

Chapter 3: Macroeconomic Effects of Capital Flows: Literature Review

The increase in magnitude and volatility of capital flows to Emerging Market Economies (EMEs) have stimulated keen interest and research on understanding the effects of these flows on the recipient countries as well as on the policy response adopted by them to safeguard against the macroeconomic instability that appears to be associated with international capital mobility. This chapter elaborates on the theoretical and empirical research on the economic effects of the various aspects of capital flows to emerging market countries and the associated policy responses.

3.1 Theoretical Perspective on Macroeconomic Effects of International Capital Flows

3.1.1 From a theoretical perspective, under assumptions of perfect markets and full information liberalization of capital flows can benefit both the source and the recipient countries by leading to a more efficient allocation of resources between these two countries (IMF, 2012). Cross-border movement of capital from a country with lower rate of return to a country with higher rate of return benefits investors in the source countries, besides giving them an opportunity for cross-border risk mitigation through international diversification of their investments. The resulting global allocation of resources in turn facilitates an increase in investment in the capital scarce recipient countries with an associated transfer of technology thereby stimulating economic growth and improving the standard of living in these countries. Capital flows contribute to financing current account deficits and increase welfare by enabling households in consumption smoothing over time. In addition, liberalization of capital flows can benefit the recipient emerging market countries through accelerated development of domestic financial systems due to greater competition and policy discipline.

3.1.2 However, large capital flows in excess of domestic absorption capacity may also lead to excessive expansion of aggregate demand and can be associated with negative effects on the financial sector (Mejia, 1999). The increase in expenditure – or macroeconomic overheating would lead to an appreciation of the real exchange rate, inflationary pressures, widening of current account deficits involving both an increase in national investment and a fall in national

saving, rise in private consumption driven by rising imports of goods, etc. The lending booms that are associated with capital flows increase the vulnerability of the financial sector by exacerbating maturity mismatches between bank assets and their liabilities, currency mismatches and reduced quality of loaning.

3.1.3 The concept of real exchange rate has been most widely used to analyze the impact of capital flows on the (overheating of the) economies of the developing countries. The impact of the capital inflows on the domestic economy which is mainly captured through the appreciation of Real Exchange Rate (RER) is referred to as the “the transfer problem”. The real exchange rate (RER) is an important measure of the competitiveness of an economy as it is associated with export growth. Real Exchange Rate (RER) is the relative price of the domestic goods in terms of foreign goods (eg US pizza per Indian Pizza).

$$\text{RER} = \frac{e \times P}{P^*}$$

Where e = nominal exchange rate, the relative price of domestic currency in terms of foreign currency (e.g. Dollar per rupee)
 P = Overall price level in domestic country.
 P^* = Overall price level in foreign country.

3.1.4 The seminal works of Salter (1959), Swan (1960) Corden (1960) & Dornbusch (1974) provide the theoretical framework to draw inferences on the incidence of capital flows on the real exchange rate in emerging market economies. The effects of capital inflows on appreciation of real exchange rate can be derived from Standard open economy models, such as the intertemporal model of consumption and investment in an open economy with capital mobility in the tradition of Irving Fischer (Calvo, Leiderman and Reinhart, 1996). The theoretical models assume an economy with two goods- traded and non-traded-and a representative consumer who maximizes utility by choosing the consumption of the two goods over time. In these models a decline in world interest rate induces income and substitution effects in the capital recipient country generating increase in consumption and investment and a decline in savings (which is the converse of higher consumption). Capital inflows generate higher domestic demand of both tradables and non-tradables in the economy. The rise in demand for tradables leads to rise in

imports and a widening of the trade deficit. The tradable goods are exogenously priced. The increased demand of non tradables, however, leads to an increase in the relative price of non-tradables, which are more limited in supply than the traded goods, so that the domestic resources are diverted to their production. A higher relative price of the non-tradables corresponds to real exchange rate appreciation. The extent of real appreciation in the economy will depend largely on the intertemporal elasticity of aggregate demand and the income elasticity of demand and supply elasticity for non-tradable goods. The intertemporal elasticity will determine the extent of consumption smoothing and the distribution of expenditure increase through time. The elasticities for non-tradables will determine the extent to which the surge in capital flows will exercise pressure on the non-tradable prices. The appreciation of the RER is indicative of the "Dutch Disease Effects" (Corden and Neary, 1982) that illustrates the impact of natural resources booms or increase in capital flows on the competitiveness of the export-oriented sectors and import-competing sectors.

3.1.5 The effect of Capital flows on the real exchange rate can be different depending upon the choice of the exchange rate system and the composition of capital flows (Combes, Kinda and Plane, 2011).

(a) The choice of the exchange rate system. The influence of the capital flows on the real exchange rate will depend on the nature of the nominal exchange rate system and in the way in which the monetary authorities react to the changes in key macroeconomic aggregates.

With fixed exchange rate, the increased availability of foreign resources will result in accumulation of international reserves at the Central Bank and consequent increase in money supply in the economy when monetary authorities fail to adequately sterilize the capital inflows. The higher money supply and the consequent inflationary pressure in the economy contribute to an increase in relative price of non-tradables (tradable goods are exogenously priced) leading to real exchange rate appreciation. Neutralization of inflows of foreign assets by sterilization can dampen real appreciation but this may not be sustainable in the long run. Sterilization generates quasi fiscal losses for the Central Banks as it entails holding foreign assets with lower interest rates than domestic ones leading them to give up the policy in the long run. Moreover, higher interest rate on domestic assets triggers additional capital inflows.

In the floating exchange rate system capital inflows lead to appreciation of the nominal exchange rate leading to a fall in the relative prices of tradables and shift away from the

consumption of non-tradables. By introducing uncertainty a more flexible exchange rate can discourage short term speculative flows and reduce financial system vulnerability (Calvo, Leiderman and Reinhart, 1996; Mejia, 1999). Exchange rate flexibility ensures that monetary policy is some-what independent of capital flows. However, the appreciation of the nominal exchange rate on account of capital flows under purely flexible exchange rate regime, may have significant impact on the real sector (exports may become uncompetitive) necessitating Central Bank intervention to prevent perverse effects and costly reallocations of productive resources in the economy.

Under the intermediate exchange rate regime the monetary authorities aim for a specific level of nominal exchange rate and monetary aggregate. In such systems, holding to a specified nominal exchange rate with intervention by accumulating more foreign asset reserves lowers the pressure on the nominal exchange rate but may raise inflation due to monetary expansion. In contrast, small scale inventions with lower foreign asset reserves accumulation can raise pressure on the nominal exchange rate and lower inflation.

(b) The type of capital flows: In the financial account of balance of payments four distinctive types of capital flows usually appear, namely Foreign Direct Investment (FDI), Portfolio Investments, Debt Creating Flows and Other Capital. The impact on real exchange rate depends on the types of expenditure which each flow is tied to. In economies with supply constraints, capital flows associated with the higher consumption put more pressure on the non-tradables, leading to an increase in their relative prices and consequently to RER appreciation. On the other hand, capital flows associated with higher investments, which have significant imported goods content are less likely to lead to RER appreciation. FDI flows could be related to investment in imported machinery and equipment, which do not suffer from constraints in domestic supply capacity and thus would have no effect on prices of domestic goods and consequently almost no appreciation effect on real exchange rate (Combes, Kinda and Plane, 2011). In addition, the spillover effects of FDI may also improve local productive capacity through transfer of technology and managerial know how thereby reducing pressure on the real exchange rate (Javorick, 2004). FDI is also more stable as compared to portfolio investment and other investment flows such as bank lending.

