

Lecture 2: Exchange Rate Basics

I. INTRODUCTION

- Money serves as a medium of exchange that simplifies transactions between millions of people interacting in a marketplace.
- Transactions between people who live in different countries, however, is more complicated because of the existence of different mediums of exchange. Cross-border transactions therefore typically require a corresponding exchange of one currency for another.
- An exchange rate describes the price of one currency in terms of another. This lecture presents some basic definitions of exchange rates and also describes basic features of the foreign exchange market.

II. EXCHANGE RATES

- The nominal exchange rate between two countries is the one country's currency in terms of the other country's currency. In this class we will define the nominal exchange rate between two countries in terms of domestic currency units per unit of foreign currency.
- So the U.S Dollar/Japanese Yen exchange rate is given as 0.00833 Dollars per Yen instead of as 120 Yen per Dollar, which is what you often see reported in the newspaper. Nonetheless, \$/foreign currency is the right way to think about exchange rates since we price goods that way as well, i.e. we think of dollars per cabbage rather than cabbages per dollar. I will use the symbol e to denote the nominal exchange rate.
- We can multiply the price of a good denominated in foreign currency by the nominal exchange rate to convert it to domestic currency terms; we can divide the price of goods denominated in domestic currency by the nominal exchange rate to convert them to foreign currency terms. For example: if a BMW costs 40,000 Euros and the exchange rate between Germany and the U.S. was 1.25 \$/Euro then the dollar price of the BMW is $40,000 \text{ Euro} * 1.25 \text{ \$/Euro} = \$50,000$. Similarly, if a Dell computer costs \$2400 then its price in Euros would be $\$2400 / (1.25 \text{ \$/Euro}) = 1920 \text{ Euros}$.
- An increase in e is called a depreciation of the domestic currency, i.e. in the United States, the dollar has decreased in value (more dollars are needed to buy one unit of foreign currency). A decrease in e is an appreciation of the domestic currency, i.e. the dollar has increased in value (fewer dollars are needed to buy one unit of foreign currency.)
- Changes in the exchange rate change the relative price of goods in two countries. However, the nominal exchange rate is not the only variable that affects the relative price of goods in two countries, the price levels in each country matter as well. Economists use the real exchange rate to compare prices in two countries.

- I will use the symbol R to denote the real exchange rate, which can be defined as

$$R = \frac{eP^*}{P}$$

- R is the relative price of foreign goods, as can be seen from the fact that

$$R = \frac{\$/\text{foreign currency} * \text{foreign currency price of foreign goods}}{\$ \text{ price of domestic goods}} = \frac{\$ \text{ price of foreign goods}}{\$ \text{ price of domestic goods}}$$

- An increase in R is known as a depreciation of the real exchange rate (foreign goods become more expensive) and a decrease in R is an appreciation of the real exchange rate (foreign goods become cheaper).
- Note that nominal exchange rate appreciation can cause real exchange rate appreciation, all else equal, i.e. if relative prices in the two economies do not change. However, changes in prices can cause the real exchange rate to fluctuate without an underlying change in the nominal exchange rate.
- An increase in domestic prices, all else equal, will cause the real exchange rate to appreciate. A decrease in foreign prices, all else equal, will also cause a real exchange rate appreciation.
- A decrease in domestic prices, all else equal, will cause the real exchange rate to depreciate. An increase in foreign prices, all else equal, will also cause a real exchange rate depreciation.

III. THE FOREIGN EXCHANGE MARKET

- The foreign exchange market is literally a gigantic worldwide trading system of currencies. Even though every country in the world has a medium of exchange, not all of them are regularly traded on the foreign exchange market. We will discuss some reasons for this in a subsequent lecture.
- Information about the foreign exchange market is reported in publications like the Wall Street Journal. The information reports the nominal exchange rate BOTH in terms of foreign currency/\$ and \$/foreign currency.

