

# 2<sup>nd</sup> session

20th February 2014

<http://www.sundaytimes.lk/140126/columns/no-room-for-complacency-in-export-development-81123.html>



## Strategies for increasing exports

One of the prerequisites to encourage exports is a realistic exchange rate that would ensure that exports would be competitive with other countries and producers would have adequate profit margins to spur them to produce more for export. It is not the nominal exchange rate that matters, but the **real effective exchange rate** that takes into account the relative rates of inflation, the relative production costs and exchange rates of other export competing countries. The exchange rate should be flexible so that the real effective exchange rate does not appreciate and render exports less competitive.

- **Nominal** *versus* **Real**

- $S_r(j/n) = S(j/n) \times (P_j/P_n)$

- **Competitiveness**

- Increase in  $S_r$ : Larger  $S$  and/or larger  $(P_j/P_n)$ . The country that uses the currency  $n$  gains competitiveness in relation to the other.
- Decrease in  $S_r$ : Lower  $S$  and/or Lower  $(P_j/P_n)$ . The country that uses the currency  $j$  gains competitiveness in relation to the other.

- **Bilateral** *versus* **Effective**

- Example: If the USD appreciates 10% in relation to JPY, not changing in relation to the rest of the currencies and trade with Japan accounts for 25% of the international trade of the USA, the dollar appreciated 2,5% in effective terms.
- Real effective exchange rate.



- **Arbitrage**

- There are foreign exchange trades in many places in the world. Are prices similar in every location?
- There are many foreign exchange rates relating different pairs of currencies. It is possible to have the price of many currencies in terms of a certain one. Is there a relation between the exchange rates and the cross-rates or are they independent of each other?
- Definition: Simultaneous purchase and sale of an asset in order to profit from a price discrepancy, without risk. (Closed Position)

- **Locational or Two Point Arbitrage**

- When the price of a currency in a financial centre is different from the price of that currency in another financial centre.

$S$  (EUR/JPY) in Tokyo = 149,125

$S$  (EUR/JPY) in Paris = 149,725

- Should buy EUR /sell JPY

in Tokyo

and sell EUR/ buy JPY

in Paris.

- Unicity of exchange rates.

- Role of the spread.

Tokyo:  $S_a$  (EUR/JPY) = 149,125;  $S_b$  (EUR/JPY) = 148,725

Paris:  $S_a$  (EUR/JPY) = 149,725;  $S_b$  (EUR/JPY) = 149,125

- **Triangular Arbitrage or Three Point Arbitrage**

- When the quoted market cross exchange rate is different from the implicit cross exchange rate obtained from the exchange rates of other currencies.

$$S(\text{EUR}/\text{JPY}) = 149,125$$

$$S(\text{EUR}/\text{GBP}) = 0,7880$$

$$S(\text{JPY}/\text{GBP}) = 0,0045$$

$$S(\text{EUR}/\text{JPY}) \times S(\text{JPY}/\text{GBP}) \times S(\text{GBP}/\text{EUR}) \neq 1$$

How can someone with euros obtain a gain?

With 1 EUR, buys 0,788 GBP.

With 0,788 GBP buys  $0,788/0,0045 = 175,1111$  JPY

With 175,1111 JPY buys  $175,1111/149,125 = 1,17425$  EUR !

- Exchange rates consistency

## Exercise

- At a certain time, the following exchange rates are registered:

$$S(\text{USD}/\text{CHF}) = 1,2240$$

$$S(\text{EUR}/\text{USD}) = 1,2810$$

$$S(\text{EUR}/\text{CHF}) = 1,6000$$

- a) Is there arbitrage opportunity? If so, what are the profitable transactions?
- b) What exchange rate  $S(\text{CHF}/\text{EUR})$  would be consistent with the other two?