The effect of portfolio investment flows on the real exchange rate might be different. If portfolio investment flows are oriented towards the modernization of firms in recipient countries, which requires new machinery and new product lines, the impact might be similar to that of FDI.

But if they are volatile investments for speculation that do not necessarily increase the production capacity in the economy then they would lead to a higher appreciation of real exchange rate as compared to FDI (Lartey, 2007).

The same applies to other investment flows that can be either liabilities of the private or public sector of the economy. Their impact would be different if they are used to finance purchase of non-tradables, or tradables or are used to finance exports production.

3.1.6 Determinants of Real Exchange Rates (RER): Capital flows maybe one of the most important though not the only variable contributing to the real exchange rate changes. The issue of the factors contributing to determination of real exchange rate has been a topic of debate in the literature. A study by Edwards (1987) indicated that both the real and monetary factors are important for explaining the real exchange rate variability with structural variables being more important in explaining long run variability and monetary variables more important in explaining short run variability. In addition instability of the exchange rate policy significantly influences the real exchange rate. Edwards (1988, 1989) developed an analytical framework for exchange rate determination using both nominal and real factors. As per this analysis terms of trade, trade restrictions, government expenditure, technology and capital controls are the fundamental determinants of the equilibrium real exchange rate. Later studies by Williamson (1994), Hinkle and Montiel (1999) and Maesco-Fernandez, Osbat and Schnatz (2004) also provide insights into determinants of the real exchange rates. Carrera and Restout (2008) on survey of the existing literature arrived at productivity, capital flows, government spending, terms of trade, degree of openness and defacto nominal exchange rate regime as important determinants of equilibrium RER. Recent studies (Jongwanich, 2009) indicate that the real exchange rate behavior at medium and long horizons is determined by five key fundamental economic variables that in addition to Net Capital Flows include Government Consumption Expenditure, Trade Openness, Productivity Differentials and Terms of Trade. Other variables may be included in some countries where such factors play an important role in determining real exchange rate. These factors influence the real exchange rate as follows:

Government Consumption: The theoretical impact of public consumption expenditure on real exchange rate is ambiguous depending largely on whether the public spending is oriented more towards tradable or nontradable goods (Bakardzhieva, Naceur and Kamar, 2010). A bias in

public expenditure on nontradables is likely to appreciate the relative price of nontradables thereby inducing real exchange rate appreciation. On the other hand a higher proportion of public spending on imports is likely to cause real exchange rate depreciation. In case the increase in public spending leads to increase in public wages and if the rise in private spending due to higher wages falls stronger on tradable goods then this may cause real exchange rate to depreciate. Another impact of increase in government expenditure on real exchange rate is through deterioration of the fiscal balance that is expected to put downward pressure on the exchange rate.

Trade Openness: This variable describes the degree of openness of the economy. The impact of trade openness is mixed in the literature (Bakardzhieva, Naceur and Kamar, 2010). If this variable is considered as an indicator of trade liberalization then Trade Openness is expected to lead to lower domestic prices and a more depreciated real exchange rate. An improvement in supply capacity induced by Trade Openness may also lead to lowering of prices of nontradables and depreciation of the real exchange rate.

Productivity Differential: The difference in productivity arising due to differences in technological progress potentially affects the real exchange rates as noted by Balasa (1964) and Samuelson (1964). As technological progress is more likely to take place in the traded relative to the non traded sectors of the economy, the productivity grows faster in the traded goods sector resulting in higher wages in these sectors, which spills over to the non tradable sector as well and puts higher pressure on wages. As the prices of traded goods is exogenously determined, the higher wages in nontradable goods sector results in higher relative prices for the nontradables creating a domestic inflation and an appreciation of the real exchange rates (Combes, Kinda and Plane, 2011).

Terms of Trade: Changes in external terms of trade also causes movements in real exchange rates. An increase in relative price in exports relative to imports is likely to cause contraction in non-traded goods sector thereby encouraging labour migration to export sector causing the real exchange rate to appreciate (Bakardzhieva, Naceur and Kamar, 2010). A rise in Terms of Trade is expected to affect the real exchange rate through a combination of income or wealth effects (related to demand for non-tradables) and substitution effects (related to supply of non-tradables). An improvement in terms of trade leads to an increase in income which results in increase in demand for both traded and non-traded goods. This in turn leads to a higher price for

nontradables causing real appreciation. However, increase in terms of trade may result in increase in resources for producers, and the consequent increase in production of all goods including non-tradables causing their price to decline and real exchange rates to depreciate.

3.2 The Empirical Evidence on the Capital Flows on Real Exchange Rate Nexus:

The behavior of real exchange rate in response to capital inflows and its components has been examined in several empirical studies. Among the literary works in early 1990s that examine the relationship capital flows and real exchange rates Calvo, Leiderman and Reimhart (1993) examined some key aspects of the resurgence of capital inflows to Latin America in the early 1990's. Based on the monthly data for individual countries from 1988 to 1992, they found evidence that with the exception of Brazil, all countries in Latin America experienced real appreciation since January, 1991. In addition, they found considerable evidence of the cyclical behavior of real exchange rates. They came to the inference that while some of these cycles could be attributed to fluctuation in capital inflows, other shocks such as changes in terms of trade and in domestic monetary fiscal and exchange rate policies also influenced them.

Similar inferences were reported by El Badawi and Soto (1994) who studied the impact of the four disaggregated components - short term capital flows, long term capital flows, portfolio investment and foreign direct investment for the case of Chile and found that long term capital flows and foreign direct investment have a significant appreciating effect on the equilibrium real exchange rate, though the short term capital flows and portfolio investments did not have any affect.

Another literature on similar experiences of countries in Latin America with capital flows is by Edwards (1998) who found that increases in capital inflows had been associated with the real exchange rate appreciation, while decline in inflows were associated with real exchange rate depreciation for Argentina, Brazil, Chile, Colombia, Mexico, Peru and Venezuela for the period 1980 to 1997. The Granger Causality tests for these two variables showed that in seven out of eight cases (with the exception of Colombia) it is not possible to reject the hypothesis that the capital flows cause real exchange rate appreciation. In three out of seven countries, it is not possible to reject the two-way causality and that in none of the seven cases analyzed it was found that real exchange rate caused capital flows. These results provide support to the view that the

surges in capital flows were (partially) responsible for generating real exchange rate appreciation and losses in real international competitiveness. In order to gain further insights into the dynamic interaction between capital flows and real exchange rates, he estimated a series of unrestricted Vector Autoregressions (VARs) for a group of countries using quarterly data. The impulse response functions of the cyclical component of the real exchange rate of one standard deviation innovation to capital flows indicated that in all cases the capital inflow shocks generated an appreciation in the real exchange rate. However, both the magnitude and dynamics of the response varied cross countries ranging from a 4% appreciation in Argentina to a 0.8% appreciation in Chile and Brazil in response to a one standard deviation shock in capital inflows. The analysis of the variance decomposition indicated that in spite of small effect on the real exchange rate, capital inflows indeed played an important role in explaining changes in real exchange rate in these countries.

