International Monetary Policy

10 Open Macro - Exchange Rate [1]

Michele Piffer

London School of Economics

[1] Course prepared for the Shanghai Normal University, College of Finance, April 2011

Lecture topic and references

- In this lecture we understand what we mean by nominal and exchange rates
- Mishkin, Chapter 17; Krugman-Obstfeld, Chapter 13

International Economics

- It is now time to move from closed economy to open economy
- The first step is to understand precisely what we mean by exchange rates. Afterwards, we will proceed as follows
  - Understand the determinants of foreign currency demand and supply (Balance of Payment, National Accounting)
  - Understand the implications of flexible vs. fixed exchange rate regimes
  - Review some theory on exchange rate determination (PPP and UIP)
  - Redesign the IS - LM model in an open economy setting

Nominal Exchange Rates

- The purchase of a good is typically expressed in terms of a unit of measurement: we can say that a TV costs 200 $ since there is an accepted medium of exchange like the dollar
- When the exchange of goods and assets is not within a country but between countries we have a lack of a commonly accepted medium of exchange: the two different countries will have different currencies
- The exchange rate is the rate at which different currencies are traded
- What makes exchange rates particular is that the value of one currency is expressed in terms of the other currency

Nominal Exchange Rates

- For the sake of generality, consider two countries: the *Domestic* country and the *Foreign* country
- You may think of China as the domestic country and US as the foreign country. For reasons that you can easily imagine, your textbook does exactly the opposite
- Define E as the *Nominal Exchange Rate*
- Denote by $\mathcal{D}c$ the domestic currency and by $\mathcal{F}c$ the foreign currency
- Being a relative measure, it turns out that one can define the exchange rate in two symmetric ways. Let's see them both

Nominal Exchange Rates - Direct Way

- The direct (or American) definition of a the exchange rate is:

$$\begin{aligned} E_{\mathcal{D}c,\mathcal{F}c} &= \text{price of the foreign in terms of domestic} = \\ &= \text{number of domestic per 1 unit of foreign} = \\ &= \frac{\#\mathcal{D}c}{1\mathcal{F}c} \end{aligned}$$

- For instance, if $E_{\mathcal{D}c,\mathcal{F}c} = 2$ it means that you need 2 units of domestic currency to get one unit of foreign currency

- Equivalently, you need half a unit of foreign currency to get one unit of domestic currency

Nominal Exchange Rates - Direct Way

- Suppose that $E_{\mathcal{D}c,\mathcal{F}c}$ goes up to 3. This means that:
  - We need more units of domestic currency to get the same units of foreign currency
  - Equivalently, we need fewer units of foreign currency to get the same amount of domestic currency
- This means that the foreign currency has become stronger relative to the domestic currency
- Domestic currency has *depreciated*, foreign currency has *appreciated*

Nominal Exchange Rates - Indirect Way

- The indirect (or European) definition of a the exchange rate is:

$$\begin{aligned} E_{\mathcal{F}c,\mathcal{D}c} &= \text{price of the domestic in terms of foreign} = \\ &= \text{number of foreign per 1 unit of domestic} = \\ &= \frac{\#\mathcal{F}c}{1\mathcal{D}c} \end{aligned}$$

- For instance, if $E_{\mathcal{F}c,\mathcal{D}c} = 2$ it means that you need 2 units of foreign currency to get one unit of domestic currency

- Equivalently, you need half a unit of domestic currency to get one unit of foreign currency

Nominal Exchange Rates - Indirect Way

- Suppose that $E_{\mathcal{F}c,\mathcal{D}c}$ goes up to 3. This means that:
  - We need more units of foreign currency to get the same units of domestic currency
  - Equivalently, we need fewer units of domestic currency to get the same amount of foreign currency
- This means that the *domestic* currency has become stronger relative to the foreign currency. In other words
- Domestic currency has *appreciated*, foreign currency has *depreciated*

Nominal Exchange Rates

- Which definition do we use? Most textbooks follow the direct definition. But be aware of the distinction

$$E = E_{\mathcal{D}c,\mathcal{F}c} = \frac{\#\mathcal{D}c}{1\mathcal{F}c}$$

- Exchange rate going up does not mean anything if one does not specify the definition of the exchange rate used

