

W P S (DEPR) : 7 / 2011

RBI WORKING PAPER SERIES

---

Sensitivity of Capital Flows  
to Interest Rate Differentials:  
An Empirical Assessment for India

---

Radheshyam Verma  
and  
Anand Prakash



DEPARTMENT OF ECONOMIC AND POLICY RESEARCH

MAY 2011

The Reserve Bank of India (RBI) introduced the RBI Working Papers series in May 2011. These papers present research in progress of the staff members of RBI and are disseminated to elicit comments and further debate. The views expressed in these papers are those of authors and not that of RBI. Comments and observations may please be forwarded to authors. Citation and use of such papers should take into account its provisional character.

Copyright: Reserve Bank of India 2011

# Sensitivity of Capital Flows to Interest Rate Differentials: An Empirical Assessment for India

Radheshyam Verma and Anand Prakash\*

*In the aftermath of the global financial crisis, multi-speed recovery and divergent inflationary trends have led to asymmetric monetary exit between Emerging Market Economies (EMEs) and the advanced economies. An outcome of this process has been return of excessive capital flows to EMEs, exerting pressure on their asset prices to inflate and the exchange rates to appreciate. The risk of attracting even larger inflows as a result of monetary policy actions has been recognized generally in these countries. This study provides empirical evidence of sensitivity of capital inflows to interest rate differential in the India specific context. Using both causality and cointegration analyses, this study suggests that FDI and FII equity flows, which together on a net basis accounted for around three fourth of the total net capital inflows during the 10-year period from 2000-01 to 2009-10, are not sensitive to interest rate differentials. In turn, debt creating flows, in particular ECBs, FCNR(B) and NR(E)RA deposits exhibit statistically significant sensitivity to interest rate differentials, even though other determinants of these inflows dominate significantly the impact of interest rate differential. At the aggregate level, cumulative gross capital inflows appear to increase by 0.05 percentage points in response to 1 percentage point increase in interest rate differential. Moreover, contrary to general perceptions, stronger growth in OECD countries actually coexists with larger capital inflows to India. The paper concludes that RBI's monetary policy needs to continue its focus on objectives relating to inflation and growth. The magnitude and composition of capital flows that might change in response to monetary policy actions could be managed using other instruments, as has been the case in the past. Monetary policy should not be constrained by the explicit impact on capital inflows since other determinants of capital inflows could dominate the impact of interest rate differential most of the time.*

**JEL Classifications:** F41, E52, F21

**Key words:** capital flows, interest rate differential, monetary policy

## Section I: Introduction

Interest rate differential has often been viewed as a major determinant of capital flows to Emerging Market Economies (EMEs), and at times, monetary policy measures that may be conditioned by the inflation-growth objectives could magnify or dampen the volume of capital

---

\* Radheshyam Verma (rsverma@rbi.org.in) and Anand Prakash (aprakash@rbi.org.in) are Research Officer and Assistant Adviser, respectively, in the Department of Economic and Policy Research (DEPR), Reserve Bank of India. The authors are thankful to Shri Sitikantha Pattanaik, Director, DEPR for his constant encouragement, guidance and support. We gratefully acknowledge the guidance received from Dr. Abhiman Das, Director and Shri Joice John, Research Officer, Department of Statistics and Information Management (DSIM) and Dr. S.C.Dhal, Assistant Adviser, DEPR on technical aspects of the paper. We are also thankful to the Division of International Trade and Finance for providing useful data pertaining to the study. Views expressed in the study are those of the authors alone and not of the institution to which they belong.

inflows into a country. In the recent period, the multi-speed recovery of the world economy from the Great Recession and the asymmetric monetary exit has widened the growth as well as interest rate differentials, creating concerns that there may be another wave of surges in capital flows to EMEs, which have to be managed. While sterilised interventions to prevent overvaluation of the exchange rate, use of macro-prudential measures to stem risks to asset prices or even use of soft capital controls to contain the magnitude of inflows have been used by several EMEs as possible instruments to deal with the challenge, there is little support as yet for delaying monetary policy actions just because of the risk that such actions may pose in terms of influencing the magnitude and composition of capital flows.

In India, during the normalization of the monetary policy over the period March to November 2010 when the policy interest rates were raised six times, a general reference was made to the risk of attracting larger capital inflows, given particularly the fact that other determinants of capital inflows to India also turned significantly favourable during this period. Among the push factors, near zero policy rates maintained in advanced economies, their weak growth prospects and ample global liquidity conditions reflecting quantitative easing implied scope for larger inflows to EMEs, including India, in search of higher return. Stronger recovery in a stable macroeconomic environment and the general assessment of India continuing to be one of the fastest growing economies in the world for a long period of time have provided the necessary pull to capital inflows. Prior to the global crisis, India had exhibited surges in capital flows which were in excess of the financing needs of the current account deficit, and a number of instruments were used in combination to manage the surplus, particularly sterilized intervention, more open capital account to encourage capital outflows by residents, and occasional use of prudential measures to discourage capital inflows within the preferred hierarchy. In the second half of 2010-11, unlike in other EMEs, a larger current account deficit of India suggested the need for higher stable capital inflows. As a result, while the concerns relating to anti-inflationary monetary policy measures attracting excessive capital inflows eased, the relevance of interest rate as an instrument to modulate the magnitude and composition of capital inflows continued. In this context, the focus of this paper is to study whether RBI's interest rate actions have been a major determinant of capital inflows to India.

An assessment of different components of capital flows would suggest that portfolio inflows into the equity segment are unlikely to be very sensitive to interest rate actions of the

RBI, unless the monetary policy changes affect the asset prices and, thereby, alter the return on equity. In the debt segment, where portfolio flows are permitted only up to a limit, one would expect interest rate sensitivity to work, though expected appreciation/depreciation of the exchange rate or the hedging cost could be a factor that needs to be taken into account while arriving at the relevant interest rate differential. FDI inflows are most likely to be driven by long-term fundamentals, and very unlikely to be influenced by short-term changes in policy interest rates. If the FDI firms depend on large leverage, cost of debt could affect their return on equity. But FDI inflows per se may not be driven by short-term changes in interest rates. Among the debt flows, ECB is a key component, which could be highly sensitive to interest rate differentials, since corporates would invariably recognize the arbitrage opportunities in their planning of financing, and they also can hedge their exchange rate risks, both in the domestic and international markets. In India, however, there are annual caps on access to ECB and ceilings on the overall cost of ECB, which are linked to international interest rates. The scope for very large flows in response to interest rate differential is, thus, limited by the extant ECB related policies. NRI deposits represent the second most prominent debt related inflows. In this category, interest rates on FCNR deposits are linked to international interest rates, and, hence, interest rate differential may have much smaller role in explaining the pattern of FCNR inflows. Other NRI deposits, however, could be expected to be sensitive to interest-rate differentials, even though other determinants may have a more dominant role, in particular, the employment prospects and income growth of the NRIs. These impression based assessment of interest rate sensitivity of capital flows needs to be validated through empirical estimates, which is the main focus of this paper.

Against this background, Section-II of the paper presents a review of the literature, with the aim of identifying the factors that often lead to contrasting findings on interest rate sensitivity of capital flows. If some studies show high sensitivity while others do not, then identifying the contributing factors becomes important before proceeding to empirical estimates. Section-III examines the policy environment for each component of capital flows and explains why, at least in some of the segments, lack of interest rate sensitivity may be because of policy interventions. Historical evolution of such policy interventions that hinder greater interest rate sensitivity will be covered in this section. Empirical assessment of interest rate sensitivity, using data on different components of capital flows and expected determinants for each type of inflows, has

been presented in Section-IV. Concluding observations in the final section draws some inferences based on empirical findings that could be relevant for the conduct of monetary policy.

## **Section II: A Review of the Literature**

Singh (2009) analysed the determinants of various components of private debt flows and equity flows to India. He found a high correlation between external commercial borrowing (ECB) disbursements and interest rate differential (i.e., the commercial banks' prime lending rate minus the six-month LIBOR). He also observed strong comovement of ECBs and domestic activity. He found that Indian corporates' long-run demand for overseas commercial borrowings is predominantly influenced by the pace of domestic real activity, followed by interest rate differentials and the credit conditions in domestic markets. The author also found that while during the normal periods the overseas borrowings are influenced by the underlying domestic demand shocks, the external credit shocks seem to be the most dominant factor during the periods of financial crisis. For determinants of non-resident Indian (NRI) deposits, he applied vector error correction model (VECM) for the period 1993:1 to 2009:3 taking monthly data. He found that NRI deposits are significantly influenced by real economic activity in the host country (index of oil price was taken as a proxy), exchange rate movements and interest rate differential (between interest rate on NRI deposits and six month LIBOR). Thus, NRI deposits were found to be much unstable in nature. With regard to portfolio equity flows, he found comovement in volatility of daily net foreign institutional investments (FII) inflows and stock returns. The Granger causal analysis revealed that portfolio flows and the stock prices have a simultaneous interaction due to their bidirectional causal relationship. The Johansen's approach to the co-integration analysis suggested a long-run relationship between the two variables.

Singh (2007) using quarterly data for the period 1993: Q1 to 2007: Q4 estimated a cointegration and ECM model for the determinants of the Indian external commercial borrowings. He found that real activity (proxied by IIP), interest rate differential and liquidity (proxied by broad money supply) had a statistically significant long-run effect on the demand for external borrowings. The real activity and interest differential had a positive association while liquidity had an inverse relation with the external borrowings. The coefficient of the error correction term in the error correction equation suggested that there is a rapid and complete adjustment to deviation from the long run path of ECBs in about three quarters. Variance decomposition analysis revealed that

interest rate differentials, real activity and money supply together explained three-fourths of the variation in external borrowings. Real activity alone explained about 38 per cent of the variation in external borrowings over the 10 quarter horizon. Interest rate differentials (arbitrage) was found to be the second most important variable explaining changes in external borrowings with its contribution rising almost three fold from the initial to the terminal period. The contribution of the broad money – representing the liquidity conditions – though small over the shorter horizon, got prominent over the medium term with almost a six fold increase by the terminal period. Thus, credit constraint also assumed significance for corporates in their decisions about overseas borrowings.

Chakrabarty (2006) tested for co-integration between net capital inflows, interest rate differential and the real exchange rate using quarterly data for the period 1993 to 2003. He found that variables were co-integrated. Dynamics of capital inflows to India in the post-liberalisation period were such that an error-correcting mechanism was operating which related dynamic adjustment to capital inflows to the movements in the real exchange rate and the interest rate differential. Presence of the error-correction mechanism implied that the mechanism of short-run dynamic adjustment was operating from the real exchange rate to net capital inflows. Since 1993, the changes in the real exchange rate in India have mainly been due to the intervention by the Reserve Bank of India in the foreign exchange market. These changes in the real exchange rate were, therefore, followed by the changes in net capital inflows, such that a long-run equilibrium relationship held good between capital inflows, real exchange rate and interest rate differential. The policy of exchange market intervention was, therefore, instrumental in preventing the volatility of the real exchange rate, which could have resulted from the volatility of the net capital inflows into India.