- PPP – Several versions



## The LONG RUN

- The Law of One Price

- $P_B = P_A \cdot S(A/B) \Leftrightarrow S(A/B) = P_B / P_A$
- It makes sense with highly internationally traded goods and services (Gold and other metals, oil, cereal...)
- It does not apply to most manufactured goods. Causes: transport costs, restrictions to trade, taxes, price discrimination by firms, ...)
- The Big Mac Index <http://www.economist.com/content/big-mac-index>



■ Absolute Purchasing Power Parity (parity of prices)

- $P_B = P_A \cdot S(A/B) \Leftrightarrow S(A/B) = P_B / P_A$
- The expression has the same aspect, but a different meaning.  $P_B$  and  $P_A$  are the prices of baskets of goods and not the prices of specific goods.
- Even if the relation does not apply to every good, differences may cancel with each other so that the relation is observed on average.
- Idea that the value of a currency is related to its power to purchase goods.
- “Correct foreign exchange rate”.
- Even though it does not fit reality well, there is evidence that large discrepancies relative to absolute PPP tend to reduce with time, for traded goods.

## ■ Relative Purchasing Power Parity

- The perspective changes from the verification in one point in time to the verification of a change.
- With time, the difference between prices of traded goods in different countries will be compensated by the variation of the foreign exchange rate.

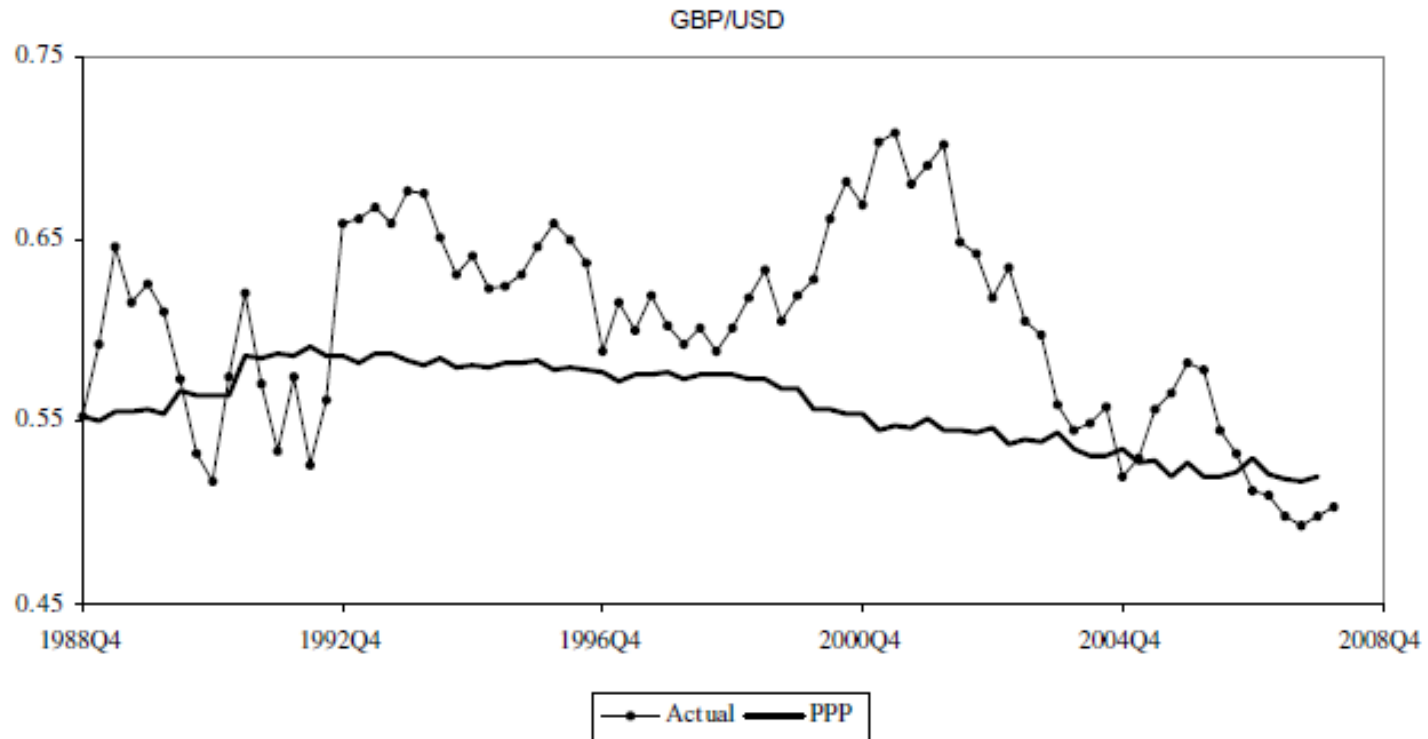
$$\frac{S_t(A/B)}{S_0(A/B)} = \frac{P_{Bt} / P_{B0}}{P_{At} / P_{A0}}$$

