate that Canada could lose 150,000 jobs as a result of declining exports to the United States. Ontario's manufacturing sector has been particularly hard hit. Companies such as Collins & Aikman, Crane Valves, Siemens—even the province's leading pickle company, Bick's Pickle—have shuttered their Canadian operations, often in favor of new locations south of the border. Fewer Americans are frequenting Windsor's casinos, and Canadian retailers in border towns are losing customers to U.S. shops. The Retail Council of Canada believes that the rise in the number of Canadians heading south to take advantage of now-cheaper U.S. goods has trimmed retail sales in Canada by 5 percent. Many Canadian retailers have slashed their prices to stop this hemorrhaging of customers, but these price cuts harm their profit margins. Canadian auto dealers have been particularly vulnerable to this bargain-seeking behavior. And companies such as Dofasco, a steel manufacturer in Hamilton, Ontario, are hurt because their sales are denominated in U.S. dollars but their costs are in Canadian currency. The loonie's soaring value has cut deeply into such export-oriented firms' profit margins. And pity Canada's Christmas tree growers. They normally greet the yuletide season with a hearty, "Merry Christmas," exporting in a typical year some 2.5 million trees to the United States. But the loonie's rise has changed that to "Bah, humbug," as Canadian Christmas tree exports to the United States have fallen by 20 percent, forcing some firms, such as Kirk Forest Products of Nova Scotia, out of business and slashing the profits of most other Canadian growers.[1] ■

One factor that obviously distinguishes international business from domestic business is the use of more than one currency in commercial transactions. If Marks and Spencer, one of the United Kingdom's leading department stores, purchases kitchen appliances from a British supplier, that is a domestic transaction that will be completed entirely in pounds. However, if Marks and Spencer chooses to purchase the appliances from Michigan-based Whirlpool Corporation, this international transaction will require some mechanism for exchanging pounds (Mark and Spencer's home currency) and U.S. dollars (Whirlpool's home currency). The foreign-exchange market exists to facilitate this conversion of currencies, thereby allowing firms to conduct trade more efficiently across national boundaries. The foreign-exchange market also facilitates international investment and

capital flows. Firms can shop for low-cost financing in capital markets around the world and then use the foreign-exchange market to convert the foreign funds they obtain into whatever currency they require. But changes in exchange rates also affect the prices that consumers pay, the markets in which they shop, and the profits of firms, as the opening case indicates.

The Economics of Foreign Exchange

Foreign exchange is a commodity that consists of currencies issued by countries other than one's own. Like the prices of other commodities, the price of foreign exchange—given a flexible exchange rate system—is set by demand and supply in the marketplace.

Let us look more closely at what this means by using the market between U.S. dollars and Japanese yen as an example. Figure 8.1 presents the demand curve for Japanese yen. Economists call this demand curve a *derived demand* curve because the demand for yen is derived from foreigners' desire to acquire Japanese goods, services, and assets. To buy Japanese goods, foreigners first need to buy Japanese yen. Like other demand curves, it is downward sloping, so as the price of the yen falls, the quantity of yen demanded increases. This is shown as a movement from point A to point B on the demand curve.

Figure 8.2 presents the supply curve for yen. Underlying the supply curve for yen is the desire by the Japanese to acquire foreign goods, services, and assets. To buy foreign products, Japanese need to obtain foreign currencies, which they do by selling yen and using the proceeds to buy the foreign currencies. Selling yen has the effect of supplying yen to the foreign-exchange market. As with other goods, as the price of the yen rises, the quantity supplied also rises; you can see this when you move from point A to point B along the supply curve in Figure 8.2. The supply curve for the yen thus behaves like most other supply curves: People offer more yen for sale as the price of the yen rises.[2] Figure 8.3 depicts the determination of the equilibrium price

FIGURE 8.1

The Demand for Japanese Yen is Derived from Foreigners' Demand for Japanese Products

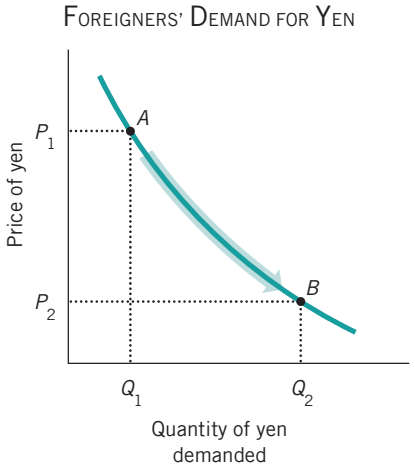
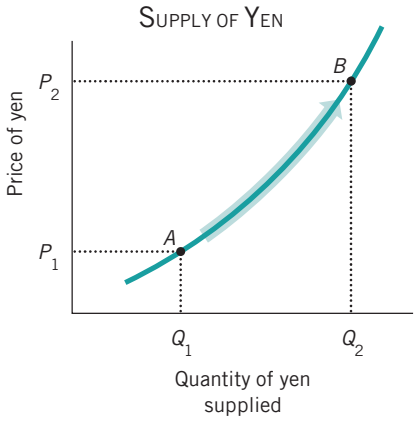


FIGURE 8.2

The Supply of Yen is Derived from Japanese Demand for Foreign Products



The Structure of the Foreign-Exchange Market

The foreign-exchange market comprises buyers and sellers of currencies issued by the world's countries. Anyone who owns money denominated in one currency and wants to convert that money to a second currency participates in the foreign-exchange market. Pakistani tourists exchanging rupees for British pounds at London's Heathrow Airport use the foreign-exchange market, as does Toyota when it exports automobiles to Canada from its factories in Japan, and the British government when it arranges a multimillion-pound loan to rebuild the monsoon-ravaged economy of Bangladesh. The world wide volume of foreign-exchange trading is estimated at $5.3 trillion per day. Foreign exchange is being traded somewhere in the world every minute of the day (see Map 8.1). The largest foreign-exchange market is in London, followed by New York, Singapore, and Tokyo. As Figure 8.5 indicates, approximately 87 percent of the transactions involve the U.S. dollar, a dominance stemming from the dollar's role in the Bretton Woods system. Because the dollar is used to facilitate most currency exchange, it is known as the primary **transaction currency** for the foreign-exchange market.