Culha (2006) analyzed determinants of capital flows into Turkey using Structural Vector Auto Regression (SVAR) model, impulse response function and variance decomposition functions for the period 1992:01 to 2005:12. He used push-pull factors approach. For capital inflows he used the sum of portfolio and short term capital flows. As push factors, he took interest rate on 3-month US T-Bills and US industrial production index. As pull factors, he took real rate of interest on Turkish T-Bills, Istanbul stock exchange price index, budget balance and current account balance. He found a general dominance of pull factors over push factors in determining capital flows into Turkey. More specifically, he found a positive association between stock

exchange price index and capital inflows. He found a negative relationship of capital inflows with budget balance and current account balance. A shock to real interest rate in Turkey induced an immediate capital outflow in Turkey during subperiod 1992:01-2001:12. The unexpected effect of real interest rate on capital flows was mostly due to the risk premium inherited in the T-Bill rates in Turkey. At times of economic and/or political instability, the enhanced risk premium is immediately reflected in the interest rates, which simultaneously triggers massive capital outflows. When the crisis prone and unstable nature of the Turkish economy during the whole 1990s is considered, this outcome is understandable. In the sub-period 2002:01-2005:12, it was seen that a shock to real interest rate tended to initially enhance capital inflows while keeping it in the positive territory over the twelve-month horizon. This outcome, which is also consistent with the theory, reflects once again the improved economic and political stability and, hence, 'normalization' of the Turkish economy in the post crisis period.

Gordon and Gupta (2003) analyzed factors affecting portfolio equity flows into India using multivariate regression on monthly data for the period 1993-2001. They found that portfolio flows were affected by both external and domestic factors, and quantitatively both were found to be equally important. Among external factors, an increase in external interest rate adversely affected FII flows into India; while the performance of emerging stocks positively influenced FII flows. Among domestic factors, lagged domestic stock market returns, credit rating downgrades and depreciation of the exchange rate were found to affect FII flows negatively. The existence of negative relationship between lagged domestic stock return and FII flows and positive relationship between portfolio flows and expected domestic returns has been explained by the authors in terms of FIIs being bargain hunters (i.e. "buying on the dips"). Alternatively, the authors have explained this in terms of global investors allocating a fixed share of their portfolio to India, which results in FIIs selling after the market rises and buying after the market falls. To test the robustness of this relation they estimated a VAR model using daily data of FII flows, BSE returns and forward exchange rate. They found the coefficient of the lagged stock market return with respect to the FII flows to be negative.

Chakrabarti (2001) did pair-wise Granger causality test between FII inflows (as a proportion of preceding months's BSE market capitalization) and return on BSE National Index using monthly data between 1993 and 1999 and found bidirectional causality between the two. During the pre-Asian Crisis period, however, there seems to be some support for the causality running from



flows to returns, while with the onset of the Asian Crisis, there is mild evidence of a reversal of causality. On the whole then, the issue of which is the cause and which is the effect remains indeterminate with monthly data. However, using daily data at various lags for the period January 1, 1999 to December 31, 1999, he found that FII flows were more an effect than a cause of market returns in India. Regression of FII flows (as a proportion of the previous month's BSE capitalization) on monthly rupee returns on the BSE National Index over the period 1993:05-1999:12 indicated that returns on the BSE Index explained over three-tenths of the total variation in FII flows during the entire period. The explanatory power rose considerably with the onset of the Asian crisis when the regression accounted for over four-tenths of the variation. The results of a Chow breakpoint test showed that the onset of the Asian Crisis marked a structural break in the relationship implying a rise in the effect of market return in explaining FII flows. If in the regression framework some other variables were included, only exchange rate movement (in addition to stock return) turned out to be significant.

Mohanty et al (2000) analyzed the behavior of NRI deposits by separately studying the determinants of Rupee denominated non- resident deposits (NR(E)RA) and foreign currency denominated deposits (FCNR(B)) to bring out the differential behavior of the two. For the OLS estimate of NR(E)RA deposits they took the period from January 1990 to June 2000. They found Cash Reserve Ratio (CRR) (which took the value of 1 when CRR was imposed and 0 otherwise) to be negatively significant. Nominal exchange rate depreciation turned out to be positive and significant. Interest rate turned out to be of wrong sign indicative of multicollinearity problem. Accordingly, nominal exchange rate was replaced by the variable 'NR(E)RA interest rates minus depreciation over the past 12 months.' which turned out to be significant and with the expected positive sign. International crude oil prices were found to have a positive and significant impact though with 12 month lag. In case of FCNR(B) deposits OLS estimation was made for the period April 1994 to June 2000. In this case also they found CRR to be negative and significant. The coefficient of exchange rate expectation proxied by REER was found to be negative. The negative sign would indicate that as the Rupee gets overvalued, it signals a likely depreciation and balances flows out of FCNR(B) deposits. Interest rate variable was not found to be significant due to policy of keeping FCNR(B) rates close to LIBOR making depositors neutral to interest rate movements. Impact of crude oil prices on FCNR(B) accretions turned out to be insignificant unlike the case of NR(E)RA deposits. The authors ascribe this to divergent source

of FCNR(B) and NR(E)RA deposits: predominant part of NR(E)RA deposits coming from oil exporting countries while FCNR(B) deposits from non-oil exporting countries. Through VAR and error correction model, they found a long-run stable relationship between NR(E)RA deposits and forex reserves and found that changes in exchange rate, CRR and international crude oil prices variable were exogenous to the model. In case of FCNR(B) deposits, the authors found a long term stable relationship between FCNR(B) deposits and REER. CRR was found to be exogenous.

Gordon, J P and P Gupta (2004) analysed the determinants of non-resident deposits in India for the period March, 1994-December, 2002 using multivariate regression on monthly data. For dependent variables, they took both foreign currency denominated deposits and rupee denominated deposits separately and also total NRI deposits. In explanatory variables, they took broadly interest variables and non-interest variables. As part of interest rate variables, they took Cash Reserve Ratio (not-significant), change in interest rate differential on dollar deposits and LIBOR for dollar deposits (positive association), change in interest rate differential on rupee deposits and LIBOR for rupee deposits (positive association) and lagged month on month exchange rate change (negative, not-significant). In non-interest rate variables they took dummy variable for downgrade in India's sovereign ratings (not significant) and political (insignificant) and geo-political events (negative, significant). In addition they also took monthly return on the Dow Jones Industrial Average (not significant), return on Bombay Stock Exchange (positively associated with foreign currency deposits) and to capture the wealth of NRIs oil price variable (positively significant for foreign currency deposits) was used.

Ying and Kim (2001) applied structural VAR method to investigate the macroeconomic factors of capital flows and economic fluctuations in Korea and Mexico for the period 1960:1 to 1996:4. As push factors, they took foreign output and foreign interest rate and as pull factors, they took domestic productivity and domestic money supply as determinants of capital flows. Their empirical results revealed that foreign output shock accounted for more than 50 percent of the variation in capital flows for both countries. It suggested that capital flows in the two countries were very sensitive to business cycles in industrial countries. To the extent capital flows were "pushed" by external conditions, they were beyond the immediate control of domestic policy making and could reverse when foreign economic conditions change. They also found that foreign interest rate shock became more important towards the end period of their study. A

foreign interest rate shock generated a moderately negative effect on domestic output in both countries.

Taylor and Sarno (1997) analyzed the determinants of the large portfolio flows from the United States to Latin American and Asian countries during January 1988 - September 1992. As country specific factors, they took country credit rating and black market exchange rate premium. For global factors, they took long-term nominal interest rate - the Treasury bill rate and the government bond yield and the level of the real U.S. industrial production. They estimated a parsimonious error correction model in the panel data framework for the purpose. They found the bond flows to be relatively more strongly determined by global factors than by domestic factors, while equity flows to be relatively more responsive to changes in country specific factors. Change in the U.S interest rates explained the dynamics of bond flows better than the other global factor considered in their study, i.e., the growth of the U.S. industrial production. Moreover, interest rates were found to be a more important short-term determinant of portfolio flows in Latin American countries than in Asian countries.

However, findings of Chuhan, Claessens, and Mamingi (1993) were contradictory to Taylor and Sarno (1997). Their finding was that equity flows were more sensitive than bond flows to global factors, while bond flows were more sensitive to country-specific factors. However, the former was primarily interested in identifying the long-term determinants of the large capital flows to developing countries rather than in fully modeling the dynamics of capital flows. Hence, their conclusions were drawn for illustrative purposes, using a simpler approach based on the computation of standardized coefficients and elasticities.

Mody, Taylor and Kim (2001) gave capital flow forecasts for 32 developing countries using a dynamic vector error correction framework (using partial derivative approach and integrated approach of low case scenario) based on underlying domestic (pull) fundamentals and international (push) factors. For country specific factors, they took consumer price index, level of domestic credit, short term debt to forex reserves ratio, level of industrial production, domestic short term interest rate, credit rating, reserves to import ratio and the level of domestic stock market index. In global or 'push' factors they included factors such as the strength of the US output growth, the US short-term and long-term interest rates, the Emerging Markets Bond Index (EMBI), the US swap rate and the US high-yield spread (as proxies for a measure of risk aversion). Variance decomposition analysis suggested that domestic, or 'pull' factors were

relatively more dominant in the determination of capital flows for the countries examined. Under the partial derivative approach, shocks to global financial variables, including the US high-yield, swap rate and the US interest rates, caused an immediate drop in inflows, but flows began to recover after 6–8 months and resumed their original trend. Under the scenario of shock to global real factors, such as, zero growth in the US industrial production, the flows to emerging markets dropped substantially, and continued to decline without any signs of recovery. For the integrated low case scenario approach, changes in both the US interest rates and the US high-yield spreads had significant effects on capital flows to most emerging markets. However, these were mediated through significant shifts in the US real activity.

Ralhan (2006) did a cross-sectional study of eight countries, viz. Australia, India, Indonesia, Argentina, Brazil, Chile, Colombia and Mexico using Non-linear Seemingly Unrelated Regression (SUR) analysis for determinants of capital flows. He found gross foreign exchange reserves as one of the important factors affecting capital flows in all of the countries considered, regardless of any region or group. The level of gross domestic product was another factor influencing capital flows, although this seemed to be more relevant for countries in the non-Latin American group. Growth in the size of an economy could lead to an increase in capital flows because of growing investors' confidence. But LIBOR turned out to be insignificant in this study.

Fedderke, J.W. and W. Liu (2002) analyzed the determinants of capital flows and capital flight for South Africa for the period 1960 to 1995. They applied ARDL cointegration for the analysis. They found that aggregate growth measure contributed to the long-run determination of capital flows, implying that capital inflows followed the creation of favourable growth prospects. Further, they found that normal capital flows to be responsive to changes in interest differential (a rate of return proxy).

Bird and Rajan (2000) found that in the East Asian case, an interest rate advantage persisted. Domestic interest rates actually increased following financial liberalization. The persistent interest rate advantage in favor of East Asian economies was associated with rising domestic interest rates rather than falling world interest rates. In other words, capital was “pulled” rather than “pushed”.

### **Section III: Policy Environment Restricting Interest Rate Sensitivity of Capital Flows**

Capital flows to emerging market economies (EMEs) including India have increased significantly since the 1980s reflecting both push and pull factors. The pull factors are essentially domestic factors which are instrumental in attracting large capital flows to India while push factors mainly represent external factors. The relative importance of pull and push factors in capital flows to India has varied over time though both of them are responsible for large capital flows to India in the recent years. Various pull factors include strong growth performance of the Indian economy, reduction in inflation, macroeconomic stability, opening up of the capital account and buoyant growth prospects of the Indian economy. The stance of monetary policy in the advanced economies has been a major push factor with the loose monetary policy and search for yield in the advanced economies encouraging large capital inflows to the EMEs, including India, and vice versa in periods of tighter monetary policy. Thus, cycles in monetary policy in the advanced economies have impacted the cycles and volatility in capital flows to EMEs, including India. Innovations in information technology have also contributed to the two-way movement in capital flows to the EMEs. Overall, in response to these factors, capital flows to the EMEs since the early 1980s have grown over time, but with large volatility (Committee on Global Financial System, 2009). The increased volatility in capital flows has contributed to many financial crises in EMEs in the past. It is noteworthy that whether the crisis originates in emerging economies or advanced economies, capital flows generally reverse from EMEs. The successful management of volatile capital movements poses severe policy challenges to the EMEs.

