
Inflows and their Macroeconomic Impact in India a VAR Analysis

Narayan Sethi*

The present study attempts to examine the effects of private foreign capital inflows (FINV) on macroeconomic variables in India. The study also examines the trends and composition of capital inflows into India. Using the Vector Autoregression (VAR) method, this paper specifically examines effects of private foreign capital inflows (FINV) on macroeconomic variables in India. This study is based on the monthly data from 1995:04 to 2011:07 and incorporating the macroeconomic variables such as exchange rate (EXR), inflation, money supply (M3), export (EXPO), import (IMP), foreign exchange reserve (FOREX) and economic growth (IIP as proxy of GDP). The important observations emerge from the VAR analysis

* **Narayan Sethi**, Assistant Professor in Economics, Dept. of Humanities and Social Sciences, National Institute of Technology (NIT), Rourkela, Odisha, India, email: nsethinarayan@gmail.com

An early version of this paper was presented at the "16th World Congress of the International Economic Association 2011 (IEA, 2011)" at Tsinghua University, Beijing, China, July 2011. The author would like to thank Prof. JVM Sarma and Prof. N R Bhanumaurty for their comments and suggestions in an earlier draft of this paper

which shows there is dynamic short and long equilibrium relationship between few macroeconomic variables like exchange rate (EXR), foreign exchange reserve (FOREX), index of industrial production (IIP) and money supply (M3) with private foreign capital inflows (FINV) during the study period from 1995:04 to 2011:07

Keywords: Private Foreign Capital Inflows, Macroeconomic Variable, Vector Autoregression (VAR), India

JEL Classifications: C32, E63, F30, F41

Introduction

International capital investment can play a useful role in development by adding to the savings of low and middle income developing countries in order to increase their pace of investment. However, foreign investment can also prove unproductive to developing economies by exposing them to disruptions and distortions from abroad, and by subjecting them to surges of capital inflows or massive outflows of capital flight. During 1997 to 2001 the capital movement to developing countries has declined, but increased marginally in 2002. International capital flow can help developing economies spread the benefit, when the flows are steady and do not undermine the stability of financial system.

Foreign capital flows can come from public or private sources. Over the past twenty years, the volume of private flows has become much greater than public flows. The average annual net official flows were \$26.7 billion from 1980 to 1990, and then declined to an average of \$21.3 billion from 1991 to 2003. Meanwhile, net private flows were \$20 billion and \$118

billion, respectively. These private investments are more important due to the decline in official flows. The private flows not only become larger but also more volatile. The volatility of foreign capital movements rose sharply from \$16 billion for the 1980 to 1990 period to \$55 billion for 1991 to 2003.

Some types of foreign capital investments were more volatile than others. A more volatile source of foreign capital comes as portfolio investment in bonds and stocks issued by developing country governments and corporations. Net flows of portfolio investment surged starting in 1992, dropped sharply in 1998 and then turned negative in 2000.

Capital flows are most helpful when the magnitude of those flows is steady and stable and when the types of investments are suitable to meet the development needs of the economy. Although the purpose of foreign capital is to augment domestic savings in order to raise investment, the volatility of those flows sometimes results in the opposite. Savings averaged 23.4% of GDP for developing countries between 1981 and 1996, while investment averaged 25.7%, thus foreign investment contributed 1.3% of GDP towards investment on average each year. However, since 1998 the savings rate has exceeded that of investment because of the net outflow of capital from developing countries. The trend is predicted to continue through the near future. There are many motivations for international capital investment, and generally it is the pursuit of a higher rate of return.

The study, therefore, make an attempt to analyse the dynamics of some major macroeconomic variables during the post-reform period in India. The main focus of this study lies in analysing the behaviour of some

selected macroeconomic indicators in relation to the surge in inflows of private foreign capital in India since 1995 the year in which several major reform programmes were initiated. A review of the analytical literature shows that macroeconomic consequences of financial liberalization are the results of the combined effect of money supply, interest rate, inflation, and exchange rate policies followed by the government of a country. The objective of this study is to observe and analyse the dynamics of some selected macroeconomic indicators in relation to the inflows of private foreign capital as a consequence of economic reforms in India. The study also examines the trends and composition of capital flows into India. The paper is divided into seven sections including introduction. Section II describes the review of earlier theoretical and empirical literatures. Section III discusses the trends and composition of capital flows into India. Section IV reports the data and methodology. Section V presents the empirical findings and its discussion thereof. Section VI discusses the capital flows and its impact on macroeconomic variables. Section VII presents conclusion with some observations.

Capital Flows and Growth: Literature Survey

There have been large number empirical and theoretical studies in the recent years on capital inflows and their impact on macroeconomic variables. Edwards (2000) is one of the empirical studies which have made an attempt to evaluate the dynamic effects of capital inflows on the real exchange rate in some Latin American countries. The study observes that historically there has been an inverse relationship between capital inflows and the real exchange rate in the Latin American countries.

Immediately after the debt crisis, the real exchange rate depreciated sharply in all these countries. The trend, however, was reversed during the 1990s with the liberalization of the capital account in these countries. From a vector autoregression analysis, the study observes that the dynamic impact of capital inflows on the real exchange rate was different in several countries of the region, as far as the magnitude and the degree of persistence were concerned.

Recently, Alfaro et al. (2005) examine the empirical role of different explanations for the lack of flows of capital from rich to poor countries the "Lucas Paradox". The theoretical explanations include differences in fundamentals across countries and capital market imperfections. They show that during 1970-2000 low institutional quality is the leading explanation. This study emphasizes the role of institutions for achieving higher levels of income, but remains silent on the specific mechanisms. The results indicate that foreign investment might be a channel through which institutions affect long-run development. Another important study by Alfaro et al. (2002) examine the various links among FDI, financial markets and economic growth. The empirical analysis using cross-country data between 1975 to 1995 shows that FDI alone plays an ambiguous role in contributing to economic growth. However, countries with well-developed financial market gain significantly from FDI.

