Chapter 18. Openness in Goods and Financial Markets

We have assumed until now that the economy was *closed*—that it did not interact with the rest of the world. We had to start this way, to keep things simple and build up your intuition for the basic macroeconomic mechanisms. We are now ready to relax this assumption. Understanding the macroeconomic implications of openness will occupy us for this and the next three chapters.

"Openness" has three distinct dimensions:

1. **Openness in goods markets**—the ability of consumers and firms to choose between domestic goods and foreign goods. In no country is this choice completely free of restrictions: Even the countries most committed to free trade have **tariffs**—taxes on imported goods—and **quotas**—restrictions on the quantity of goods that can be imported—on at least some foreign goods. At the same time, in most countries, average tariffs are low and getting lower.

2. **Openness in financial markets**—the ability of financial investors to choose between domestic assets and foreign assets. Until recently even some of the richest countries, such as France and Italy, had **capital controls**—restrictions on the foreign assets their domestic residents could hold and on the domestic assets foreigners could hold. These restrictions are rapidly disappearing. As a result, world financial markets are becoming more and more closely integrated.

3. **Openness in factor markets**—the ability of firms to choose where to locate production, and of workers to choose where to work. Here also trends are clear. Multinational companies operate plants in many countries and move their operations around the world to take advantage of low costs. Much of the debate about the **North American Free Trade Agreement (NAFTA)** signed in 1993 by the United States, Canada, and Mexico centered on its implications for the relocation of U.S. firms to Mexico. Similar fears now center around China. And immigration from low-wage countries is a hot political issue in countries from Germany to the United States.

In the short run and in the medium run—the focus of this and the next three chapters—openness in factor markets plays much less of a role than openness in either goods markets or financial markets. Thus, I shall ignore openness in factor markets, and focus on the implications of the first two dimensions of openness here.

Section 18–1 looks at openness in the goods market, the determinants of the choice between domestic goods and foreign goods, and the role of the real exchange rate.

Section 18–2 looks at openness in financial markets, the determinants of the choice between domestic assets and foreign assets, and the role of interest rates and exchange rates.

Section 18–3 gives the map to the next three chapters.

18–1. Openness in Goods Markets

Let's start by looking at how much the U.S. sells to and buys from the rest of the world. Then, we shall be better able to think about the choice between domestic goods and foreign goods, and the role of the relative price of domestic goods in terms of foreign goods—the real exchange rate.

Exports and Imports

Figure 18–1 plots the evolution of U.S. exports and U.S. imports, as ratios to GDP, since 1960 ("U.S. exports" means exports *from* the United States; "U.S. imports" means imports *to* the United States.) The figure suggests two main conclusions.

Figure 18–1. U.S. Exports and Imports as Ratios of GDP; 1960–2003. (Caption. Exports and imports, which were equal to 5% of GDP in the 1960s, are now equal to about 12% of GDP.

- The U.S. economy is becoming more open over time. Exports and imports, which were equal to 5% of GDP during the 1960s, now are equal to about 12% of GDP (10% for exports, 14% for imports). In other words, the United States trades more than twice as much (relative to its GDP) with the rest of the world as it did just 40 years ago.
- Although imports and exports have followed broadly the same upward trend, they have also diverged for long periods of time, generating sustained trade surpluses and trade deficits.[1] Two episodes stand out:

  First, the large trade deficits of the mid–1980s: The ratio of the trade deficit to GDP reached 3% in 1986, before decreasing to 1% in the early 1990s.

  Second, the large and increasing trade deficits since the mid–1990s. The ratio of the trade deficit to GDP reached 4.5% in 2003, a historical record.

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1. From Chapter 3: The trade balance is the difference between exports and imports:
   Exports > imports: Trade surplus (equivalently, positive trade balance)
   Exports < imports: Trade deficit (equivalently, negative trade balance)

Understanding the sources and implications of these trade deficits is a central issue in macroeconomics today, and one to which we shall return later.

Given all the talk in the media about *globalization*, a volume of trade (measured by the average of the ratios of exports and imports to GDP) around 12% of GDP may strike you as small. However, the volume of trade is not necessarily a good measure of openness. Many sectors can be exposed to foreign competition without the effects of this competition showing up in large imports: By being competitive and keeping their prices low enough, these sectors can retain their domestic market share and keep imports out. This suggests that a better index of openness than export or import ratios is the proportion of aggregate output composed of **tradable goods**—goods that compete with foreign goods in either domestic markets or foreign markets.[2] Estimates are that tradable goods represent around 60% of aggregate output in the United States today.

It remains true that, with exports around 10% of GDP, the United States has one of the smallest ratios of exports to GDP among the rich countries of the world. Table 18–1 gives ratios for a number of OECD countries.[3]

Table 18–1. Ratios of Exports to GDP for Selected OECD Countries, 2003.

Country	Export Ratio	Country	Export Ratio
United States	10%	Switzerland	42%
Japan	12%	Austria	51%
Germany	36%	Netherlands	62%
United Kingdom	25%	Belgium	79%

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2. Tradable goods: Cars, computers... Non tradable goods: Housing, most medical services, haircuts...
3. For more on the OECD and for the list of member countries, see Chapter 1.

The United States and Japan are at the low end of the range of export ratios. The large European countries, such as Germany and the United Kingdom, have ratios that are two to three times larger. And the smaller European countries have even larger ratios, from 42% in Switzerland to 79% in Belgium. (Belgium's 79% ratio of exports to GDP raises an odd possibility: Could a country have exports larger than its GDP, an export ratio greater than one? The answer is: Yes. The reason why is given in the Focus box "Can Exports Exceed GDP?")

Do these numbers indicate that the United States has more trade barriers than, say, the United Kingdom or Belgium? No. The main factors behind these differences are geography and size. Distance from other markets explains a good part of the low Japanese ratio. Size also matters: The smaller the country, the more it must specialize in only a few products, producing and exporting them, and relying on imports for the others. Belgium can hardly afford to produce the range of goods produced by the United States, a country roughly 40 times its economic size.[4]

Focus. Can Exports Exceed GDP?

Can a country have exports larger than its GDP—i.e. have an export ratio greater than one?

It would seem that the answer must be no. Countries cannot export more than they produce, so that the export ratio must be less than one. Not so. The key to the answer is to realize that exports and imports may include exports and imports of intermediate goods.

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4. Iceland is both isolated and small. What would you expect its export ratio to be? (Answer: 37%)

Take for example a country that imports intermediate goods for $1 billion. Suppose it transforms them into final goods using only labor. Say that total wages equal $200 million and there are no profits. The value of these final goods is thus equal to $1,200 million. Assume that $1 billion worth of final goods is exported and the rest, $200 million, is consumed domestically.

Exports and imports therefore both equal $1 billion. What is GDP in this economy? Remember that GDP is value added in the economy (see Chapter 2). So, in this example, GDP equals $200 million, and the ratio of exports to GDP equals $1000/$200 = 5.

Hence, exports can exceed GDP. This is actually the case for a number of small countries where most economic activity is organized around a harbor and import–export activities. This is even the case for small countries where manufacturing plays an important role, such as Singapore. In 2002, the ratio of exports to GDP in Singapore was 145%.

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The Choice Between Domestic Goods and Foreign Goods

How does openness in goods markets force us to rethink the way we look at equilibrium in the *goods market*?