- To avoid mistakes, think in terms of currencies appreciating - depreciating, not in terms of exchange rates going up or down

- Remember, for us an increase in E means domestic currency depreciates

Exercise 1 on Exchange Rates

- Consider China as the domestic economy and the US as foreign economy. China uses RMB, the US uses $
- Say that the forex market trades 6 RMB against 1 $. What is the direct nominal exchange rate? What is the indirect nominal exchange rate? Interpret
- Suppose that the market moves to trade at 8 RMB against 1 $. What happens to the nominal exchange rate? Interpret

Real Exchange Rates

- Consider a case where the domestic currency depreciates nominally (the exchange rate goes up)
- This means that it is easier now for foreign citizens to buy our currency: domestic currency is weaker, hence you need less foreign currency to buy the same amount of domestic currency
- One might think that this is equivalent to saying that domestic goods have become more competitive
- Is this reasoning true?

Real Exchange Rates

- Not necessarily: what if domestic prices have gone up? Surely foreign citizens will find it easier to buy domestic currency, but they will need a higher amount of it
- The same thing happens if domestic price stay the same and foreign prices decrease
- It is true that domestic currency is now cheaper, but domestic goods are competing with cheaper foreign goods (cheaper in foreign currency, of course)

Real Exchange Rates

- The same argument goes through if the domestic currency appreciates
- An equivalent amount of domestic currency will buy a bigger amount of foreign currency
- Does this mean that foreign goods are more competitive? Not necessarily: what if foreign prices have increase, and-or domestic prices have decrease?
- As you see, we need to refine the nominal exchange rate to account for variations in prices. This is what the Real Exchange Rate does

Real Exchange Rates

- Define P as the level of prices in the domestic economy and P^* as the price level in the foreign country expressed in foreign currency
- A better measure of competitiveness is given by the relative cost if goods in different countries when expressed in a common currency
- Define the real exchange rate ϵ as

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

Real Exchange Rates

- An increase in ϵ means that the domestic currency depreciates *in real terms*, i.e. that domestic goods become more competitive relative to foreign goods
- An decrease in ϵ means that the domestic currency appreciates *in real terms*, i.e. that domestic goods become less competitive relative to foreign goods

Real Exchange Rates

- To see what determines appreciation and depreciation of ϵ, rewrite the real exchange rate in terms of percentage variations instead of levels
- Define π as the domestic inflation rate and π^* the foreign inflation rate. It follows that

$$\%\Delta\epsilon = \%\Delta E + \pi^* - \pi$$

- If domestic and foreign prices do not change, a depreciation of the nominal exchange rate implies a depreciation of the real exchange rate: foreign currency becomes stronger and domestic good become more competitive

Real Exchange Rates

- Given constant nominal exchange rate and domestic prices, the domestic currency depreciates in real terms if there is an increase in foreign prices: the price in domestic currency of foreign goods increase, domestic goods become more competitive
- Given constant nominal exchange rate and foreign prices, the domestic currency depreciates in real terms if there is a decrease in domestic prices: domestic goods are now cheaper than foreign goods (both in domestic and foreign currency), domestic goods become more competitive

Real Exchange Rate and Trade Flows

- We have seen that the real exchange rate is a possible measurement of the competitiveness of domestic goods
- Define X as exports of the domestic country and IM as its imports
- We will assume that

$$X = X(\underset{+}{\epsilon})$$

$$IM = IM(\underset{-}{\epsilon}, \underset{+}{Y})$$

- Exports are increasing in the real exchange rate; imports decrease in the real exchange rate and increase in domestic national income

Exercise 2 on Exchange Rates

- Suppose that the RBM appreciates nominally by 5 %, that Chinese prices increase by 2 % and US prices by 10 %. What happens to the RMB and the $ in real terms?
- What is the rate of nominal appreciation that would make the real exchange rate constant despite a movement in prices?

Plan for the Future

- We have seen what the exchange rate is. But what are its determinants?
- To answer this question we need to understand who is demanding and who is suppling foreign vs. domestic currency. That's our next topic