#### **Policy Stance Restricting Unlimited Arbitrage Driven Inflows**

India's experience with private capital flows has been a post-reforms phenomenon. Traditionally, external aid was the major component of the capital account of India's balance of payments. However, the dependence on external aid has gradually reduced in recent years. The capital account has been dominated by flows in the form of foreign direct investment (FDI), portfolio investments including ADR/GDR issues, external commercial borrowings, non-resident deposits and special deposit schemes, such as, India Development Bonds (IDBs), Resurgent

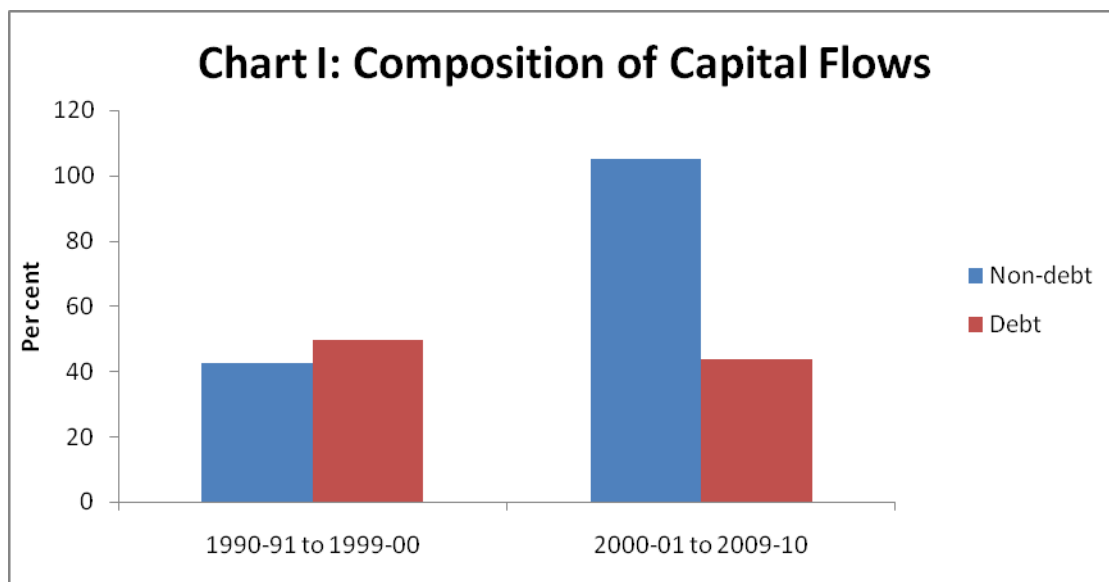
India Bonds (RIBs) and India Millennium Deposits (IMDs). In recent years, the change in the size and composition of the capital account has provided considerable support to the external sector of the economy by financing the current account deficit.

Charts I depicts the changing composition of capital flows<sup>1</sup> in the last two decades. The chart shows the dominance of non-debt flows in total capital flows during the 2000s as compared to the 1990s. The predominance of non-debt<sup>2</sup> flows during the 2000s was mainly on account of factors, such as, robust growth performance of the Indian economy, attractiveness of India on account of bright growth prospects of the Indian economy and the resultant confidence of foreign investors in India as a long-term investment destination, investor friendly policies pursued by successive governments, moderate inflation, buoyant capital market, etc. However, it is noteworthy that there was some resurgence in debt flows, especially ECBs and short-term trade credit, in the second half of the 2000s prior to the onset of the global financial crisis on the back of strong performance of the Indian economy and India's foreign trade, necessitating greater recourse to ECBs and trade credit. Subsequently, during 2008-09 and 2009-10, there was a marked slowdown in inflows under ECB and trade credit flows in the aftermath of the global financial crisis on account of freezing of the global credit markets and slowdown experienced by the Indian economy as a result of the contagion effect of the crisis. There has been a sharp resurgence in inflows under ECBs and short-term trade credit in 2010-11 reflecting pickup in the domestic economic activity and improvement in global credit market conditions. However, on the whole, non-debt flows are predominant insofar as capital flows to India is concerned, which is in tandem with the RBI's stated policy objective in regard to capital flows.

---

<sup>1</sup> The debt flows and non-debt flows do not add up to hundred per cent of capital flows (above hundred percent during the 2000s) as the study focuses on capital inflows to India and, thus, capital outflows in the form of FDI, portfolio flows, external assistance, commercial borrowings and short-term trade credit by India (i.e., Indians investing/lending abroad) have not been taken into consideration. Additionally, 'other capital', which includes leads and lags in exports, net funds held abroad, advance FDI pending issue of shares, SDR allocations and others, has not been taken into account. 'Other capital' for many years formed a significant portion of the total capital inflows. In the 'banking capital' segment of debt creating flows, only NRI deposits have been taken into consideration.

<sup>2</sup> Non debt flows comprise foreign direct investment in India and foreign portfolio investment in India. Debt flows comprises external assistance to India, external commercial borrowing to India, short term trade credit to India, NRI deposits and Rupee debt service.



For the first four decades after independence, the economic policies of the Indian Government were characterized by planning, control and regulation. Until the 1980s, India's development strategy was focused on self-reliance and import substitution. Periodically, there were attempts at market-oriented reform, usually following balance of payments pressures, which induced policy responses that combined exchange rate depreciation and an easing of restrictions on foreign capital inflows. However, such measures were relatively narrow in scope and had little impact on actual inflows, which remained small. The situation changed dramatically with the initiation of economic reforms in the early 1990s in the aftermath of the balance of payments crisis of 1991. Broadly speaking, India's approach to external capital flows could be divided into three main phases. In the first phase, which started at the time of independence and continued upto the early 1980s, India's reliance on external flows was mainly restricted to multilateral and bilateral concessional finance. In the second phase, on account of the widening current account deficit during the 1980s, this was supplemented with a recourse to external commercial loans including short-term borrowings and deposits from non-resident Indians (NRIs). As a result, the proportion of short term debt in India's total external debt increased significantly by the late 1980s. The third phase started after the balance of payments crisis of 1991 and the subsequent reforms process.

The opening up of the capital account in India was an integral part of the economic reforms programme initiated in 1991. India adopted a gradualist approach towards capital

account convertibility, based on the framework provided by Report of the High Level Committee on Balance of Payments (C, Rangarajan, 1991) and the two Reports on Capital Account Convertibility (S.S.Tarapore, 1997 and 2006)<sup>3</sup>. These Reports recommended a compositional shift in private capital inflows from short-term to long-term debt, debt to equity creating flows, strict regulation of short term external commercial borrowings and gradual liberalization of outflows and also recognized the need for structural and institutional reforms to strengthen the fiscal and financial sector before moving towards full capital account convertibility.

India has followed a calibrated approach towards capital account liberalization with various restrictions on capital flows, both price and quantity based, being part of the process of managed capital account liberalization. In the Indian context, capital account liberalization has been regarded as a process rather than an event. The strategy has been to encourage non-debt creating and long-term capital inflows and discourage short-term and volatile flows. A hierarchy has been worked out in the sources and types of capital flows. The priority has been to liberalise inflows relative to outflows, but all outflows associated with inflows have been totally freed. Capital account liberalisation has moved in tandem with other reforms. The extent and timing of capital account liberalisation is properly sequenced with other concomitant developments such as strengthening of banking sector, fiscal consolidation, market development and integration, trade liberalisation, and the changing domestic and external economic environments. In recent years there has been a distinct shift from debt to non-debt creating flows like foreign direct investment and foreign portfolio investment. In this hierarchy of preferences, emphasis is also given to maintaining a diversified capital account (such as FDI, portfolio flows, External Commercial Borrowings and NRI deposits), so that synchronised outflows under each segment could be avoided. This gradualistic approach towards capital account liberalisation has helped India in protecting itself from the vagaries of international capital flows and has also helped it in weathering the contagion effect of financial crises in EMEs of the 1990s and the recent global financial crisis.

India's experience with managing large capital flows prior to the global crisis of 2008-09 suggests that apart from allowing some degree of appreciation in the exchange rate, the excess liquidity generated in the system due to regular intervention by the RBI was managed through a

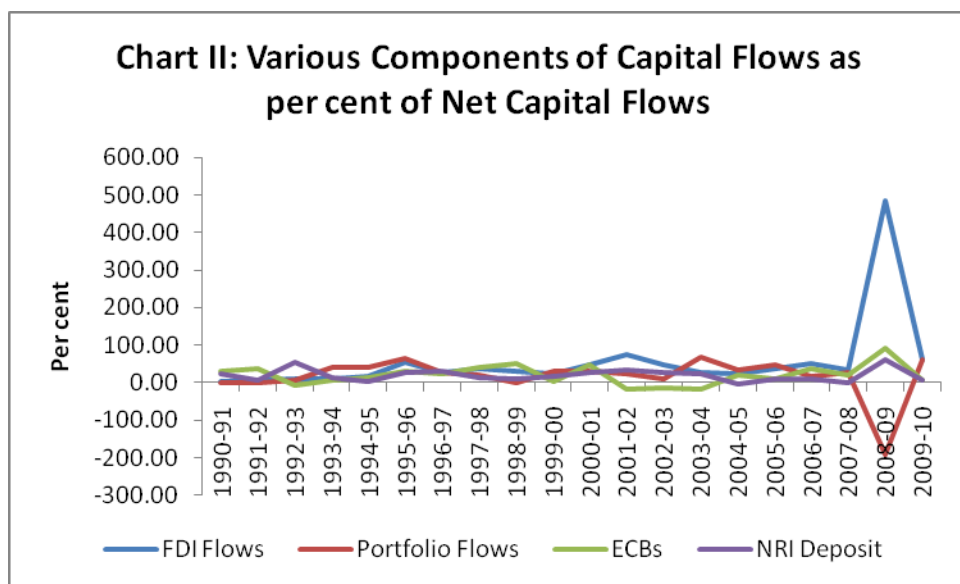
---

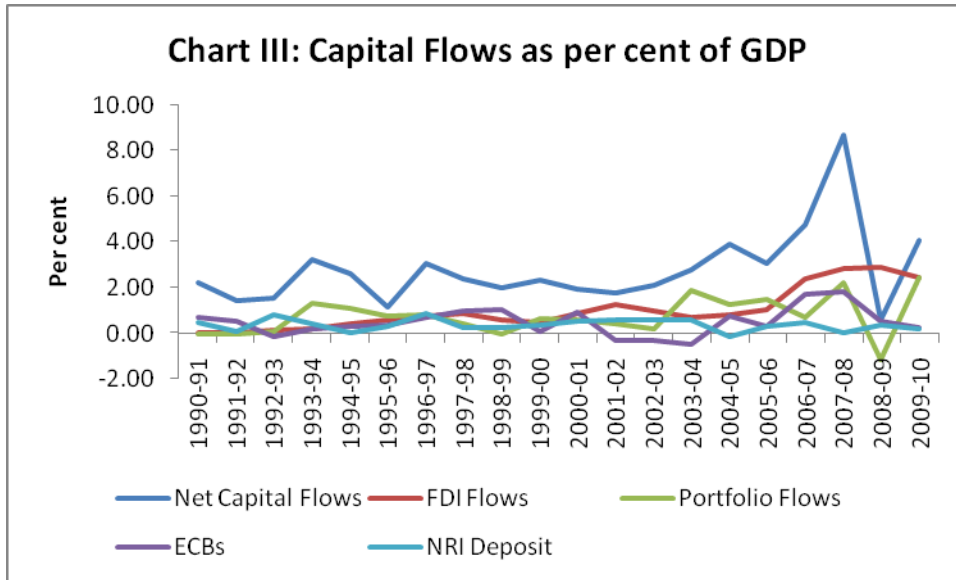
<sup>3</sup> Though several recommendations of the Tarapore Committee reports have not been implemented, reflecting the balanced approach to liberalization of capital account in India.



mix of instruments, viz., increase in CRR, auctions under the day-to-day Liquidity Adjustment Facility (LAF), open market operations (OMO), the Market Stabilization Scheme (MSS), building up of surplus balances of the Government with the Reserve Bank, foreign exchange swaps, relaxations with respect to capital outflows and modulating debt creating flows depending on the financing needs of the corporate sector. Given the availability of multiple instruments at its command, the Reserve Bank has the flexibility to use these instruments and modulate the liquidity and interest rate conditions in case capital inflows turns out to be large.