Until now, when we were thinking about consumers' decisions in the goods market, we focused on their decision to save or to consume. When goods markets are open, domestic consumers face a second decision: whether to buy domestic goods or to buy foreign goods.[5] Indeed, all buyers—other domestic buyers such as firms or the government, and foreign buyers—face

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5. In a closed economy, people face one decision:
    Save, or Buy (consume)
In an open economy, they face two decisions:
    Save, or Buy
    Buy domestic, or Buy foreign

the same decision. This decision has a direct effect on domestic output: If buyers decide to buy more domestic goods, the demand for domestic goods increases, and so does domestic output. If they decide to buy more foreign goods, then foreign output increases instead of domestic output.

Central to this second decision (to buy domestic goods or foreign goods) is the price of domestic goods relative to foreign goods. We call this relative price the **real exchange rate**. The real exchange rate is not directly observable, and you will not find it in the newspapers. What you will find in newspapers are *nominal exchange rates*, the relative prices of currencies. So, in the rest of this section, we start by looking at nominal exchange rates, and then see how we can use them to construct real exchange rates.

Nominal Exchange Rates

Nominal exchange rates between two currencies can be quoted in one of two ways:

- As the price of the domestic currency in terms of the foreign currency. If for example, we look at the United States and the United Kingdom, and think of the dollar as the domestic currency and the pound as the foreign currency, we can express the nominal exchange rate as the price of a dollar in terms of pounds. In August 2004, the exchange rate defined this way was 0.55 (1 dollar was worth 0.55 pounds.)
- As the price of the foreign currency in terms of the domestic currency. Continuing with the same example, we can express the nominal exchange rate as the price of a pound in terms of dollars. In August 2004, the exchange rate defined this way was 1.8 (1 pound was worth 1.8 dollars.)

Either definition is fine; the important thing is to remain consistent. In this book, I shall adopt the first definition: I shall define the **nominal**

exchange rate as *the price of the domestic currency in terms of foreign currency*, and denote it by E.[6] When looking for example at the exchange rate between the United States and the United Kingdom (from the viewpoint of the United States, so the dollar is the domestic currency), E will denote the price of a dollar in terms of pounds (so, for example, 0.55 in August 2004. [7]

Exchange rates between the dollar and most foreign currencies change every day, every minute of the day. These changes are called *nominal appreciations* or *nominal depreciations*—appreciations or depreciations for short.

- An **appreciation** of the domestic currency is an increase in the price of the domestic currency in terms of a foreign currency. Given our definition of the exchange rate, an appreciation corresponds to an *increase* in the exchange rate.[8]

- A **depreciation** of the domestic currency is a decrease in the price of the domestic currency in terms of a foreign currency. So, given our definition of the exchange rate, a depreciation of the domestic currency corresponds to a decrease in the exchange rate, E.[9]

You may have encountered two other words to denote movements in exchange rates: "revaluations" and "devaluations". These two terms are used when countries operate under **fixed exchange rates**—a system in which two or more countries maintain a constant exchange rate between their currencies. Under such a system, increases in the exchange rate—which

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6. Warning. There is no agreed upon rule among economists or among newspapers as to which of the two definitions to use. You will encounter both. Always check which definition is used.
7. E: Nominal exchange rate—Price of domestic currency in terms of foreign currency. (From the point of view of the U.S. looking at the United Kingdom, the price of a dollar in terms of pounds.)
8. Appreciation of the domestic currency ⇔ Increase in the price of the domestic currency in terms of foreign currency ⇔ Increase in the exchange rate
9. Depreciation of the domestic currency ⇔ Decrease in the price of the domestic currency in terms of foreign currency ⇔ Decrease in the exchange rate

are infrequent by definition—are called **revaluations** (rather than appreciations). Decreases in the exchange rate are called **devaluations** (rather than depreciations).[10]

Figure 18–2 plots the nominal exchange rate between the dollar and the pound since 1970. Note the two main characteristics of the figure:

- *The trend increase in the exchange rate.* In 1970, a dollar was worth only 0.41 pounds. In 2003, a dollar was worth 0.59 pounds. Put another way, there was an appreciation of the dollar vis–à–vis the pound over the period.
- *The large fluctuations in the exchange rate.* In the space of less than ten years in the 1980s, the value of the dollar increased from 0.42 pounds in 1981 to 0.82 pounds in 1985, only to go back down to 0.54 pounds by early 1988. Put another way, there was a very large appreciation of the dollar in the first half of the 1980s, followed by a large depreciation later in the decade.

Figure 18–2. The Nominal Exchange Rate Between the Dollar and the Pound, 1970–2003 (Caption. While the dollar has appreciated vis–a–vis the pound over the past 33 years, this appreciation has come with large swings in the nominal exchange rate between the two currencies, especially in the 1980s.)

If we are interested however in the choice between domestic goods and foreign goods, the nominal exchange rate gives us only part of the information we need. Figure 18–2 for example tells us only about movements in the relative price of the two currencies, the dollar and the pound. To U.S. tourists thinking of visiting the United Kingdom, the question is not only how many pounds they will get in exchange for their dollars, but how

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10. We shall discuss fixed exchange rates in Chapter 20.

much goods will cost in the United Kingdom, relative to how much they cost in the United States. This takes us to our next step—the construction of real exchange rates.

From Nominal to Real Exchange Rates

How can we construct the real exchange rate between the United States and the United Kingdom—the price of U.S. goods in terms of British goods?

Suppose the United States produced only one good, a Cadillac Seville Luxury Sedan, and the United Kingdom also produced only one good, a Jaguar S-type Luxury Sedan (This is one of those "Suppose" statements that run completely against the facts, but we shall become more realistic shortly.) Constructing the real exchange rate, the price of the U.S. goods (Cadillacs) in terms of British goods (Jaguars), would be straightforward. We would express both goods in terms of the same currency, and then compute their relative price.

Suppose for example we expressed both goods in terms of pounds.[11] Then:

- The first step would be to take the price of a Cadillac in dollars and convert it to a price in pounds. The price of a Cadillac in the United States is $ 40,000. A dollar is worth 0.55 pounds, so the price of a Cadillac in pounds is 40,000 dollars x 0.55 = £22,000.
- The second step would be to compute the ratio of the price of the Cadillac in pounds to the price of the Jaguar in pounds. The price of a Jaguar in the United Kingdom is £30,000. So the price of a Cadillac in terms of Jaguars—that is, the real exchange rate between the United States and the United Kingdom—would be $22,000/$30,000 = 0.73.

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11. Check that, if we expressed both in terms of dollars instead, we would get the same result for the real exchange rate.

The example is straightforward, but how do we generalize it? The United States and the United Kingdom produce more than Cadillacs and Jaguars, and we want to construct a real exchange rate that reflects the relative price of *all* the goods produced in the United States in terms of *all* the goods produced in the United Kingdom.

The computation we just went through tells us how to proceed. Rather than using the price of a Jaguar and the price of a Cadillac, we must use a price index for all goods produced in the United Kingdom and a price index for all goods produced in the United States. This is exactly what the GDP deflators we introduced in Chapter 2 do: They are by definition price indexes for the set of final goods and services produced in the economy.

Figure 18–3. The Construction of the Real Exchange Rate

So let P be the GDP deflator for the United States, P^* be the GDP deflator for the United Kingdom (as a rule, I shall denote foreign variables by a star), and E be the dollar-pound nominal exchange rate. Figure 18–3 goes through the steps needed to construct the real exchange rate.