The Role of Banks

The foreign-exchange departments of large international banks such as JPMorgan Chase, Barclays, and Deutsche Bank in major financial centers such as New York, London, Tokyo, Singapore, and Hong Kong play a dominant role in the foreign-exchange market. These banks stand ready to buy or sell the major traded currencies. They profit from the foreign-exchange market in several ways. Much of their profits come from the spread between the bid and ask prices for foreign exchange. Suppose JPMorgan Chase buys 10 million Swiss francs (SwFr) from one customer at a price of SwFr 1.649/$1 and sells those Swiss francs to a second customer at SwFr 1.648/$1; JPMorgan Chase makes $3,679.78. (Get out your calculator and do the arithmetic! JPMorgan Chase buys the Swiss francs for 10,000,000 ÷ 1.649, or $6,064,281.38, and sells them for 10,000,000 ÷ 1.648, or $6,067,961.16, thereby earning a profit of $3,679.78.) Sometimes international banks act as speculators, betting that they can guess in which direction exchange rates are headed. Such speculation can be enormously profitable, although it is always risky. And, as discussed later in this chapter, banks also may act as arbitrageurs in the foreign-exchange market.

International banks are key players in the wholesale market for foreign exchange, dealing for their own accounts or on behalf of large commercial customers. Interbank transactions, typically involving at least $1 million (or the foreign currency equivalent), account for a majority of foreign-exchange transactions. Corporate treasurers, pension funds, hedge funds, and insurance companies are also major players in the foreign exchange market. Banks and institutional investors in one market are in constant contact with their counterparts in other markets to seek the best currency prices. Online currency trading is a growing component of this market, as is the role of institutional investors like hedge funds and mutual funds.[3] International banks also play a key role in the retail market for foreign exchange, dealing with individual customers who want to buy or sell foreign currencies in large or small amounts. Typically, the price paid by retail customers for foreign exchange is the prevailing wholesale exchange rate plus a premium. The size of the premium is in turn a function of the size of the transaction and the importance of the customer to the bank. A Danish music store chain that needs $50,000 to pay for 10,000 compact discs of Lady Gaga's or M.I.A.'s latest release will pay a higher premium for its foreign currency than will General Motors when it needs £20 million to repay British investors. And of course, foreign tourists cashing in a traveler's check for local currency at a bank or exchange office or using an automatic teller machine pay an even higher premium.

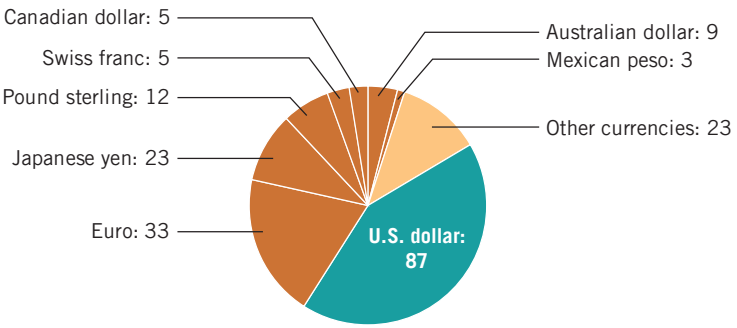
The clients of the foreign-exchange departments of banks fall into several categories:

- *Commercial customers* engage in foreign-exchange transactions as part of their normal commercial activities, such as exporting or importing goods and services, paying or receiving dividends and interest from foreign sources, and purchasing or selling foreign assets and investments. Some commercial customers may also use the market to hedge, or reduce, their risks as a result of potential unfavorable changes in foreign-exchange rates for moneys to be paid or received in the future.
- *Speculators* deliberately assume exchange rate risks by acquiring positions in a currency, hoping that they can correctly predict changes in the currency's market value. Foreign-exchange speculation can be lucrative if one guesses correctly, but it is also extremely risky.

FIGURE 8.5

Currencies Involved in Foreign-Exchange Market Transactions

Source: Based on data from Bank for International Settlements, *Triennial Central Bank Survey*: Foreign exchange turnover in April 2013: preliminary global results (September 2013, p. 12).



- *Arbitrageurs* attempt to exploit small differences in the price of a currency between markets. They seek to obtain riskless profits by simultaneously buying the currency in the lower-priced market and selling it in the higher-priced market.

Countries' central banks and treasury departments are also major players in the foreign-exchange market. As discussed in Chapter 7, under the gold standard and the Bretton Woods system, a country's central bank was required to intervene in the foreign-exchange market to ensure that the market value of the country's currency approximated the currency's par value. Countries that have chosen to peg their currencies to that of another country must do the same. And, of course, central banks of countries that allow their currencies to float are free to intervene in the foreign-exchange market to influence the market values of their currencies if they so desire.

Active markets exist for relatively few pairs of currency other than those involving the U.S. dollar, the euro, the British pound, and the Japanese yen. Suppose a Swedish knitting mill needs New Zealand dollars to pay for 100,000 pounds of merino wool. The foreign-exchange market between the Swedish krona and the New Zealand dollar is small—in fact, no active market exists for the direct exchange of these two currencies. Usually, the U.S. dollar would be used as an intermediary currency to facilitate this transaction. The knitting mill's Swedish banker would obtain the necessary New Zealand dollars by first selling Swedish krona to obtain U.S. dollars and then selling the U.S. dollars to obtain New Zealand dollars. Such transactions are routine for international banks.

Domestic laws may constrain the ability to trade a currency in the foreign-exchange market. Currencies that are freely tradable are called **convertible currencies**. Also called **hard currencies**, these include the euro, the British pound, the Swedish krona, the Canadian dollar, the Australian dollar, the Swiss franc, the Japanese yen, and the U.S. dollar. Currencies that are not

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A BRIEF HINT

Not everyone reading this book is a finance major. Some readers may have difficulty with the concept of using money to buy money and what is meant by a currency's value rising or falling. If you are having trouble with this, here is a simple trick. In Figure 8.3 replace the currency that is being bought and sold with the phrase "loaf of bread" (or the name of any other tangible good). If you do this, then the vertical axis is the price in dollars of one unit of bread and the horizontal axis is the quantity of bread sold—a standard supply and demand graph that you encountered in your basic economics course. Nothing has changed in the supply and demand graph except the label. Think about this until you feel comfortable with the notion that yen are merely a good, like bread or widgets.

As you read the rest of this book, if you get confused about what is up and what is down when we say a currency is rising or falling in value, you can use the same trick. For example, suppose on Monday the British pound is worth $2.01 and on Tuesday it is worth $2.02. From Monday to Tuesday the pound rose in value, whereas the dollar fell in value. If that is obvious to you, fine. If it is not, substitute "a loaf of bread" for "pound." A statement about this example would then read, "On Monday a loaf of bread is worth $2.01, and on Tuesday a loaf of bread is worth $2.02." The conclusion is that a loaf of bread has gone up in value because more dollars are needed to buy it on Tuesday. Conversely, you can say the dollar has gone down in value because each dollar on Tuesday buys less bread.