The RBI and the Government of India have been using various policy instruments at their disposal to manage capital flows. The use of specific instrument is contextual and depends not only on the nature and size of flows but also on domestic considerations. The policy of using interest rate on specific debt flows has been a determinant of capital flows itself, which may distort any analysis of interest rate sensitivity of capital flows that focuses on monetary policy rates alone for arriving at the interest rate differential variable. Various policy interventions by the authorities tend to mask the quantum of actual capital inflows to India in the form of ECBs and NRI deposits, which are quite sensitive to interest rate differential, primarily on account of higher interest rate differential. The paper endeavours to examine whether interest rate differential is impacting capital flows to India in the presence of various policy interventions by the authorities to modulate the quantum of capital flows. Charts II and III present components of capital flows as per cent to gross capital flows and GDP, respectively.





Among the components of capital flows, India’s policy regarding **foreign investment** can be broadly classified into four distinct phases: (i) cautious non-discrimination in controls during the period 1948 to mid/late 1960s; (ii) selective restrictions and control from the mid/late 1960s to the end 1970s with the promulgation of the Foreign Exchange Regulation Act (FERA), 1973 and the Industrial Licensing Policy, 1973, as the main instruments of control; (iii) gradual and partial liberalisation in the 1980s with special incentives for investment in export-oriented units; and, (iv) full-fledged liberalisation of foreign investment along with structural reform that has been the hallmark since 1991. Major changes in foreign investment policy were introduced in 1991 as a part of the economic reforms programme. Since the 1990s, the broad approach towards permitting **foreign direct investment** has been through a dual route, i.e., automatic and discretionary, with the ambit of automatic route progressively enlarged to almost all sectors, coupled with higher sectoral caps stipulated for such investments. These sectoral caps have been revised upwards from time to time depending on the technological needs. Since 2000, all industries, except for a small list of strategic sector of national importance, have been brought under the automatic route where prior approval is not required. FDI has mostly penetrated the engineering goods, chemicals, services and IT sectors.

Among the various components of capital flows, FDI is least likely to be influenced by interest rate differential as it entails taking a stake in the domestic company and is very long-term in nature. The significant increase in FDI inflows into India since the initiation of economic

reforms in 1991 has essentially resulted from liberal policy regime as noted above and is reflective of the attractiveness of robust growth performance of the Indian economy and confidence of international investors in India as a preferred long-term investment destination.

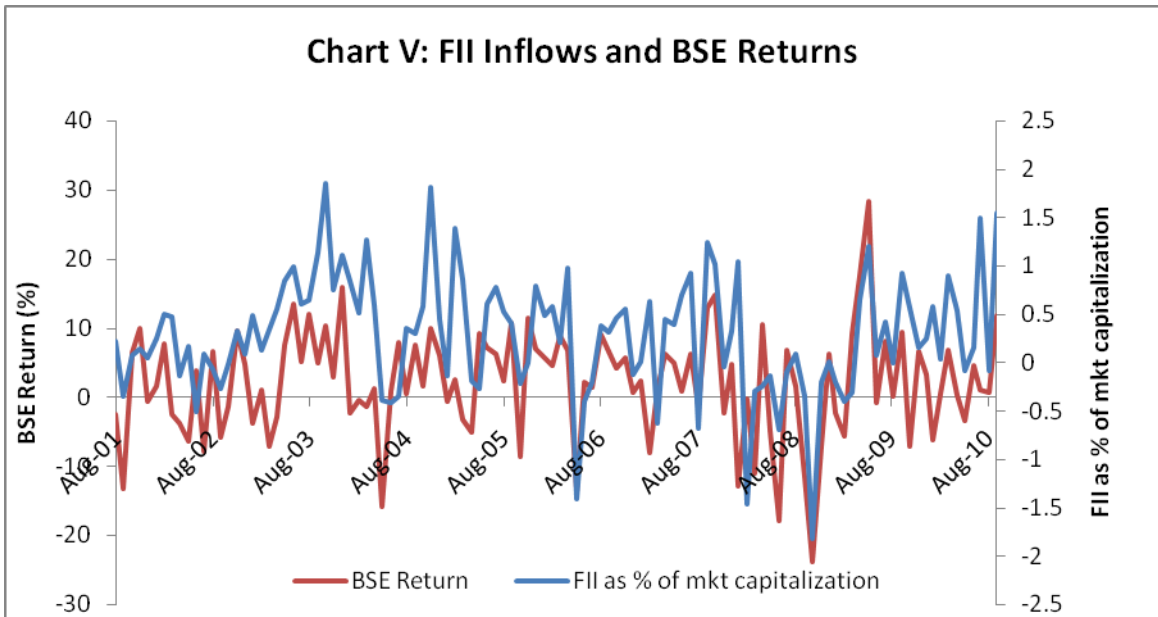
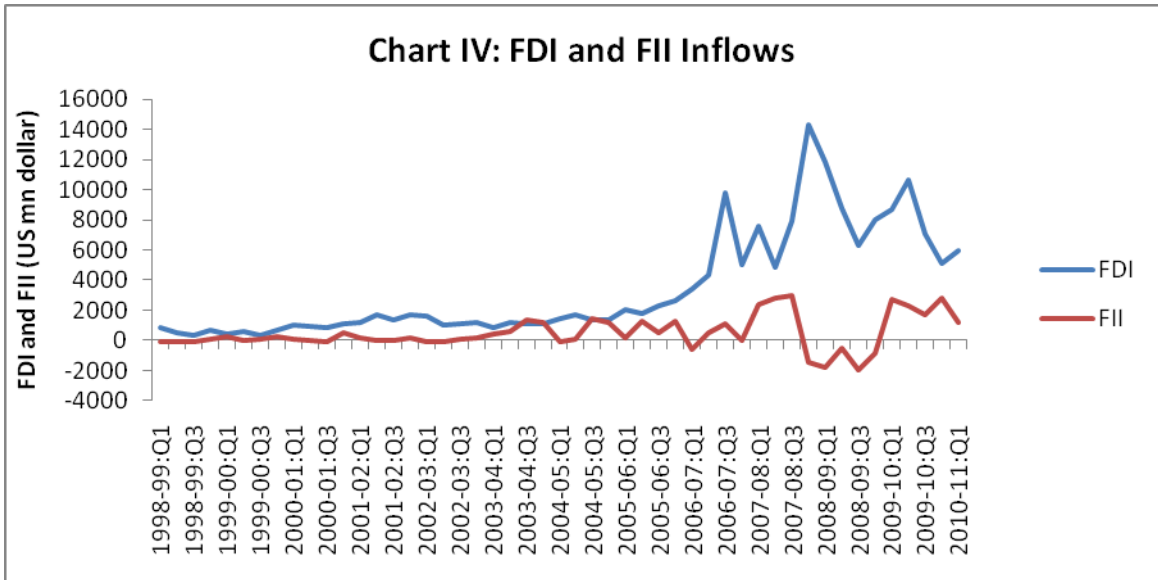
Another important component of foreign investment, viz., **FII investments** first started flowing to India in 1993. Portfolio investment inflows have since then been substantial. ADR/GDR issues by Indian companies are another important source of cross-border portfolio investment in India. Prior to 1992, only non-resident Indians (NRIs) and overseas corporate bodies (OCBs) were allowed to undertake portfolio investment in India. In line with the recommendations of the High Level Committee on Balance of Payments (Chairman: C. Rangarajan), FIIs were allowed to invest in the Indian debt and equity markets. In terms of policy liberalization, foreign portfolio investments have been significantly liberalised. Ceilings on FII investments have been progressively relaxed and at present, aggregate investment by FIIs in a company is allowed within the sectoral cap prescribed for FDI. At present total shareholding of each FII cannot exceed 10 per cent of the total paid up capital of an Indian company. Total holdings of all FIIs /sub-accounts put together should not exceed 24 per cent of the paid-up capital or paid-up value of each series of convertible debentures. This limit of 24 per cent can be increased to the sectoral cap / statutory limit, as applicable to the Indian company concerned, by passing a resolution of its Board of Directors followed by a special resolution to that effect by its General Body.

Equity flows are conditioned by domestic and global developments, and accordingly portfolio flows have been volatile, and influenced significantly both the capital market and the foreign exchange market. There has, however, never been any reversal of policies relating to equity flows and Indian policy makers have provided consistent policy framework insofar as foreign portfolio flows are concerned.

Apart from equity, FIIs registered under the 100 per cent debt route can invest in debt instruments – both Government as well as corporate within a ceiling, which has been progressively liberalised from US\$ 1 billion to the current aggregate ceiling of US \$ 50 billion (US\$ 40 billion in corporate debt and US\$ 10 billion in Government debt). Indian corporates are also allowed to access equity capital from foreign sources in the form of ADRs/GDRs and Euro issues. At present, policies on international offerings on ADRs/GDRs have been liberalised substantially and corporates are allowed to raise funds by way of ADRs/GDRs under an

automatic route, subject to specified guidelines. Two-way fungibility in ADRs/GDRs issues of Indian companies has been introduced under which investors in India can purchase shares and deposit them with an Indian custodian for issue of ADRs/ GDRs by the overseas depository to the extent of the ADRs/GDRs converted into underlying shares

FII flows to India have primarily been driven by stock market returns and this has been corroborated by various studies on this subject. Most of the policy liberalisation has been in terms of raising the ceilings and allowing FII investments in various new instruments. Since FII investments are primarily driven by stock market returns, which, in turn, depend on the corporate performance, interest rate differential is not expected to play a very significant role though a sharp increase in interest rates may impact corporate profitability, which may indirectly impact FII investments in the stock markets. However, FII investment in debt securities could be affected by change in interest rates as change in interest rate directly affects bond prices by changing the yield. Additionally, through portfolio reallocation between bonds and equities on account of change in bond prices resulting from change in interest rate, equity prices may also be impacted, albeit in an indirect fashion. However, such influences are likely to be marginal as the quantum of FII investment in equities is much higher than debt securities (on account of the cap). In a nutshell, FII investments are more likely to be influenced by returns on equities rather than interest rate differential. In the present study, major determinants of FII flows, including interest rate differential, have been empirically tested in order to gauge which determinants are exerting maximum impact on FII flows. Chart IV presents FDI and FII flows while chart V juxtaposes FII inflows as per cent to market capitalization and BSE returns.



