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## **EXCHANGE RATE MOVEMENT OF DEVELOPING COUNTRIES LIKE INDIA: AN ALTERNATIVE THEORETICAL FRAMEWORK**

### **Abstract:**

In the context of explaining exchange rate behaviour theories pertaining to the latter have been negligent with regard to the role of foreign exchange reserve. Either it has been excluded as a determinant or treated as a mere residual factor. Yet foreign exchange reserve has been playing a reasonably important role in determining the nominal exchange rate of countries, more specifically for developing countries with current account deficits coupled with substantial capital account surpluses leading to growth in growing foreign exchange reserve. This characteristic of the developing countries shares a similarity with India's external balances. It may not hold true for the countries with currencies used as international money to a reasonable extent. This paper develops a theoretical framework, in order to understand the exchange rate movement for developing countries by keeping foreign exchange reserve in conjunction with capital flows at the centre stage. It also suggests that the movement of speculative capital needs to be restricted to avoid a currency crisis.

### **Keywords:**

Exchange Rate, Foreign Exchange Reserve, Speculative Capital Flows

**JEL Classification:** F31, F32, F41

## Introduction

In the flexible exchange rate system of the Post-Bretton Woods era, after the initial two decades of the transition period, most countries' exchange rates are determined in the foreign exchange market. It follows then that the link between exchange rate and the stock of reserves should not exist in principle. And yet many countries do follow various types of pegged exchange rate systems including the managed float or an independent floating exchange rate system. With many countries following a pegged exchange rate system the stock of reserves continues as an important factor behind the stability of the exchange rate. Even countries that follow an independent floating exchange rate system have preserved the Central Bank's right to intervene in the foreign exchange market or, conversely, they wield sizeable intervention in the foreign exchange market. So, foreign exchange reserves are among the important factors influencing exchange rate stability.

Most theories of exchange rate behaviour have ignored foreign exchange reserves as an important determinant of exchange rate. Foreign exchange reserves are either ignored or treated as residual. This holds true for the Mundell-Flemming-Dornbusch theory of exchange rate behaviour, the portfolio balance model, and most currency crises theories. The monetarists link up reserve changes and exchange rate changes through changes in the money supply. They say intervention in the foreign exchange market by any central bank will be effective in changing the exchange rate only to the extent that it constitutes a change in the money supply, which results in price change. Thus, according to this view the reserves-exchange rate linkage gets established through the changes in the money supply. Some economists<sup>i</sup> have argued that sterilised intervention is also effective in terms of changing the exchange rate. There are two channels- portfolio balance and signalling – through which, they claim, this exchange rate change can take place.

The portfolio balance channel holds domestic and foreign securities as imperfect substitutes because of the risk posed by foreign exchange. So, investors have to be compensated by a risk premium for holding foreign securities. Sterilised intervention changes the supply of foreign securities relative to domestic securities. So, the equilibrium in investors' portfolios gets disturbed. In order to restore balance a change in risk premium measured as the deviation from uncovered interest rate is required. Hence, change in asset return will change the spot exchange rate. If the Central Bank is sells foreign currency denominated assets and buys back domestic currency denominated assets to sterilise the reduction in money supply, the supply of foreign currency denominated assets will increase. This will lower the risk premium for holding domestic currency denominated assets.

The risk premium can be defined as  $\phi = r - r^* - \frac{\dot{e}}{e}$

Where  $r$  is the real rate of interest of domestic country, “\*” denotes the foreign country, and  $\hat{e}$  is the expected exchange rate. The exchange rate of the domestic currency is defined by keeping the foreign currency as denominator.