- The price of U.S. goods in dollars is P. Multiplying it by the exchange rate, E—the price of dollars in terms of pounds—gives us the price of U.S. goods in pounds, EP.
- The price of British goods in pounds is P^*. The *real exchange rate*, the price of U.S. goods in terms of British goods, which we shall call ϵ (the greek lowercase epsilon), is thus given by[12]

$$\epsilon = \frac{E\,P}{P^*} \qquad (18.1)$$

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12. ϵ: Real exchange rate—Price of domestic goods in terms of foreign goods (For example, from the point of view of the U.S. looking at the United Kingdom, the price of U.S. goods in terms of British goods)

The real exchange rate is constructed by multiplying the domestic price level by the nominal exchange rate, and then dividing by the foreign price level—a straightforward extension of the computation we made in our Cadillac/Jaguar example.

Note, however, an important difference between our Cadillac/Jaguar example and this more general computation:

Unlike the price of Cadillacs in terms of Jaguars, the real exchange rate is an index number: That is, its level is arbitrary, and so, uninformative. It is uninformative because the GDP deflators used in the construction of the real exchange rate are themselves index numbers; as we saw in Chapter 2, they are equal to 1 (or 100) in whatever year is chosen as the base year. But all is not lost. Although the level of the real exchange rate is uninformative, the rate of change of the real exchange rate is informative: If for example, the real exchange rate between the United States and the United Kingdom increases by 10%, this 10% increase tells us U.S. goods are now 10% more expensive relative to British goods than they were before.

Like nominal exchange rates, real exchange rates move over time. These changes are called real appreciations or real depreciations:

- An increase in the real exchange rate, i.e. an increase in the relative price of domestic goods in terms of foreign goods, is called a **real appreciation**.[13]
- A decrease in the real exchange rate, i.e. a decrease in the relative price of domestic goods in terms of foreign goods, is called a **real depreciation**.[14]

Figure 18–4 plots the evolution of the real exchange rate between the United States and the United Kingdom from 1970 to 2003, constructed

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13. Real appreciation ⇔ Increase in the price of the domestic goods in terms of foreign goods ⇔ Increase in the real exchange rate
14. Real depreciation ⇔ Decrease in the price of the domestic goods in terms of foreign goods ⇔ Decrease in the real exchange rate

using equation (18.1). For convenience, it also reproduces the evolution of the nominal exchange rate from Figure 18–2. The GDP deflators have both been set equal to 1 in the first quarter of 2000, so the nominal exchange rate and the real exchange rate are equal in that quarter by construction.

Figure 18–4. Real and Nominal Exchange Rates between the United States and the United Kingdom, 1970–2003. (Caption. Except for the difference in trend reflecting higher average inflation in the United Kingdom than in the United States, the nominal and the real exchange rates have moved largely together since 1970.)

Note the two main characteristics of Figure 18–4:

- While the nominal exchange rate went up during the period, the real exchange rate went down: In 1970, the real exchange rate was equal to 1.04; in 2003, it was down to 0.60.

  How do we reconcile the fact that there was both a nominal appreciation (of the dollar vis a vis the pound) and a real depreciation (of U.S. goods vis a vis British goods) during the period? To see why, return to the definition of the real exchange rate:

$$\epsilon = E\frac{P}{P^*}$$

  Two things have happened since 1970:

  First, E has increased: The dollar has gone up in terms of pounds—this is the nominal appreciation we saw earlier.

  Second, P/P^* has decreased. The price level has increased less in the United States than in the United Kingdom. Put another way, over the period, average inflation has been lower in the United States than in the United Kingdom.

  The resulting decrease in P/P^* has been larger than the increase in E, leading to a decrease in ϵ, a real depreciation.

To get a better intuition for what happened, let's go back to our U.S tourists thinking of visiting the United Kingdom. They find that they can buy more pounds per dollar than in 1970 (E has increased). Does this imply their trip will be cheaper? No: When they arrive in the United Kingdom, they will discover that the prices of goods in the United Kingdom have increased much more than the prices of goods in the United States (P^* has increased more than P, so P/P^* has declined), and this more than cancels the increase in the value of the dollar in terms of pounds. They will find that their trip will actually be more expensive (in terms of U.S. goods) than it was in 1970. In other words, they will find that there has been a real depreciation.

There is a general lesson here. Over long periods of time, differences in inflation rates across countries can lead to very different movements in nominal exchange rates and real exchange rates.[15] We shall return to this issue in Chapter 20.

- *The large fluctuations in the nominal exchange rate we saw in Figure 18–2 also show up in the real exchange rate.*

  The is not surprising: Year–to–year movements in the price ratio P/P^* are typically small compared to the often sharp movements in the nominal exchange rate, E. Thus, from year to year, or even over a few years, movements in the real exchange rate (ϵ) tend to be driven mostly by movements in the nominal exchange rate E. Note that since the early 1990s, the nominal exchange rate and the real exchange rate have moved nearly together. This reflects the fact that, since the mid–1980s, inflation rates have been very similar in both countries.[16]

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15. Can there be a real appreciation with no nominal appreciation?

  Can there be a nominal appreciation with no real appreciation?

(The answers to both questions: Yes.)

16. If inflation rates were exactly equal, P^*/P would be constant, and ϵ and E would move exactly together.

From Bilateral to Multilateral Exchange Rates

We need to take one last step. We have so far concentrated on the exchange rate between the United States and the United Kingdom. But the United Kingdom is just one of many countries the United States trades with. Table 18–2 gives the geographic composition of U.S. trade for both exports and imports (The numbers refer only to **merchandise trade**—exports and imports of goods. They do not include exports and imports of services, such as travel services and tourism, for which the decomposition by country is not available.)

The main message of the table is that the United States does most of its trade with three sets of countries. The first includes its neighbors to the North and to the South, Canada and Mexico: Trade with Canada and Mexico accounts for 36% of U.S. exports and 29% of U.S. imports. The second includes the countries of Western Europe, which account for 23% of U.S. exports and 21% of U.S. imports. The third includes the Asian countries, including Japan and China, which, together, account for 25% of U.S. exports and 39% of U.S. imports.

Table 18–2. The Country Composition of U.S. Merchandise Trade, 2003

	Proportion of Exports to	Proportion of Imports from
Canada	23	18
Mexico	13	11
Western Europe	23	21
China	4	13
Japan	7	9
Rest of Asia *	14	17
Others	11	6

*Source: Survey of Current Business, April 2004. *: Asia, excluding Japan*

and China. OPEC: Organization of Petroleum Exporting Countries.

How do we go from **bilateral** exchange rates, such as the real exchange rate between the United States and the United Kingdom we focused on earlier to **multilateral** exchange rates which reflect this composition of trade?[17] The answer is straightforward. If we want to measure the average price of U.S goods relative to the average price of goods of U.S. trading partners, we should use the U.S. share of trade with each country as the weight for that country. Using export shares we can construct an "export" real exchange rate, and using import shares we can construct an "import" real exchange rate. Because economists usually do not want to keep track of two different exchange rates, they typically use an exchange rate that takes an average of export and import shares. This is the variable we shall think of when talking about the **multilateral real U.S. exchange rate**, or the U.S. real exchange rate for short.[18]

Figure 18–5. The U.S. Multilateral Real Exchange Rate, 1973–2003. (Caption. The large real appreciation of U.S. goods in the first half of the 1980s was followed by a large real depreciation in the second half of the 1980s. This large swing in the 1980s is sometimes called the "dance of the dollar.")

Figure 18–5 shows the evolution of this multilateral real exchange rate, the price of U.S goods in terms of foreign goods, from 1973 to 2003.[19] Like the bilateral real exchange rates we saw a few pages earlier, it is an index

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17. "Bi" means two. "Multi" means many.
18. These are all equivalent names for the relative price of U.S.goods in terms of foreign goods:
   – The real multilateral U.S. exchange rate
   – The U.S. **trade weighted real exchange rate**
   – The U.S. **effective real exchange rate.**

19. The figure starts in 1973 because this multilateral real exchange rate, which is constructed by the Federal Reserve Board, is available only from 1973 on.