The Spot Market

- The spot market for foreign exchange is the market for currency delivered immediately or at the most within a couple of days. These exchange rates are typically for large blocs of currency, typically \$1 million or more. Individuals who trade smaller amounts are likely to get much more unfavorable exchange rates.
- Banks are typically willing to SELL foreign currency at a less advantageous rate than which they would be willing to BUY currency. The difference between the two prices is known as the “spread”. The spread enables the bank to make money by dealing in currencies.
- For example, at noon on Jan 8th 2004, my bank quoted a buying rate of 1.210 \$/Euro and a selling rate of 1.315 \$/Euro. This means that my bank would buy 1 Euro from me for 1.210 U.S. dollars but would charge 1.315 U.S. dollars to sell me 1 Euro. The difference between the two rates \$0.105 is the “spread”.

- The spread is typically very small for large transactions and also for more commonly traded currencies. So the per-unit spread on buying and selling \$10,000 worth of Nepali Rupees will be much higher than the per-unit spread on buying and selling \$10,000,000 worth of Yen or Euros.
- The information reported in the Wall Street Journal is for the mid-range rates, i.e. the average of the buying and the selling rates. For analytical ease, we will assume that spreads are pretty small and consider currencies being bought and sold for the same price for the purposes of this class. The key point is that for large transactions in major currencies, the buying rate, selling rate and by extension the mid-range rate are all pretty much identical, allowing us to proceed with the assumption of a single exchange rate.
- What are the primary reasons that transactions occur in the spot market?

1. Clearing Transactions:

When someone in the U.S. buys a car from Japan or buys a bond issued by the Turkish government that person has to exchange dollars for yen or Turkish lira. This is usually done through the person's bank because the bank can take a large volume of clients' orders and do bulk trading of currencies.

2. Arbitrage:

Arbitrage refers to actions that seek to take advantage of exchange rate discrepancies between different markets. Suppose that the \$/Euro exchange rate is 0.95 in London and 0.949 in New York. Then banks can make a profit by exchanging dollars for Euros in New York and re-exchanging Euros for dollars in London.

Arbitrage is risk-free and therefore immensely profitable to those who can trade in bulk; correspondingly, the opportunities for arbitrage are fleeting unless there are restrictions on free currency trading set in place.

The existence of arbitrage ensures consistency between cross rates. So the dollar/yen rate should be equivalent to the dollar/euro multiplied by the euro/yen exchange rate, otherwise arbitrageurs can make money by trading through the euro.

Arbitrage also establishes exchange rates for rarely traded pairs of currency. The Nepali Rupee/Zambian Kwacha exchange rate will be equivalent to the Rupee/\$ rate multiplied by the \$/Kwacha rate.

3. Hedging:

Firms that conduct transactions with international partners are exposed to currency risk.

Example: a specialty food store in the U.S. wants to import 5000 cans of mushy peas, each costing 1 pound sterling, from England. Payment is due in 30 days. If the exchange rate changes from 2 \$/pound-sterling to 2.5 \$/pound-sterling the cost increases from \$10,000 to \$12,500. (Alternatively, the dollar could appreciate to 1.75 dollars/pound-sterling and the cost could fall to \$8750.)

If the firm wants to avoid the risk of fluctuations in the amount of dollars it has to pay, i.e. it wants to "lock-in" the dollar price of the goods, it can choose to buy 5000 pounds-sterling on the spot market. This enables it to hedge against foreign exchange risk; the firm is said to have taken a closed position.

Hedging only protects against the downside: there are other instruments that allow you to take advantage of the upside as well: these are called options; we will discuss them later.

4. Speculation:

Speculation is a transaction undertaken explicitly hoping to take advantage of exchange rate fluctuations. For example, someone who is certain that the dollar/pound exchange rate will go from 2 to 2.25 will exchange dollars for pounds now in the hope of exchanging them back later when the pound becomes more valuable.

IV. PLAYERS

- Based on our analysis thus far, the major players in the foreign exchange market seem to be
 1. Banks: performing transactions for corporations and individuals
 2. Corporations: Large companies with sales in many countries in the world have to conduct transactions in many currencies, e.g. Toyota builds cars in Malaysia, Japan, the U.S. and Mexico and sells them in South Africa, England and Germany.
 3. Non-bank Financial Institutions: mutual funds, pension funds that invest in stock markets and lend money to foreign companies.
 4. Central Banks: occasionally central banks buy or sell currencies on the foreign exchange market; we will explore their motives in a subsequent lecture.