

*A nominal exchange rate is the price of one country's money in terms of another's. A real exchange rate is the nominal exchange rate adjusted for the price levels in the two countries. An exchange rate index is the value of one country's currency in terms of a basket of others.*

*Foreign exchange* refers to the currency of a country other than our own.

The *nominal* exchange rate between two countries indicates how many units of the first country's currency you can buy for one unit of the second country's currency. For example, the nominal exchange rate between the US and the UK might be 2 dollars per pound. Since this is a price of two moneys, we can give any exchange rate in two ways. For example, we can say that one British pound is worth 2 dollars, or we can say that one dollar is worth 0.5 pounds.

We speak of a country's currency *appreciating* or getting *stronger* when one unit of that currency can buy more of a foreign currency than it was formerly able to. We speak of a currency *depreciating* or getting *weaker* when one unit can buy fewer units of a foreign currency than formerly. Since the value of one currency is measured in terms of the other currency, an appreciation of one is the same as a depreciation of the other.

When the value of a *fixed* exchange rate is changed by deliberate government policy, that is called a *devaluation* or *revaluation*, rather than a depreciation or appreciation.

Because exchange rates can be quoted either as units of the home currency per unit of the foreign currency, or as units of the foreign currency per unit of the home currency, the terms "higher" and "lower" are ambiguous when applied to exchange rates. For example, suppose the value of the dollar increased to 0.8 pounds; we could just as well describe that as the value of the pound falling to 1.25 dollars. The same change could be described as the exchange rate going up or down, depending which way the it is quoted. So we try to avoid speaking of currencies going up or down; rather than saying a currency "went up," we say it got stronger or appreciated. When you see a reference to an exchange rate going up, for instance in a newspaper article, you should take a moment to figure out if higher means stronger, or if it could mean weaker.

### *Real exchange rates*

The *real exchange rate* is the nominal exchange rate adjusted for inflation. Or equivalently, the real exchange rate is the price of a basket of goods in one country relative to the price of the same basket in another country. Real exchange rates are affected by changes in the nominal exchange rate, and by the difference in the inflation rates in both countries.

For example: Suppose you are a real estate speculator and you decide to sell 100 houses in the United States and buy a bunch of similar houses in the UK. How many houses you can buy there will depend on:

1. How many dollars you get for each house you sell in the US.
2. How many pounds you get for each dollar.
3. How many pounds a similar house costs in the UK.

So, the number of British houses you can get for your American houses will increase if:

1. The price of an American house in dollars rises by a lot. (Inflation is high in the US.)
2. The number of pounds you get for each dollar increases. (There is a nominal appreciation of the dollar.)
3. The cost of a British house in pounds does not rise by a lot. (Inflation is low in the UK.)

Any of these changes is equivalent to a *real appreciation* of the dollar.

Let's write the *nominal* dollars-per-euro exrate as  $E_{\$/e}$ . In other words, if one euro is worth 1.2 dollars, we can write  $E_{\$/e} = 1.2$ . We could equally well describe the same exchange rate as  $E_{e/\$} = 0.83$ , since if one euro is worth 1.2 dollars then one dollar is worth 0.83 euros. If we write the exchange rate as  $E_{\$/e}$  (dollars per euro) then a higher number means an appreciation of the euro, and a depreciation of the dollar. If we write the exchange rate as  $E_{e/\$}$  (euros per dollar), then a higher number means an appreciation of the dollar, and a depreciation of the euro.

We'll write the price level in the US as  $P_{\$}$ , the price level in the euro area as  $P_e$ , and the *real* exchange rate as  $RE_{\$/e}$ . Then

$$RE_{\$/e} = E_{\$/e} \left( \frac{P_e}{P_{\$}} \right)$$

In other words, if everything in the euro area costs exactly 20 percent more than the same good in the US, and the euro is worth 1.2 dollars, that is the same real exchange rate as if everything in the euro area had the same price as in the US, and the nominal exchange rate was one dollar for one euro.

In practice, we are usually interested in the change in the real exchange rate, not its absolute level. For this, we write:

$$\Delta RE_{\$/e} \approx \Delta E_{\$/e} + inflation_e - inflation_{\$}$$

where  $\Delta$  means change in percentage points. So an additional point of inflation in Europe over one year implies a one percentage point real appreciation of the euro. And each additional point of inflation in the US over one year implies a one point real appreciation of the dollar. If inflation in Europe and the US is the same over a year, then the change in the real exchange rate will just be the same as the change in the nominal exchange rate.

For a given nominal exchange rate, higher inflation in our country than in our trade partners means a real appreciation for currency; lower inflation than in our trade partners means a real depreciation for us.

In some cases, we may expect the real exchange rate to be more or less fixed. In that case, as you can see from the previous equation, higher inflation in our country than in our trade partners must lead to a nominal depreciation of our currency, and lower inflation must lead to a nominal appreciation.

In other cases, the nominal exchange rate may be fixed, but policymakers might consider a change in the real exchange rate to be desirable. If the nominal exchange rate can't change, moving the real exchange rate will require achieving a different level of inflation. When a country tries to weaken its real exchange rate via lower inflation (or deflation) relative to its trade partners, that is sometimes called an *internal devaluation*, as opposed to the normal devaluation that involves a change in the nominal exchange rate.