A number of studies in the literature examine the comparative experience of Asian and Latin American countries on the impact of capital flows on real exchange rates. A prominent study on this issue was by Corbo & Hernandez (1994) who reviewed and compared the experiences of Latin American Countries (Argentina, Chile, Colombia and Mexico) and five East Asian Countries (Indonesia, Malaysia, the Philippines, the Republic of Korea and Thailand) with capital flows and found that generally they would result in appreciation of the real exchange rate, a larger non-tradable sector, a smaller tradable sector and a larger trade deficit. However, a similar study on macroeconomic effects of capital flows by Khan and Reinhart (1995) for the period 1984-1993 indicates that appreciation in real exchange has been less common in Asian Countries as compared to Latin American Countries.

A similar mixed response of the real exchange rate behavior to the resurgence of capital inflows in Asian and Latin American countries is reported in the study by Calvo Leiderman and Reinhart (1996). On examining the important macroeconomic effects of the capital inflows for the period 1988-1994 in the largest recipients of capital flows in Asia and Latin American including Argentina, Brazil, Chile, Columbia, Indonesia, Malaysia, Mexico, Philippines and Thailand, they found that in most Latin American countries, capital inflows had been associated with the marked real exchange rate appreciation while in Asia, with the exception of Philippines, real exchange rate remained stable throughout the inflow period. They attributed this difference in change of the real exchange rate to the differences in composition of aggregate demand. In the

Asian economies, investment as a share of GDP increased considerably more during the capital inflows period than in most Latin American Countries, whereas in the Latin American countries the capital inflows were primarily associated with a decline in private saving and an increase in consumption expenditure, especially private expenditure on non-tradables. If investment is tilted more towards imported capital goods and consumption has a higher domestic component, then this would lead to a stronger real exchange rate appreciation in Latin America as compared to Asia. In addition, they found that the period of resurgence of capital inflows in Asian economies coincided with fiscal spending contractions in these countries. On the other hand, Latin American countries did not have any fiscal contractions during the period of capital inflows and the major fiscal adjustment programmes of some of these countries predated the surge in capital inflows. As public sector consumption is more biased towards domestic non tradable goods, the behavior of public sector consumption expenditure in aggregate demand would also influence the real exchange rate. Consequently, the greater the contraction in fiscal expenditure at that time of capital inflows the weaker the extent of real exchange rate appreciation.

Similar outcomes have also been reported in another comparative analysis of the experiences of the emerging market economies in Asia and Latin America on the nexus of real exchange rates and capital inflows by Athukorala and Rajapatirana (2003). Their study reports that during the period 1985-2000 the degree of appreciation in real exchange rate associated with capital inflow is uniformly much higher in Latin American countries as compared to Asian economies in spite of the fact that the latter experienced far greater foreign capital inflows relative to the size of the economy. They found evidence that both the composition of capital flows and differences in the degree of response of real exchange rate to capital inflows matter in explaining these contrasting experiences. The evidence suggested that for all countries on an average one percent increase in other capital flows brings about a 0.56 % appreciation in real exchange rate, but by contrast FDI inflows are associated with depreciation rather than appreciation of the real exchange rate. The authors attribute the depreciation effect of FDI on real exchange rate on the hypothesis that FDI generally tends to have a more tradable bias as compared to other types of capital flows. Further, their analysis indicated that a given level of non-FDI capital flows led to a far greater degree of appreciation of real exchange rate in Latin America where the importance of these flows in total capital inflows is also far greater. The authors came to a conclusion that at least part of this difference can be explained on the basis of policy responses in the two regions. Asian countries

seem to have used fiscal contraction and frequent nominal exchange adjustment more effectively to cushion the real exchange rate against the appreciation pressure of capital inflows.

A number of subsequent studies have also examined both the combined and the differential effect of the components of capital flows on real exchange rates in the emerging market countries. In a recent work in this direction, Bakardzhieva, Naceur and Kamar (2010), using a sample of 57 developing countries covering Africa, Europe, Asia, Latin America and Middle East for the period 1980 to 2007, reported that an increase in net capital flow would lead to appreciation of real exchange rate and to the possible loss of competitiveness and that the increase of term of trade and productivity would also lead to the appreciation of the real exchange rate while the increase of openness and government consumption would tend to depreciate the real exchange rate. Their analysis of the impact of different type of capital flows indicated that except Foreign Direct Investment, other forms of capital flows i.e., debt, portfolio investments, aid have a significant positive impact on the real exchange rate. Their study reveals that FDI has no significant impact on the real exchange rate. Based on these findings they suggest that while FDI flows might lead to real exchange rate appreciation in the short run when the economy receives the flows, its impact is diluted over time as part of the flows start to leave the country in the form of imports of machinery and other capital goods. Besides, the increase in production induced by Foreign Direct Investment can lead to downward pressure on prices and result in real exchange rate depreciation.

Another important recent study on the subject is by Combes, Kinda and Plane (2011) who analyzed the impact of capital inflows and exchange rate flexibility on the real exchange rate using panel co-integration technique for a sample of 42 developing countries for the period 1980-2006. Their results show that aggregated capital inflows as well as public and private flows are associated with real exchange rate appreciation. Among private flows, portfolio investment has the highest appreciation effect – almost seven times that of Foreign Direct Investment or bank loans. The authors suggest that the portfolio investment flows as compared to other private flows are more volatile and speculative—something generally associated with macroeconomic instability and lead to no improvement of productivity. They further argued that Foreign Direct Investment is the more stable flow than portfolio investment and increases productive capacity through transfer of technology and know-how. It is primarily for investment purposes and can lead to import of new machinery and equipment, which has limited impact on the real exchange

rate. The appreciation of the real exchange rate on account of loans from commercial bank is limited as in the case of Foreign Direct Investment. The authors suggest that bank loans can be directed to some extent to investment financing like Foreign Direct Investment thereby improving productive capacity with a similar inflation potential as that of Foreign Direct Investment.

In a more recent study Jongwanich & Kohpaiboon (2013) examined the impact of capital flows on real exchange rates in emerging Asian countries for the period 2000-2009 using a dynamic panel-data model and found evidence that composition of capital flows matters in determining the impact of flows on real exchange rates, and that Portfolio investment brings in a faster speed of real exchange rate appreciation than foreign direct investment, though the magnitude of appreciation among capital flows is close to each other. The evidence further indicates that capital outflows bring about a greater degree of exchange rate adjustment than capital inflows.