For a given real rate of interest differential, as the risk premiums decline either the present exchange rate has to appreciate i.e.  $e$  has to come down or expectations about future exchange rate appreciation needs to decline. In other words,  $\dot{\hat{e}}$  has to go up. In mainstream economics it is usually assumed that  $\dot{\hat{e}} = f(e)$ . If  $1 > f' > 0$  or  $f' = 0$ , for the declination of risk premium  $\phi$  exchange rate needs to appreciate. If regressive expectation operates, i.e. for  $f' < 0$ ,  $\dot{\hat{e}}$  goes up as the exchange rate appreciates. If  $f'$  has a very large negative value, the exchange rate will appreciate by very little.

The second channel, signalling, signifies that sterilised intervention is supposed to signal a change in the monetary policy intentions of central banks. The signal activates a response on the part of the private sector to move the exchange rate in a direction sought by the monetary authority.

All these theories have linked the reserve change and exchange rate by keeping monetary policy at the centre stage. The obvious criticism of these theories is directed to the assumption of a full employment situation as well as that of an exogenous money supply. Further, these theories may be criticised on two more grounds. First, these theories ignore the fact that the stock of foreign exchange reserve itself creates an expectation of stability in the exchange rate of a country. Second, these theories overlook one glaring asymmetry in international finance, that of the exchange rates of currencies of developing countries being more volatile than those of the developed world's, generally speaking. To be precise, the currency with greater use as international money has greater stability in the value of its exchange rate. Hence, in a situation allowing for a substantially free movement of capital flows, the rate of interest policy of developing countries has a very limited capital attracting power.

In this paper, we argue that there is no need to bring in monetary policy to establish the linkage between the exchange rate and reserves. The level of reserve stock itself will create the expectation regarding the future exchange rate. If a majority of foreign exchange traders believe that a particular currency is expected to appreciate, these traders will buy the currency to realise capital gains. A net increase in the demand for this currency will lead to its actual appreciation, i.e. actual exchange rate of a certain period depends upon its expected exchange rate and if the average expectation is that the exchange rate will appreciate the actual exchange rate will certainly do so. This expectation about the exchange rate will change with change in the stock of reserves. This change in expectations about the exchange rate will influence capital flow and

capital flow will influence the expectation regarding the exchange rate. Ultimately the exchange rate will change.

I

Let us assume that in the foreign exchange market two kinds of agents are active- 1) Central Banks and 2) Private foreign exchange traders. Both agents buy and sell foreign exchange. The foreign exchange rate gets determined in a free market from the decisions of these two types of agents regarding selling (supply) and buying (demand) foreign exchange.

An individual private foreign exchange trader tries to guess what on the average other foreign exchange traders are thinking about the future exchange rate of a particular currency. If he expects that others on average are having expectations of appreciation he would tend to buy that currency to make capital gains. When most other private foreign exchange traders have a similar expectation of currency appreciation, the market sentiment to buy that currency prevails causing the currency to appreciate in a bullish market. One of the indicators of this expectation may be capital flow. If one or two banks lend to a particular country it generates confidence amongst other bankers regarding that country's credibility as a borrower which itself generates the expectation of stability of its currency value at the very least (if not its appreciation). Hence capital flow may be an indicator of change in the expected exchange rate.

Central banks can intervene in the foreign exchange market by buying and selling currency. During the last quarter of 2011, the total world foreign exchange reserves amounted to over \$10.02 trillion. And in the last quarter of the year 2010, it amounted to \$ 9.26 trillion (International Financial Statistics, Cofer 2013, IMF). This was, at that time, the equivalent of 2.3 times of any single day's turnover in the world's foreign exchange market (Central Bank Survey of Foreign Exchange and Derivative Market Activity, BIS, 2010), which indicates that one central bank or even a number of central banks intervening together in exchange markets cannot hope to counter a concerted onslaught on a particular currency or currencies by the exchange markets. This inadequacy on the part of central banks means that to become effective any central bank must act upon the exchange rate expectations that prevail in the market. In other words, the role of central bank intervention is to change this expectation. The central bank's policy of intervention would be rendered effective if foreign exchange traders were to believe that it will be effective. This belief depends significantly upon the position of the stock of reserve held by the central banks, e.g. by the Reserve Bank of India (RBI) in the Indian context. Suppose, the rupee is depreciating, the RBI may start to or be expected to sell dollars and buy rupee to halt the downward movement of the rupee. If the foreign exchange traders deem this as the average expectation of the market that this intervention would be sufficient to maintain the stability of the Indian rupee, they might begin to buy the rupee in the hope of the exchange rate appreciating as a result of the RBI's intervention. Should