This Tel Aviv foreign-exchange trader is an important link in the $5.3 trillion-per-day global foreign exchange market. The largest center for foreign exchange trading is London, followed by New York and Singapore.

Dan Silverman/Getty Images

freely tradable because of domestic laws or the unwillingness of foreigners to hold them are called **inconvertible currencies** or **soft currencies**. The currencies of many developing countries fall in the soft category.

Spot and Forward Markets

Many international business transactions involve payments to be made in the future. Such transactions include lending activities and purchases on credit. Because changes in currency values are common, such international transactions would appear to be risky in the post–Bretton Woods era. How can a firm know for sure the future value of a foreign currency? Fortunately, in addition to its geographic dimension, the foreign-exchange market also has a time dimension. Currencies can be bought and sold for immediate delivery or for delivery at some point in the future. The **spot market** consists of foreign-exchange transactions that are to be consummated immediately. (*Immediately* is normally defined as two days after the trade date because of the time historically needed for payment to clear the international banking system.) Spot transactions account for 38 percent of all foreign-exchange transactions.

The **forward market** consists of foreign-exchange transactions that are to occur sometime in the future. Prices are often published for foreign exchange that will be delivered one month, three months, and six months in the future. For example, on Wednesday, July 17, 2013, the spot price of the British pound was $1.5212, whereas the forward price for pounds for delivery in one month was $1.5209 and for delivery in six months was $1.5196.

Currency	U.S. $ equiv.		per U.S. $	
	Wed.	Tues.	Wed.	Tues.
Britain (Pound)	1.5212	1.5159	0.6574	0.6597
1-month Forward	1.5209	1.5155	0.6575	0.6598
3-month Forward	1.5203	1.5149	0.6578	0.6601
6-month Forward	1.5196	1.5142	0.6581	0.6604

Many users of the forward market engage in swap transactions. A **swap transaction** is a transaction in which the same currency is bought and sold simultaneously, but delivery is made at two different points in time. For example, in a typical "spot against forward" swap, a U.S. manufacturer borrowing £10 million from a British bank for one month but needing dollars will

(Because the example calls for a three-month forward rate, n equals 4; there are 4 three-month periods in a year.) Thus,

$$\text{Annualized forward premium or discount} = \frac{\$1.5203 - \$1.5212}{\$1.5212} \times 4$$
$$= -.0024 = -.24\%$$

Because the equation results in a negative number, the pound is selling at a forward discount. Had the forward price of the pound been higher than the spot price (using the direct quote), the sign of the equation would have been positive and the formula would have yielded the annualized forward premium for the pound.

The forward price represents the marketplace's aggregate prediction of the spot price of the exchange rate in the future. Thus, the forward price helps international businesspeople forecast future changes in exchange rates. These changes can affect the price of imported components as well as the competitiveness and profitability of the firm's exports. If a currency is selling at a forward discount, the foreign-exchange market believes that the currency will depreciate over time. Firms may want to reduce their holdings of assets or increase their liabilities denominated in such a currency. The currencies of countries suffering balance of payment (BOP) trade deficits or high inflation rates often sell at a forward discount. Conversely, if a currency is selling at a forward premium, the foreign-exchange market believes the currency will appreciate over time. Firms may want to increase their holdings of assets and reduce their liabilities denominated in such a currency. The currencies of countries enjoying BOP trade surpluses or low inflation rates often sell at a forward premium. Thus, the difference between the spot and forward prices of a country's currency often signals the market's expectations regarding that country's economic policies and prospects.

Arbitrage and the Currency Market

Another important component of the foreign-exchange market is arbitrage activities. **Arbitrage** is the riskless purchase of a product in one market for immediate resale in a second market to profit from a price discrepancy. We explore two types of arbitrage activities that affect the foreign-exchange market: arbitrage of goods and arbitrage of money.

ARBITRAGE OF GOODS—PURCHASING POWER PARITY Underlying the arbitrage of goods is a simple notion: If the price of a good differs between two markets, people will tend to buy the good in the market offering the lower price, the "cheap" market, and resell it in the market offering the higher price, the "expensive" market. Under the *law of one price*, such arbitrage activities will continue until the price of the good is identical in both markets (excluding transactions costs, transportation costs, taxes, and so on). This notion induced purchasing agents for Galeries Lafayette to buy clock radios in Japan and export them to France in the example in Chapter 6.

The arbitrage of goods across national boundaries is represented by the **theory of purchasing power parity (PPP)**. This theory states that the prices of tradable goods, when expressed in a common currency, will tend to equalize across countries as a result of exchange rate changes. PPP occurs because the process of buying goods in the cheap market and reselling them in the expensive market affects the demand for, and thus the price of, the foreign currency, as well as the market price of the good itself in the two product markets in question. For example, assume the exchange rate between U.S. and Canadian dollars is U.S. \$0.80 = Can \$1. Suppose Levi's jeans sell for U.S. \$48 in the United States and Can \$60 in Canada. PPP would exist in this case. At the existing exchange rate

$$\frac{\text{U.S. } \$0.80}{\text{Can } \$1} \times \text{Can } \$60 = \text{U.S. } \$48.$$

Thus, the Levi's jeans are the same price in both markets (expressed in either U.S. or Canadian dollars), and neither U.S. nor Canadian residents would have any reason to cross their shared border to purchase the jeans in the other country.