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number. So its level is also arbitrary; here it is set equal to 1 in the first quarter of 2000.

The most striking aspect of the figure is something we already saw when looking at the bilateral exchange rate between the United States and the United Kingdom in Figure 18–4, the large swing in the real exchange rate in the 1980s. U.S. goods were about 40% more expensive relative to foreign goods in the mid–1980s than they were either at the beginning or at the end of the decade. In other words, there was a large real appreciation in the first half of the 1980s, followed by an even larger real depreciation in the second half. This large swing, which as we have seen has its origins in the movement of the nominal exchange rate, is so striking that it has been given various names, from the "dollar cycle" to the more graphic "dance of the dollar." Note the similar, but smaller movements of the dollar from the mid 1990s on, with an increase of 25% from 1995 to 2001, and a decrease since then. Many economists wonder whether we are in the middle of a second large swing, a second dollar cycle. In the coming chapters, we shall return to these swings, look at where they come from, and what effects they have on the trade deficit and economic activity.

18–2. Openness in Financial Markets

Openness in financial markets allows financial investors to hold both domestic assets and foreign assets, to diversify their portfolios, to speculate on movements in foreign interest rates versus domestic interest rates, on movements in exchange rates, and so on.

Diversify and speculate they do. Given that buying or selling foreign assets implies buying or selling foreign currency—sometimes called **foreign exchange**—the volume of transactions in foreign–exchange markets gives a sense of the importance of international financial transactions. In 2001

the recorded *daily* volume of foreign–exchange transactions in the world was $2.6 trillion, of which 90%—about $2.4 trillion—involved dollars on one side of the transaction.[20]

To get a sense of the magnitude of these numbers, the sum of U.S. exports and imports in 2001 totalled $2.5 trillion *for the year*, or about $7 billion a day. Suppose the only dollar transactions in foreign–exchange markets had been, on one side, by U.S. exporters selling their foreign currency earnings, and on the other side by U.S. importers buying the foreign currency they needed to buy foreign goods. Then, the volume of transactions would have been $7 billion a day, or about 0.3% of the actual daily volume of dollar transactions ($2.4 trillion) involving dollars in foreign exchange markets.[21] This computation tells us that most of the transactions are associated not with trade, but with purchases and sales of financial assets. The volume of transactions in foreign exchange markets is not only high but also rapidly increasing. The volume of foreign–exchange transactions in New York is now about 25 times what it was in 1980. Again, this activity reflects mostly an increase in financial transactions rather than an increase in trade over the last 15 years.

For a country as a whole, openness in financial markets has another important implication. It allows the country to run trade surpluses and trade deficits. Recall, a country running a trade deficit is buying more from the rest of the world than it is selling to the rest of the world. In order to pay for the difference between what it buys and what it sells, the country must borrow from the rest of the world. It borrows by making it attractive for foreign financial investors to increase their holdings of domestic assets—in effect, to lend to the country.

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20. The year 2001 is the latest year for which these numbers are available.
21. Daily volume of foreign exchange transactions with dollars in one side of the transaction: $ 2.4 trillion.
Daily volume of trade of the United States with the rest of the world: $7 billion (0.3% of the volume of foreign exchange transactions.)

Let's start by looking more closely at the relation between trade flows and financial flows. When this is done, we shall look at the determinants of these financial flows.

The Balance of Payments

A country's transactions with the rest of the world, including both trade flows and financial flows, are summarized by a set of accounts called the **balance of payments**. Table 18–3 presents the U.S. balance of payments for 2003. The table has two parts, separated by a line. Transactions are referred to either as **above the line** or **below the line**.

The current account. The transactions above the line record payments to and from the rest of the world. They are called **current account** transactions.

- The first two lines record the exports and imports of goods and services. Exports lead to payments from the rest of the world, imports to payments to the rest of the world. In 2003, imports exceeded exports, leading to a U.S. trade deficit of $490 billion—roughly 4.5% of U.S. GDP.

- Exports and imports are not the only sources of payments to and from the rest of the world. U.S. residents receive **investment income** on their holdings of foreign assets, and foreign residents receive investment income on their holdings of U.S. assets. In 2003, investment income received from the rest of the world was $275 billion, and investment income paid to foreigners was $258 billion, for a net balance of $17 billion.

- Finally, countries give and receive foreign aid; the net value of these payments is recorded as **net transfers received**. These net transfers amounted in 2003 to –$68 billion. This negative amount reflects

the fact that, in 2003, the United States was—as it has traditionally been—a net donor of foreign aid.

The sum of net payments to and from the rest of the world is called the **current account balance.** If net payments from the rest of the world are positive, the country is running a **current account surplus**; if they are negative, the country is running a **current account deficit**. Adding all payments to and from the rest of the world, net payments from the United States to the rest of the world were equal in 2003 to –$490 +$17 –$68 = –$541 billion. Put another way, in 2003, the United States ran a current account deficit of $541 billion—roughly 5.0% of its GDP.[22]

Table 18–3. The U.S. Balance of Payments, 2003, in billions of U.S. dollars

Current Account		
Exports	1018	
Imports	1508	
Trade balance (deficit= −) (1)		–490
Investment income received	275	
Investment income paid	258	
Net investment income (2)		17
Net transfers received (3)		–68
Current account balance (deficit=−) (1)+(2)+(3)		–541
Capital account		
Increase in foreign holdings of U.S. assets (4)	856	
Increase in U.S. holdings of foreign assets (5)	277	
Capital account balance (deficit=−) (4)-(5)		579
Statistical discrepancy		-38

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22. Can a country have:
     A trade deficit and no current account deficit?
     A current account deficit and no trade deficit?
(The answers to both questions: Yes.)

Source: Survey of Current Business, April 2004. All numbers in billions of dollars.

The capital account. The fact that the United States had a current account deficit of $541 billion in 2003 implies that it had to borrow $541 billion from the rest of the world—or, equivalently, that net foreign holdings of U.S. assets had to increase by $541 billion. The numbers below the line describe how this was achieved. Transactions below the line are called **capital account** transactions.

The increase in foreign holdings of U.S. assets was $856 billion. But there was also an increase in U.S. holdings of foreign assets of $277 billion, so the net increase in U.S foreign indebtedness, (the increase in foreign holdings of U.S. assets, minus the increase in U.S. holdings of foreign assets), also called **net capital flows** to the United States, was $856 − $277 = $579 billion. Another name for net capital flows is the **capital account balance**: Positive net capital flows are called a **capital account surplus**; negative net capital flows are called a **capital account deficit.** So, put another way, in 2003, the United States ran a capital account surplus of $579 billion.[23]

Shouldn't net capital flows (equivalently the capital account surplus) be exactly equal to the current account deficit (which we saw from above was equal to $541 billion in 2003)?

In principle, yes. In practice, no.

The numbers for current and capital account transactions are constructed using different sources; although they should give the same answers, they typically do not. In 2003, the difference between the two—the **statistical discrepancy**—was $38 billion, about 7% of the current account balance.

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23. A country that runs a current account deficit must finance it through positive net capital flows. Equivalently, it must run a capital account surplus.

