International Economics
January 26, 2020
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Problem Set 7 - Exchange rate Regime, LOOP, and PPP

Exercise 1: **Exchange Rate: The asset based approach**

Suppose the following facts (not all of which are relevant to the answer):

- Yesterday the exchange rate between the British pound and the US dollar was 2.00 £|$.
- The interest rate in the U.S. is 6% per year.
- The rate of inflation in the U.K. is 1% per year.
- The public expects the exchange rate tomorrow to be 1.92 £|$.
- The rate of inflation in the U.S. is 3% per year.
- The interest rate in the U.K. is 5% per year.
- The U.S. bilateral trade deficit with the U.K. is 2% of U.S. GDP.

Then, according to the asset theory of exchange rate determination, the exchange rate today should be approximately...?

Solution:

The asset-based approach postulates that the exchange rate should adjust to eliminate the incentives to shift between assets held in different currencies. These incentives can be simplified considering just the expected difference between exchange rates in two points in time: as a matter of facts, differences between expected and current exchange rates would cause massive shifts, that would demand for being reequilibrated.

Thus, todays exchange rate should equals tomorrows expected exchange rates: $E_{£|\$} = 1.92$

Exercise 2: **Purchasing Power Parity**

Suppose that the inflation rate in Russia reaches 100% over one year. Conversely, Switzerland only records a 5% inflation rate over the same period. According to the relative PPP, what should happen over the year to the Swiss franc's exchange rate against the Russian ruble?

Solution:

Relative PPP predicts that inflation differentials are matched by a change in the exchange rate.

$$\frac{E_{CHE|RUS,t} - E_{CHE|RUS,t-1}}{E_{CHE|RUS,t-1}} = \pi_{CHE,t} - \pi_{RUS,t}$$

where

$$\pi_{x,t} = \frac{P_{x,t} - P_{x,t-1}}{P_{x,t-1}} = \text{Inflation Rate in country } X$$

Under the relative PPP, the Franc | Ruble exchange rate should fall by 95% with inflation rates equal to 100% in Russia and 5% in Switzerland. This can be shown by

$$\frac{E_{CHE|RUS,t} - E_{CHE|RUS,t-1}}{E_{CHE|RUS,t-1}} = 5 - 100 \longrightarrow -95\%$$

A single Swiss franc would then cost 95% more Russian rubles in one year time, and will get 95% more of them when traded.

Exercise 3: **Open Question: PPP in the real world**

The importance of PPP and LOOP lies in the intuition it provides to understand the basic mechanisms driving shifts in Exchange Rates over time. The main limitation however is, they don't really not hold in practice.

Provide a definition for both LOOP and PPP, and discuss the reasons why they might not hold.

Solution:

a. **Law of One Price**: in competitive markets, with no transaction costs or barriers to trade, identical goods sold in different countries must sell for the same price when expressed in the same currency. But:

   - Transaction and transportation costs are often substantial, and barriers to trade (tariffs, quotas) might raise prices in importing countries

     As an example, assume the exchange rate between the US$ and the British £ to be $E_{\$|£} = 1.45$, and suppose the same shirt to be produced and sold both in London and New York for 30£ and 45$ respectively. The dollar price of the sweater sold in London should be $1.45 \times 30 = 43.5US\$$. Thus, the US importer would have incentives to buy in the UK and sell in New York, as their price is higher there. However, what happens if it has to face a shipping cost of 2US$ per unit? The cost of the sweater would be higher (43.5 + 2 = 45.5US$).
   - Segmented markets offer room for price differentials (think of streaming platforms in different countries)
   - Monopolistic/Oligopolistic markets create room for the same product to be produced at different cost and sold at different prices.

b. **Purchasing Power Parity**: The exchange rate between any two currencies equals the ratio of the price levels in the countries where those currencies have legal course.

- All of the above, plus:
- Different baskets of goods are consumed in different countries.
- What about non tradable goods or services? Can we expect the cost of a cab run in Berlin to be the same as in Rome? (Spoiler: no)

Exercise 4: **Trade policy and Exchange Rates**

Figure 1 below reports the demand and supply for euros in the US market. Consider that, since we are discussing the market for euros, the y axis reports the cost of 1 euro expressed in dollars (that is, all terms are expressed indirectly). Assuming that only one good is traded.