this be the average perception it would actually lead to either stability or appreciation of the rupee. If private traders expected that the RBI intervention were not enough to maintain stability of the rupee, then the exchange rate would not be expected to appreciate leading the foreign exchange traders to sell rupees in a bearish mood. The rupee will then actually continue to depreciate further and RBI's intervention would be rendered ineffective. The expectation regarding the effectiveness of the central bank intervention of a particular country with a current account deficit in the medium and long terms depends upon the stock of reserves it has and the net flow of capital that affect the changes in reserve. This expectation will change with the change in the stock of reserves. Further, intervention in the foreign exchange market by the central banks alters the volume of the stock of reserve. If the central bank purchases foreign exchanges, the stock of reserve will increase which, in turn, will strengthen the expectation of exchange rate appreciation. Taking into account all these factors foreign exchange traders will form expectations regarding the change in exchange rate. Hence, the change in reserve as well as capital flows will play the role of determinants of change in the exchange rate.

Formally, we can write,

$$\frac{d\hat{e}_t}{dt} = \phi\left(\frac{dR_t}{dt}, K_t\right) \dots \dots \dots (1)$$

Where,  $\hat{e}_t$  = expected exchange rate,

$dR/dt$  = change in stock of reserve at period t

K= capital account inflow

Actions flow from judgement about the future. Let us suppose that the majority of foreign exchange traders believe that a particular currency is expected to appreciate. These traders will buy the currency because by doing so they will be able to realise capital gains. A net increase in the demand for this currency will lead to its actual appreciation i.e. the actual exchange rate of a period depends upon the expected exchange rate of that period and if the average expectation is that the exchange rate will appreciate, then the actual exchange rate will indeed appreciate.

Formally we can write,

$$e_t = f(\hat{e}_t), f' > 0$$

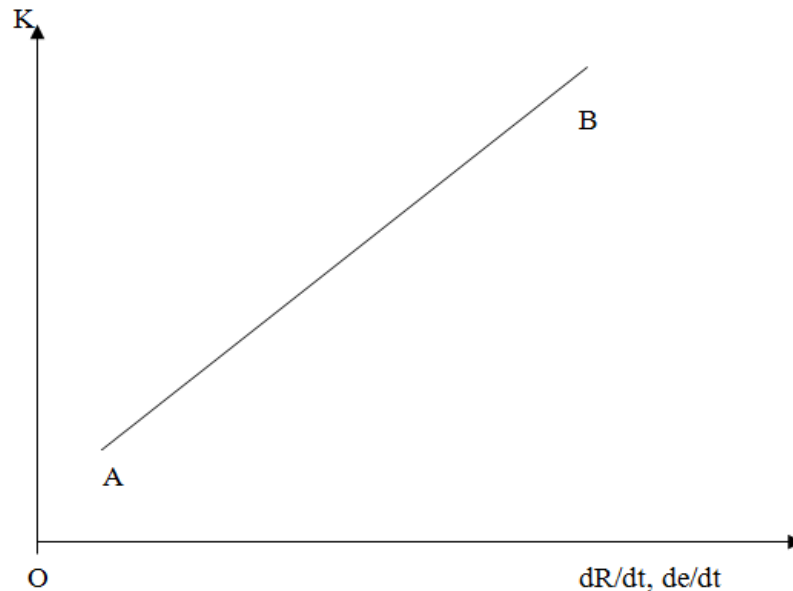
$$\therefore \frac{de_t}{dt} = f' \frac{d\hat{e}_t}{dt}$$