Insofar as debt flows like **external commercial borrowings (ECBs) and NRI deposits** are concerned, unlike equity flows, these flows have been modulated based on the overall cycle of net capital flows, through the use of both price based measures (such as linking the interest rate to LIBOR) and some administrative measures (such as end use norms for ECB). While during periods of large capital inflows, some outflows relating to residents have been liberalised, during periods of moderate capital inflows, both NRI deposits and ECBs have been made more attractive.

**ECBs** provide an additional source of funds for corporates to finance the expansion of existing capacity as well as for financing new investment, taking into account interest rate differentials between domestic and international markets and market risks associated with such borrowings. ECBs include commercial bank loans, buyers' credit, suppliers' credit, securitised instruments, such as, Floating Rate Notes and Fixed Rate Bonds and, commercial borrowings from the private sector window of multilateral financial institutions, such as, International Financial Corporation (IFC) and Asian Development Bank (ADB). The quantum of ECB flows is determined by a host of domestic and external factors, such as, interest rate differential, cost of hedging on the part of corporate, growth performance of the economy, the ease of availability of credit in the domestic credit market and international liquidity conditions. An important objective of ECB policy in India has been to provide flexibility in borrowings by Indian corporates, while maintaining prudent limits for total external borrowings, subject to end-use restrictions, which prohibits investment in stock market and real estate sector to avoid the possibility of build up of speculative bubbles in these sectors. The ECB policy clearly favours long-term borrowings and restricts short-term borrowings. The permissible area for ECB has been gradually expanded from the exclusive thrust on infrastructure sectors to services sector like hospitals, hotels and software companies. Further, ECB limits and norms for prepayment have been used as flexible instruments to modulate ECB flows in line with domestic liquidity needs and global financial market developments.

The recourse to ECBs began in the 1970s but remained modest due to predominance of concessional aid from bilateral and multilateral sources. However, in the 1980s, the concessionality in aid flows dwindled, which resulted in greater recourse to ECBs. The commercial borrowings were, however, regulated by an approval procedure, subject to conditions on cost, maturity, end use and ceilings on borrowings. Following the balance of payments (BoP) crisis of 1991, the flow of funds from global commercial banks and bond markets virtually dried up in response to a downgrading of sovereign ratings by the credit rating agencies. The problem that emerged was related to the access of Indian entities to international markets rather than the cost of borrowings. As a consequence, a prudent external debt management policy was pursued to bring the external debt situation to a more comfortable level.

ECBs, after experiencing some slowdown in the aftermath of the BoP crisis, also rose significantly in the latter half of the 1990s, responding to the strong domestic investment

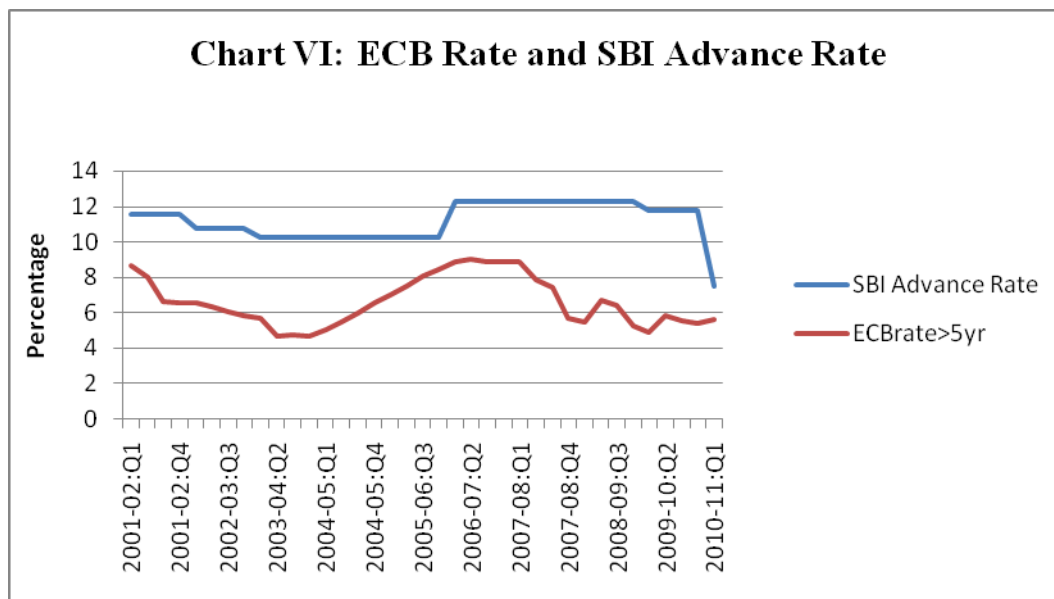
demand, favourable global liquidity conditions, upgrade of sovereign credit rating, lower risk premia on emerging market bonds and an upward phase of capital flow cycle to the EMEs.

The period beginning 2003-04 marked the resumption of debt flows to developing countries, which was a combined outcome of the higher interest rate differential emanating from ample global liquidity and the robust growth expectations and a low risk perception towards the emerging markets. During this period, Indian corporates also increased their recourse to ECBs.

Apart from the end use restriction, an important guiding principle of the ECB policy is to keep the costs of borrowings within prudent limits so that the excessive risk taken by the corporates can be avoided. Accordingly, the all-in-cost ceiling for raising borrowing in the international capital markets is linked to the 6-month LIBOR for the respective currencies in which the loan is raised. It is noteworthy that the interest rate spread over the LIBOR has been progressively reduced which might be driven by the improved credit rating and finer spreads on Indian bonds in the international markets and better aligning of the domestic interest rate to global rates. There has been a secular reduction in implicit rates on ECBs since 1990-91.

It is noteworthy that interest rate differential has been used as a policy tool to attract ECBs at the time of cyclical downturn in capital flows by increasing the all in cost ceilings while reduction in all in cost ceilings have been resorted to discourage such flows at the time of surges in capital flows. For instance, in July 2007, all in cost ceiling over 6-month LIBOR was reduced by 50-100 basis points depending on maturity to moderate such flows against the backdrop of a surge in capital flows during the period preceding the global financial crisis. However, with the slowdown in capital inflows after the onset of the global financial crisis, the all-in-cost ceilings were raised by 50-100 basis points in 2008 and further with the deepening of the crisis, the ceilings were raised by 100-150 basis points in 2009. The relaxation in the all-in-cost ceiling took place on the back of slowdown in capital inflows, drying up of resources in domestic capital market and the continuing pressure on credit spreads in the international markets. The increase in all-in-cost ceilings and relaxation in ECB policy to attract greater inflows under ECBs contributed towards enhancing such flows, especially during the current financial year, signifying the sensitivity of such inflows to interest rate movements. However, the quantum of inflows primarily on account of interest rate differential gets masked by other liberalisation measures to facilitate greater ECB inflows. The differential between ECB rate and SBI advance rate (used as a proxy for domestic interest rate in the study) is more relevant for sensitivity

analysis of ECB flows rather than the policy rate (even though SBI advance rate may respond to policy rate changes with a lag). The interest rate sensitivity of ECB flows has been empirically examined in this study. Chart VI depicts ECB rate and SBI advance rate.



The introduction of **NRI deposit schemes** by the RBI was the outcome of the two oil shocks of the 1970s, which resulted in substantial global transfer of resources to oil exporting countries and provided investment and employment opportunities in the oil-rich countries. These schemes were devised by the RBI to tap the savings of non-resident Indians employed in these countries. Non-Resident Indians/Overseas Corporate Bodies were allowed to open and maintain bank accounts in India under special deposit schemes –both rupee and foreign currency denominated. Special schemes for Non-Resident Indians were initiated in February 1970 with the introduction of the Non Resident External Rupee Account [NR(E)RA]. This was followed by the Foreign Currency Non-Resident (Account) [FCNR(A)] scheme in November 1975. In the 1980s, investor preferences clearly shifted in favour of foreign currency denominated deposits, partly due to interest rate differential over the prevailing international interest rates as also the foreign exchange guarantee provided by the Reserve Bank. Accordingly, at end-March 1991, foreign currency deposits formed 72 per cent of total NRI deposits. The vulnerability associated with these deposits was amply demonstrated during the payments crisis of 1991 when large-scale withdrawals from these accounts took place.



The FCNR(A) scheme where the interest rate risk was borne by the RBI became unsustainable on account of the increasing size of the exchange losses to the RBI which impacted its balance sheet in a market determined exchange rate system and was finally withdrawn in 1994. In order to provide depositors with an alternative to FCNR(A), a new scheme, i.e., Foreign Currency Nonresident (Banks) (FCNR(B)) was introduced under which the foreign exchange risk was borne by banks on the basis of their risk perception. The interest rate differential between FCNR(B) and international rates was kept very low to discourage arbitrage. A new rupee denominated scheme, Non-resident Non-repatriable Rupee Deposit (NR(NR)RD), was devised, which was initially non-repatriable but later provided for repatriation of only interest income. Deposits under this scheme, given their non-repatriability, were promoted by exempting them from SLR and CRR over most of the period. The scheme was withdrawn in April 2002.

Since the 1990s, the policy with respect to the non-resident deposit schemes has been to retain the attractiveness of these schemes to maintain capital flows from abroad, while at the same time, reducing the effective cost of borrowing in terms of interest outgo and the cost to macroeconomic management. In line with these objectives, while the interest rates on these deposits have been gradually deregulated, the reserve requirements and interest rate ceilings have been fine-tuned in relation to capital flow cycles in order to modulate these flows consistent with the overall macroeconomic management.

Thus, NRI deposits are another component of capital flows which are sensitive to interest rate differential. Apart from interest rate differential, NRI deposits are also influenced by level of economic activity in the economies where NRIs work as higher economic growth in such economies entails higher income for NRI and, hence, higher NRI deposits. Additionally, in the case of rupee denominated repatriable NRI deposits, hedging cost may also be a consideration. NRIs have been depositing in these accounts in search of better returns. With the resurgence of the Indian economy as a result of far reaching economic reforms introduced in 1991, the preponderance of foreign currency deposits has been reduced and rupee denominated deposits have come to the fore. The interest rate, which is linked to LIBOR, has been changed in order to make the deposits less or more attractive depending on the cycle of capital flows. For instance, in the recent years, against the backdrop of large capital inflows, which were creating problems in terms of macroeconomic management, interest rate on NRE deposits was reduced by 50 basis

points to LIBOR plus 50 bp in January 2007 and further to just LIBOR in April 2007. During the same period, interest rate on FCNR (B) deposits was reduced to LIBOR minus 25 bp and further to LIBOR minus 75 bp in order to discourage inflows under NRI deposits. However, with the onset of the global financial crisis in 2008 and the resultant drying up of capital inflows to India, interest rate on NRE deposits was increased successively during September, October and November 2008 to LIBOR plus 175 bp (cumulative increase of 175 bp). Simultaneously, interest rate on FCNR (B) deposits was also increased during the period to LIBOR plus 100 bp (cumulative increase of 175 bp). The study has endeavoured to empirically estimate the impact of such interest rate changes in attracting flows under NRI deposits as various other policy actions, like change in reserve requirements may mask the actual quantum of flows on account of interest rate differential and may make such flows less sensitive to interest rate changes.