- FMI recommendations.
- If the condition holds in absolute terms, then it also holds in relative terms.

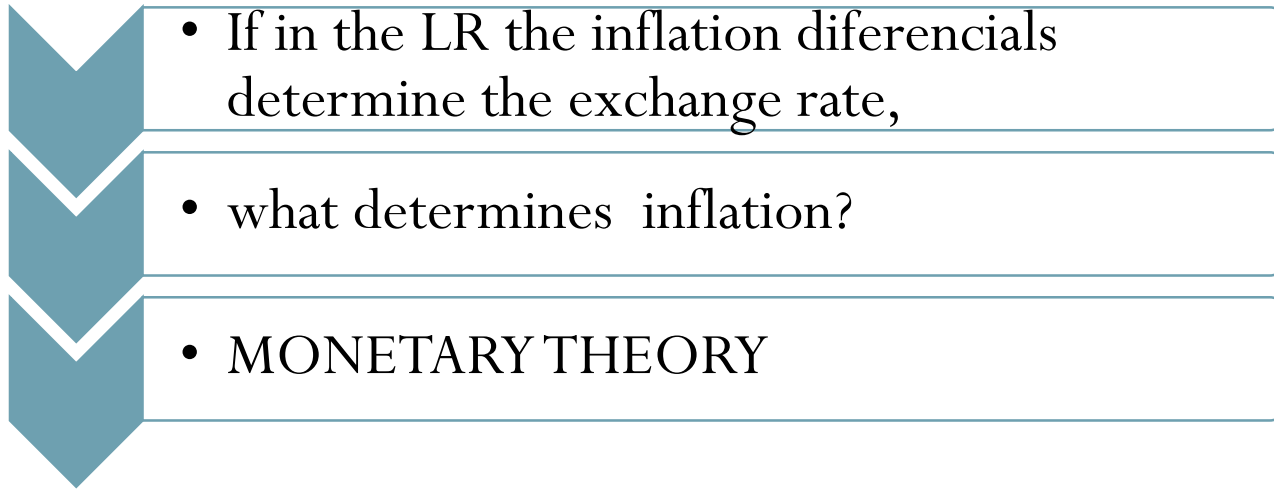
- The relative version is like a guide about the long run evolution of the foreign exchange rate, even if the absolute version is not verified in every moment.
- The relative version is sometimes presented in the following way:

$$\text{depreciation rate of the home currency} = \text{Inflation rate} - \text{inflation rate}^*$$

- Countries with low inflation rates have currencies that tend to appreciate.
- If a country wants stable prices when neighbour countries have higher inflation rates this country should be prepared to see its currency appreciate.



Source: Moosa & Bhatti, 2009, Why do we study exchange rates?

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- If in the LR the inflation differentials determine the exchange rate,
  - what determines inflation?
  - MONETARY THEORY

- In the Long Run, the growth of money supply determines Inflation . Therefore, it makes sense to analyse the evolution of the foreign exchange rate based on the evolution of domestic money supplies.
- The larger the money supply comparing with money demand, the lower must its value be.