$$\text{now, } \frac{d\hat{e}_t}{dt} = \phi\left(\frac{dR_t}{dt}, K_t\right) \dots \dots \dots \text{from(1)}$$

$$\therefore \frac{de_t}{dt} = f' \phi\left(\frac{dR_t}{dt}, K_t\right)$$

$$\text{or, } \frac{de_t}{dt} = g\left(\frac{dR_t}{dt}, K_t\right)$$

Graph 1



Now,  $dR/dt$ , change in reserve and  $K$ , capital flows are positively linked with each other for a given  $de/dt$ , change in exchange rate. If capital inflows increase for the existing change in exchange rate the reserve too will increase, otherwise the exchange rate will appreciate. If change in the reserve stock increases, it creates an expectation about the particular currency's value going up, creating further capital inflows. So, for a given exchange rate we can represent this relationship with a positively sloped straight line, AB, in figure1 (For simplicity, we have assumed this functional relationship to be a straight line).

The validity of the relationship between exchange rate change, foreign exchange reserve change, and capital flows stated in figure1 depends upon two conditions. First, the

change in foreign exchange reserve is exogenously determined and second, capital inflow should be autonomous to the current account or, to be precise, current account deficit should not have a significant influence on the exchange rate.

Now, the question is why we need these two conditions. The necessity of these two conditions is embedded in the fact that change in the stock of reserve is nothing but the aggregate of net capital inflows and net current account surplus. If changes in the reserve and net capital flows are two determinants of exchange rate change, then the current account has to be the adjusting factor for maintaining the balance of payment identity.

Every country needs a critical level of stock of reserves in order to keep its exchange rate stable. This critical level should be able to generate the expectation of an intervention by the Central Banks as being effective enough to keep the exchange rate stable. Every Central Bank will try and have, at the very least, the critical level of foreign exchange reserves. The central banks' perceptions of the requirement of the reserve determine these critical levels. They generally do not make it public beforehand. Hence, change in the reserve stock is determined by the central banks and it is exogenous here. If the current account is not influencing capital flows and is sensitive to capital flows itself then we can say that the current account surplus is the adjusting factor.

The gradual replacement of traditional bank loans with marketable security issues has led to a proliferation of high risk financial transactions since the late 1980s. These rely, as a source of profit, on the rather uncertain movements in exchange and interest rates. These profits are essentially short run and speculative in nature. Increased control over capital flows by the financial institutions has led to the increased importance of having short-run profits. The competition between institutional investors manifests itself as a persistent requirement to demonstrate superior returns in order to attract more funds. Successive high short-run gains in each period are more effective in this respect than the longer-term returns. In the US a typical stock was held in 1992-93 for an average of a little over two years compared to over four years ten years ago and seven years in 1960. The average holding period for institutional investors is less than two years compared to almost five years for individuals (Eatwell, 1996). There are debates<sup>1</sup> regarding the average stock holding period in the US, the most conservative estimate being 7 months in the year 2007. For India, in one available measure, the average stock holding period is 40 days<sup>2</sup> presently (2012). The foreign exchange market also reflects this fact. A very large part of currency trades are very short run. Given that the vast majority of trades are not for the finance of trade in goods and services or long-term investment, these short-term trades must be based on expectations of gains derived from changes in the value of financial assets.