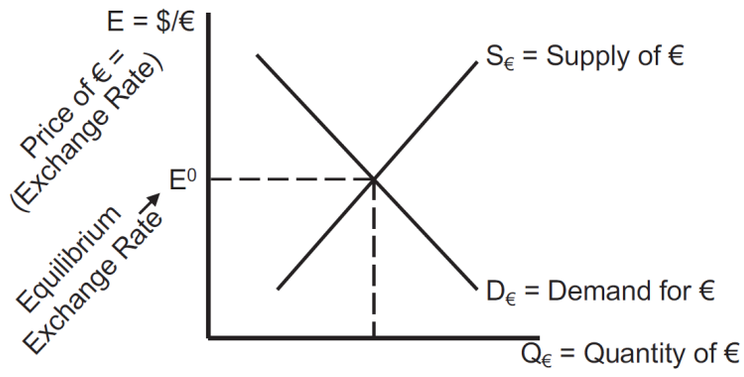

Figure 1: Supply and Demand on the Foreign Exchange Market

- **What happens when a the US imposes a tariff on the good they import?**

  Solution:

  A Tariff imposed by the US will reduce the US demand for the imported good. This implies a lower need for euros, and the demand for euros will shift inward. As a result, *the US$ will appreciate*, as less dollar will be needed to purchase one euro. (SEE FIGURE 2)

- **What happens when it is the EU to impose a quota on imports from the US?**

  Solution:

  When the EU introduces a quota, it is restricting its internal demand for dollars. At the same time, US exports are reduced, reducing the availability of euros in the US. As a result, the euro supply curve will shift upward, leading to an increase of the indirect exchange rate (that is, the dollar depreciate against the Euro). (SEE FIGURE 2)

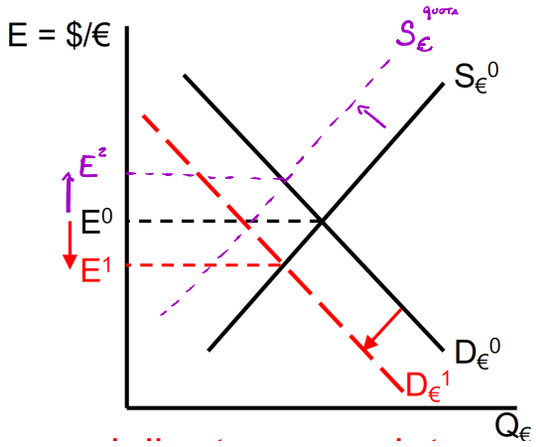

Figure 2: Effect of a Tariff

Exercise 5: **Open Questions: Exchange rate regimes**

a. **What are the possible regimes for the exchange rate? What are their main characteristics?**

Solution:

There are two main groups of regimes. In a Flexible regime (or free float), the market is let free to determine the exchange rate. This means that countries adopting this kind of regime are subject to high volatility in the exchange rate. In a fixed (or, *pegged*) exchange rate regime, the relative value of a currency is kept artificially stable with respect to an anchoring currency (or basket thereof). Pegs are rarely full. More often, pegs are managed by the central bank within a *floating band*

b. **Why should a country peg to a foreign currency (de facto giving up to an independent monetary policy)?**

Solution:

There are many reason why a country might be willing to do so. Among the others, the reduction of the uncertainty (and therefore, of the expected variation of the exchange rate).

c. **How could National Central Banks intervene to manage the exchange rate (in a pegged, dirty, or crawling peg?)**

Solution:

- Accumulating or decumulating reserves. This can be done by acquiring/selling foreign currency on the market.
- Changing the supply of national currency
- Sterilizing the variation of money supply (that is, maintaining M^s constant) using open market operations. This is done by selling/purchasing bonds denominated in national currency. But: issuing bonds have a cost (the interest rate). Not all countries' CBs have the resources to do so.

d. The ***ley de convertibilidad*** is a law adopted by Argentina in 1991. Among other things, it set a 1-to-1 fixed peg for the peso (freshly restored after a few years in which a temporary currency was adopted) agains the US$. The Ley came at the apex of a decade-long crisis that saw the economy sinking because of high debt, badly applied liberalization policies and austerity. Among the various characteristics of that period worth remembering, we can mention: a double-digits tax evasion; a set of wild liberist policies that depressed wages and get rid of many social protection mechanisms; a sinking exchange rate. The fixed peg and an aggressive borrowing by the central government to resuscitate the economy led to a period of economic growth. In such a critical situation, the fixed peg initially contributed to the recovery by slowing down inflation and reducing uncertainty, facilitating trade. Yet, by the end on the 20th century, the economy collapsed abruptedly. Argentina lost almost one third of its GDP in just the 5 years between 1998 and 2002, a periond in which inflation peaked to almost 200%. Also the level of public debt skyrocketed.
How do you think the exchange rate regime adopted contributed both to the initial recovery and the subsequent collapse? What action do you think the CB and the Argentinian Governemnt should have taken to prevent the economy from overheating? Why do you think neither the government nor the CB have been able to avoid the deafult (which came in 2001)?