## The Monetary Approach to the Determination of Foreign Exchange Rates

- Money demand is a result of the need to trade. Therefore, it should be proportional to the volume of transactions (proportion  $k$ ).
- Quantity Theory of Money

$$M^s = k.P.Y \quad \text{and} \quad M^{s*} = k*.P*.Y*$$

- $M^s / M^{s*} = (k/k*). (P/P*). (Y/Y*)$

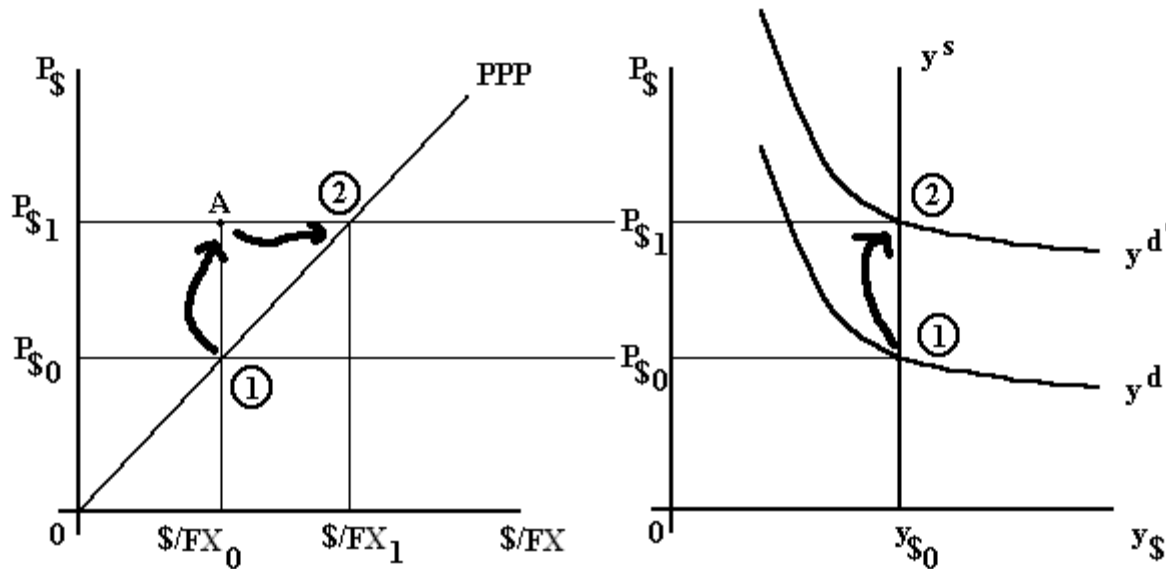
$$(P/P*) = (M^s / M^{s*}) / [(k/k*). (Y/Y*)]$$

- Combining the PPP (absolute) with the Quantitative Theory of Money, we have:

$$S(* / \text{nac}) = P/P* = (M^s / M^{s*}) / [(k/k*). (Y/Y*)]$$

- $S(* / nac) = P / P^* = (M^s / M^{s*}) / [(k / k^*) \cdot (Y / Y^*)]$
- Determinants of the appreciation of a currency in the LR (what is behind the lower increase in relative prices):
  - Lower growth of the money stock.
  - Larger growth of the real output.
  - Increase in the ratio  $(k / k^*)$ .
- Some elasticities = 1.
  - With everything else constant,
    - 1% increase in  $M^s \rightarrow$  1% depreciation of the domestic currency
    - 1% increase in  $M^{s*} \rightarrow$  1% appreciation of the domestic currency
    - 1% increase in  $Y \rightarrow$  1% appreciation of the domestic currency
    - 1% increase in  $Y^* \rightarrow$  1% depreciation of the domestic currency

## The Monetary Model with an increase in the money supply.



Source: Harvey, J. , 2007, Teaching Post Keynesian Exchange Rate Theory, *Journal of Post - Keynesian Economics*, 30, 2, 147-168

Note: Here,  $\$/FX$  is the dollar price of the FCurrency, the opposite of our convention.

①- Starting Point : PPP holds; In the LR the Y is the full employment.

Monetary Expansion: Increase in the demand from  $y_d$  to  $y_d'$ . Increase in from  $P_{\$0}$  to  $P_{\$1}$ . Temporary unbalance (A) with a US déficit.

②- Lower relative demand of \$ in the foreign exchange market  $\rightarrow$  depreciation of \$.



- Typical Monetarist Conclusion:

The variation of the Money Supply has an effect on the foreign exchange rate. In the Long Run, it has no real effect.

