Chapter 13
Exchange Rates and the Foreign Exchange Market: An Asset Approach

■ Chapter Organization

■ Key Themes

Exchange rates translate the price of goods denominated in different currencies to common units. Exchange rates also represent the relative price of foreign and domestic currencies. An introduction to these two functions of the exchange rate is the main focus of this chapter. This chapter shows you how to use exchange rates to convert the prices of goods denominated in different currencies into common units. This chapter also begins our discussion of the determination of exchange rates in the asset market. These two points are of central importance for your understanding of all of the material that follows in the international macroeconomics course.

The main players in the foreign exchange market are large organizations such as commercial banks, corporations, nonbank financial institutions, and central banks. These organizations are able to trade deposits quickly and at low cost, which creates a highly integrated market and ensures that common exchange rates are offered worldwide. Financial instruments such as forward foreign-exchange trading, foreign-exchange futures contracts, and foreign-exchange options play an important part in currency market activity. The chapter describes how these financial instruments provide a low-cost way to eliminate short-run exchange-rate risk.

The determination of exchange rates follows from the role they play in bringing about equilibrium in asset markets. Equilibrium in asset markets requires an equalization of nominal returns on assets that differ only in the currency in which they are denominated, when these returns are expressed in a common currency (differences in the riskiness or liquidity of different assets may affect this equilibrium relationship). It is very important to understand how to compare expected returns on assets denominated in domestic and foreign currency. There are two parts of the expected return on a foreign-currency asset (measured in domestic-currency terms): the interest payment and the change in the value of the foreign currency relative to the domestic currency over the period during which the asset is held.

Setting equal the return on a domestic-currency asset and the expected return on a foreign-currency asset gives us the interest parity condition. The foreign exchange market is in equilibrium only when the interest parity condition holds. Thus, for given interest rates and given expectations about future exchange rates, interest parity determines the current equilibrium exchange rate. The interest parity diagram introduced in this chapter is instrumental in later chapters in which a more general model is presented.

The result that a dollar appreciation makes foreign currency assets more attractive and that dollar depreciation makes foreign currency assets less attractive may strike you as strange—why does a stronger dollar reduce the expected return on dollar assets? The key to explaining this point is that, when the expected value of the future exchange rate is constant and when interest rates remain unchanged, an appreciation of the dollar today implies a future depreciation of the dollar. Thus when the dollar appreciates today, an American investor can expect to gain not only the foreign interest payment but also the extra return due to the dollar's future depreciation.

The following diagram illustrates this point. In this diagram, the exchange rate at time $t + 1$ is expected to be equal to E. If the exchange rate at time t is also E then expected depreciation is 0. If, however, the exchange rate depreciates at time t to E' then it must appreciate to reach E at time $t + 1$. If the exchange rate appreciates today to E'' then it must depreciate to reach E at time $t + 1$. Thus, with a given expected future exchange rate, a depreciation in period t to E' implies an expected appreciation during the time from t to $t + 1$ (as the exchange rate moves during this time from E' to E). Conversely, an appreciation in period t to E'' implies that the exchange rate depreciates over the period t to $t + 1$ as it moves from E'' to E.

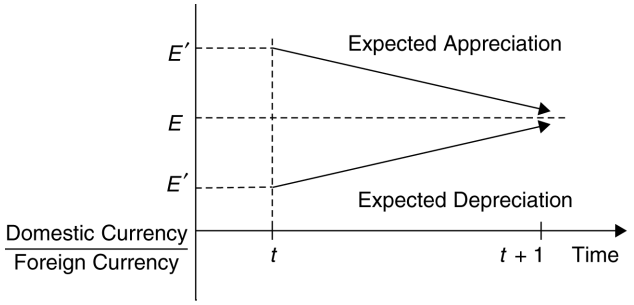


Figure 13-1

This diagram helps provide some further intuition behind the interest parity relationship. Suppose that the domestic and foreign interest rates are equal. Interest parity then requires that expected depreciation is equal to zero and that the exchange rate today and next period is equal to E. If the domestic interest rate rises, people will want to hold more domestic-currency deposits. The resulting increased demand for domestic currency drives up the price of domestic currency, causing the exchange rate to appreciate. How much will it appreciate? The answer is that the appreciation of the domestic currency continues until the expected depreciation that is a consequence of the domestic currency's appreciation today just offsets the interest differential.

The appendix describes the covered interest parity relationship. The covered interest parity relationship differs from the uncovered interest parity relationship only in the use of the forward exchange rate in the covered interest parity relationship, rather than the (unobservable) expected future exchange rate, which is used in the uncovered interest parity relationship. Covered interest parity explains the determination of forward rates and also helps explain why spot exchange rates and forward exchange rates move together.