Now suppose Canadian firms decide to increase their investments in Mexico as a result of opportunities created by the North American Free Trade Agreement (NAFTA). As Canadians sell their currency to buy Mexican pesos, they increase the supply of Canadian dollars in the foreign-exchange market, causing the value of the Canadian dollar to fall. Suppose the new exchange rate between U.S. and Canadian dollars is U.S. \$0.60 = Can \$1. PPP would no longer exist. At this

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THE BIG MAC INDEX

Country	Price of a Big Mac: in local currency	Price of a Big Mac: in U.S. dollars	Implied exchange rate for PPP to exist	Actual exchange rate July 22, 2013	Under (–) or over (+) valuation versus the U.S. dollar
United States	$4.56	$4.56	—	—	—
Argentina	Peso 21	3.85	4.61	5.46	–16%
Australia	A$5.04	4.66	1.11	1.08	2%
Brazil	Real 12	5.37	2.63	2.23	18%
Britain	£2.69	4.13	0.59	0.65	–9%
Canada	C$5.53	5.35	1.21	1.03	17%
Chile	Peso 2000	3.97	439	504	–13%
China	Yuan 16	2.61	3.51	6.14	–43%
Colombia	Peso 8600	4.57	1886.0	1882.3	0%
Costa Rica	Colones 2150	4.31	471.5	498.6	–5%
Czech Republic	Koruna 70.45	3.58	15.45	19.66	–21%
Denmark	DK 28.50	5.04	6.25	5.66	10%
Egypt	Pound 16.75	2.39	3.67	7.00	–48%
Euro area	€ 3.62	4.78	0.79	0.76	5%
Hong Kong	HK$ 17	2.19	3.73	7.76	–52%
Hungary	Forint 860	3.85	188.6	223.1	–15%
India	Rupee 90	1.51	19.74	59.73	–67%
Indonesia	Rupiah 27939	2.78	6127	10065	–39%
Israel	Shekel 17.50	4.90	3.84	3.57	8%
Japan	¥320	3.21	70.18	99.67	–30%
Latvia	Lats 1.69	3.18	0.371	0.532	–30%
Lithuania	Litas 8.60	3.29	1.886	2.617	–28%
Malaysia	Ringgit 7.30	2.30	1.60	3.18	–50%
Mexico	Peso 37	2.96	8.11	12.50	–35%
New Zealand	NZ$5.50	4.38	1.21	1.26	–4%
Norway	Kroner 46	7.75	10.09	5.93	70%
Pakistan	Rupee 300	2.98	65.8	100.6	–35%
Peru	Sol 10	3.61	2.193	2.767	–21%
Philippines	Peso 115.21	2.66	25.27	43.24	–42%
Poland	Zloty 9.20	2.88	2.02	3.19	–37%
Russia	Rouble 87	2.69	19.08	32.34	–41%
Saudi Arabia	Riyal 10	2.67	2.19	3.75	–42%
Singapore	S$4.70	3.73	1.03	1.26	–18%
South Africa	Rand 18.33	1.87	4.02	9.81	–59%
South Korea	Won 3900	3.49	855.3	1118.9	–24%
Sri Lanka	Rupee 370	2.81	81.14	131.5	–38%
Sweden	SKr 41.61	6.41	9.13	6.49	41%
Switzerland	SFr 6.50	6.94	1.43	0.94	52%
Taiwan	NT$ 79	2.64	17.3	29.9	–42%
Thailand	Baht 89	2.88	19.5	30.9	–37%
Turkey	Lira 8.50	4.45	1.86	1.91	–2%
UAE	Dirhams 12	3.27	2.63	3.67	–28%
Ukraine	Hryvnia 19	2.33	4.17	8.14	–49%
Uruguay	Peso 105	5.02	23.0	20.9	10%
Venezuela	Bolivar 45	7.09	9.87	6.35	55%

Sources: Based on data from www.economist.com, accessed July 23, 2013; *Wall Street Journal,* July 23, 2013, p. C5; *Houston Chronicle*, July 23, 2013, p. B7; *Financial Times*, July 23, 2013, p. 19; www.exchangerates.org.uk, accessed July 23, 2013.

What happens in the two lending markets and the foreign-exchange market when such arbitrage occurs? When funds are transferred from New York to London, interest rates will rise in New York because the supply of lendable money in New York decreases. Interest rates will fall in London because the supply of lendable money increases there. In the spot market the demand for pounds increases, thereby raising the spot price of pounds. In the three-month forward market the supply of pounds increases, thereby lowering the forward price of pounds. Lendable funds will continue to flow from New York to London until the return on the covered investment is the same in London as it is in New York. Only then will all possibilities for profitable covered-interest arbitrage be exhausted. ("Venturing Abroad" discusses the growing role of uncovered interest arbitrage, known as the carry trade.)

Returns to international investors will be equal—and arbitrage-driven, short-term international capital flows will end—when the interest rate difference between the two markets equals the three-month forward discount on the pound. Said another way, covered-interest arbitrage will end if the gains investors capture from the higher interest rates in the London market are just offset by the exchange rate losses they suffer from the conversion of their dollars to pounds today and reconversion of their pounds back to dollars in three months. (Note that the pound's forward discount measures in percentage terms the exchange rate loss on this "spot against forward" swap transaction.)

The short-term capital flows that result from covered-interest arbitrage are so important to the foreign-exchange market that, in practice, the short-term interest rate differential between two countries determines the forward discount or forward premium on their currencies.

This last statement raises another question: Why should interest rates vary among countries in the first place? Addressing this question in 1930, Yale economist Irving Fisher demonstrated that a country's nominal interest rate reflects the real interest rate (which he assumed to be constant across countries) plus expected inflation in that country. National differences in expected inflation rates thus yield differences in nominal interest rates among countries, a phenomenon known as the **international Fisher effect**. Because of the international Fisher effect and covered-interest arbitrage, an increase in a country's expected inflation rate implies higher interest rates in that country. This in turn will lead to either a shrinking of the forward premium or a widening of the forward discount on the country's currency in the foreign-exchange market. Because of this linkage between inflation and expected changes in exchange rates, international businesspeople and foreign currency traders carefully monitor countries' inflation trends. The connection between inflation and exchange rates also affects the international monetary system. For example, a fixed exchange rate system functions poorly if inflation rates vary widely among countries participating in the system.

In summary, arbitrage activities are important for several reasons. Arbitrage constitutes a major portion of the $5.3 trillion in currencies traded globally each working day. It affects the supply and demand for each of the major trading currencies. It also ties together the foreign-exchange markets, thereby overcoming differences in geography (two-point arbitrage), currency type (three-point arbitrage), and time (covered-interest arbitrage). Arbitrage truly makes the foreign-exchange market global.

In Practice

- Large international banks play a critical role in both the wholesale and retail components of the foreign exchange market.
- Much of the enormous daily turnover ($5.3 trillion a day) in the foreign exchange market is the result of arbitrage activities.

For further consideration: What would be the impact on international trade if the foreign exchange market became inefficient and costly to use?