Insofar as **capital outflows** are concerned, impediments to capital outflows have also been reduced over a period of time. For example, avenues for direct overseas investment through joint ventures and wholly owned subsidiaries have been opened up; mutual funds have been allowed to invest overseas; and exporters and exchange earners have also been given permission to maintain foreign currency accounts and use them for permitted purposes. Further, outward FDI flows have also witnessed a sharp growth in recent years. Indian companies have been investing in joint ventures and wholly owned subsidiaries in countries like Singapore, Mauritius, Cyprus and Netherlands. Policy reforms in overseas direct equity investment have facilitated global expansion of Indian companies in sectors like manufacturing, non-financial services, trading and financial services. However, residents, and more particularly the resident individuals continue to face stringent restrictions on investing abroad. Recently, they have been allowed some flexibility for asset diversification through the Indian Depository Receipts (IDR) route. Under the IDR, foreign companies have been allowed to list their depository receipts on Indian stock exchange and mobilize capital from India.

Thus, it is evident from the above discussion that capital flows to India have increased significantly in the post-liberalisation era in response to the various policy reforms undertaken by the authorities as well as the better growth prospects of the Indian economy. Different components of capital flows are impacted by different sets of factors, interest rate sensitivity being one of them. The present study has empirically tested the interest rate sensitivity of four major components of capital flows, viz., FDI, FII inflows, ECBs and NRI deposits. While FDI

and FII investments are not expected to be significantly interest rate sensitive, debt flows like ECBs and NRI deposits are expected to be influenced by interest rate differential though various other policy interventions by the authorities can weaken the impact of interest rate differential on capital flows. The subsequent section empirically examines this hypothesis and tests whether monetary policy actions in terms of interest rate changes by the RBI are having the desired impact on the quantum of capital flows to India.

## **Section IV: Empirical Findings for India**

The major objective of this paper is to explore the interest rate sensitivity of various types of capital flows to India using empirical techniques. Towards this objective, as the first step, causality has been tested between net capital flows and various components of capital flows on the one hand and interest rate differential on the other. In the second step, given the causality relationship, the impact of interest rate differential has been estimated using co-integration technique. Besides interest rate differential, other determinants of capital flows and their impact have also been studied.

### **Net Capital Flows**

At the outset, relationship between net capital inflows<sup>4</sup> to India, which includes all the components of capital flows, and interest rate differential was analysed using quarterly data for the period April 1996 to June 2010. It was found that in a vector auto regression (VAR) framework, there exists a unidirectional causality between net capital inflows and interest rate differential (between 91-days Government of India Treasury-bill and US 3-month Treasury-bill), i.e., interest rate differential Granger caused net capital flows to India with a lag of 1 period (as per Schwartz Information Criteria). Since net capital inflows, inter alia. comprise various types of capital inflows, viz., portfolio flows, FDI, NRI deposits, ECB, external assistance, etc., causality between net capital inflows to India was also tested with respect to an alternative measure of interest differential as represented by difference between yield on 1-year Government of India security and 1-year LIBOR. Even in this case, Granger causality test established

---

<sup>4</sup> Includes on a net basis, FDI to India, foreign portfolio investment flows to India, external assistance to India, commercial borrowings to India, short-term credit to India, banking capital, rupee debt service and other capital.

unidirectional causality from interest differential to net capital inflows during the period of analysis. In order to test the robustness of this finding, cointegration technique was employed. The results of the Granger causality test are set out in the Table below:

### **Causal Relationship between Net Capital Inflows and Interest Rate Differential**

Null Hypothesis:	Obs	Chi-sq	Prob.
DNETCF does not Granger Cause INTBILDIF	55	1.38	0.24
INTBILDIF does not Granger Cause DNETCF		5.72	0.02

Null Hypothesis:	Obs	Chi-sq	Prob.
DNETCF does not Granger Cause _1YRINTDIF	55	0.55	0.46
1YRINTDIF does not Granger Cause DNETCF		6.01	0.02

The Cointegration equation of net capital inflows shows that it has positive relationship with interest rate differential (represented by the difference between yields on 91-days Government of India T-bill and 3-month US T-bill) signifying that an increase in interest rate differential leads to an increase in net capital inflows to India. This lends credence to the findings of Granger causality relationship between the two variables. The equation shows that 1 percentage point increase in interest differential leads to 0.05 percentage point increase in cumulative net capital inflows to India.

Additionally, exchange rate, domestic output and growth rate of OECD economies are the other major factors having an impact on the net capital inflows to India. Both domestic output and OECD growth rate positively affect the net capital inflows while nominal exchange rate impacts it negatively. In absolute terms, coefficients of OECD growth rate is the largest followed by domestic output. This suggests that stronger growth performance of OECD countries could coexist with larger capital inflows to India. The coefficient of the interest differential is the least. The cointegration results in our model show that in the long-run, growth in OECD economies has an important bearing on the quantum of capital flows to India, which is consistent with the findings of other studies which established a positive relationship between

growth in US GDP and Capital flows to EMEs<sup>5</sup>. It can be possibly explained in terms of the fact that growth in these advanced economies entails greater availability of capital, viz., FDI, ECB and NRI deposits for investment in EMEs in search of yield. But simultaneously, the growth prospects of the recipient economy (India in our model) also matters significantly. The cointegration results also show that an appreciating rupee attracts capital flows to India on expectations of higher dollar returns. However, the sensitivity of different components of capital flows to various macroeconomic variables differs widely. Some components, such as, FDI are less sensitive to interest rates while some others like ECB are more sensitive. Further, NRI deposits are very sensitive to growth of industrial economies.

In the remaining part of this section, component-wise analysis of capital flows has been undertaken in order to analyse which components of capital flows are more sensitive to interest rate differential and which ones are less sensitive. The results of stationarity and cointegration tests are given below:

#### Results of Unit Root/Stationarity Tests

Variables	ADF Test		Phillips-Perron Test	
	Level	1st Difference	Level	1st Difference
INTBILDIFF	-3.15**	-8.89***	-4.35***	-9.46***
NETCF	-2.42	-9.37***	-2.42	-9.43***
LCUMGROSSCF	-1.34	-7.57***	-3.54**	-9.76***
1YRINTDIF	-3.09**	-7.84***	-3.14**	-7.99***
LEXCHANGE_RATE	-2.57	-2.34	-2.52	-4.46***
LGDP_SA	1.53	-8.60***	1.91	-8.60***
LOECDGRINDEX	-2.21	-4.18***	-2.45	-8.49***

Note-\*\*\*, \*\* and \* denote statistical significance at 1%, 5% and 10% levels, respectively.

#### Cointegration of Net Capital Flows

Variables	Cointegrating Equation
LCUMNETCF	1
LGDP_SA	2.59 (25.32)

<sup>5</sup> Calvo and others (2001) document the pattern of capital flows to the EMEs during various monetary policy and growth cycles. According to them, recessions in the United States are associated with a lower volume of capital flows to the EMEs; FDI flows are particularly sensitive to the growth cycle. Other capital flows (which include bank lending and capital flight), however, behave countercyclically—banks seek to lend abroad as the U.S. loan demand weakens during recessions. This offset has, at least historically, cushioned the blow.

LEXCHANGE_RATE	-0.56 (-4.33)
LOECDGRINDEX	3 (9.59)
INTBILDIFF	0.05 (6.83)
Trend	0.002 (0.35)
Intercept	-35.48

Note-Figures in brackets indicate t-statistic

DNETCF: First difference of net capital flows

INTBILDIFF- Differential between yield on 91 day Indian T-Bill and 3 months US T-Bill

1YRINTDIF- differential between yield on 1year Government of India security and 1year LIBOR

CUMNETCF- Cumulative Net Capital Inflows

EXCHANGE\_RATE- Nominal Rupee-US Dollar exchange rate

OECDGRINDEX- Index of OECD countries growth rates taking 1995-96 as 100

GDP\_SA- Seasonally adjusted GDP of India at constant prices

Prefix of D refers to first difference of the variable

Prefix of L refers to Logarithm of the variable

## FII Flows

An analysis of monthly FII flows reveals that after taking appropriate lags, Granger causality test in VAR framework showed that causal relationship from interest rate differential (between 91-days Indian Govt. T-bill and US 3-month T-bill) to net FII inflows existed for the sample period April 1999 – September 2010. This result was not in conformity with the perception that FII flows are primarily influenced by equity price movements rather than interest rates. It may be pointed out in this context that a portion of FII investment is made in debt instruments as well and the debt component of the FII flows could get affected by change in interest rate differential. However, component-wise data on FII inflows into equity and debt markets are not available separately (presently, there is a cap of US\$ 50 billion on FII investment in debt securities). With respect to equity prices, using a VAR framework, we found unidirectional causality from stock returns to FII inflows. The results of the Granger causality, stationarity and cointegration tests are set out in the Table below.

### Causal Relationship between FII Inflows and Interest Rate Differential

Null Hypothesis:	Obs	Chi-sq	Prob.
DINTBILDIFF does not Granger Cause DCUMFII	136	4.99	0.02
DCUMFII does not Granger Cause DINTBILDIFF		0.31	0.58

### Causal Relationship between FII Inflows and BSE return

Null Hypothesis:	Obs	Chi-sq	Prob.
BSERETURN does not Granger Cause DCUMFII	134	16.84	0.0008
DCUMFII does not Granger Cause DINTBILDIFF		1.45	0.69

### Results of Unit Root/Stationarity Tests

Variables	ADF Test		Phillips-Perron Test	
	Level	1st Difference	Level	1st Difference
BSE	0.05	-10.57***	-0.25	-10.75***
LBSE	-0.32	10.27***	-0.51	-10.33***
BSERETURN	-10.52***	-11.41***	-10.63***	-46.09***
CUMFII	2.69*	-3.35***	1.90	-11.05***
LCUMFII	-2.44	-16.31***	-4.25***	-16.31***
EXCHANGE_RATE	-3.39***	-8.19***	-2.31	-8.16***
LEXCHANGE_RATE	-2.33	-8.18***	-2.30	-8.18***
LUSIIP_SA	-2.24	-3.97***	-1.95	-12.24***
INTBILDIFF	-1.65	-15.68***	-2.27	-15.44***

Note-\*\*\*, \*\* and \* denote statistical significance at 1%, 5% and 10% levels, respectively.

### Cointegration relation of FII Inflows

Variables	Cointegrating Equation
LCUMFII	1
LEXCHANGE_RATE	-24.24 (-3.02)
LUSIIP_SA	-37.63 (-3.08)
LBSE	1.29 (2.81)
TBINDIFF	-0.39 (-1.34)
Intercept	264.28

---

Note-Figures in brackets indicate t-statistic

BSE- Sensitive Index of Bombay Stock Exchange of 30 scrips

BSERETURN- Percent increase in BSE index over the previous month

CUMFII- Cumulative Foreign institutional Inflows

CUMFII- Cumulative Foreign institutional Inflows

EXCHANGE\_RATE- Nominal Rupee-US Dollar exchange rate

USIIP\_SA- Seasonally adjusted Index of Industrial Production of US

INTBILDIFF- Differential between yield on 91 day Indian T-Bill and 3 months US T-Bill

Prefix of D refers to first difference of the variable

Prefix of L refers to Logarithm of the variable

In view of the existence of causal relationship from interest rate differential to FII flows, which was not in tandem with the theoretical expectations, it was considered necessary to examine the relationship further in order to determine if long-term relationship exists between interest rate differential and FII flows using the co-integration framework. For the exercise, we took FII inflows in cumulative terms as dependent variable, and exchange rate, US Index of Industrial Production (USIIP)<sup>6</sup>, 30-scrip BSE-Sensex and interest rate differential as explanatory variables. The coefficients of exchange rate, US IIP and BSE Sensex were found to be statistically significant, which entails that these variables impact FII flows but interest differential was found to be insignificant with a negative sign. This was in contrast with the unidirectional causality found to exist from interest rate differential to FII inflows. **Thus, the long-run relationship in the cointegration framework shows that interest rate differential does not have any significant impact on FII flows into the Indian financial market.** It is possible that in the short-run, when domestic interest rate increases, bond prices decline and become attractive to investors, which may induce some investors to switch their portfolio from equities to bonds. This, in turn, may lead to decrease in demand for equities resulting in a fall in their prices and may possibly lead to larger buying by FIIs to take advantage of the lower equity prices as FIIs are known to buy when the equity prices are low and sell when they are high. This may explain, to an extent, the existence of causal relationship from interest rate differential to FII flows in the short-term.