■ Key Terms

Define the following key terms:

1. Spot Exchange Rate _____

_____

_____

_____.

2. Forward Exchange Rate _____

_____

_____

_____.

3. Arbitrage _____

_____

_____.

4. Interest Parity Condition _____

_____

_____.

5. Risk _____

_____

_____

_____.

6. Liquidity _____

_____

_____

_____.

■ Review Problems

1. a. Look up the following exchange rates in today's newspaper:

(*Note*: You can also find these rates online on the New York Federal Reserve's webpage [www.ny.frb.org/pihome/statistics/forex10.shtml].)

U.S. Dollars per Euro _____
U.S. Dollars per British Pound _____
U.S. Dollars per Japanese Yen _____
U.S. Dollars per Canadian Dollar _____

b. Use these exchange rates to calculate the following cross-rates:

Euros per British Pound _____
Japanese Yen per Canadian Dollar _____
Canadian Dollar per Euro _____
British Pound per Japanese Yen _____

2. a. Suppose you start the Totally Cool International Shirt (TCIS) Company, a business that imports authentic college t-shirts from foreign universities and sells them on campuses in the United States. You need to translate the foreign prices of the shirts into dollars. Do this for the t-shirts from the following universities by filling in the table:

University (Country)	Price of T-Shirt	Exchange Rate	Dollar Price
Sorbonne (France)	12.0 Euros	1.0 Euros/$	_____
Delhi University (India)	350.0 Rupees	35.0 Rupees/$	_____
Seoul National Univ. (Korea)	8080.0 Wons	800.0 Wons/$	_____
Hebrew Univ. (Israel)	24.0 Shekels	3.0 Shekels/$	_____
Oxford Univ. (U.K.)	8.0 Pounds	0.7 Pound/$	_____

b. Suppose that a month from now the exchange rates are given below. State whether these new exchange rates represent an appreciation or a depreciation of each currency against the dollar. Also, without calculating the actual dollar prices of t-shirts, state whether the dollar price will fall or rise.

Currency	**Franc**	**Rupee**	**Won**	**Shekel**	**Pound**
Exchange Rate	0.9 Euro/$	30 R/$	880 W/$	2.5 S/$	0.6 P/$
Appreciation or Depreciation?	_____	_____	_____	_____	_____
Dollar Price Rise or Fall?	_____	_____	_____	_____	_____

3. Upon graduating from college, you take the proceeds from your successful shirt company and begin a company that sells foreign securities in the United States (to save money on stationery, you keep the same acronym by calling your new company Traditional Client Investment Service [TCIS] Company). Part of your task is to provide a newsletter to clients discussing the return on foreign securities. Fill in the blanks in the following newsletter.

TCIS Newsletter

Currently, a one-year bond denominated in dollars pays an interest rate of 6 percent. A bond that is denominated in won, and has similar characteristics in terms of risk and liquidity, pays 7 percent. This means that the implicit forecast by the foreign exchange market is that the dollar will (appreciate/depreciate) against the won over the next year by ___ percent.

This month, it takes 1500 Korean won to buy one dollar. TCIS forecasts that next year at this time it will take 1575 won to purchase a dollar. This represents (an appreciation/a depreciation) of the dollar against the won of ____ percent.

Based upon our forecast, (we advise against/we advise) purchasing won denominated securities. The reason for this is that _____

_____

_____.

For example, if you used $1000 to purchase a dollar-denominated bond, a year from now you would have $_____. If you took the same $1000 and purchased a won-denominated bond, a year from now you would have $_____.

Some of you may be concerned that we have focused on nominal returns and thus have ignored real returns. We do this because _____

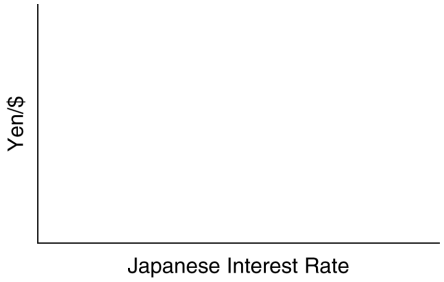
_____

_____.

4. Use the covered interest parity condition to fill in the following table.

U.S. Interest Rate	U.K. Interest Rate	Spot Exchange Rate	Forward Exchange Rate
10%	5%	2 $/£	____$/£
8%	__%	2 $/£	2.04 $/£
10%	0%	__$/£	2.10 $/£
__%	9%	2 $/£	1.98 $/£

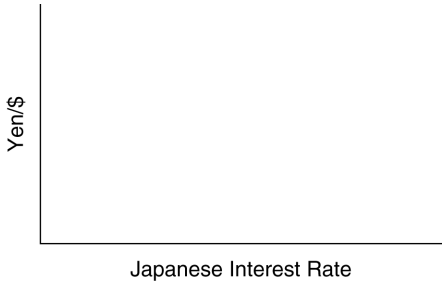
5. a. Consider a case where the interest rate on a one-year dollar-denominated bond is 6 percent and the expected value of the yen one year from now is 100 yen to the dollar. Plot the points that satisfy the interest parity relationship between the yen/dollar exchange rate and the Japanese interest rate in Graph 1, where the yen/dollar exchange rate is on the vertical axis and the Japanese interest rate is on the horizontal axis.