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<sup>1</sup> <http://www.ritholtz.com/blog/2010/10/average-stock-holding-period-11-seconds/>

<sup>2</sup> <http://orpheus.asia/2012/09/14/india-30-ormi-faqs-what-does-average-holding-period-mean/>

The new instruments are mainly meant for hedging against the risk in the exchange rate change or rate of interest change. This essentially means transferring risk to others. Short-run profits are gained through transferring risk. They have no link with the return on the physical capital in the economy. This ultimately leads to a gradual disconnection from the real world, because to earn profits the capital market no longer looks towards the real world. By transferring risk this market is able to draw profits on its own and sustain itself. In 2010, due to this hedging, the foreign exchange transactions constituted more than 62.5% of the total average per day foreign exchange turnover (Central Bank Survey of Foreign Exchange and Derivative Market Activity, BIS, 2010). As a result, capital inflows were coming into countries mainly for speculative gains. Now speculative gains can come from fluctuations in exchange rate and rate of interest. For countries with very high levels of exchange rates fluctuations the speculative gain motive from exchange rate fluctuations will dominate in attracting capital inflows.

Now we shall try to look at how current account balance can influence the interest rate of a country, theoretically speaking. Let us suppose that a country's current account balance is on the increase. If the economy is under full employment equilibrium for a given exchange rate the income will surely increase and so will the aggregate demand along with the demand for money. With an unchanged money stock the rate of interest too will increase. If money supply is endogenous the stock of money will go up while the rate of interest will remain unchanged. Hence, changes in current account balance can affect capital flows through rate of interest in a full employment equilibrium economy for a given exchange rate only if the money supply is assumed to be exogenous. At full employment an increase in current account balance will change the price but not the rate of interest. Even if we assume that the money supply is exogenous (which can be questioned) capital flow may not be sensitive to change in the rate of interest, most probably for the developing nations, as the levels of exchange rate fluctuations are high for them.

Now we shall examine the influence of current account on capital flows through exchange rate. Looking at the data of the whole world it becomes evident that the capital transaction has increased to a level where the foreign exchange transaction for foreign trade and services is very negligible today. The volume of transactions in 2010 stood at close to \$3.98 trillion per day (B.I.S., 2010). In 2010, the annual global volume of exports of goods and services stood at \$15.1 trillion. This amounted to, on average, about \$57.22 billion per trading day. So, foreign exchange trading was 69.5 times as great as trade in goods and services. Further, a need to defend the exchange rate against the volatility of international financial flows has been identified. As a matter of fact, the World Bank<sup>3</sup> told the developing countries in 1997 itself to keep their reserves according "to variations in the capital account, rather than in terms of months of imports, since the level of gross

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<sup>3</sup> Private Capital Flows to Developing Countries, The Road to Financial Integration, A World Bank Policy Research Report, 1997, Pp-7, OUP



flows is higher following the integration". This is indicative of a smaller impact of trade in goods and services than of capital flows on the exchange rate movement because of a much smaller share in world foreign exchange transactions.

Capital flow can influence the current account balance through various channels. If capital flows influence the exchange rate then changes in the exchange rate will influence both imports and exports. Also, increase in capital flows increase the international purchasing power of a country which, in turn, helps increase imports through an increase in average propensity to imports of a foreign exchange constrained economy.

Capital flow can influence current account not only through imports and exports but also through the factor income flows it generates. We have seen that the gross transaction of foreign exchange due to the income earned from foreign investment, as a proportion to the current account, is quite large. All G-7 countries had flows on factor payments on capital more than 10% of their gross current account flow in 1998<sup>ii</sup>. For Japan it was close to 30% throughout the period of 1982-1998. For the US it was around 20% throughout the period of 1982-98. For other industrially developed countries too it was between 10% and 20%. For developing countries similarly, the flows constituted by investment income, compared to their current account flows were large, though not as large as in the developed world. For Latin American countries the situation is quite comparable to that of the developed world of the North. But for East Asian countries and India the flows were not that large- roughly around 3-6%.

Now, we should check how capital flows influence current account through the net investment income route. If a country gets net capital inflows, this implies that it is a net borrower country. Net investment income should be less than zero. If a country is a net exporter of capital then its net investment income should be greater than zero. This is true if the world capital market is perfectly integrated, the time lag between investment and return is not too stretched, and the stock of capital invested abroad is smaller than the stock of capital invested by foreigners into that country.