Among the literatures on the impact of capital flows on real exchange rates in the Indian economy is the work by Kohli (2001) who studied the effect of capital inflows upon some macroeconomic aggregates such as exchange rates, foreign exchange reserves, money supply and the policy responses of the authorities in India for the period 1985-86 to 1999-00. Her study shows that the real exchange rate appreciates in response to capital flows and that during the capital surge in 1992-95 and 1996-97 the real exchange rate appreciated by 10.7 and 14% respectively over its March 1993 level. She found that the time series properties of both the real effective exchange rate and net capital inflow indicated them to be stationary $I(0)$ processes. Restricting analysis of data to the post 1993 period with quarterly observations, testing for co-integration through Johansen's (1990) procedure indicated both the series to be tied together in a long run equilibrium relationship. The simple correlation coefficient between the two series was small. The Granger causality tests between the two variables indicated that the hypothesis that net capital inflows do not cause real exchange rates can be rejected 93% all the time. Reverse causality i.e., real exchange rates do not Granger cause net capital flows, however, could not be rejected. The impulse response function between the two series indicated that a one standard deviation surprise shock to net capital inflows in the first period causes the real exchange rate to appreciate by 1.2% in the second period. She inferred that the policy response of the authorities was to avert a nominal appreciation, preferring an adjustment through gradual increase in domestic inflation. Part of the policy response was directed towards external adjustment through

trade reform, convertibility of the current account, and liberalization of overseas investments by Indian firms.

A study by Chakraborty (2001) also examined the effects of inflows of private foreign capital on some major macroeconomic variables in India using quarterly data for the period 1993-99. The results of the study indicated unidirectional causality from private foreign capital flows to nominal effective exchange rates – both trade based and export based. Another study Chakraborty (2003) on the relationship between the external shocks generated by capital inflows and the real exchange rate using the Vector Auto Regression (VAR) method on the quarterly data on India from 1993 (Q2) to 2001 (Q4) indicated that unlike East Asian and Latin American countries, the real exchange rates depreciated with respect to one standard deviation innovation to capital inflows. Further, the dynamic impact of random disturbances generated by capital inflows on the real exchange rate was found to be persistent and the dynamic response of the real exchange rate to capital inflows shock has largely been influenced by the monetary policy (and not by fiscal policy). From the analysis, the author inferred that the monetary policy was effective in avoiding any serious distortion in the real exchange rate following the liberalization of capital inflows in India whereas the role of fiscal policy in this process remained passive. This observation is in sharp contrast to the case of East Asian countries in which contractionary fiscal policy along with other macro-economic policies was one of the important tools in the management of liberalized inflows of capital. At the beginning the appreciation of nominal exchange rate was prevented through sterilized intervention in the foreign exchange market like the East Asian and Latin American countries. However, in contrast to Latin American countries, as sterilized innovation became unsustainable, during the later period on account of the quasi fiscal cost of higher rate of interest, the real appreciation was prevented by increasing money supply thereby causing domestic inflation.

Another study by Chakraborty (2005) that analyzed quarterly data over the period 1993-2000 reported findings that an error correction mechanism was operating between net capital inflows and the real exchange rate. Based on the examination of the time series properties of the foreign capital inflows into India after liberalization in 1990's, the study has further reported inferences that the portfolio investment flows was volatile whereas foreign direct investment and external commercial borrowings were not volatile and that the aggregate of these three components, which represents net inflow of capital into India was also volatile. The author has suggested that

to the policy of intervention by the Reserve Bank of India in the foreign exchange market has helped prevent volatility of real exchange rates in spite of volatility in net inflows of capital.

In another empirical study on the subject Dua and Sen (2006) examined the relationship between the real exchange rate, the level of capital flows, volatility of capital flows, fiscal and monetary policy indicators and current account surplus of the Indian economy for the period 1993 (Q2) - 2004 (Q1). The empirical analysis based on quarterly data indicates that the real exchange rate is positively related to net capital flows and their volatility. Tests of Granger causality indicate that the level of net capital flows and their volatility Granger causes real exchange rate. The generalized variance decompositions indicate that the determinants of real exchange rate in descending order of important include net capital flows and their volatility, government expenditure, current account surplus and the money supply.

In another recent study for India Sohrabji (2011) estimated the relationship with real exchange rate as dependent variable and terms of trade, openness, investment, capital flows, government spending and technological progress as explanatory variables using Johansen Cointegration test and error correction model with annual data from 1975 to 2006. The results indicate that increased capital flows are associated with an appreciating real exchange rate. In addition, capital flows are found to be an important contributor to real exchange rate misalignment which explains the overvaluation of the rupee associated with increased foreign investment in recent years.

In another study Ghosh and Reitz (2012) investigated the relationship between capital flows and exchange rates in India for the period 2000 to 2011 using a new index of real exchange rate, indicated as real financial market exchange rate that is constructed by deflating the exchange rates by asset prices rather than consumer prices. The cointegration analysis indicates a long-run relation between the real financial market exchange rate and outstanding portfolio FII and that a rise in outstanding foreign portfolio investment in equity is accompanied by an appreciation of domestic currency and/or a rise in the asset prices as compared to other countries. In the short run capital inflows are accompanied by an appreciation of the real financial market exchange rate.

Another study by Biswas and Dasgupta (2012) that examined the impact of capital inflows in India on the real exchange rates using quarterly data for the period 1994-95Q1 to 2009-10Q4

using Johansen multivariate cointegration test arrived at the findings that Foreign Direct Investment (FDI) and worker's remittances affect real exchange rate positively. The impulse response analysis results indicated that shocks to FDI has a long term positive impact on the real exchange rates, though it is slightly negative in some of the ending periods.

A very recent study by Gaiah, Padhi and Ramanathan (2014) that explored the relationship between capital flows and real exchange rates in India for the period 2005 to 2012 using OLS estimation has reported findings that FDI flows have no significant impact on change in real exchange rate. However, portfolio flows and debt flows have a significant appreciation impact on the change in real exchange rates.

3.3 Theoretical & Empirical Perspectives on the Macroeconomic Impact of the Volatility of Capital Flows

3.3.1 Another set of adverse consequences of international capital flow liberalization relate to the economic instability brought in by the volatility of capital flows. Capital inflows, especially short term capital flows, maybe reversed at a short notice, possibly leading to a domestic financial crisis. Almost all the studies on currency crisis identified the presence of short term capital, what is called as "hot money" variety, which are volatile in nature, as the main factor responsible for increase in financial fragility and eventually economic crisis in the East Asian and Latin American countries in the late 1990s. The evidence suggested that short term capital flows, which are volatile in nature, increases the volatility of the net international capital flows to these countries and leads to financial fragility in these countries.

3.3.2 The volatility of capital flows is often associated with high real exchange rate volatility in the emerging and developing countries that in turn translate into unpredictable movements in the relative prices in the economy adversely affecting investment and the consequent economic growth. These adverse consequences are amplified in countries with relatively low level of financial development. Aghion et al (2006) show theoretically and empirically that rising exchange rate volatility can hamper growth, especially in countries with shallow financial markets and that macroeconomic volatility is mainly driven by financial shocks. The negative impact of the real exchange rate volatility on growth can be transmitted through declining investment and by lower foreign trade -- particularly in the differentiated products.

3.3.3 The literature on the empirical studies capturing the effect of volatility of capital flows on real exchange rate volatility is limited and inconclusive. Easterly, Islam and Stiglitz (2000) working on a sample of 74 countries over the period 1960-1997 draw inference that neither the financial openness nor a volatility of flow of capital has a significant impact on macro-economic volatility. Similarly Buch, Dopke and Pierdzioch (2002) also do not find a logical empirical relationship between the financial openness and real exchange rate fluctuation. Further, Hau (2002) in a study on 23 OECD countries for the period 1980-1998 found evidence that real exchange rate is less volatile for the most open countries (financial and commercial openness). Similar conclusion that financial integration and liberalization of capital flows reduce volatility as well as increase growth is documented in the study by Prasad, et al (2003). Calderon (2004) also found a positive effect of liberalization on the reduction of the real exchange rate volatility in a study on the effects of the financial and trade openness on the real exchange rate volatility for a panel of industrialized and emerging market countries over the period 1974-2003 using the dynamic GNM technique. However, Edwards and Rigobon (2005) in a study on the case of Chile for 1990s showed that the capital controls decrease exchange rate vulnerability to external shocks.