Graph 1

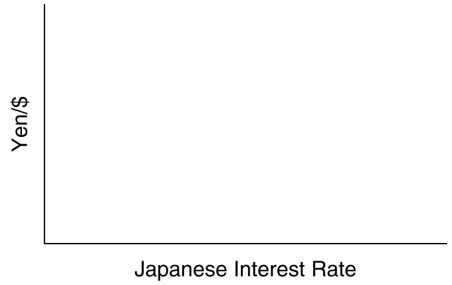
Determine the spot ¥/$ exchange rates when the Japanese interest rate is 4 percent. Also determine the ¥/$ exchange rate when the Japanese interest rate is 7 percent.

b. In Graph 2, plot the interest parity relationship, but this time for a U.S. interest rate of 8 percent.



Graph 2

c. Now go back to the case of a U.S. interest rate of 6 percent, but suppose the expected value of the ¥/$ exchange rate one year from now is 110 yen to the dollar. Plot the interest parity relationship under these assumptions in Graph 3.



Graph 3

Again determine the spot ¥/$ exchange rates when the Japanese interest rate is 4 percent and when the Japanese interest rate is 7 percent and compare your answers here to your answers in part (i).

d. What can you conclude about the direction of the effect of changes on the ¥/$ exchange rate of the following, holding everything else unchanged?

i. A fall in the Japanese interest rate: _____.

ii. A rise in the U.S. interest rate: _____.

iii. A rise in the expected future value of the ¥/$ exchange rate: _____.

■ Answers to Odd-Numbered Textbook Problems

1. At an exchange rate of $1.50 per euro, the price of a bratwurst in terms of hot dogs is 1.875 (7.5/4) hot dogs per bratwurst. After a dollar appreciation to $1.25 per euro, the relative price of a bratwurst falls to 1.56 (6.25/4) hot dogs per bratwurst. Hot dogs have become more expensive relative to bratwurst.

3. When the yen depreciates versus the dollar, its costs go up. This depresses its profits. On the other hand, if it exports products to the United States, it can increase the yen price (without changing the dollar price) so there may be some offsetting effects. But, by and large, a firm that has substantial imported input costs does not relish a depreciating home currency.

5. Note here that the ordering of the returns of the three assets is the same whether we calculate real or nominal returns.

   a. The real return on the house would be 25% − 10% = 15%. This return could also be calculated by first finding the portion of the $50,000 nominal increase in the house's price due to inflation ($20,000), then finding the portion of the nominal increase due to real appreciation ($30,000), and finally finding the appropriate real rate of return ($30,000/$200,000 = 0.15).

   b. Again, subtracting the inflation rate from the nominal return we get 20% − 10% = 10%.

   c. 2% − 10% = −8%.

7. If market traders learn that the dollar interest rate will soon fall, they also revise upward their expectation of the dollar's future depreciation in the foreign-exchange market. Given the current exchange rate and interest rates, there is thus a rise in the expected dollar return on euro deposits. The downward-sloping curve in the diagram below shifts to the right and there is an immediate dollar depreciation, as shown in the figure below where a shift in the interest-parity curve from *II* to $I'I'$ leads to a depreciation of the dollar from E_0 to E_1.

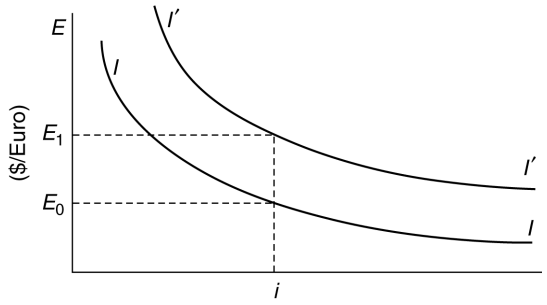


Figure 13-2

9. a. If the Federal Reserve pushed interest rates down, with an unchanged expected future exchange rate, the dollar would depreciate (note that the article uses the term "downward pressure" to mean pressure for the dollar to depreciate). In terms of the analysis developed in this chapter, a move by the Federal Reserve to lower interest rates would be reflected in a movement from *R* to *R′* in Figure 13-5, and a depreciation of the exchange rate from *E* to E^*.