As we have described before, changes in foreign exchange reserves are exogenously determined in our model. But capital flows are endogenous. We need to know what influences capital flows. Capital flows into a country for two motives - income earning and capital gaining. If the income earning motive is the dominant one, capital flows will be sensitive to the rate of interest change and less sensitive to exchange rate change. And if capital gaining happens to be the dominant motive, capital flows will be sensitive to exchange rate change and less sensitive to the rate of interest change. It is expected that developed countries' rate of interest policy is relatively more effective in attracting capital flows compared to developing countries. On the other hand, the capital flows coming into developing countries are more sensitive to exchange rate changes.

A plausible answer to why capital flows are insensitive to real rate of interest changes for developing countries but sensitive to such real rate of interest changes for developed countries may be attributable to the currencies of developed countries enjoying the expectation of greater stability in their currency value. Besides, it discourages foreign investors from having a capital gains motive. So, capital flow is less sensitive to the exchange rate change in the developed world. Exchange rate fluctuates much more in the developing countries compared to the developed world. Were rate of interest to increase in the developing world the foreign investors would remain unsure about the return because of high exchange rate fluctuations. This explains why capital flows in developing countries are more sensitive to the percentage changes in exchange rate than to the rate of interest differentials.

Table 1

The Role of Different Currencies as International Currency in 2010  
(as a share of a currency in total use)

Currency	Allocated Foreign Exchange Reserves held by Central Bank*	Foreign exchange trading in world markets**
US Dollar	0.62	0.85
EURO	0.26	0.39
Pound sterling	0.04	0.19
Japanese yen	0.04	0.13
Others	0.05	0.44

Source: \* COFER, IMF

\*\* Central Bank Survey of Foreign Exchange and Derivative Market Activity, BIS, 2010

Currencies of developed countries have a much greater use as international money compared to those of developing countries. They have a very large use as the international medium of exchange as well as reserve currency (due to the store of value as well as medium of exchange functions). Usually, any currency with these two functions also functions as a unit of account. All these functions require stability in the value of the currency. So, the greater use of a currency as international money requires greater stability in its value. Since currencies of the developed countries have much greater use

as international money (See Table 1) the general expectation is that these countries' exchange rates would be more stable compared to those of developing countries.

Hence, for developed countries the capital flows may be altered through the rate of interest change. For developing countries, on the other hand, the rate of interest policy won't be effective in terms of attracting capital flows. Capital flows in developing countries are sensitive to exchange rate changes and not to interest rate changes.