This is yet another reminder that, even for a rich country such as the United States, economic data are far from perfect. (This problem of measurement manifests itself in another way as well. The sum of the current account deficits of all the countries in the world should be equal to zero: One country's deficit should show up as a surplus for the other countries taken as a whole. However, this is not the case in the data: If we just add the published current account deficits of all the countries in the world, it would appear that the world is running a large current account deficit! Some economists speculate that the explanation is unrecorded trade with the Martians. Most others believe that mismeasurement is the explanation.)

Now that we have looked at the current account, we can return to an issue we touched on in Chapter 2, the difference between GDP, the measure of output we have used so far, and GNP, another measure of aggregate output. This is done in the Focus box "GDP versus GNP: The Example of Kuwait."

Focus. GDP versus GNP: The Example of Kuwait

Should value added in an open economy be defined as

- *The value added domestically (that is, within the country), or*
- *The value added by domestically owned factors of production ?*

The two definitions are not the same: Some domestic output may be produced by capital owned by foreigners, while some foreign output may be produced by capital owned by domestic residents.

The answer is that either definition is fine, and economists use both. **Gross domestic product (GDP)**, *the measure we have used so far, corresponds to value added domestically.* **Gross national product (GNP)** *corresponds to the value added by domestically owned factors of production.*

GNP is equal to GDP plus net factor payments from the rest of the world (factor payments from the rest of the world minus factor payments to the rest of the world). While GDP is now the measure most commonly mentioned, GNP was widely used until the early 1990s, and you will still encounter it in newspapers and academic publications.

For most countries, the difference between GNP and GDP is typically small, because factor payments to and from the rest of the world roughly cancel. For the United States in 2003, the difference between GDP and GNP was $43 billion—about 0.4% of GDP (This is an unusually small number, by historical standards. But, for the United States, the difference between the two has never exceeded 1% of GDP.)

There are a few exceptions. Among them is Kuwait. When oil was discovered in Kuwait, Kuwait's government decided that a portion of oil revenues would be saved and invested abroad rather than spent, so as to provide future Kuwaiti generations with investment income when oil revenues came to an end. Kuwait ran a large current account surplus, steadily accumulating large foreign assets. As a result, it now has large holdings of foreign assets, and receives substantial investment income from the rest of the world. Table 1 gives GDP, GNP, and net factor payments for Kuwait, from 1989 to 1994.

Table 1. GDP, GNP, and Net Factor Payments in Kuwait, 1989–1994

Year	GDP	GNP	Net Factor Payments
1989	7143	9616	2473
1990	5328	7560	2232
1991	3131	4669	1538
1992	5826	7364	1538
1993	7231	8386	1151
1994	7380	8321	941

Source: International Financial Statistics, IMF All numbers are in millions of Kuwaiti dinars. 1 dinar=$3.3 (2003).

Note how much larger GNP is compared to GDP throughout the period. But note also how net factor payments decreased after 1989. This is because Kuwait had to pay its allies for part of the cost of the 1990–1991 Gulf War and to pay for reconstruction after the war. It did so by running a current account deficit—equivalently, by decreasing its net holdings of foreign assets. This in turn led to a decrease in the income from foreign assets, and by implication, a decrease in net factor payments.

The Choice between Domestic and Foreign Assets

Openness in financial markets implies that financial investors face a new financial decision, holding domestic versus holding foreign assets.

It would seem that we actually have to think about at least *two* new decisions, the choice of holding domestic *money* versus foreign *money*, and the choice of holding domestic *interest–paying assets* versus foreign *interest–paying assets*. But remember why people hold money: to engage in transactions. For somebody who lives in the United States, and whose transactions are mostly or fully in dollars, there is little point in holding foreign currency: Foreign currency cannot be used for transactions in the United States, and if the goal is to hold foreign assets, holding foreign currency is clearly less desirable than holding foreign bonds, which pay interest.[24] This leaves us with only one new choice to think about, the choice between domestic interest–paying assets and foreign interest–paying assets.

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24. Two qualifications:

Foreigners involved in illegal activities often hold dollars, because dollars can be exchanged easily and cannot be traced.

In times of very high inflation, people sometimes switch to a foreign currency, often the dollar, for use even in some domestic transactions.

Let's think of these assets for now as domestic one–year bonds and foreign one–year bonds. To continue with our focus on the United States and the United Kingdom, consider for example the choice between U.S. one–year bonds and U.K. one–year bonds, from the point of view of a U.S. investor.

- Suppose you decide to hold U.S. bonds.

  Let i_t be the one–year U.S. nominal interest rate. Then, as Figure 18–6 shows, for every dollar you put in U.S. bonds, you will get $(1 + i_t)$ dollars next year. (This is represented by the arrow pointing to the right at the top of the figure.)

- Suppose you decide instead to hold U.K. bonds.

  To buy U.K. bonds, you must first buy pounds. Let E_t be the nominal exchange rate between the dollar and the pound. For every dollar, you get E_t pounds. (This is represented by the arrow pointing downward in the figure).

  Let i_t^* denote the one–year nominal interest rate on U.K. bonds (in pounds). When next year comes, you will have $E_t(1 + i_t^*)$ pounds. (This is represented by the arrow pointing right at the bottom of the figure.)

  You will then have to convert your pounds back into dollars. If you expect the nominal exchange rate next year to be E_{t+1}^e, each pound will be worth $(1/E_{t+1}^e)$ dollars. So you can expect to have $E_t(1 + i_t^*)(1/E_{t+1}^e)$ dollars next year for every dollar you invest now. (This is represented by the arrow pointing upward in the figure.)

  We shall look at the expression we just derived in more detail soon. But note its basic implication already: In assessing the attractiveness of U.K. versus U.S. bonds, you cannot look just at the U.K. interest rate and the U.S. interest rate; you must also assess what you think will happen to the dollar/pound exchange rate between this year and next.[25]

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  25. The decision whether to invest abroad or at home depends on more than interest rates. It also depends on the expected movements in the exchange rate in the future.

Figure 18–6. Expected Returns from Holding One–Year U.S. Bonds or One-Year U.K. Bonds

Let's now make the same assumption we made in Chapter 14 when discussing the choice between short–term bonds and long–term bonds, or between bonds and stocks. Let's assume that you and other financial investors care only about the expected rate of return and therefore want to hold only the asset with the highest expected rate of return. In that case, if both U.K. bonds and U.S. bonds are to be held, they must have the same expected rate of return, so that the following *arbitrage relation* must hold

$$(1 + i_t) = (E_t)(1 + i_t^*)(\frac{1}{E_{t+1}^e})$$

Reorganizing

$$(1 + i_t) = (1 + i_t^*)(\frac{E_t}{E_{t+1}^e}) \tag{18.2}$$

Equation (18.2) is called the **uncovered interest parity** relation, or simply the **interest parity condition**.[26]

The assumption that financial investors will hold only the bonds with the highest expected rate of return is obviously too strong, for two reasons:

• It ignores transaction costs: Going in and out of U.K. bonds requires three separate transactions, each with a transaction cost.

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26. The word *uncovered* is to distinguish this relation from another relation called the *covered interest parity* condition. The covered interest parity condition is derived by looking at the following choice:
Buy and hold U.S. bonds for one year. Or buy pounds today, buy one-year U.K. bonds with the proceeds, and agree to sell the pounds for dollars a year ahead at a predetermined price, called the *forward exchange rate*.
The rate of return to these two alternatives, which can both be realized at *no risk today*, must be the same. The covered interest parity condition is a *riskless arbitrage* condition.