The International Capital Market

Not only are international banks important in the functioning of the foreign-exchange market and arbitrage transactions, but they also play a critical role in financing the operations of international businesses, acting as both commercial bankers and investment bankers. As commercial bankers, they finance exports and imports, accept deposits, provide working capital loans, and

VENTURING ABROAD

THE CARRY TRADE

Although covered-interest arbitrage is an important component of the foreign-exchange market, uncovered-interest arbitrage—the so-called **carry trade**—is a growing phenomenon. The carry trade tries to exploit differences in the interest rates between countries. Because Japan's interest rates have been among the lowest of the major trading nations, the yen is a favorite currency of the carry trade. The strategy is simple: Borrow yen at a low interest rate, and use the borrowed yen to buy bonds, notes, or certificates of deposit denominated in currencies that are paying higher interest rates, such as the Australian dollar or the New Zealand dollar. The strategy is risky: If the yen rises in value relative to the second currency, the carry trader can lose lots of money very quickly. Some experts have compared it to picking up nickels in front of a moving steamroller—easy money, as long as nothing goes wrong. In their view, the carry trade is high risk, low reward.

Nonetheless, investors and speculators are often seduced by the lure of the carry trade, particularly in times of low volatility in the foreign-exchange market. FX Concepts, a $13 billion New York–based hedge fund, often invests in the carry trade. A few years ago, it borrowed yen, paying an interest rate of less than 1 percent, and invested them in Australian- and New Zealand-dollar based securities yielding 6 to 8 percent. But the carry trade has also enticed less professional investors as well. Trying to escape the low interest rates offered by Japanese banks, tens of thousands of Japanese married women, who by custom manage their households' finances, routinely trade currencies and engage in carry trade transactions using online trading platforms. A cottage industry of investing clubs, books, and online blogs has mushroomed to aid these legions of housewife currency traders. All told, private Japanese investors were estimated to account for 30 percent of the spot trading in the yen, 5 percent of trading in the Australian dollar, and 4 percent in the British pound in a recent year.

Volatile currency markets are poisonous to the carry trade. For instance, as the problems with subprime mortgages became more widely known during the summer of 2007, the currency and capital markets became increasingly skittish. During one week in August 2007, the yen rose 4 percent versus the U.S. dollar, 9 percent against the Australian dollar, and 11 percent relative to the New Zealand dollar. When the yen began to rise, many carry traders tried to cut their losses by buying yen to close out their open positions. The sudden deluge of buy orders elevated the yen's value, worsening the squeeze on the carry traders. Private online Japanese currency traders lost an estimated $2.5 billion that month.

Sources: "Forex tips from the Far East," *Wall Street Journal*, February 25, 2011; "Japan limits Forex trades of 'Mrs Watanabes'," *Financial Times*, August 2, 2010, p. 13; "In Japan, currency traders stay in game," *Wall Street Journal*, November 28, 2008; "Japanese housewives sweat in secret as markets reel," *New York Times*, September 16, 2007 (online); "Currency 'carry trade' becomes harder play amid aversion to risk," *Wall Street Journal*, August 18, 2007, p. B1; "Japan faces scrutiny over carry trade," *Financial Times*, August 2, 2007 (online); "Two-thirds of a problem," *Financial Times*, July 1, 2007 (online).

offer sophisticated cash management services for their clients. As investment bankers, they may underwrite or syndicate local, foreign, or multinational loans and broker, facilitate, or even finance mergers and joint ventures between foreign and domestic firms. The big international banks are continually developing new products to meet the needs of borrowers worldwide. Unfortunately, market participants may not fully appreciate the risks inherent in some of these new financial instruments, which contributed to the depth and breadth of the Global Recession in 2008–2009.

Major International Banks

The international banking system is centered in large money market banks headquartered in the world's financial centers—Japan, the United States, and the European Union. These banks are involved in international commerce on a global scale (see Table 8.1).

International banking takes many forms. Originally, most international banking was done through reciprocal correspondent relationships among banks located in different countries. A **correspondent relationship** is an agent relationship whereby one bank acts as a correspondent, or agent, for another bank in the first bank's home country, and vice versa. For example, a U.S. bank could be the correspondent for a Danish bank in the United States, while the Danish bank could be the U.S. bank's correspondent in Denmark. Services performed by correspondent banks include paying or collecting foreign funds, providing credit information, and honoring letters of credit. To facilitate these transactions, each bank maintains accounts at the other bank denominated in the local currency.

As the larger banks have internationalized their operations, they have increasingly provided their own overseas operations, rather than using correspondent banks, to improve their ability to compete internationally. A bank that has its own foreign operations is better able to access new sources of deposits and profitable lending opportunities. Equally important, as its domestic clients internationalize, the bank can better meet those clients' international banking needs. Thus, it retains the international business of its domestic clients and reduces the risk that some other international bank will steal them away.

The Eurocurrency Market

Another important facet of the international financial system is the Eurocurrency market. Originally called the Eurodollar market, the Eurocurrency market originated in the early 1950s when the communist-controlled governments of Central Europe and Eastern Europe needed dollars to finance their international trade but feared that the U.S. government would confiscate or block their holdings of dollars in U.S. banks for political reasons. The communist governments solved this problem by using European banks that were willing to maintain dollar accounts for them. Thus, **Eurodollars**—U.S. dollars deposited in European bank accounts—were born. As other banks worldwide, particularly in Canada and Japan, began offering dollar-denominated deposit accounts, the term *Eurodollar* evolved to mean U.S. dollars deposited in any bank account outside the United States. As other currencies became stronger in the post–World War II era—particularly the yen, the pound, and the German mark—the Eurocurrency market broadened to include Euroyen, Europounds, and other currencies. Today a **Eurocurrency** is defined as a currency on deposit outside its country of issue.

The Euroloan market has grown up with the Eurocurrency market. The Euroloan market is extremely competitive, and lenders operate on razor-thin margins. Euroloans are often quoted on the basis of the **London Interbank Offer Rate (LIBOR)**, the interest rate that London banks charge each other for short-term Eurocurrency loans. The Euroloan market is often the low-cost source of loans for large, creditworthy borrowers, such as governments and large multinational enterprises (MNEs), for three reasons. First, Euroloans are free of costly government banking regulations, such as reserve requirements, that are designed to control the domestic money supply but that drive up lending costs. Second, Euroloans involve large transactions, so the average cost of making the loans is lower. Third, because only the most creditworthy borrowers use the Euroloan market, the risk premium that lenders charge also is lower.

