

Exchange Rate Determination

1.- Introduction

This note discusses (briefly) the theories behind the determination of the exchange rate. By no means this is supposed to be a treaty in the subject. I will leave important contributions aside. Thus, here I mostly analyze what in my opinion are the most important ones.

2.- Theories

PPP

The purchasing power parity approach to the exchange rate was, and continues to be, a very influential way of thinking about the exchange rate. The PPP derives from the assumption that in the world there exists the "law of one price". This law states that identical goods should be sold at identical prices. This is far from a law (by the way), it is mainly an assumption.

For the purpose of the initial discussion let's believe it. The law of one price implies that exchange rates should adjust to compensate for price differentials across countries. In other words, if we are in a banana-world (only bananas exists), and a banana is sold in US at 1 Dollar, and the same banana is sold in Spain at 133 Pesetas, then the exchange rate has to be 133 Pesetas per Dollar.

$$p_t = p_t^* / e_t$$

This is the absolute PPP approach. Where p represent domestic prices, p^* are foreign prices and e is the exchange rate.

There is also the relative PPP approach. It is the same model but applied to differences: the change in the exchange rate will compensate inflation differentials.

$$1 + \pi_t = (1 + \pi_t^*) (1 + \hat{e}_t)$$

where π_t, π_t^* , and \hat{e}_t represent domestic inflation, foreign inflation and the depreciation, respectively. In other words, a 3 percent inflation rate in US and a 1 percent inflation rate in

Japan should imply a depreciation of the Dollar versus the Yen by 2 percent.

The theory behind PPP is very appealing. However, when taken to the data, usually we do not find PPP to hold in the short, nor medium, run and when we are lucky (truly lucky) we find that it holds in the long run.

There are several important reasons for PPP not to hold in the long run:

1. The law of one price might not hold in the short run: The law of one price requires a perfect arbitrage in goods. This means that individuals should be able to import and export any product that are identical and have different prices across countries. This is hardly a good assumption in the short run. And the fact that domestic markets are relatively oligopolistic in the short run implies that indeed prices will differ. The real world is closer to one in which good segmentation is relevant, both in the decision of production and pricing.
2. PPP assumes that there is no government intervention: Tariffs, Quotas, VER's, taxes, etc.
3. PPP might not even hold in the long run:
 - There is an important component of non-tradable goods, and productivity differentials in those sectors might be different across countries. This implies that there is a permanent change in the price level across countries that should not be compensated by the exchange rate.
 - Taste might change, and thus the real exchange rate.
 - Market structures might change, and thus the equilibrium exchange rate.

Indeed, there are few cases in which PPP holds in the short run. And when it holds, it usually economies with very high inflation rates (mostly hyperinflation) where domestic currency has no meaning in the determination of prices, and the agents tend to dollarize their economies.

Balance of Payments Approach

This approach is mainly the BB-NN (or dependant economy). The idea is that there exists an exchange rate at which there exists internal and external equilibrium.

The internal equilibrium assumes that there is full employment: unemployment is in the natural rate of unemployment. Or in other words, the unemployment is such that there are no pressures to change real wages.

The external equilibrium refers to equilibrium in the balance of payments. Sometimes, people look at the current account instead of the balance of payments.

This is indeed a wonderful theory. It can explain permanent deviations of PPP, but also explain PPP if so is required.

The main problem with this approach is that in general it is extremely difficult to determine what is the exact natural rate of unemployment, nor the exchange rate consistent with an equilibrium in the external accounts. We tend to think, again, that this is a good guess of the long run exchange rate. This model will determine where the exchange rate has to converge to, however, it provides very little guidance to the short term fluctuations.

Monetary and Portfolio Approaches

This is an asset pricing view of the exchange rate. The idea is that agents have a portfolio choice decision between domestic and foreign assets. Those instruments (either money or bonds) have an expected return that could be arbitrated. This arbitrage opportunity is what determines the process of the exchange rate.

In its simplest form, this approach implies the uncovered interest rate parity.

$$1 + i_t = (1 + i_t^*)(1 + E\hat{e}_t)$$

where the idea is that if the expected depreciation does not compensate the interest rate differentials, agents would have arbitrage opportunities.

This is an amazingly attractive theory. Unfortunately, works extremely bad. This is an area of research where still today in economics, we have very little explanations for its failure.

3.- How they do in the data?

I have already hinted in the previous section that all these theories perform quite badly in the short run. Well, this is not strong enough. The performance is horrible! Moreover, in a lot of the empirical exercises, not even the signs are correct.

4.- Government intervention

Governments intervene in foreign markets frequently. The form of this intervention goes from selling small amounts of foreign currency, domestic instruments, to sterilization and even buying stocks in their own stock markets.

Obviously there are less interventionist central banks (such as the FED) to banks that think the exchange rate is just a three dimensional Nintendo.

The most common form of intervention is called sterilization. The general idea is the following: assume foreigners decide to invest at home and start buying home government bonds. The price of the bonds goes up, due to the increase in demand, which implies a fall in the interest rate. In the end, the reduction in the cost of capital increases aggregate demand pushing prices up. A Central Bank who is concerned with inflation responds to the capital inflow with a tight monetary policy. This tightening is what is called sterilization.

What occurs in the central bank is that there is an increase in reserves and a drop in domestic credit. Thus, sterilization is just a portfolio re-composition of the Central Bank's assets.