Others too share this observation. Mihir Rakshit, (Rakshit, 2002) writes

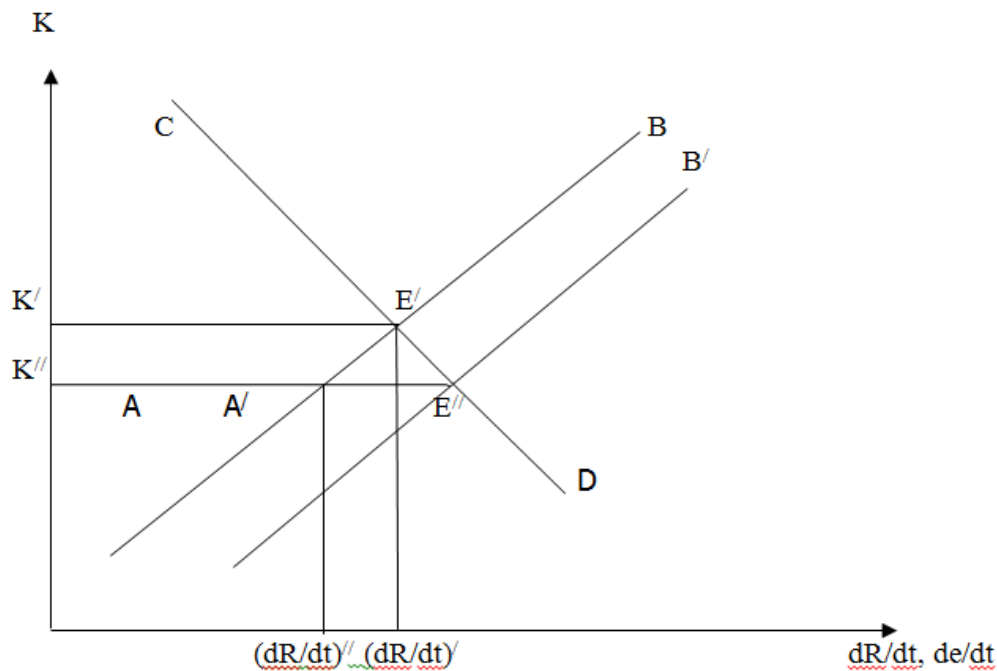
*“The severity of external credit crunch a country faces following some large negative shock depends also on the country's standing in the international financial market. When faced with pressing balance of payments problems, along with depressed economic conditions at home, Great Britain or France could in early 90s have kept their currencies within the ERM band by inducing capital inflows through jacking up interest rates, provided they were prepared to endure a prolonged spell of unemployment and output loss. However, even though the long term fundamentals of South Korea, Malaysia and Thailand were stronger, at least not worse than the European economies in distress, the former failed to attract foreign capital even when their interest rate went through roofs.”*

So, we can write for the developing countries,

$$K_t = \mathfrak{F}\left(\frac{de_t}{dt}\right) \text{ and } \mathfrak{F}' < 0$$

For the sake of simplicity we have assumed a linear form of this functional relation before incorporating it into figure 1. The line, CD, in figure 2 represents this functional relation.

Graph 2



The point  $E'$  in figure 2 signifies for a change in foreign exchange reserve, the extent to which change will occur in the exchange rate. To understand its mechanism, let us suppose the central bank wants to increase the stock of reserves at a faster rate. So  $dR/dt$  will go up. Then there will be tendency of  $E'$  to move towards right. As a result exchange rate will depreciate and capital outflow will start and  $AB$  line start moving downwards, and the new equilibrium will be at  $E''$ . Let us suppose there is an increase in the US Fed rate and capital outflow is taking place from a particular developing country. The capital flow has come down to  $K''$  at a given  $dR/dt$  i.e.  $(dR/dt)'$ . As a result the exchange will depreciate, from the exchange rate at point  $E'$ . Now for  $K''$  the required  $dR/dt$  is  $(dR/dt)''$ . So the addition to stock of reserves will come down. And it will put pressure on the exchange rate to appreciate and this may bring some capital inflows also. As a result the exchange rate appreciates and moves towards  $E'$ .