Insofar as exchange rate is concerned, the cointegration results established negative relationship between FII inflows and exchange rate. This may be on account of the higher dollar return that foreign institutional investors get when the rupee appreciates and vice versa. The negative relationship between USIIP and capital flows signify that a decrease in USIIP results in

---

<sup>6</sup> US IIP was taken as a proxy for the performance of advanced economies on account of the fact that a large portion of FII flows to the EMEs including India originates from the US.



a increase in FII flows to India as India becomes more attractive for investment on account of better returns and vice versa. **As expected, BSE stock price is found to be a major pull factor for FII flows into the domestic financial markets, with 1 per cent increase in BSE Sensex leading to 1.29 per cent increase in cumulative FII inflows to India.**

### FDI Flows

In the case of FDI flows, Granger causality test under a VAR framework to analyse relationship between FDI and interest rate differential (Difference between yields on 10 year Government of India security and US Government bond of 10 year maturity) shows that there is no causality between the two, which implies that FDI flows to India are not sensitive to interest rates<sup>7</sup>. They are driven more by the fundamentals and growth prospects of the Indian economy. The sharp increase in FDI flows to India in the recent years signifies the attractiveness of the Indian economy as a long-term investment destination and the sustained confidence of the international investors in the growth prospects of the Indian economy. The results of Granger causality test are set out below:

#### Causal Relationship between FDI Inflows and Interest Rate Differential

Null Hypothesis:	Obs	Chi-sq	Prob.
DGSECDIF does not Granger Cause DFDINET	55	0.81	0.37
DFDINET does not Granger Cause DGSECDIF		1.59	0.21

GSECDIF- Differential between yield on 10 year Indian Government security and that on US Government bond of 10 year maturity

DFDINET-First difference of net FDI flows to India

### NRI Deposits

Two major components of NRI deposits are NR(E)RA (Non-Resident (External) Rupee Accounts) deposits and FCNR(B) ( Foreign Currency Non-Resident (Banks)) deposits.

<sup>7</sup> Since no causality was found to exist between FDI and interest rate differential, further tests like cointegration, etc., were not considered necessary.

In the case of NR(E)RA (Non-Resident (External) Rupee Accounts) deposits, using monthly data for the sample period October, 2003-September-2010 Granger causality in a VAR framework shows that interest differential (between two year<sup>8</sup> NR(E)RA rate<sup>9</sup> and two year swap rate) Granger causes NR(E)RA deposits. This shows the interest rate sensitivity of NR(E)RA deposits. The results are set out below:

### Causal Relationship between NR(E)RA Deposits and Interest Rate Differential

Null Hypothesis	Obs	Chi-sq	Prob.
DNREINTDIF does not Granger Cause NRE	79	11.59	0.02
NRE does not Granger Cause DNREINTDIF		5.46	0.24

### Results of Unit Root/Stationarity Tests

Variables	ADF Test		Phillips-Perron Test	
	Level	1st Difference	Level	1st Difference
NRE	-7.97***	-9.91***	-7.97***	-28.64***
LNRECUM	-0.67	-7.39***	-1.02	-7.25***
LFCNRCUM	-3.08**	-7.41***	-2.79*	-7.37***
LIIP_SA	-0.55	-15.59***	-0.63	-16.87***
LUSIIP_SA	-1.92	-2.95**	-1.44	-9.22***
LREER	-2.61*	-6.86***	-2.62*	-10.67***
LCRUDE_PRICE	-2.78*	-6.21***	-2.28	-6.34***
NREINTDIF	-1.16	-6.54***	-1.11	-6.62***
FCNRRATE2YR	-1.23	-8.20***	-1.34	-8.20***

Note-\*\*\*, \*\* and \* denote statistical significance at 1%, 5% and 10% levels, respectively.

### Cointegration of NR(E)RA Deposits

Variables	Cointegrating Equation
LNRECUM	1
LREER	-7.82 (-6.76)
NREINTDIF	0.26 (3.25)

<sup>8</sup> Proxied by two year swap rate plus ceiling imposed by RBI for 1-3 year NR(E)RA deposits.

<sup>9</sup> Due to the non availability of actual interest rate data on NR(E)RA deposits, it has been estimated by LIBOR/SWAP rate of corresponding maturity plus ceiling as imposed by RBI from time to time.

LCRUDE_PRICE	1.08 (9.15)
Intercept	39.58

Note-Figures in brackets indicate t-statistic

NRE- NRE(E)RA deposits

NRECUM- Cumulative NR(E)RA deposits

FCNRCUM- Cumulative FCNR(B) deposits

IIP\_SA- Seasonally adjusted Index of Industrial Production for India

USIIP\_SA- Seasonally adjusted Index of Industrial Production for US

REER-Trade Based Real Effective Exchange Rate (36 currency)

Crude Price-Average Crude Price (Dollars per barrel)

NREINTDIF-Interest differential between two year NR(E)RA rate (two year swap rate plus ceiling imposed by RBI for 1-3 year NR(E)RA deposits) and two year swap rate

FCNRRATE2YR- Swap rate for two year maturity plus ceiling imposed by RBI

Prefix of D refers to first difference of the variable

Prefix of L refers to Logarithm of the variable

Cointegration result showed that cumulative NR(E)RA deposits are positively impacted by interest rate differential. It was found that 1 percentage point change in interest rate differential brings about 0.26 percentage point change in NR(E)RA deposits. As a significant portion of NR(E)RA deposits comes from Gulf countries, the level of industrial activity in the Gulf region has been proxied by crude oil prices. Crude oil prices were found to have a positive and significant impact on NR(E)RA deposits. This implies that when oil prices increase, the income of NRIs employed in the Gulf countries increase and they repatriate more money to the domestic economy for family maintenance and other purposes. Further, trade-based Real Effective Exchange Rate (REER) (36-currency) was found to have negative relation with cumulative NR(E)RA deposits, which entails that in the case of depreciation of the rupee more NRE deposits flow into India to take advantage of the depreciating rupee and vice versa.

### **Foreign Currency Non-Resident (Banks)) deposits (FCNR(B))**

In the case of FCNR(B) deposits using monthly data for the sample period January, 2004-September, 2010, cointegration results establish the sensitivity of such deposits to interest rates. One percentage point change in interest rate<sup>10</sup> on FCNR(B) deposits brings about a 0.13 percentage point change in cumulative FCNR(B) deposits. In the case of FCNR(B) deposits,

<sup>10</sup> Due to non-availability of actual interest rate data on FCNR (B) deposits, it has been estimated by LIBOR/SWAP rate of corresponding maturity plus ceiling as imposed by RBI at intermittent intervals.

crude oil price is found to have a negative and significant impact. This implies that bulk of the FCNR(B) deposits are remittances not from Gulf region but from advanced industrial economies. It is possible that a decline in crude oil price leads to less transfer of global resources from advanced economies to oil producing economies and hence more income with the NRIs for depositing in NRI accounts and vice versa. USIIP is found to have a positive impact on these deposits, which possibly means that better economic growth in the US results in availability of more funds in the hands of NRI, which are deposited in FCNR(B) accounts in India to take advantage of the better returns offered by these deposits. Additionally, REER has a negative and significant long-term relation with FCNR(B) deposits. The cointegration results are set out below:

#### **Cointegration of FCNR(B) Deposits**

Variables	Cointegrating Equation
LFCNRCUM	1
LIIP_SA	5.05 (14.33)
LUSIIP_SA	9.91 (7.35)
LREER	-4.98 (-6.29)
LCRUDE_PRICE	-0.97 (-5.41)
FCNRRATE2YR	0.13 (4.34)
Intercept	-39.14

Note-Figures in brackets indicate t-statistic

#### **External Commercial Borrowings (ECBs) Flows**

For the sample period April 2001 to June 2010, using quarterly data, Granger causality in a VAR framework between ECBs and interest rate differential (between SBI prime lending rate

representing domestic interest rate and interest rate<sup>11</sup> on ECBs) showed that interest rate differential Granger causes ECB flows. The causality results are set out below:

### **Causal Relationship between ECBs and Interest Rate Differential**

Null Hypothesis	Obs	Chi-sq	Prob.
DINTDIFF1 does not Granger Cause DLECB	35	19.22	0.00
DLECB does not Granger Cause DINTDIFF1		3.27	0.07

Cointegration analysis of ECB flows<sup>12</sup> showed sensitivity of ECB flows to interest rate differential (between implicit interest rate<sup>13</sup> on ECBs and yield on 10 year government security). One percentage point change in interest rate was found to bring about 0.85 percentage point change in ECBs. Thus, the increase in interest rate differential induced corporates to access the cheaper ECB market as expected. ECB flows were also found to be sensitive to exchange rate movements, domestic industrial activity and current account deficit. An appreciating domestic currency was found to induce greater ECB flows possibly on account of the fact that an appreciating rupee entails lower repayment burden in terms of rupee and lower effective cost for corporates, which possibly encourages corporates to resort to more external commercial borrowings. Greater industrial activity (proxied by IIP) entails greater need for funds to finance new investments/ expansions of existing capacities and this, in turn, induces greater ECB flows. Current account deficit was also found to induce ECBs. Results of stationarity and cointegration tests are set out below:

---

<sup>11</sup> Due to non-availability of actual interest rate on ECB borrowing, it was computed by 6 month LIBOR plus all in cost ceiling imposed by RBI.

<sup>12</sup> In addition to the above-mentioned statistically significant variables like interest rate differential, IIP, exchange rate and CAD as per cent to GDP, effort was made to incorporate some measures of domestic liquidity condition as represented by broad money supply (M3) and also external sector vulnerability as represented by the level of forex reserves as explanatory variables, but these were not found to be statistically significant.

<sup>13</sup> Interest rate (r) is computed by dividing the interest payments (ip) in period t by the debt stock (d) in period t-1, i.e.  $r = [ip(t)/d(t-1)]-1$ .

### Results of Unit Root/Stationarity Tests

Variables	ADF Test		Phillips-Perron Test	
	Level	1st Difference	Level	1st Difference
LECB	-2.32**	-7.30***	-2.28*	-8.28***
LIIP_SA	1.16	-4.49***	0.94	-4.49***
CAD_GDP	-3.44***	-7.30***	-3.37***	-12.89***
INTDIFIMPLICIT	-5.60***	-7.33***	-5.63***	-11.68***
LEXCHANGERATE	-3.23**	-3.65***	-2.04	-3.62**

Note-\*\*\*, \*\* and \* denote statistical significance at 1%, 5% and 10% levels, respectively.