EXERCISE 11 from Pugel, p.470

In 1975, the price level for the US was 100, the price level for Pugelovia was also 100, and in the foreign exchange market one Pugelovian pnut was equal to \$1. In 2008, the US price level had risen to 260, and the Pugelovian price level had risen to 390.

- a. According to PPP, what should the dollar-pnut exchange rate be in 2008?
- b. If the actual dollar-pnut exchange rate is \$1/pnut in 2008, is the pnut overvalued or undervalued relative to PPP?

## EXERCISE 12 from Pugel, p.471

Here is further information on the US and Pugelovian economies.

	1975			2002		
	$M^S$	Y	P	$M^S$	Y	P
US	20,000	800	100	65,000	1,000	260
Pugelovia	10,000	200	100	58,500	300	390

- What is the value of  $k$  for the US in 1975? For Pugelovia?
- Show that the change in price level from 1975 to 2008 for each country is consistent with the quantity theory of money with a constant  $k$ .

(Carbaugh)

Starting at the point of equilibrium between the money supply and the money demand, a *decrease in the* demand for money in the home country causes the value of the home currency to:

- a. Depreciate relative to other currencies
- b. Appreciate relative to other currencies
- c. Not change relative to other currencies
- d. None of the above



### The Asset Market Approach to the Determination of the Foreign Exchange Rates (Portfolio Balance)

- Most of the foreign exchange transactions have no commercial motivations, but financial motivations.
- The asset market approach to the foreign exchange rates emphasizes the role of the international investors. The price of the currency is a result of the demand and of the supply of assets denominated in different currencies.
- Capital mobility.
- The interest rate parity indicates the expected evolution of the foreign exchange rates in the short run.
- The interest rate parity results from the arbitrage of interest rates. Equilibrium conditions of financial markets.

- Decision of where to invest. In Lisbon, the interest rate is 6%. In NY it is 8%. Where should one invest?
- Foreign Exchange Risk .
- If investing in a financial asset denominated in a foreign currency, one has to convert the initial amount of money into the foreign currency, in order to purchase the financial asset. The investment return obtained will be in the foreign currency. It will have to be converted into domestic currency, in the future.
- Which foreign exchange rate will be used to convert the foreign currency into the domestic currency, in the future?
- If the Forward exchange rate is used, this is a **Covered International Investment**. If the Future exchange rate is used, this is an **Uncovered International Investment**.

# COVERED INTERNATIONAL INVESTMENT

(The same type of analysis applies to credit demand in the international market, instead of investment)

- Alternative returns are compared:

- $m \cdot (1 + i_N) = m \cdot S(n/j) \cdot (1 + i_J) \cdot F(j/n)$

- The **covered interest differential** = CD

$$(1 + i_J) \cdot F(j/n) / S(j/n) - (1 + i_N)$$

- IF  $CD > 0$ , it is better to invest abroad (J).
- IF  $CD < 0$ , it is better to invest home (N).

- Let's define  $f(j/n)$  as  $[F(j/n) - S(j/n)] / S(j/n)$ .
- $f$  is the **foreign exchange premium**. (To Remind: IF  $f < 0$ ,  $j$  is at a discount and  $n$  is at a premium. IF  $f > 0$ ,  $j$  is at a premium and  $n$  is at a discount.)
- CD is approximately equal to  $f + (i_J - i_N)$ .
- In order to be indifferent to invest in one country or the other, it must happen that:

$$\bullet \quad CD = 0 \quad \Leftrightarrow \quad F(j/n) / S(j/n) = (1 + i_N) / (1 + i_J) \quad \Leftrightarrow$$

$$F(j/n) / S(j/n) - 1 = (1 + i_N) / (1 + i_J) - 1 \quad \Leftrightarrow$$

$$f(j/n) = (1 + i_N) / (1 + i_J) - 1 \quad \Leftrightarrow$$

$$f(j/n) (1 + i_J) = i_N - i_J$$

- Approximate Version of the condition COVERED INTEREST

PARITY :

- $f(j/n) = i_N - i_J$
- $CD > 0 \Leftrightarrow f(j/n) > i_N - i_J$ ;       $CD < 0 \Leftrightarrow f(j/n) < i_N - i_J$ .
- Covered Interest Arbitrage: To purchase a currency in the spot market and to sell it in the forward market in order to make a profit with the combination of the interest differential in both countries and the foreign exchange premium.