- It ignores risk: The exchange rate a year from now is uncertain; that means that holding U.K. bonds is more risky, in terms of dollars, than holding U.S. bonds.[27]

But as a characterization of capital movements among the major world financial markets (New York, Frankfurt, London, and Tokyo), the assumption is not far off. Small changes in interest rates and rumors of impending appreciation or depreciation can lead to movements of billions of dollars within minutes. For the rich countries of the world, the arbitrage assumption in equation (18.2) is a good approximation of reality. Other countries whose capital markets are smaller and less developed, or countries that have various forms of capital controls, have more leeway in choosing their domestic interest rate than is implied by equation (18.2). We shall return to this issue at the end of Chapter 20.

Interest Rates and Exchange Rates

Let's get a better sense of what the interest parity condition implies. First rewrite E_t/E_{t+1}^e as $1/(1 + (E_{t+1}^e - E_t)/E_t$. Replacing in equation (18.2) gives

$$(1 + i_t) = \frac{(1 + i_t^*)}{[1 + (E_{t+1}^e - E_t)/E_t)]} \tag{18.3}$$

This gives us a relation between the domestic nominal interest rate, i_t, the foreign nominal interest rate, i_t^*, and the expected rate of appreciation of the domestic currency, $(E_{t+1}^e - E_t)/E_t$. As long as interest rates or the expected rate of depreciation are not too large—say below 20% a year—a good approximation to this equation is given by[28]

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27. Whether holding U.K. bonds or U.S. bonds is more risky actually depends on which investors we are looking at. Holding U.K. bonds is more risky from the point of view of U.S. investors. Holding U.S. bonds is more risky from the point of view of British investors. (Why?)
28. This follows from Proposition 3 in Appendix 2 at the end of the book.

$$i_t \;\approx\; i_t^* \;-\; \frac{E_{t+1}^e - E_t}{E_t} \qquad\qquad (18.4)$$

This is the form of the *interest parity* condition you must remember: Arbitrage implies that *the domestic interest rate must be equal to the foreign interest rate minus the expected appreciation rate of the domestic currency.*

Note that the expected appreciation rate of the domestic currency is also the expected depreciation rate of the foreign currency.[29] So equation (18.4) can be equivalently stated as saying that *the domestic interest rate must be equal to the foreign interest rate minus the expected depreciation rate of the foreign currency.*

Let's apply this equation to U.S. bonds versus U.K. bonds. Suppose the one–year nominal interest rate is 2.0% in the United States, 5.0% in the United Kingdom. Should you hold U.K. bonds or U.S. bonds? The answer:

- It depends whether you expect the pound to depreciate vis–à–vis the dollar over the coming year by more or less than the difference between the U.S. interest rate and the U.K. interest rate, 5.0% – 2.0% =3.0%.

- If you expect the pound to depreciate by more than 3.0%, then, despite the fact that the interest rate is higher in the United Kingtom than in the United States, investing in U.K. bonds is less attractive than investing in U.S. bonds. By holding U.K. bonds, you will get higher interest payments next year, but the pound will be worth less in terms of dollars next year, making investing in U.K. bonds less attractive than investing in U.S. bonds.

- If you expect the pound to depreciate by less than 3.0% or even to appreciate, then the reverse holds, and U.K bonds are more attractive than U.S. bonds.

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29. If the dollar is expected to appreciate by 3% vis a vis the pound, then the pound is expected to depreciate by 3% vis a vis the dollar.

Looking at it another way: If the uncovered interest parity condition holds, and the U.S. one-year interest rate is 3% lower than the U.K. interest rate, it must be that financial investors are expecting on average an appreciation of the dollar vis a vis the pound over the coming year of about 3%, and this is why they are willing to hold U.S. bonds despite their lower interest rate. (Another application of the uncovered interest parity condition is provided in the Focus box "Buying Brazilian Bonds").

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Focus. Buying Brazilian Bonds

Go back to September 1993 (the very high interest rate in Brazil at the time helps make the point I want to get across here). Brazilian bonds are paying a monthly interest rate of 36.9%. This seems very attractive compared to the annual rate of 3% on U.S. bonds—corresponding to a monthly interest rate of about 0.2%. Shouldn't you buy Brazilian bonds?

The discussion in this chapter tells you that, to decide, you need one more crucial element, the expected rate of depreciation of the cruzeiro (the name of the Brazilian currency at the time; the currency is now called the real) in terms of dollars.

You need this information because, as we saw in equation 18–3, the return in dollars from investing in Brazilian bonds for a month is equal to one plus the Brazilian interest rate, divided by one plus the expected rate of depreciation of the cruzeiro relative to the dollar:

$$\frac{1 + i_t^*}{[1 + (E_{t+1}^e - E_t)/E_t]}$$

What rate of depreciation of the cruzeiro should you expect over the coming month? A reasonable assumption is to expect the rate of depreciation over

*the coming month to be equal to the rate of depreciation over the last
month. The dollar was worth 100,000 cruzeiros at the end of July 1993,
and worth 134,600 cruzeiros at the end of August 1993, so the rate of
appreciation of the dollar vis a vis the cruzeiro—equivalently the rate of
depreciation of the cruzeiro vis a vis the dollar—in August was 34.6%. If
depreciation is expected to continue at the same rate in September as it
did in August, the expected return from investing in Brazilian bonds for a
month is*

$$\frac{1.369}{1.346} = 1.017$$

*The expected rate of return in dollars from holding Brazilian bonds is only
(1.017 − 1) = 1.6% per month, not the 36.9% per month that looked so
attractive. Note that 1.6% per month is still much higher than the monthly
interest rate on U.S. bonds (about 0.2%). But think of the risk and the
transaction costs—all the elements we ignored when we wrote the arbitrage
condition. When these are taken into account, you may well decide to keep
your funds out of Brazil.*

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The arbitrage relation between interest rates and exchange rates (either
in the form of equation (18.2) or equation (18.4)) will play a central role
in the following chapters. It suggests that, unless countries are willing to
tolerate large movements in their exchange rate, domestic and foreign in-
terest rates are likely to move very much together. Take the extreme case
of two countries that commit to maintaining their bilateral exchange rates
at a fixed value. If markets have faith in this commitment, they will expect
the exchange rate to remain constant, and the expected depreciation will
be equal to zero. In that case, the arbitrage condition implies that interest
rates in the two countries will have to move exactly together.[30] Most of
the time, as we shall see, governments do not make such absolute commit-

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30. If $E_{t+1}^e = E_t$, then the interest parity condition implies $i_t = i_t^*$.

ments to maintain the exchange rate, but they often do try to avoid large movements in the exchange rate. This puts sharp limits on how much they can allow their interest rate to deviate from interest rates elsewhere in the world.

How much do nominal interest rates actually move together in major countries? Figure 18–7 plots the three–month nominal interest rate in the United States and the three–month nominal interest rate in the United Kingdom (both expressed at annual rates), since 1970. The impression from the figure is of related but not identical movements. Interest rates were very high in both countries in the early 1980s, and high again—although much more so in the United Kingdom than in the United States—in the late 1980s. Both have been low since the early to mid 1990s. At the same time, differences between the two have sometimes been quite large: In 1990, for example, the U.K. interest rate was nearly 7% above the U.S. interest rate. In the coming chapters, we shall return to why such differences emerge, and what their implications may be.[31]

Figure 18–7 Three–Month Nominal Interest Rates in the United States and in the United Kingdom, 1970–2003 (Caption. U.S. and U.K. nominal interest rates have largely moved together over the last 33 years.)

18–3. Conclusions and a Look Ahead

We have now set the stage for the study of the open economy:

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31. Meanwhile, do the following: Look at the back pages of a recent issue of the Economist for short-term interest rates in different countries relative to the United States. Which are the currencies against which the dollar is expected to depreciate?