In a more recent study on the factors affecting exchange rate volatility based on a panel of 10 economies of South and South East Asia for the period 1979 to 2004 Amor, Sarkar (2008) find evidence that the impact of financial openness on real exchange rate volatility is dependent on the exchange rate system in the region. Real exchange rate volatility is positively correlated with the financial integration while controlling for the effect of macroeconomic fundamentals – real GDP growth, government consumption as a percentage of GDP, domestic investment, money and trade openness. This correlation is higher among countries with intermediate and flexible exchange rate regimes. In contrast, with fixed exchange rate regime, real exchange rate volatility is negatively co-related with financial integration. The GDP growth volatility is positively and significantly associated with real exchange rate volatility for most cases while trade openness is negatively and significantly correlated. The co-relation between real exchange rate volatility and government spending, terms of trade and money is not found to be significant. If a country is more integrated to the international financial market the real exchange rate will be more volatile.

Similar findings were arrived at by Calderon and Kubota (2009) who tested the relationship between real exchange rate volatility and financial openness for a panel of 82 countries over the period 1975-2005 using least squares and instrumental methods for panel data model. They find evidence that real exchange rate volatility is higher in countries that are more integrated to international financial markets. Further, compared to floating regimes real exchange rate volatility in fixed exchange rate regime is lowered by a third. Secondly, they find evidence that the composition of capital flows has an important role in explaining the link between financial openness and real exchange rate volatility. They find evidence that financial openness may reduce real exchange rate volatility in countries with low debt to equity ratios but also that higher share of debt in foreign liabilities may amplify real exchange rate volatility and increase the likely hood of currency crisis.

The evidence in support of the hypothesis that international financial integration is an important source of exchange rate variability in emerging countries is further documented in the study by Caporale, Amor and Rault (2009) who estimate a reduced form model using the GMM method for dynamic panels over the period 1979 – 2004 for a sample of 39 developing countries grouped into three regions, Latin America, Asia and MENA with the objective of finding new empirical evidence on the determinants of volatility of real exchange rates in emerging markets, focusing on the role of international financial integration. Their findings further suggest that in the Asian and Latin American countries financial integration amplifies fluctuations of the real exchange rate even in the presence of a fixed exchange rate regime. By contrast in MENA region which is characterized by adoption of a more flexible exchange rate regime, international financial integration reduces the volatility of the real exchange rate.

3.4 Literature on Policy Management of Capital Inflows:

As indicated above, the arrival of international capital inflows to emerging market economies have several macroeconomic consequences that include the possibility of such inflows leading to overheating of the economy on account of excessive expansion of aggregate demand, increase in domestic inflationary pressures especially when the flows are monetized and an appreciation of the real exchange rate which may lead to loss of competitiveness and widening of the trade deficit to uncomfortable levels. Further, excess volatility of capital inflows in a world of high

capital mobility where capital flows can depart just as rapidly as they arrive, there is a genuine risk that they with their effects on real exchange rate and the financial sector can lead to severe macroeconomic instability.

As a result the surge of capital flows have posed several challenges to the policy makers in these countries and has elicited wide-ranging response from them with varying degree of success in mitigating their adverse impact on the domestic economy. The literature on the policy responses to capital flows indicates that the appropriate combination of policy options has been determined by a variety of factors such as causes behind the inflows, the availability and flexibility of different policy instruments, the nature of domestic financial markets, the macro-economic and policy climate of the recipient country and the extent of policy makers credibility (Khan, and Reinhart 1995). The role of the different policies that have been adopted by the countries and their relative merits and demerits are as follows:

3.4.1 Monetary Policy: Sterilization via Open Market Operations and Reserve Requirements

In an exchange rate regime that is not completely flexible, sterilization policy aims at insulating the money supply and the exchange rate from the effect of capital inflows with an intention to prevent monetary expansion, mitigate inflationary pressures and restrict the real exchange rate appreciation. Sterilization policies have been implemented in a number of ways such as Open Market Operations, increase in reserve requirements; etc (Mejia, 1999).

Open Market Operations: Sterilization via the open market operations usually takes place through the central bank sale of high yield domestic assets – either government or central bank securities – for low yielding foreign currency assets. Main advantages of this type of sterilization are that it reduces the monetary credit expansion generated by the purchase of foreign currency without increasing the burden on the banking system of higher reserve requirements and that by limiting the role banking system in intermediating the flows; it reduces the banks' vulnerability to sudden reversal of flows. However, open market operation has certain disadvantages (Mejia, 1999). They tend to increase domestic interest rates and thus induce further capital inflows. Further, since sterilization involves increasing the number of domestic bonds to offset the currency inflow and consequent accumulation of foreign reserves, it results in quasi fiscal costs to the extent that the interest rate on domestic bonds is higher than that of the accumulated

foreign exchange reserves. Eventually this policy can result in a large increase in public debt so as to make this policy unsustainable in the long run.

The empirical evidence (Mejia, 1999) indicates that while most countries have undertaken open market policies of sterilization and used them for most of the inflow period in the 1990s, the intensity of open market operation has varied substantially across countries and across time. For example, Chile sterilized almost fully the capital inflows during the first half of 1990, and subsequently reduced the intensity of sterilization by mid-1990. In Asia, Indonesia, Malaysia and Sri Lanka also adopted similar policy in the 1990s. In this period, Korea, Mexico, the Philippines and Thailand maintained open-market operations through much of the inflow period to sterilize a fraction of the inflows.

In recent years, sterilized interventions have been used by countries like Brazil and Peru to manage exchange rate volatility while keeping monetary aggregates under control (IMF, 2011). Sterilized interventions are also an important tool for Indonesia, Peru and Thailand in smoothing exchange rate volatility and slowing the rate of appreciation at least in the short-term. In these countries, reserves are 30-40 percent above their pre-crisis levels and by 35-50 percent since the second half of 2009. Sterilization costs are high and increasing for these countries and can pose a constraint especially where fiscal positions are already weak.

In some countries the central banks undertake direct borrowing from commercial banks to withdraw the excess liquidity in the system on account of capital inflows. In Malaysia, the central bank resorts to direct borrowing for sterilizing excess liquidity, although it has gradually shifting to the use of repo operations and central bank securities. The central bank in Philippines uses a tiering deposit system under which interest rates vary with the amount of deposit as an instrument for stabilizing intervention. The central bank of Mexico offers special deposit facility to banks at market interest rates to withdraw long term liquidity from the banking systems.

While the securities issued for sterilization purpose have traditionally tended to be very short, in some case long maturity securities are being used in order to have longer term impact on the liquidity in the banking system, thereby enhancing the monetary control. Presently sterilization in Mexico involves selling of securities with maturities of between three and five years. In China, beginning in 2005 the central bank began to issue three years security with a view to lengthen the maturity of stabilization bonds.