   If there is a "soft landing," and the Federal Reserve does not lower interest rates, then this dollar depreciation will not occur. Even if the Federal Reserve does lower interest rates a little, say from *R* to *R″*, this may be a smaller decrease than what people initially believed would occur. In this case, the expected future value of the exchange rate will be more appreciated than before, causing the interest-parity curve to shift in from *II* to $I'I'$ (as shown in Figure 13-6). The shift in the curve reflects the "optimism sparked by the expectation of a soft landing" and this change in expectations means that, with a fall in interest rates from *R* to *R″*, the exchange rate depreciates from *E* to *E″*, rather than from *E* to E^*, which would occur in the absence of a change in expectations.

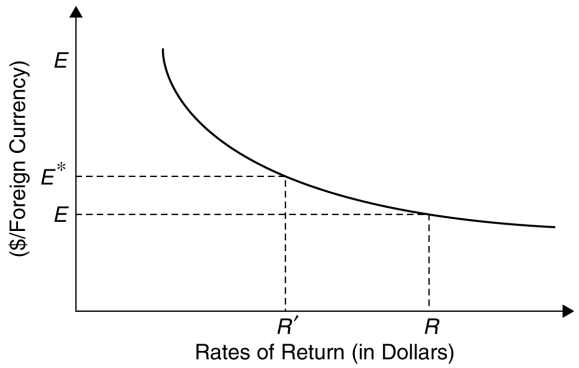


Figure 13-5

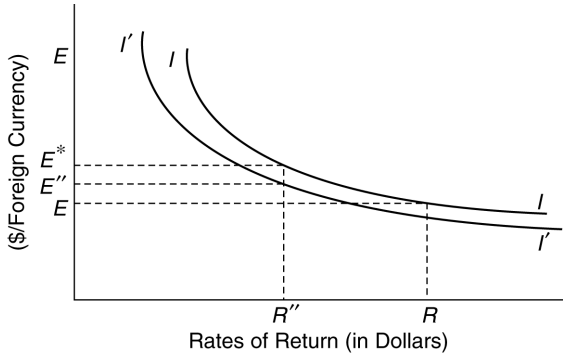


Figure 13-6

b. The "disruptive" effects of a recession make dollar holdings more risky. Risky assets must offer some extra compensation such that people willingly hold them as opposed to other, less risky assets. This extra compensation may be in the form of a bigger expected appreciation of the currency in which the asset is held. Given the expected future value of the exchange rate, a bigger expected appreciation is obtained by a more depreciated exchange rate today. Thus, a recession that is disruptive and makes dollar assets more risky will cause a depreciation of the dollar.

11. The chapter states that most foreign-exchange transactions between banks (which accounts for the vast majority of foreign-exchange transactions) involve exchanges of foreign currencies for U.S. dollars, even when the ultimate transaction involves the sale of one nondollar currency for another nondollar currency. This central role of the dollar makes it a vehicle currency in international transactions. The reason the dollar serves as a vehicle currency is that it is the most liquid of currencies since it is easy to find people willing to trade foreign currencies for dollars. The greater liquidity of the dollar as compared to, say, the Mexican peso, means that people are more willing to hold the dollar than the peso, and thus, dollar deposits can offer a lower interest rate, for any expected rate of depreciation against a third currency, than peso deposits for the same rate of depreciation against that third currency. As the world capital market becomes increasingly integrated, the liquidity advantages of holding dollar deposits as opposed to euro deposits will probably diminish. The euro represents an economy as large as the United States, so it is possible that it will assume some of that vehicle role of the dollar, reducing the liquidity advantages to as far as zero. When it was first introduced in 1999, the euro had no history as a currency, though, so some investors may have been leery of holding it until it established a track record. As the euro has become more established, though, the liquidity advantage of the dollar should be fading (albeit slowly).

13. A tax on interest earnings and capital gains leaves the interest parity condition the same, since all its components are multiplied by one less the tax rate to obtain after-tax returns. If capital gains are untaxed, the expected depreciation term in the interest parity condition must be divided by one less the tax rate. The component of the foreign return due to capital gains is now valued more highly than interest payments because it is untaxed.

15. The value should have gone down as there is no more need to engage in intra EU foreign currency trading. This represents the predicted transaction cost savings stemming from the euro. At the same time, the importance of the euro as an international currency may have generated more trading in euros as more investors (from central banks to individual investors) choose to hold their funds in euros or denominate transactions in euros. On net, though, we would expect the value of foreign exchange trading in euros to be less than the sum of the previous currencies.