- Openness in goods markets allows a choice between domestic goods and foreign goods. This choice depends primarily on the *real exchange rate*—the relative price of domestic goods in terms of foreign goods.
- Openness in financial markets allows a choice between domestic assets and foreign assets. This choice depends primarily on their relative rates of return, which depend on domestic interest rates and foreign interest rates, and on the expected rate of appreciation of the domestic currency.

In the next chapter, Chapter 19, we look at the implications of openness in goods markets. Chapter 20 brings in openness in financial markets. In Chapter 21, we discuss the pros and cons of different exchange rate regimes.

Summary
- Openness in goods markets allows people and firms to choose between domestic goods and foreign goods. Openness in financial markets allows financial investors to hold domestic financial assets or foreign financial assets.
- The nominal exchange rate is the price of the domestic currency in terms of foreign currency. From the viewpoint of the United States, the nominal exchange rate between the United States and the United Kingdom is the price of a dollar in terms of pounds.
- A nominal appreciation (an appreciation, for short) is an increase in the price of the domestic currency in terms of foreign currency, i.e. an increase in the exchange rate. A nominal depreciation (a depreciation, for short) is a decrease in the price of the domestic currency in terms of foreign currency, i.e. a decrease in the exchange rate.

- The real exchange rate is the relative price of domestic goods in terms of foreign goods. It is equal to the nominal exchange rate times the domestic price level divided by the foreign price level.

- A real appreciation is an increase in the relative price of domestic goods in terms of foreign goods, i.e. an increase in the real exchange rate. A real depreciation is a decrease in the relative price of domestic goods in terms of foreign goods, i.e. a decrease in the real exchange rate.

- The multilateral real exchange rate, or real exchange rate for short, is a weighted average of bilateral real exchange rates, with the weight for each foreign country equal to its share in trade.

- The balance of payments records a country's transactions with the rest of the world. The current account balance is equal to the sum of the trade balance, net investment income, and net transfers received from the rest of the world. The capital account balance is equal to capital flows from the rest of the world minus capital flows to the rest of the world.

- The current account and the capital account are mirror images of each other. Leaving aside statistical problems, the current account plus the capital account must sum to zero. A current account deficit is financed by net capital flows from the rest of the world, thus by a capital account surplus. Similarly, a current account surplus corresponds to a capital account deficit.

- Uncovered interest parity, or interest parity for short, is an arbitrage condition stating that the expected rates of return in terms of domestic currency on domestic bonds and foreign bonds must be equal. Interest parity implies that the domestic interest rate approximately equals the foreign interest rate minus the expected appreciation rate of the domestic currency.

Key terms

- openness in goods markets
- tariffs
- quotas
- openness in financial markets
- capital controls
- openness in factor markets
- North American Free Trade Agreement (NAFTA)
- tradable goods
- real exchange rate
- nominal exchange rate
- appreciation (nominal, real)
- depreciation (nominal, real)
- fixed exchange rates
- revaluation
- devaluation
- merchandise trade
- bilateral exchange rate
- multilateral exchange rate
- multilateral real U.S. exchange rate
- trade–weighted real exchange rate
- effective real exchange rate
- foreign exchange
- balance of payments
- above the line, below the line
- current account
- capital account
- investment income
- net transfers received
- current account balance

- current account surplus, deficit
- net capital flows
- capital account balance
- capital account surplus, deficit
- statistical discrepancy
- gross domestic product (GDP) versus gross national product (GNP)
- uncovered interest parity relation, or interest parity condition

Further Readings

If you want to learn more about international trade and international economics, a very good textbook is by Paul Krugman and Maurice Obstfeld, *International Economics, Theory and Policy*, 6th ed. (New York: Pearson Addison Wesley, 2002).

If you want to know current exchange rates between nearly any pair of currencies in the world, look at the "currency converter" on http://www.oanda.com.

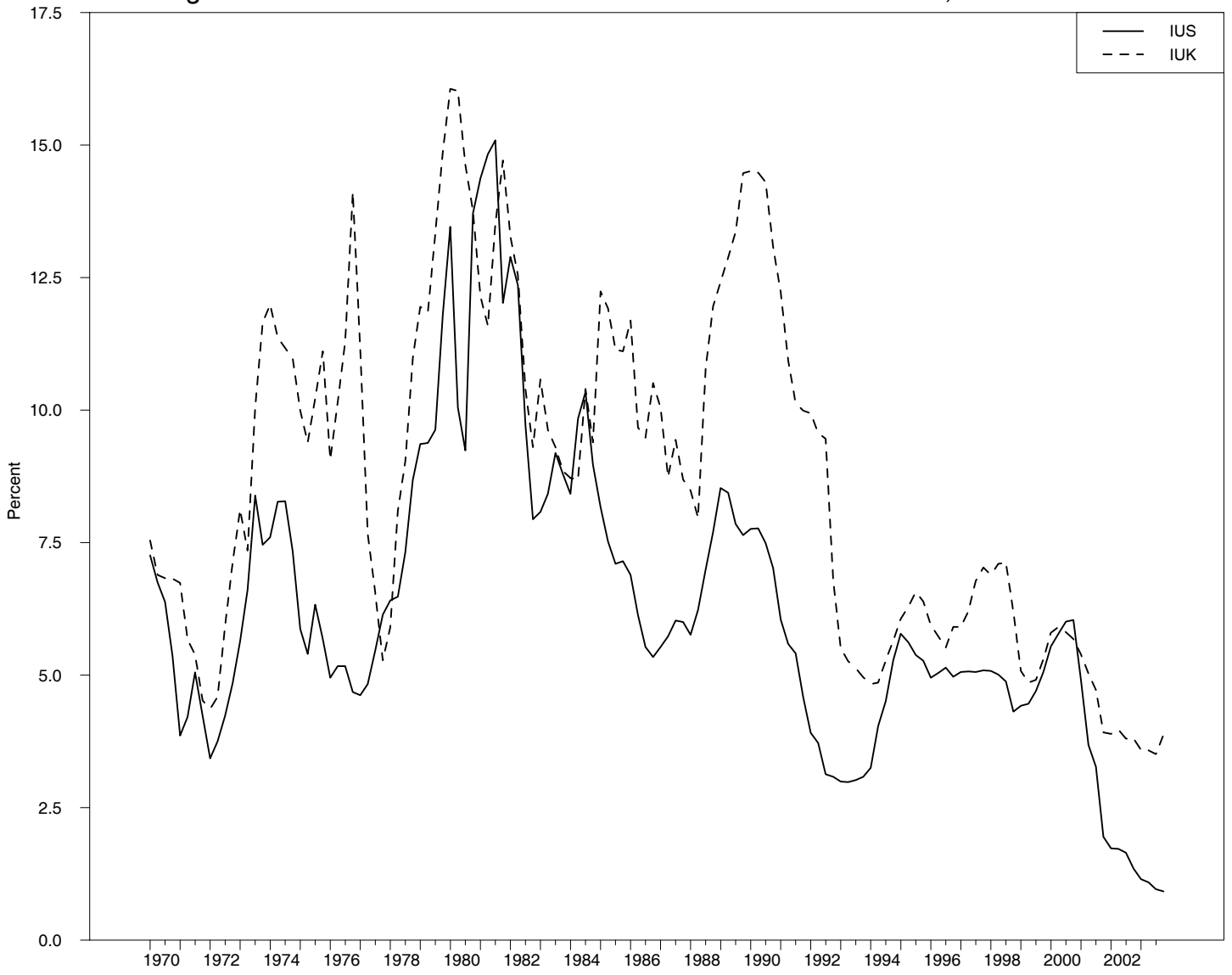Figure 18-7. U.S. and U.K. Three-Month Nominal Interest Rates, 1970-2003