Both government and central bank securities have been used for sterilization purposes for mopping up excess liquidity, although the approaches to their uses have differed considerably from country to country. In majority cases, such as Chile, China, Colombia, Indonesia, Malaysia, Peru, Philippines, Russia, Sri Lanka, and Thailand central banks issue their own securities rather than using government securities for sterilization purposes. In Mexico both types of securities have been used in the past few years. However, central banks in some of these countries have faced deterioration in their balance sheets. Moreover, in case of an already well-established government debt market, the issuance of new central bank securities of overlapping maturity could cause considerable confusion and possible market segmentation which could obfuscate the yield curve, reduce liquidity of instruments, and make monetary operations that much more difficult. As such, they have resorted to issuing sterilization bonds on a government account. In number of emerging market economies such as Malaysia, the Czech Republic, Hungary, Turkey and South Africa, central banks sparingly use their own securities for sterilization operations. Some Central banks, like in the Philippines, depend exclusively on Government securities for sterilization operation. Korea has adopted a strategy under which the Bank of Korea issues monetary stabilization bond for a period of up to three years whereas the Government issues primarily longer term securities.

Reserve Requirements: Instead of reducing the money supply by selling bonds, the central bank can raise bank reserve requirements or increase the discount rate. This policy has the advantage that it decreases the capacity of banks to lend and thus help avoid the quasi fiscal costs associated with open market operations (Mejia, 1999). But, increasing the reserve requirements also has certain shortcomings such as high reserve requirements promote disintermediation, as it results in shifting of funds to the non bank financial sector and the desired effects of preventing monetary expansion is not achieved. In addition, it may amount to reversal of the trend of financial liberalization in developing countries and lead to inefficiency in allocation of credit. Financial reserve requirements are a tax on the financial system that is passed, at least in part, to the bank's clients through an increase in loan rates and this may in turn induce further capital inflows in the form of borrowing from abroad.

Empirical evidence indicates that in the episodes of capital inflows in the early 1990s several countries in Latin America attempted to reduce the monetary expansion and increased reserve requirements, including Brazil, Chile and Columbia. Indonesia, Malaysia, the

Philippines, Korea, Sri Lanka and Czech Republic sharply raised reserve requirements (Mejia, 1999). Montiel (1995) shows that among the countries with higher reserve requirements during the capital inflow period in 1990s, money multipliers fell in Korea and Malaysia, were stable in the Philippines, Columbia and Sri Lanka and increased in Chile. In the recent period India and China raised cash reserve requirement (CRR) ratio to moderate the exemplary impact of large capital inflows on domestic monetary and credit aggregates and prevent over heating from 2004 to mid 2008 (Mohan, 2008). The increases in these ratios were rolled back in late 2008 and early 2009 as capital flows reversed in the aftermath of the global financial crisis in 2008. The reserve requirements provided these central banks with a liquidity cushion that can be released when the banks faced harsh funding difficulty in October and November, 2008. The domestic financial system was thus largely insulated from both the large influx and the subsequent reversal of capital flows. In Indonesia, Malaysia and the Philippines reserve requirements were cut in the aftermath of the global financial crisis of 2008 and the capital flow reversals to provide the banking system with adequate liquidity.

Non-sterilized intervention, i.e. accumulating foreign exchange reserves by central bank through purchase of foreign assets without insulating money supply from the capital inflows, maybe taken up if the demand for money is expected to increase due to reasons like high real GDP growth etc. Under these circumstances, money supply growth is not inflationary and no quasi fiscal burdens are generated. However, non-sterilized intervention runs a risk that increase in money supply would put downward pressure on short term interest rates, bank credit would tend to expand increasing the vulnerability of the financial system, especially if there is system of implicit or explicit deposit insurance and banking supervision is poor. Further, eventually the inflationary pressures may mount.

Empirical evidence indicates that in rapidly growing economies such as India in recent years, there is a need for expansion of the monetary base on account of high real GDP growth. Hence, only part of the increase in Central Banks balance sheet through accretion of foreign assets needs to be sterilized. The cost of sterilization is therefore muted (Kapur and Mohan, 2010).

3.4.2 Fiscal Policy:

Tightening of fiscal policy usually via a cut in public expenditure is another counter cyclical measure adopted by some countries with the objective to lower the aggregate demand and to reduce the inflationary impact of capital inflows (Khan and Reinhart, 1995). As a sizeable share of government expenditure is in the form of non tradable goods, cutting government spending will reduce the demand for non-tradables relative to the demand for tradable goods thereby limiting the appreciation of the real exchange rate. Reduction of pressure on real exchange rate leads to a decline in current account deficits. This policy avoids the costs associated with different types of sterilization policies. However, fiscal contraction has its limits as it is not always flexible enough to respond to fluctuations in capital movements and may require changes in legislation and involve sensitive political actions that cannot be undertaken on short notice (Mejia, 1999). Further, the use of fiscal policy may not be considered appropriate on the grounds of maintaining continuity and predictability of government policy as taxes and expenditure should be set keeping long term goals into consideration rather than changed frequently in response to external, volatile fluctuations in international capital markets. Frequent changes in fiscal stance will give wrong signals to economic agents. In the context of high financial integration and presence of volatile capital flows, preemptive tightening of fiscal policy has been advocated (Heller, 1997& World Bank, 1997) because it helps insulate core revenues and expenditures from being adjusted following macroeconomic shocks. Moreover, if the fiscal stance has to be tightened further in face of large and volatile capital inflows, the required changes will be smaller. Given the inflexibility of fiscal policy in the short run, smaller adjustments in taxes and expenditures would not significantly hamper economic growth and social objectives.

Most East Asian countries used fiscal tightening to overcome the expansion in aggregate demand during the capital inflows period in 1990s (Mejia, 1999). During this period fiscal tightening occurred in Indonesia (1990 – 94), Malaysia (1988 – 92), the Philippines (1990-92) and Thailand. Empirical evidence indicates that countries such as Thailand, Chile, Indonesia and Malaysia that followed this policy had real depreciation of the exchange rate and large increases in economic growth. Despite these positive indicators fiscal policy response to capital inflows has been limited in most countries. In the recent years, fiscal policy has not played an active major role in managing inflows in most of the Asian and Latin American emerging market

economies other than the gradual withdrawal of the discretionary stimulus introduced to the global financial crisis of 2008.

3.4.3 Exchange Rate Policy:

Allowing nominal exchange rates to appreciate in response to capital inflows is another policy measure available to policy makers. This policy helps to avoid expansion of monetary aggregates associated with capital inflows thereby insulating the money supply from the inflows and reduce international reserve accumulation. In addition, the exchange rate flexibility might also strengthen the autonomy of the domestic monetary policy. This enables the central bank to function as a lender of last resort and permits it to exercise more control over the monetary aggregates. This advantage is particularly desirable when the flows are perceived reversible and the supervision of the financial system is poor (Mejia, 1999). Moreover, with exchange rate flexibility the appreciation of the real exchange rate is likely to occur through a change in the nominal exchange rate and not through higher inflation on account of monetary expansion. Further, the flexibility in the nominal exchange rate introduces uncertainty, which can discourage speculative short term capital inflows. However, a disadvantage of the pure float is that it may be associated with a high nominal and real appreciation of the exchange rates which may damage the strategic sectors such as the nontraditional exports. If the real exchange rate appreciation is sufficiently large it might induce hysteresis in the trade balance altering the steady state real exchange rate (Calvo, Leiderman and Reinhart, 1996). Even if the capital flows are temporary the real exchange rate will be volatile. Real exchange rate volatility could have negative effects on the tradable goods sectors if the financial sectors are insufficiently developed and do not provide enough instruments to hedge against real exchange rate volatility (Khan and Reinhart 1995).