The Covered Interest Arbitrage leads to the Covered Interest Parity.



- When there is no equilibrium, how is it reestablished?
- Suppose  $(1+i_j) \cdot F(j/n) / S(j/n) - (1+i_N) > 0$  and it is better to invest in J.
  - The demand for j and the supply of n increase, in the spot market.
 

$S(j/n)$  increases ↙↘
  - The supply of j and the demand for n increases in the forward market
 

$F(j/n)$  decreases ↙↘
- We have analysed how the interest rates work as determinants of the foreign exchange rate in the Short Run.

- There are no *forwards* for all the exchange rates. Additionally, an investor may want to assume the foreign exchange risk, because he/she trusts his/her expectations relating the evolution of the foreign exchange rate. Or the investor has a portfolio of international investments and, by assuming the risk of this investment, it is reducing the risk of the total portfolio (Diversification).

## UNCOVERED INTERNATIONAL INVESTMENT

- In this case, the exchange rate that is used to convert the value of the international investment into the domestic currency is not the forward exchange rate.
- The rationale is similar to the one of the Covered International Investment, except that instead of  $F(j/n)$  it is  $S^e(j/n)$ .

- Expected uncovered interest differential = EUD, given by:

$$(1+i_j) \cdot S^e(j/n) / S(j/n) - (1+i_N).$$

- $[S^e(j/n) - S(j/n)] / S(j/n)$  it is not a premium, but the expected appreciation of  $j$ .

- UNCOVERED INTEREST PARITY:

$$S^e(j/n) / S(j/n) = (1+i_N) / (1+i_j).$$

Equilibrium: The investments in different currencies have the same expected return.

- This introduces the effect of expectations, in addition to the interest rates, as determinants of the foreign exchange rate in the Short Run.

- If the currency of country J is expected to appreciate, the investments in currency j are more attractive now.

The relative demand of currency j in the exchange market increases. ↩

Currency j appreciates. ↩

- Similar rational in the case of expectation of depreciation.

- EXERCISE

If  $i_N = 0,03$  and  $i_J = 0,04$ , 90 days maturity, and the 90 days forward and spot exchange rates are 2n for each j ( $f=0$ ), what will the arbitrage process be?

- EXERCISE 8 from Pugel, p.440

The following rates are available in the markets:

Current spot exchange rate: \$0.500/CHF

Current 30-day forward exchange rate: \$0.505/CHF

Annualized interest rate on 30-day dollar-denominated bonds: 12% (1.0% for 30 days)

Annualized interest rate on 30-day Swiss-franc-denominated bonds: 6% (0,5% for 30 days)

- a. Is the Swiss franc at a forward premium or discount?
- b. Should a US-based investor make a covered investment in Swiss franc-denominated bonds, rather than investing in 30-day dollar-denominated bonds? Explain.
- c. Because of covered interest arbitrage, what pressures are placed on the various rates? If the only rate that actually changes is the forward exchange rate, to what value will it be driven?

- EXERCISE 9 from Pugel, p.440

The following rates exist:

Current spot exchange rate: **\$1.80/£**

Annualized interest rate on 90-day dollar-denominated bonds: 8% (2% for 90 days)

Annualized interest rate on 90-day pound-denominated bonds: 12% (3% for 90 days)

Financial investors expect the spot exchange rate to be **\$1.77/£** in 90 days.

- a. If he bases his decision solely on the difference in the expected rate of return, should a US based investor make an uncovered investment in pound-denominated bonds rather than investing in dollar-denominated bonds?
- b. If she bases her decision solely on the difference in the expected rate of return, should a UK based investor make an uncovered investment in dollar-denominated bonds rather than investing in pound-denominated bonds?
- c. If there is substantial uncovered investment seeking higher expected returns, what pressure is placed on the current spot exchange rate?