Figure 18-6. Expected Returns from Holding One-Year U.S. or U.K. Bonds

Year t: Year t+1:

Holding:

U.S. bonds

$$\$ 1 \longrightarrow \$(1+i_t)$$

U.K. bonds

$$\$ 1$$

$$\pounds E_t \longrightarrow \pounds E_t (1+i^*_t)$$
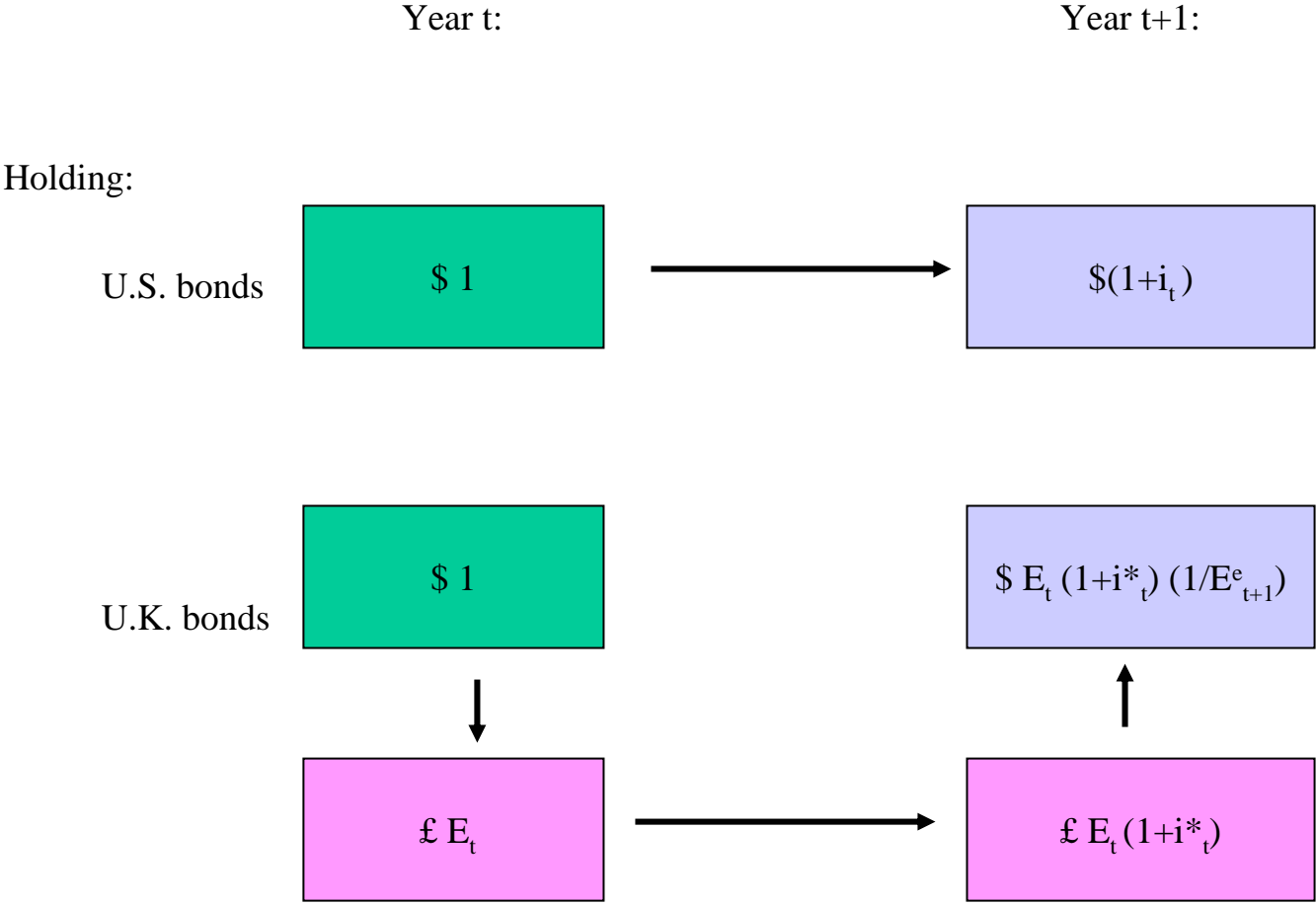
$$\$ E_t (1+i^*_t) (1/E^e_{t+1})$$

Figure 18-5. The U.S. Effective Real Exchange Rate, 1973-2003

Figure 18-4. Real and Nominal Exchange rates between the U.S. and the the U.K., 1970-2003

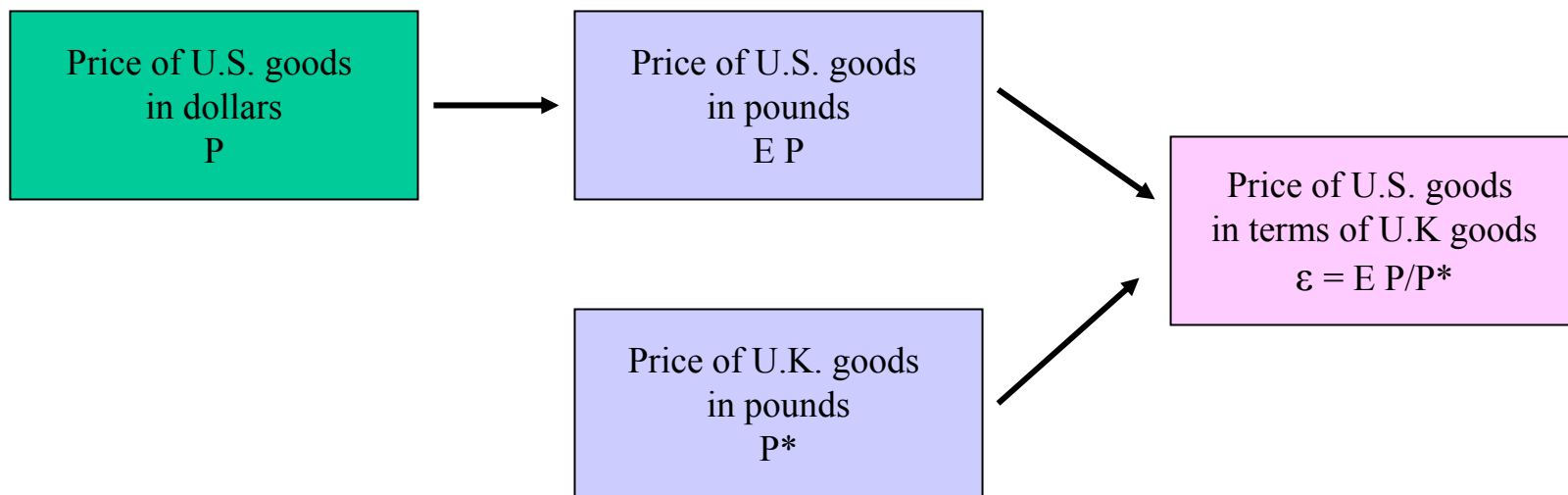# Figure 18-3. The Construction of the Real Exchange Rate

Figure 18-2. The Nominal Exchange Rate between the dollar and the pound, 1970-2003

Figure 18-1. U.S. Exports and Imports as Ratios of GDP, 1960-2003