During the 1970s, U.S. banks complained that reserve requirements and other expensive regulations imposed by the Federal Reserve Board prevented them from competing with European and Asian banks in issuing dollar-denominated international loans, which at the time accounted for more than half of the Euroloan market. Foreign banks lending in Eurodollars were not subject to the regulations. To counter this problem, in 1981 the Federal Reserve Board authorized the creation of international banking facilities. An **international banking facility (IBF)** is an entity of a U.S. bank that is legally distinct from the bank's domestic operations and that may offer only international banking services. IBFs do not need to observe the numerous U.S. domestic banking regulations. Of course, the Federal Reserve Board has issued various regulations to ensure that IBFs do not engage in domestic banking services. For example, IBFs may accept deposits from or make loans to only non–U.S. residents. Nonetheless, IBFs enable U.S. banks to compete with other international bankers on a more equal footing in the critical Euroloan market.

The International Bond Market

The international bond market represents a major source of debt financing for the world's governments, international organizations, and larger firms. This market has traditionally consisted of two types of bonds: foreign bonds and Eurobonds. **Foreign bonds** are bonds issued by a resident of country A but sold to residents of country B and denominated in the currency of country B. For example, the Nestlé Corporation, a Swiss resident, might issue a foreign bond denominated in yen and sold primarily to residents of Japan. A **Eurobond** is a bond issued in the currency of country A but sold to residents of other countries. For example, American Airlines could borrow $500 million to finance new aircraft purchases by selling Eurobonds denominated in dollars to residents of Denmark and Germany. The euro and the U.S. dollar are the dominant currencies in the international bond market (see Figure 8.7).

As the global capital market has evolved, the international bond market has grown increasingly sophisticated. Syndicates of investment banks, securities firms, and commercial banks put together complex packages of international bonds to serve the borrowing needs of large, creditworthy borrowers, such as major MNEs, national governments, and international organizations. The global bond is one such innovative financial instrument. A **global bond** is a large, liquid financial asset that can be traded anywhere at any time. Its use was pioneered by the World Bank, which simultaneously sold $1.5 billion of U.S. dollar–denominated global bonds in North America,

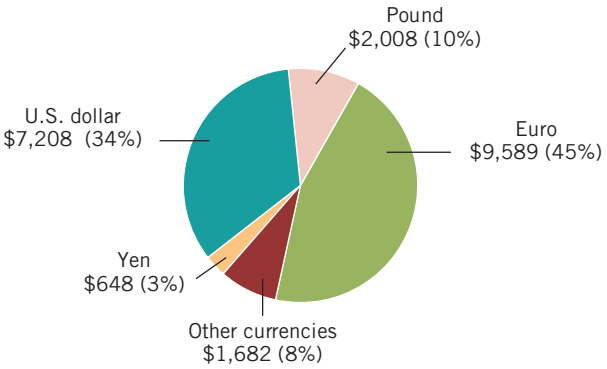

FIGURE 8.7

International Bonds and Notes Outstanding in December 2012, by Currency (in billions of U.S. dollars)

Source: Based on data from Bank of International Settlements, "International bonds and notes, Table 13B," *BIS Quarterly Review*, March 2013, p. A124.

Europe, and Japan and succeeded in lowering its interest costs on the bond issue by about 0.225 percentage point. Although 0.225 percentage point may not seem like much, multiplying that amount by $1.5 billion reveals that the bank reduced its annual financing costs by $3,375,000. Attracted by the World Bank's success, many other large organizations, such as Matsushita Electric, the Province of Ontario, Citicorp, and Household Finance, have also issued global bonds.

Other innovative opportunities exist in the bond market. For example, at the borrower's option, bond interest may be paid in one currency and the principal paid in another currency. Or the borrower may secure a lower interest rate by offering inflation protection that pegs the principal repayment to the value of gold or special drawing rights.

Like the Euroloan market, the international bond market is highly competitive, and borrowers are often able to obtain funds on favorable terms. Large transaction sizes, creditworthy borrowers, and freedom from costly regulations imposed on domestic capital markets all help to lower the interest rates charged on such loans.

Global Equity Markets

The growing importance of multinational operations and improvements in telecommunications technology has also made equity markets more global. Start-up companies are no longer restricted to raising new equity solely from domestic sources. For example, Swiss pharmaceutical firms are a major source of equity capital for new U.S. biotechnology firms. Established firms also tap into the global equity market. When expanding into a foreign market, a firm may choose to raise capital for its foreign subsidiary in the foreign market. The Walt Disney Company, for example, initially sold 51 percent of its Disneyland Paris project to French investors. Numerous MNEs also cross-list their common stocks on multiple stock exchanges. Toyota, for instance, is listed on the Tokyo, London, and New York stock exchanges, thereby enabling Asian, European, and U.S. investors to purchase its shares conveniently. Another innovation is the development of country funds. A **country fund** is a mutual fund that specializes in investing in a given country's firms.

The globalization of equity markets has been facilitated by the globalization of the financial services industry. Most major financial services firms, such as Merrill Lynch, Daiwa Securities, and Deutsche Bank, have expanded operations from their domestic bases into the major international financial centers. These financial services firms are eager to raise capital, provide investment advice, offer stock market analyses, and put together financing deals for clients anywhere around the world.

Offshore Financial Centers

Offshore financial centers focus on offering banking and other financial services to nonresident customers. Many of these centers are located on island states, such as the Bahamas, Bahrain, the Cayman Islands, Bermuda, Curaçao, and Singapore. Luxembourg and Switzerland, although not islands, are also important "offshore" financial centers.

MNEs often use offshore financial centers to obtain low-cost Eurocurrency loans. Many MNEs locate financing subsidiaries in these centers to take advantage of the benefits they offer: political stability, a regulatory climate that facilitates international capital transactions, excellent communications links to other major financial centers, and availability of legal, accounting, financial, and other expertise needed to package large loans. The efficiency of offshore financial centers in attracting deposits and then lending these funds to customers worldwide is an important factor in the growing globalization of the capital market.

Tourists flock to explore the picture postcard-pretty streets of Willemstad, the capital of Çuracao. But Çuracao is also an important offshore financial center, providing quick and efficient service to individuals and companies seeking to open offshore bank accounts that feature tax efficiency and confidentiality.

Michael Pustay

In Practice

- Large international banks play a major role in the globalization of capital markets. Firms seeking to raise capital in the global bond or global equity markets often rely on the expertise of these banks.
- Eurocurrencies have facilitated growth in the euroloan market, which is often the best source of low cost loans for credit-worthy borrowers.

For further consideration: Analyze Table 8.1. Are you surprised by the nationalities of the banks in this list? If so, why?