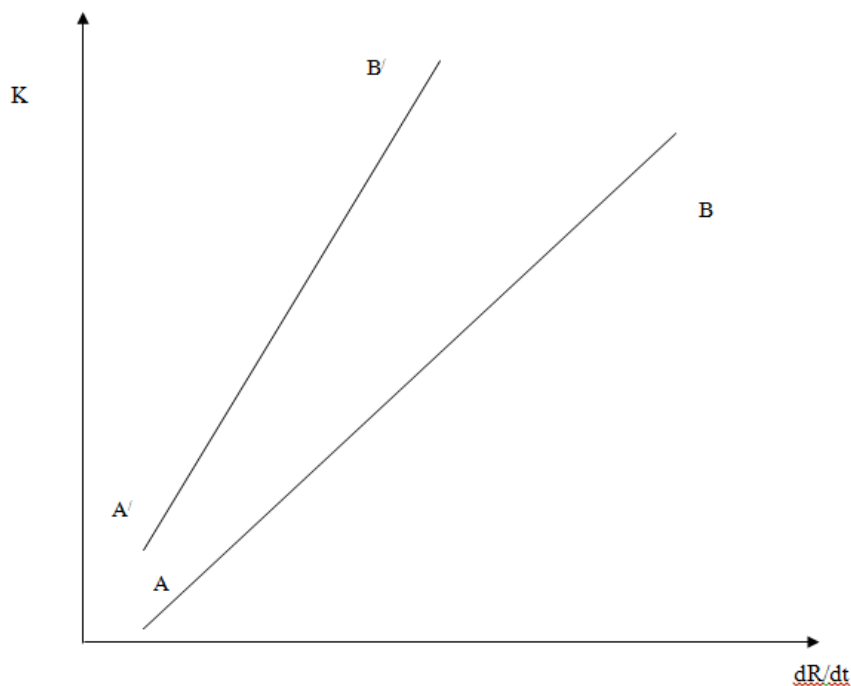
## II

Let us assume that whatever capital flows are coming will be absorbed by the central bank, after meeting the current account deficit. This implies  $de/dt = 0$ . So, the line  $AB$  (figure 3) will be with a slope of more than  $45^\circ$ . If the central bank does not do the capital flows will bring about appreciation of exchange rate which may have an adverse impact on the real economy through widening current account deficit further. Yet the accumulation of reserves does not come without its own costs. In developing countries, generally speaking, foreign exchange is kept in highly liquid US dollar or in currencies of other developed countries like Euro-denominated assets. Obviously, the rates of return of

these assets are quite low compared to the rate of return earned by capital flows coming to developing countries. Further, increasing capital flows will increase the current account deficit through the increasing international purchasing power of the country. So, what proportion of capital flows get absorbed in foreign exchange reserve by the central bank will depend upon a cost-benefit analysis that takes into account all these factors.

Let us suppose an optimum ratio exists between the stock of net foreign capital inflow and the stock of reserve for which the exchange rate of the country is stable. The central bank absorbed whatever net capital inflows were coming after meeting the current account deficit. In such a scenario the economy falls in with line AB (figure 3, for simplicity, we have removed the line CD of figure 2). The exchange rate is stable. But capital flows are continue to come; as an increasing stock of reserves gives rise to expectations of the exchange rate appreciating in future. The current account deficit will go up. Along with the cost for accumulating reserve the central bank will absorb increasingly lesser proportion of net capital inflows. After a certain period, when the stock of reserve is lower than the 'optimum ratio' the exchange rate will appreciate. This time the slope of the line AB will go up further. It will move towards A'B' in figure 3. As exchange rate appreciation will bring about capital inflows at a greater rate, the slope of the line will go up at a faster rate. Ultimately, the net capital inflows reach a level coupled with wide current account deficit so that the stock of reserves will not be sufficient to generate confidence about the exchange rate being, at the very least, stable in future. This will spell the beginning of the collapse of the exchange rate. .

Graph 3



So, there is no way a developing country, with external balance like India, can avoid a currency crisis. The only option is to change the nature of capital flows. In other words, the speculative nature of capital flows has to be changed. The only policy option available to developing countries is putting some capital control measure in place so that the inflows of speculative capital get restricted.

But the question is: why are the developing countries so hesitant in introducing some capital control measures? The answer is” putting capital control in place is against the interest of finance capital as well as the big industrial monopoly capital of developing countries. It is quite evident then why finance capital does not want capital control. The big industrial monopoly capital does not want it because it reduces the cost of capital to them enabling the former to get a high premium in its equity issues. Also, if it is unable to invest these low cost capitals into productive purposes it can invest in the stock market or adopt other means of inter-corporate investment. As a result, it can earn profits without taking up production activity or increase the control over greater resources. As a consequence, its monopoly power goes up.

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## End Note

<sup>i</sup> Dominguez, K and J A. Frankel, (1994). Schwartz, A. J. (2000).

<sup>ii</sup> Source of the data is Balance of Payment Statistics, Various Annuls Issues, IMF. Washington