Empirical evidence indicates that in general to reduce the risks associated with a pure float and the costs associated with accumulation of international reserves, several countries adopt “flexibly managed” exchange rate system. Besides, countries attaching lower weight to competitiveness than to reduced inflation have been inclined to increase nominal exchange rate flexibility. During the capital inflow of the 1990s, almost all countries allowed greater variability of the nominal exchange rate even though no country abandoned pre-determined peg for a free floating regime (Mejia, 1999). In Asia, Indonesia widened the intervention band in

1994 and Malaysia and the Philippines allowed the greater variability of exchange rate since 1992. In Latin America, Peru adopted a 'dirty floating' in which the central bank intervenes to avoid excessive fluctuations in the nominal exchange rate while Mexico, Chile and Columbia induced crawling exchange rate bands regime that can be treated as an intermediate case between fixed and flexible exchange rates. In this period the nominal exchange rate appreciation has been observed to be more common in Latin America than in East Asia. Although Korea in 1987-89, Malaysia in 1993 and the Philippines in 1992 experienced similar nominal appreciations, the largest exchange rate appreciation occurred in Chile (in excess of 9%) and in Columbia (7%) in 1994 when authorities realigned the exchange rate band. Other Latin American countries Bolivia in 1991, Costa Rica in 1992 and Mexico in 1991 experienced nominal appreciations.

Several countries, where efforts to maintain exchange rates pegs had failed because of loss of control on monetary policy and adjustments via inflation had proved to be much more disruptive, allowed the nominal exchange rate to absorb the pressures of capital inflows. In such situations flexible exchange rates had restored the effectiveness of the monetary policy. During the period 2004-2007, Brazil and Russia both allowed their currency to appreciate substantially in real terms. As a result, the potential inflationary impact of intervention in both countries has been offset by substantial higher real exchange rates. Since 2000, the currencies of most Asian countries (except India and China) have risen about 20% against the dollar but have been broadly stable in nominal effective terms. In recent years as forex reserves have risen and inflation pressures have emerged, central banks of several emerging market economies have become more willing to accept currency appreciation. For most of the emerging market countries' central banks a market determined exchange rate is a medium term goal and many believe that prolonged intervention has to be accompanied by a willingness to accept currency appreciation. In recent years, in real effective terms for all countries, except Korea, exchange rates have appreciated relative to pre-2008 crisis levels. In some countries the real exchange rate appears over valued in relation to medium term fundamentals.

3.4.4 Banking Regulation and Supervision:

Strengthening banking regulation and supervision are required to reduce the vulnerability of the financial system in the event of large and volatile capital inflows. A major concern about the intermediation of international capital inflows through the banks is the system of implicit deposit

insurance in the form of an implicit commitment by the authorities that the banks especially the large ones would not be allowed to fail (Khan and Reinhart, 1995). This free implicit deposit insurance induces the banks to increase their risk exposure by investing in riskier assets, sharp expansion in consumption loans and increase in non-performing assets, mismatch between the maturities of deposits against those for loans-with the former being typically shorter than the latter, mismatch between the currency denomination of bank loans and the currency denomination of deposits. Empirical evidence indicates that credit booms and asset prices booms are often associated with large capital inflows and constitute an important concern for future financial fragility. Countries with highest increase in bank lending are usually those that later experienced a banking crisis. On the other hand, countries that had strengthened their banking systems through regulation and supervision did not experience financial crisis in the aftermath of a credit boom (Mejia, 1999).

Regulations to insulate the banking system from short term capital flows where the inflows are particularly in the form of short deposits, regulations to limit exposure of banks to the volatility in equity and real estate markets in the event of large capital flows, increase in capitalization rate, a rise in provision made for future loss, high liquidity of bank assets, adopting risk-based reserve requirements etc in conjunction with banking supervision are designed to reduce some of these risks (Khan and Reinhart, 1995).

World Bank (1997) shows that a number of countries strengthened their financial systems during the capital inflow and lending boom period. As a result Chile witnessed a higher liquidity of bank assets, Malaysia achieved higher capitalization, Colombia achieved higher capitalization and provisioning due to tighter regulations. Countries with poor regulations experienced deterioration in the financial sector. Post-Asian crisis in late 1990s, Asian economies have considerably strengthened their banking sectors – capital adequacy ratios are above the international norms, and nonperforming loans have witnessed a significant decline from their pre crisis levels. As a result the domestic financial sectors in the Asian EMEs, unlike the advanced economies, did not exacerbate the global financial crisis in these economies in late 2008. While the ongoing slowdown in external demand witnessed some deterioration in the banking sector in 2009, high levels of capital adequacy ratios provided comfort to absorb the likely rise in nonperforming assets.

3.4.5 Capital Controls:

In the context of liberalization of capital account, capital controls have been adopted as a policy tools to discourage inflows, particularly short term inflows, that are thought to be predominantly speculative and have a destabilizing effect because they are associated with rapid expansion in short-maturity bank deposits. Besides, capital controls aim at reducing monetary and credit expansions and consequently diminish the pressures on aggregate demand and on appreciation of the real exchange rate. Restrictions on capital mobility maybe introduced in the form of quantitative controls to regulate the volume of capital flows or in the form of explicit taxes (i.e. a transaction taxes) or tax like measures (i.e. a non interest bearing reserve requirement on foreign borrowing) (Mejia, 1999). The quantitative limits on capital inflows have taken different forms in a variety of countries like limiting foreign currency liabilities of commercial banks to a percentage of their total loan portfolio, and prudential limits on, and even prohibition of, nontrade related swap activities, offshore borrowing and banks' net open market foreign exchange position. The controls related to the explicit taxes or tax like measures entail imposition of tax on foreign exchange trading or on short term cross border bank loans, non remunerated reserve requirements to be deposited at the central bank on liabilities in foreign currency associated with direct borrowing by firms. This type of capital control seems to promote long terms capital inflows and discourage short term capital flows. The capital measures are generally designed to address specific risks associated with certain types of capital flows, in particular related to their impact on certain assets markets or their short term nature, while allowing the more stable, long term and productive capital flows and guarding against sharp sudden reversal of investment flows.

However, Edwards (1999) argues that legal capital restrictions frequently prove ineffective, and are easily sidestepped by domestic and foreign residents and firms. He further suggests that capital controls may lead to economic distortions and government corruption that in turn may contribute to economic instability. Bartolini and Drazen (1997) suggest that imposing capital controls can send a signal of inconsistent and poorly designed future government policies. Fernandez and Montiel (1996) however points out that the potential costs of capital controls consist of macroeconomic distortions introduced when such controls represent neither a first best nor second best policy response. Montiel, (1998) goes on to further argue that very little evidence exists on the magnitude of such costs to the countries that have applied capital controls.