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CHAPTER REVIEW

Summary

A currency's price in the foreign-exchange market is determined by the interaction of the demand for and supply of the currency. Underlying the demand for a particular currency is the desire of foreigners to buy goods, services, and assets of the issuing country. Underlying the supply is the desire of residents to purchase goods, services, and assets owned by foreigners.

Major international banks in financial centers such as London, Hong Kong, Singapore, Tokyo, and New York City

play a critical role in the functioning of the foreign-exchange market. Key players in the wholesale market, these banks account for the vast majority of foreign-exchange transactions. In serving their clients' needs, the banks are also an important component of the retail market. They assist commercial customers, speculators, and arbitrageurs in acquiring foreign currency on both the spot and forward markets.

An important feature of the foreign-exchange market is its time dimension. International businesses may buy currency in the spot market for immediate delivery or in the forward market for future delivery. The forward market, currency futures, and currency options enable firms to protect themselves from unfavorable future exchange rate movements.

Arbitrage activities affect the demand for and supply of foreign exchange. The theory of purchasing power parity states that the prices of tradable goods will tend to equalize among countries. Arbitrage of foreign exchange itself is even more important. Two-point arbitrage implies that the exchange rate between two currencies will be the same in all geographic markets. Three-point arbitrage links individual foreign-exchange markets together. Covered-interest arbitrage causes geographic differences in interest rates to equal differences between spot and forward exchange rates.

The international capital market is growing in sophistication as a result of technological advances in telecommunications and computers. Major international banks may still use their traditional correspondent relationships with other banks but are also increasingly engaged in overseas bank operations themselves. The Eurocurrency market allows banks of any country to conduct lending operations in whatever currencies their clients require. MNEs now commonly raise capital, both debt and equity, on a global basis, wherever its cost is lowest.

Review Questions

8-1. What determines the demand for any given currency in the foreign-exchange market?
8-2. What determines the supply of any given currency in the foreign-exchange market?
8-3. How are prices established in the foreign-exchange market?
8-4. What is the role of international banks in the foreign-exchange market?
8-5. Explain the different techniques that firms can use to protect themselves from future changes in exchange rates.
8-6. Discuss the major types of arbitrage activities that affect the foreign-exchange market.
8-7. Explain what hedging is, and why it is commonly used by companies in international business.
8-8. What is arbitrage? Give examples.
8-9. Explain the function of Eurocurrency and its use in international transactions.

Questions for Discussion

8-10. The European Central Bank is in charge of Euro's interest rates. How does its policy affect the European economy?
8-11. How important are communications and computing technologies to the smooth functioning of the foreign-exchange market? If the technological advances of the past four decades were eliminated—for example, no PCs or satellite telecommunications—how would the foreign-exchange market be affected?
8-12. Do you expect the U.S. dollar to maintain its position as the dominant currency in the foreign-exchange market or will the euro or the Chinese yuan supplant it? Explain your answer.
8-13. Suppose the spot pound and the three-month forward pound are both selling for $2.00, while U.S. interest rates are 10 percent and British interest rates are 6 percent. Using covered-interest arbitrage theory, describe what will happen to the spot price of the pound, the three-month forward price of the pound, interest rates in the United States, and interest rates in the United Kingdom when arbitrageurs enter this market.
8-14. How important is the creation of international banking facilities to the international competitiveness of the U.S. banking industry?
8-15. What would be the impact on world trade and investment if there were only one currency?

Building Global Skills

Please refer to Figure 8.4 to answer the following questions:
8-16. What is the spot rate for the British pound on Wednesday in terms of the U.S. dollar? (Or, stated differently, how many dollars does a pound cost? Or, from the U.S. perspective, what is the direct quote on pounds?)
8-17. What is the spot price for the dollar on Wednesday in terms of the Swiss franc? (Or, from the U.S. perspective, what is the indirect rate on Swiss francs?)
8-18. Calculate the cross rate of exchange between the British pound and the Swiss franc.

8-19. Calculate the annualized forward premium or discount on six-month forward yen.
8-20. What are the decisions that need to be made when buying a currency? Illustrate your answer with examples.
8-21. According to the covered-interest arbitrage theory, is the United States or Japan expected to have higher interest rates?
8-22. According to the covered-interest arbitrage theory, what is the expected difference between interest rates in the United States and Japan?
8-23. What is the equation linking interest rates and inflation in a country? Discuss an example.
8-24. Did the value of the Canadian dollar rise or fall between Tuesday and Wednesday?

CLOSING CASE What Is Next for Chinese Manufacturing?

China's successful industrialization and remarkable economic development in the decades following Mao-Tse Tung's death in 1976 provides a wonderful example of the theory of competitive advantage and the Heckscher-Ohlin theorem discussed in Chapter 6. The economic policies championed by Deng Xiaoping and his successors have unleashed the entrepreneurial talents of Chinese businesspeople and unshackled millions of Chinese peasants from the chains of rural poverty.

This economic miracle was in large part due to the low wages that were paid to Chinese workers and the adoption of foreign technology, often transferred through foreign direct investment. The low wages in turn resulted from the migration of millions of rural Chinese, eager to escape the back-breaking labor and low incomes earned in farming, to urban areas. With so many people living in rural areas, a typical plot of land was too small to benefit from mechanized labor; every stage of the crop cycle, from planting to weeding to fertilizing to harvest, was done by hand. When Deng liberalized China's economic policies, residents of rural inland China, particularly teenagers and young adults despairing of being condemned to eke out a living from the land like their parents and grandparents, migrated first to the new economic zones in Shenzhen and Xiamen and later to coastal cities such as Tianjin and Qingdao to seek work in the new factories sprouting up. Each year, thousands of new factories were built, and each year millions of rural Chinese journeyed to them in hopes of a new life. All told, the journeys of rural Chinese to the cities of coastal China represented the largest internal migration in the history of the world—some 250 million people. Because the flow of new labor matched the needs of the new factories, the price of labor stayed low.

As the theory of comparative advantage suggests, China had a comparative advantage in the production of goods requiring low-cost, unskilled labor. Indeed, a common buzzword used by CEOs and business gurus a decade ago was the "China price"—a phrase suggesting that if a potential supplier wanted to sell components, they had to match or beat what it would cost to fabricate in China. Many companies in Europe and North America discovered they could not match the China price from their domestic factories. As a result, they outsourced production to a Chinese supplier, built their own factory in China, or simply lost the business to a Chinese rival.