Solution:

The reasoning is left to the class. However, part of the answer lies in the consequences of having an exchange rate that is fixed but far from market clearing.

Assume the Peso is overvalued (that is, the price of the foreign currency is too low). This implies that there is an excess of demand for the foreign currency, which the CB should sterilize to maintain the money supply unchanged. However, this means buying bond. In the long run, this migh cause the CB to run out of reserves. This is a potential source of both currency and financial crisis.

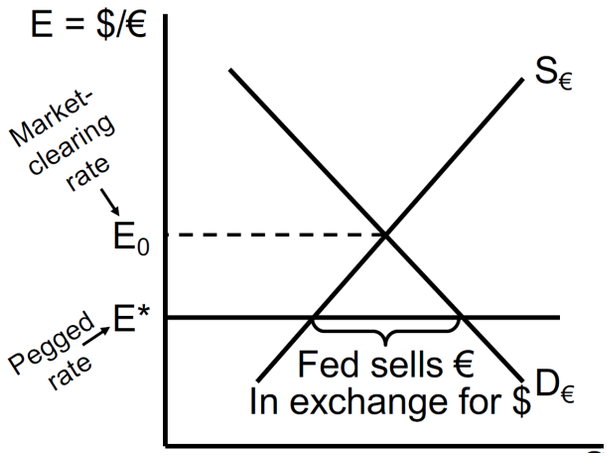

Figure 3: The currency is overvalued WRT the market. Pretend there are no Euro/dollar signs

Conversely, when the currency is undervalued with respect to the market clearing, then its price is lower. There will be an excess of supply of the foreign currency, which the bank will have to absorb, by emitting bonds. Reserves will increase, to avoid the supply of domestic currency to increase instead.

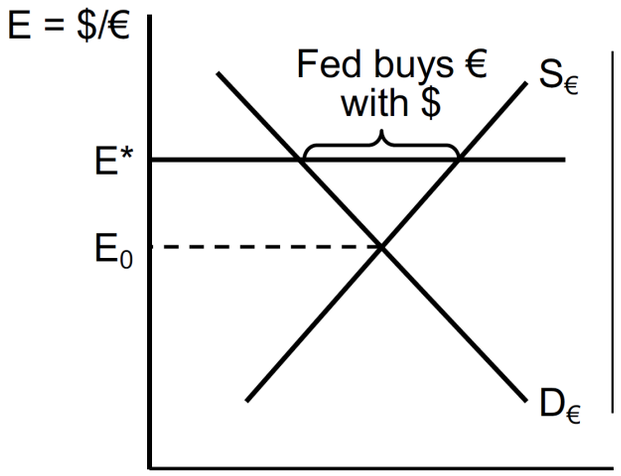

Figure 4: The currency is overvalued WRT the dollar. Pretend there are no Euro/dollar signs

Now: assume the American economy undergo a monetary expansion (more dollars circulate): inflation rate in Argentina might arise, especially if the CB has no intention of sterilizing.

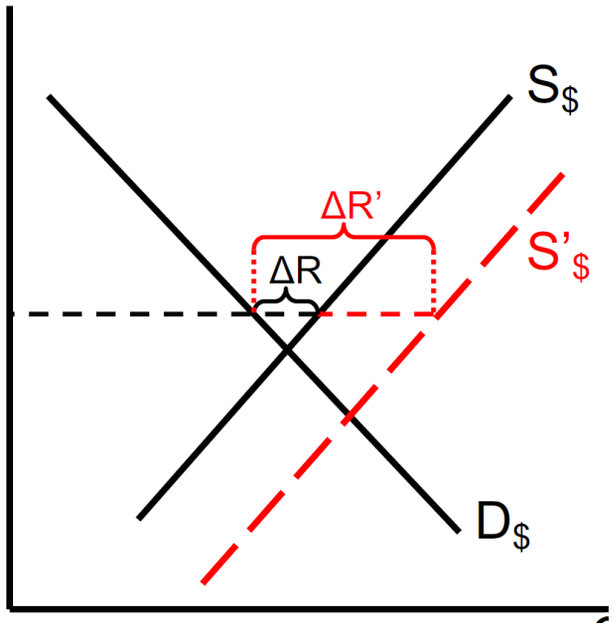

Figure 5: Effect onf an expansion in the US economy on the Argentinian Economy

Finally, don't forget that an overvalued Peso also lead to increased imports, that displaced national productive system and deteriorated the BoP - putting further pressure on the available reserves.