Moreover, the fact that a large number of emerging market countries have introduced capital controls after having liberalized capital flows initially and after having applied measure such as intervention combined with sterilization to counter their effects implies that the policy makers in these countries perceived the costs of intervention by capital controls to be less than those of sterilization. He argues that whether the controls generate any benefit at all depends on their effectiveness. There are instances when substantial inflows have followed the removal of controls and inflows have slowed after controls are reemployed. Further controls can lead to altering the composition of flows in favour of those with longer maturities.

Empirical studies indicate that in the 1990s several countries resorted to new market based capital controls. These capital controls had limited effect on real exchange rate but they were capable of either reducing overall volume of inflows, altering their maturity profile or both (Mejia, 1999). In the face of speculative flows associated with speculative short term bank deposits, in Jan 1994 Malaysia imposed controls to restrict inflows such as prohibiting domestic residents from selling short term money market instruments to foreigners. This measure succeeded in reducing domestic interest rates and short term inflows. Indonesia, Malaysia, Philippines and Thailand resorted to imposition of prudential limits on or even prohibition of non trade related swap activities, offshore borrowing, and banks' net open market foreign exchange position. Chile and Columbia used non-remunerated reserve requirements on liabilities in foreign currency associated with direct borrowing by firms in the 1990s. In Chile, the Czech Republic and Malaysia capital accounts shrunk by 7.6, 3.5 and 15.1 percentage points respectively in the year, controls were introduced in the 1990s. Furthermore, capital controls had the desired effect of lengthening maturities in Chile, Columbia and Malaysia where short term capital inflows declined sharply (Reinhart and Smith, 1996).

Some examples of capital controls introduced by emerging market countries in recent years include the case of Brazil which reinstated the tax on portfolio inflows in October 2009 to discourage carry trade and increased it twice on debt inflows in October, 2010, when it also extended it to cover margin requirements in derivatives transactions in the face of rapid exchange rate appreciation (IMF, 2011). In January 2011 it imposed reserve requirements on banks' short foreign exchange positions in the cash market to constrain this channel while reducing potential vulnerabilities in the banking sector.

In June 2010, Indonesia introduced a one-month minimum holding period for central bank paper (SBIs), applied to both primary and secondary market purchases and equally to residents and nonresidents and also introduced longer tenors for SBIs with the aim to reduce the volatility of flows involving SBIs (IMF, 2011). The measures were effective in sharply reducing foreign participation in SBIs initially, as well as dampening market volatility. However, after a short period, foreign ownership of SBIs actually rose above pre-holding period levels. In addition, nonresident investors have also increased their holdings of government bonds, since these are not subject to the holding period requirements. In December 2010, the authorities announced a set of measures including a gradual increase in reserve requirements on foreign currency deposits, effective March and June 2011, and the reimposition of a limit on short-term foreign borrowing by banks to 30 percent of capital, effective March, 2011.

In June 2010, Korea introduced ceilings on foreign exchange forward positions of banks to lower the leverage in the banking system and lengthen the maturity structure of banks' funding, without limiting portfolio debt or equity flows (IMF, 2011). These measures succeeded in reducing banks' FX derivative positions and related short-term external debt. In January 2011, the authorities re-introduced a withholding tax on foreign purchases of treasury and monetary stabilization bonds. The authorities also announced plans to introduce, from the second half of 2011, a "macro prudential stability" levy on non-deposit foreign currency liabilities of banks to reduce short-term foreign exchange inflows.

In October 2010, Thailand reinstated the withholding tax for state bonds on nonresident individual investors, equalizing the tax regime with resident individual investors (IMF, 2011). However, the withholding tax for nonresident institutional investors is set higher (15 percent) than for resident counterparts (1 percent). The uncertainty surrounding operational aspects of withholding tax in Thailand dampened inflows, but only temporarily, and inflows quickly recovered.

In December 2010, Turkey reduced the withholding tax rate on bonds issued abroad by Turkish firms, with lower rates for longer maturities (IMF, 2011). It also halted the remuneration of reserve requirements, while raising ratios across maturities. To moderate credit growth, Turkey raised the levy on the interest from consumer loans, increased the minimum

payment amount for credit cards based on credit limit, and introduced limits to loan-to-value ratios for all mortgages.

3.4.6 Liberalizing Gross Capital Outflows: The removal/lowering the institutional barriers to capital out flow have been another policy response with an aim to soften the domestic impact of capital inflows. The measures adopted include, explicitly allowing residents to invest abroad, removal of restrictions on repatriation of capital and interest by foreign direct investors, elimination of ceilings on tourist expenditures abroad by residents and accelerating the repayment of external debt (Montiel, 1995). However, one disadvantage of this policy as indicated by Laban & Larrain (1997) is that it might attract additional inflow as removal of controls on outflow would be viewed as a positive step towards economic liberalization, and may increase confidence of foreign investors that they can withdraw the capital and the return on loans to domestic agents from the country easily.

In 1990s Chile, Indonesia and Thailand accelerated the repayment of external debt in order to offset private inflows (Mejia, 1999). Korea relaxed controls on capital outflows by promoting foreign investments by domestic residents, while Thailand, Chile and Columbia removed several restrictions on capital outflows. The outflow liberalization measures included those that explicitly allowed the residents to invest abroad, that removed restrictions on repatriation of capital and interest by foreign direct investors, that eliminated export surrender requirements and that eliminated ceilings on tourist expenditures by residents and others (Montiel, 1995).

In recent period, regulations on capital outflows have been eased in Korea, Peru, South Africa, and Thailand mainly to encourage overseas investment. These have had little impact so far in South Africa and Thailand where previous ceilings were possibly nonbinding. In Peru, the limits on Pension Fund investment overseas were increased several times as investments quickly approached the new limits.

3.5 Gaps in Literature on the relationship between real exchange rates and capital flows to India:

As seen above, several empirical studies have examined the behavior of real exchange rate in response to capital inflows and its components. But several gaps exist.

- The cross country studies on the effects of Capital flows on macroeconomic aggregates present mixed results largely due to difference in foreign exchange regimes, internal factors and policy responses of these countries. The countries that received the largest average capital inflows (as a proportion of GDP) are not those that experienced the greatest exchange rate appreciation. The countries with the greatest capital inflows have experienced either depreciation or low appreciation of their currencies. No comparisons with the effects in India have been brought out in these studies.
- The studies on the effect of capital flows on the real exchange rate have been examined with fewer types of flows (FDI or FPI or debt flows etc) but not with all forms of Capital flows. Different types of capital flows have different effects on the real exchange rate because they act through different channels. Further, these studies are restricted to single country or limited country groups and cannot be directly linked to the case of India.
- The studies on the effect of capital flows on real exchange rate on India are few and far between. These studies do not provide a comprehensive analysis of the effect of capital flow and other determinants on real exchange rate especially for the period covering the last decade. The econometric methodology used by them is not robust and the evidence presented by them is rather weak.
- The literature on the empirical studies capturing the effect of volatility of capital flows on real exchange rate volatility is limited and inconclusive. No systematic study on India is available on exploring the linkage between real exchange rate volatility and the volatility of capital flows which has become significant in the last ten years.