### Cointegration of ECB Flows

Variables	Cointegrating Equation
LECB	1
LIIP_SA	5.35 (3.58)
CAD_GDP	0.52 (4.01)
INTDIFIMPLICIT	0.85 (3.21)
LEXCHANGERATE	18.30 (5.43)
Intercept	50.73

Note-Figures in brackets indicate t-statistic  
 ECB- External Commercial Borrowings  
 INTDIFF1- between SBI prime lending rate representing domestic interest rate and interest rate on ECBs  
 IIP\_SA- Seasonally adjusted Index of Industrial Production for India  
 CAD\_GDP- Current account Deficit as a proportion of GDP  
 INTDIFIMPLICIT- Differential between Implicit interest rate on ECBs and yield on 10 year government security  
 EXCHANGERATE- Nominal Rupee-US Dollar exchange rate  
 Prefix of L refers to Logarithm of the variable

### Section V. Concluding Policy Inferences

The present study has empirically tested the interest rate sensitivity of four major components of capital flows, viz., FDI, FII inflows, ECBs and NRI deposits. Different components of capital flows are impacted by different sets of factors, interest rate differential being one of them. The study shows that net capital flows are sensitive to interest rate differential as per both causality analysis and long run cointegrating relationship. According to our estimates, 1 percentage point increase in interest differential leads to 0.05 percentage point

increase in cumulative net capital flows to India. But there are segments like FDI which are not significantly interest rate sensitive as FDI inflows are essentially long-term in nature and are reflective of growth prospects of the Indian economy and confidence of international investors in India as an attractive long-term investment destination.

Interest rate sensitivity of FII flows is not found to be statistically significant in a cointegration framework. BSE stock price has been found to be a major pull factor for FII flows into the domestic financial markets with 1 percentage point increase in BSE Sensex leading to 1.29 percentage point increase in cumulative FII inflows to India.

On the other hand, ECBs and NRI deposits are found to be interest rate sensitive, as expected. 1 percentage point change in interest rate is found to bring about 0.85 percentage point change in ECBs. Similarly, in the case of NRI deposits, it has been estimated that 1 percentage point change in interest rate on FCNR(B) deposits brings about a 0.13 percentage point change in cumulative FCNR(B) deposits and 1 percentage point change in interest rate differential brings about 0.26 percentage point change in NR(E)RA deposits. It may be mentioned that besides interest rate, there are other factors as well, like exchange rate movements, stock return, domestic GDP, domestic industrial activity, performance of other advanced economies, risk perception of investors, etc., which are quite significant in the determination of quantum of capital flows to the economy.

Thus, from the point of view of monetary policy, FDI and FII flows are not impacted by interest rate changes as they are primarily determined by growth prospects of the Indian economy and returns on equities, respectively. During 2009-10, these two, on a net basis, accounted for about 96 per cent of total net capital inflows to India while for the 10-year period from 2000-01 to 2009-10, they accounted for around 76 per cent of the total net capital flows. The empirical results, however, corroborate the expectation that ECBs and NRI deposits are interest sensitive, though policy interventions by authorities do tend to reduce interest rate sensitivity. Thus, monetary policy needs to take cognizance of the fact that debt flows like ECBs and NRI deposits are impacted both by interest rate as well as exchange rate movements. The conduct of monetary policy, however, must continue to be guided by goals relating to inflation and growth, leaving the management of capital flows resulting from monetary policy changes to other instruments. The RBI has used some of these instruments effectively in the past to modulate the size and composition of capital flows and the same approach may need to continue.

## References:

- Annual Report of the Reserve Bank of India, various issues.
- Ashoka Mody, Mark P. Taylor, and Jung Yeon Kim (2001), "Modelling Fundamentals for Forecasting Capital Flows to Emerging Markets" *International Journal of Finance and Economics* 6: 201–216.
- Babu M. Suresh and K.P. Prabheesh (2008) "Causal relationships between Foreign Institutional Investments and stock returns in India" *International Journal of Trade and Global Markets*, Volume 1, Number 3 Pages: 259 – 265.
- Bank for International Settlements (2009), Report of the CGFS Working Group on Capital Flows and Emerging Market Economies (Chairman: Rakesh Mohan), January.
- Bohn, H and Linda L. Tesar (1996) "US Equity Investment in Foreign Markets: Portfolio Rebalancing or Return Chasing?" *American Economic Review*, Vol 86, No. 2.
- Calvo, Guillermo A., Eduardo Fernández-Arias, Carmen Reinhart, and Ernesto Talvi (2001) "The Growth-Interest Rate Cycle in the United States and its Consequences for Emerging Markets," Research Department Working Paper No. 458 (Washington: Inter-American Development Bank).
- Chakrabarti, Rajesh (2001): "FII Flows to India: Nature and Causes", *Money and Finance*, Vol 2(7), October-December.
- Chuhan, Peter, Stijn Claessens, and Nandu Mamingi (1993). "Equity and Bond Flows to Asia and Latin America." Working Paper 1160. Policy Research Department, World Bank, Washington, D.C.
- Committee on Global Financial System (2009), Bank for International Settlements.
- Crockett, Andrew (1994), "Monetary Policy Implications of Increased Capital Flows" Proceedings of Federal Reserve Bank of Kansas City.
- Çulha, Ali (2006), "A Structural VAR Analysis of the Determinants of Capital Flows Into Turkey" Research and Monetary Policy Department, Working Paper No: 06/05. The Central Bank of the Republic of Turkey.
- Fedderke, J.W. and W. Liu (2002), "Modeling the Determinants of Capital Flows and Capital flight: with an Application to South African data from 1960 to 1995" *Economic Modelling* 19(2002) 419-444.
- Gordon, J P and P Gupta (2003): "Portfolio Flows into India: Do Domestic Fundamentals Matter?" IMF Working Paper No 03/20, International Monetary Fund.
- Gordon, J P and P Gupta (2004): "Nonresident Deposits in India: In Search of Return?" IMF Working Papers 04/48, International Monetary Fund.
- Graham Bird and Ramkishen S. Rajan (2000), "Resolving the Interest Rate Premium Puzzle: Capital Inflows and Bank Intermediation in Emerging Economies" CIES Working Paper No. 12.
- Indrani Chakrabarty (2006) "Capital Inflows during the Post-Liberalisation Period" *Economic and Political Weekly*, January 14, 2006.



Mohanty, Deepak, Muneesh Kapur, and Satyananda Sahoo, 2000, "Management of Nonresident Deposits," in External Debt Management-Role of Financial Intermediaries, Proceedings of CRISIL Seminar, Goa, September 6–8, 335–346.

Ralhan, Mukesh (2006), "Determinants of Capital Flows: A Cross-Country Analysis. Econometrics Working Paper EWP0601. University of Victoria.

Rangarajan, C (1991), High Level Committee on Balance of Payments. Reserve Bank Of India, Mumbai.

Tarapore, S S (1997), Report of the Committee on Capital Account Convertibility. Reserve Bank of India, Mumbai.

Tarapore, S S (2006), Report of the Committee on Fuller Capital Account Convertibility. Reserve Bank of India, Mumbai.

Report on Currency and Finance, 2003-04, RBI.

Singh, Bhupal (2007): "Corporate Choice for Overseas Borrowings: The Indian Evidence", RBI Occasional Papers, Vol 28(3), Winter.

Singh, Bhupal (2009), "Changing Contours of Capital Flows to India" Economic and Political Weekly, October 24, 2009, VOL XLIV No. 43.

Taylor MP, L. Sarno (1997) "Capital flows to developing countries: Long- and short-term determinants" World Bank Economic Review 11: 451–470.

Virmani, Arvind (2007), "Macro-economic Management of the Indian Economy: Capital Flows, Interest Rates and Inflation" Working Paper No. 2/2007-DEA, Ministry of Finance, Government of India.

Ying , Yung-Hsiang and Yoonbai Kim (2001), "An Empirical Analysis on Capital Flows: The Case of Korea and Mexico" Southern Economic Journal, Vol. 67, No. 4 (Apr., 2001), pp. 954-968.

**Annex I: Interest Rate Caps on NRI Deposit**

	NRE Account		FCNR (B)	
	6mth- 1 yr	1-3 yr	below 1 yr	over 1 yr
15-Apr	9%	Freed		
25-Jun-97	8%	Freed		
Sep-97	Freed	Freed		
29-Apr-98			reduced by 25 bps	increased by 50 bps
19-Apr-01				LIBOR/SWAP rate
29-Apr-02				LIBOR minus 25 bps
17-Jul-03		LIBOR + 250 bps		
15-Sep-03		LIBOR + 100 bps		
18-Oct-03		LIBOR + 25 bps		
18-Apr-04		LIBOR		
1-Nov-04		LIBOR + 50bps		
17-Nov-05		LIBOR+75 bps		
28-Mar-06				LIBOR/SWAP rate
18-Apr-06		LIBOR+100		
31-Jan-07		LIBOR + 50 bps		LIBOR minus 25 bps
24-Apr-07		LIBOR		LIBOR minus 75 bps
16-Sep-08		LIBOR + 50 bps		LIBOR – 25 bps
15-Oct-08		LIBOR + 100 bps		LIBOR + 25 bps
15-Nov-08		LIBOR + 175 bps		LIBOR + 100 bps

bps: basis points, LIBOR: London Inter-Bank Offer Rate  
Source: RBI Annual Report (various issues).

## Annex II: Interest Rate Caps on ECBs

<b>ECB (automatic route)</b>		
	3-5 yrs	>5 yrs
2001	6 month LIBOR + 300bps	6 month LIBOR + 450bps
1-Jul-04	6 month LIBOR + 200bps	6 month LIBOR + 350bps
1-Jul-05	6 month LIBOR + 200bps	6 month LIBOR + 350bps
1-Jul-06	6 month LIBOR + 200bps	6 month LIBOR + 350bps
2-Jul-07	6 month LIBOR + 150bps	6 month LIBOR + 250bps
1-Jul-08	6 month LIBOR + 200bps	6 month LIBOR + 350bps
1-Jul-09	6 month LIBOR + 300bps	6 month LIBOR + 500bps
1-Jul-10	6 month LIBOR + 300bps	6 month LIBOR + 500bps

Source: RBI Annual Report (various issues).

### **Annex III: Major Restrictions on Capital Inflows and Outflows in India**

<b>Items</b>	<b>Administrative/Quantity-based</b>	<b>Price/Market-based</b>
FDI	Substantially free but subject to some sectoral caps with a negative list of sectors of strategic national importance.	
ADRs/GDRs	Subject to overall FDI sectoral caps.	
ECBs/FCCBs	Under the automatic route, the maximum amount of ECB which can be raised by a corporate other than those in the hotel, hospital and software sectors is US\$ 500 million or its equivalent during a financial year. Corporates in the services sector viz. hotels, hospitals and software sector are allowed to avail of ECB up to US\$ 100 million or its equivalent in a financial year for meeting foreign currency and/ or Rupee capital expenditure for permissible end-uses.	Ceiling on interest rate linked to LIBOR.
Short-term trade credit	Short-term trade credit up to \$20 million per import transaction for permissible imports with a maturity period of one year is allowed under the automatic route. Trade credit up to \$20 million per import transaction with maturity period of more than one year but less than three years is allowed for import of capital goods under the automatic route. For all transactions, all-in-cost ceilings on interest rate linked to 6-months LIBOR.	Ceiling on interest rate linked to LIBOR.
Overseas borrowings by banks	Restricted to 50% of Tier I capital of banks or \$10 million whichever is higher.	
NRI deposits	-	Ceiling on interest rate linked to LIBOR.
FII investment in debt	Ceiling of \$40 billion in corporate debt and \$10 billion in government securities.	
Indian overseas investment (outward FDI)	400% of net worth of the company.	
Outward portfolio investment	Mutual funds allowed to invest abroad up to US\$7 billion.	
Portfolio investment by listed Indian companies	50% of the net worth in listed shares and bonds/fixed income securities, rated not below investment grade by accredited / registered credit rating agencies, issued by listed overseas companies.	
Liberalised remittance scheme for individuals	\$200,000 for permissible capital and current account transactions.	