One of the reasons economics is often called the dismal science is because economic success often breeds economic failure. In China's case, the factors that led it to becoming so successful in the 1990s and 2000s are now creating problems for the country's continued economic growth. Demographic conditions have changed (see Chapter 1's closing case): China's working age population, which was growing rapidly in the previous two decades, has now begun to shrink, as a result of the country's one-child policy. Demographers estimate in 2005, 121 million Chinese were in the 15–19 age cohort; by 2010, that cohort had shrunk to 105 million; by 2015, it will fall to 95 million. The rapidly growing coastal cities suffer from congestion, raising the costs of doing business. And, as surplus rural labor has migrated to the cities, the wages of those remaining in the rural areas has increased. Moreover, to continue to attract rural migrants, employers in coastal China have been forced to raise wage rates. Turnover is a problem because workers will quit jobs and move to a new factory for small raises, more opportunities for overtime, or even better food in the factory canteen.

In the first six months of 2012, for example, wage incomes for urban workers rose 13 percent and 14.9 percent for rural workers. This is on top of annual increases in labor costs of 12 to 14 percent a year during the decade of the 2000s. Consider two of China's largest private employers. The wage rates Hon Hai Precision Industry Co. (see Chapter 5's opening case) paid its 1 million workers rose 10 percent in 2012, while the wage rates Yum Brands' fast food restaurants paid to their 400,000 employees rose 17 percent. Boston Consulting Group argues that Chinese labor costs are now above those of Mexico, after adjusting for differences in labor productivity. Moreover, Mexico benefits from its geographic relationship to the large North American market. Not only are transportation costs less, but firms selling fashion-sensitive or custom-designed goods benefit from shorter supply lines. Foxconn, for example, assembles standardized laptops in China, but customized ones—some 35,000 a day—in its facility in Ciudad Juárez, across the border from El Paso. Flextronics, the huge Singapore-based contract manufacturer, estimates its average labor cost in China is $2.50 an hour (up from $0.60 in 2000), compared to $3.50 an hour in Mexico.

Wage increases are not the only concern. As industrial complexes in coastal areas have sprouted, congestion costs, land prices, environmental and safety regulations, and taxes have climbed as well. Of even greater concern is the rising value of the yuan. We noted in Chapter 7's opening case that U.S. and European politicians believe that China is suppressing the value of its currency to protect its factories from these cost

pressures. Should the yuan rise in value, the pricing advantages that Chinese exporters once enjoyed will erode further vis-à-vis Mexico or Asian rivals with low labor costs, such as Vietnam and Bangladesh. Because of the wide disparities in income levels between rural and urban China, Communist Party officials fear that a drying up of China's exports could lead to social unrest and possible challenges to their right to govern.

Producing and sourcing in China still remains attractive in many industries. Chinese factories are well-situated to service China's booming domestic market. Producers of end products in China benefit from complex clusters of near-by factories designing and fabricating component parts. The ensuing supply chain benefits are not easily duplicable in other countries. Manufacturers in China are increasingly adopting labor-saving technologies to battle escalating wage rates. Still, many firms are adopting a China+1 strategy—build a new plant in a country such as Vietnam, Cambodia, Indonesia, or Bangladesh, which enjoy lower wage costs than contemporary China.

Case Questions

8-25. China's economic miracle rested on its abundance of low-cost unskilled labor. What type of goods would China likely export, given the predictions of the Heckscher-Ohlin theorem? Why?

8-26. China faces a cruel problem. The factors that were the foundation for its economic success will no longer work. What should China to do?

8-27. Why is China trying to keep the value of its currency from rising? What would be the impact on the Chinese economy, Chinese workers, and Chinese consumers if the yuan were to rise in value?

8-28. If you were a representative of the Vietnamese or Bangladeshi government, would you support the efforts of U.S. and European diplomats to pressure China to raise the value of its currency? Why?

8-29. Suppose you are an official with Mexico's economic development agency. Write a one-page memo detailing why firms selling to North American customers should relocate their Chinese factories to Mexico.

8-30. Some experts suggest that China will need to transition from its export-manufacturing based economy to an economy based on domestic consumption and an enhanced service sector. To make this transition, what changes in China's economic and other public policies need to be made?

Sources: "China Flips Switch to Fancy Exports," *Wall Street Journal*, March 25, 2013, p. B1; "Old-age problem comes home to roost for China's one-child policy," *Financial Times*, February 2/3, 2013, p. 4; "China approaching the turning point," *The Economist*, January 31, 2013; "Peak toil," *The Economist*, January 26, 2013; "Cambodia benefits from rising Chinese wages, *Financial Times*, January 8, 2013, p. 2; "For Mexico, an Edge on China, *Wall Street Journal*, September 16, 2012; "Wage Rises in China May Ease Slowdown," *Wall Street Journal*, July 15, 2012; "The end of cheap China," *The Economist*, March 10, 2012

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8-31. Discuss the various techniques that firms can use to lock in the price that they will pay for foreign exchange for transactions that will occur in the future.

8-32. What are the primary forms of arbitrage that affect the foreign exchange market?

8-33. Mymanagementlab Only—comprehensive writing assignment for this chapter.

Endnotes

1. "U.S. Trees, Fake Firs Denting Canada's Christmas Tree Industry," *Wall Street Journal*, December 21, 2012; "Canadian dollar makes gains as commodities rise," *The Globe and Mail*, October 30, 2012; "Ontario has to learn to live with high dollar," *The Star*, February 20, 2012; "Rise and rise of the Canadian dollar," *Wall Street Journal*, January 12, 2011; "Currency rise helps Canadian N.H.L. teams," *New York Times*, December 1, 2009; "Wallet check: It's pain or gain," *Wall Street Journal*, October 19, 2009, p. C1; "Development interest lacking in Kirk Forest Products land," *Bridgewater Bulletin*, February 19, 2008, p. A10; "Land of the spree," *Wall Street Journal*, December 15, 2007, p. W1: "They can only dream of a green Christmas," *Houston Chronicle*, December 9, 2007, p. D6; "Loonie's rise yields splitting pain for Canada," *Wall Street Journal*, November 12, 2007, p. C1; "Canada is giddy about the loonie and twitting U.S.," *Wall Street Journal*, September 22, 2007, p. A1.
2. To simplify the exposition, we assumed the foreign-exchange supply curve is upward sloping like most supply curves. Unfortunately, foreign-exchange supply curves may bend backward, a complication that can be left for graduate students in economics and finance to deal with.
3. "Currency trading soars," *Wall Street Journal*, September 1, 2010, p. A1.
4. Data are taken from the World Bank's World Development Indicators data bank, accessed April 16, 2013.