Neumann (2003) examines the effects of capital controls on the volume and composition of international capital flows in the presence of asymmetric information. Controls on capital inflows are shown to shift the composition of flows from fixed income instruments towards equity and to reduce the overall volume of inflows.

Lensink et al (1999) examine the impact of uncertain capital flows on the growth of 60 developing countries during the 1990s. They conclude that uncertain capital flows has a negative effect on financial market and growth in developing countries.

Beck (2000) empirically examines the relationship among the volatility of capital flows, foreign penetration and a liberal trade regime with regard to financial services during the period 1990s over a cross countries incorporating the variables such as inflation, foreign bank asset and economic freedom. He finds that the volatility of capital flows to emerging market is not only primarily caused by a lack of transparency and information but also liberalization of cross border supply. The positive effects of financial sector development are likely to enhance growth. He took four aspects of financial liberalization, which might have different impacts on stability of capital flows and financial stability in general, capital account liberalization, liberalization of trade in financial services, domestic deregulation and introduction of new financial instruments.

Studies on capital flows into India and its impact in macroeconomic variables have been analysed by Kohli, (2003), Chakraborty (2001 & 2003), and Dua and Sen (2006). Kohli (2003) examines capital flows on macroeconomic variables such as exchange rates, interest rates of foreign exchange reserves, domestic monetary condition and financial system in India during the period 1986 to 2001. She concludes an inflow of foreign capital has a significant impact on domestic money supply, stock market growth, liquidity, and volatility. Correlation between domestic and foreign financial market highlights India's vulnerability to external financial

shocks. Chakraborty (2003) analyses the financial crisis like East Asian crisis of 1997-98 and the Mexican crisis of 1994. She uses the vector autoregression (VAR) method to examine the external shock generated by capital inflows led to appreciation in the real exchange rate as observed in the East Asian and Latin American countries. This study is based on the quarterly data from 1993.2 to 2001.4 and incorporating the variables such as the real exchange rate, capital inflows, the rate of growth of domestic credit and the rate of inflation to examine the effects of capital flows in India. Three important observations emerge from the VAR analysis: (a) unlike the East Asian and Latin American countries, the real exchange rate depreciates with respect to one standard deviation innovation to capital inflows, (b) the dynamic impact of random disturbances generated by capital inflows on the real exchange rate is persistent, and (c) the dynamic response of the real exchange rate to capital inflows shock has largely been influenced by monetary policy and not by fiscal policy. She finds from the impulse response of the analysis which reflects the fact that the impact of inflows of foreign capital on the real exchange rate during the liberalized regime in India was different from that observed in East Asia and Latin America.

Chakraborty (2001) explains the effects of inflows of private foreign capital on some major macroeconomic variables in India using quarterly data for the period 1993-99. The Cointegration test confirms the presence of long-run equilibrium relationships between a few pairs of variables. But the dependence of each variable on private capital flows invalidates such cointegration except in two cases; cointegration exists between foreign currency assets and money supply, and between nominal

effective exchange rate and exports, even after controlling private capital flows. The Granger causality test shows unidirectional causality from private capital flows to nominal effective exchange rates. One of the important studies by Dua and Sen (2006) examine the relationship between the real exchange rate, level of capital flows, volatility of the flows, fiscal and monetary policy indicators and the current account surplus for the Indian economy for the period 1993Q2 to 2004Q1. They find that the real effective exchange rate is cointegrated with the level of capital flows, volatility of the flows, high-powered money, current account surplus and government expenditure. This relationship is statistically significant and each of the above determinants Granger causes the real effective exchange rate. The generalised variance decompositions show that determinants of the real exchange rate, in descending order of importance, include net capital inflows and their volatility (jointly), government expenditure, current account surplus and the money supply.

Studies relating to capital flows and its impact on economic growth in India have carried out by Rangarajan, (2001), Sethi and Patnaik (2007). One of the studies by Rangrajan (2000) investigates the capital flows into India and its impact on the capital formation and economic growth taking into the variable as net private capital flows, net direct investment, net official flows, net portfolio investment and other net investments during 1992 to 2000. He argues capital flows can be promoted purely by external factors which may tend to be less sustainable than those induced by domestic factors. Both capital inflows and outflows, when they are large and sudden, have important implication for economies. He concludes

that the capital account liberalization is not a discrete event. A similar paper by Sethi and Patnaik (2007) examine the impact of international capital flows on India's financial markets and economic growth. Using monthly time series data from April 1995 to July 2005, they found that Foreign Direct Investment (FDI) positively affects the economic growth, while Foreign Institutional Investment (FII) negatively affects the economic growth in India.

In the conclusion of the above literature, we find that, capital flows has significant impact on some macroeconomic variables in India. Also the capital flows between the countries reduce the cost of capital, increase investment and raise output. At a deeper level, however, it suggests that the experience of growth enhancing effects of capital inflows has been varied across countries. In this paper we examine the relationship between capital inflows and economic growth in India for a period of 10 years.

II.1. Cross-Border Capital Flows: The Analytics

The decade of the 1980s and 1990s witnessed an accelerated movement towards liberalization of capital controls, both as developed and developing economies. Liberalized capital accounts and the consequent freedom of cross border mobility for capital have been argued to be beneficial on several counts (Eichengreen et. al 1998, Stiglitz, 2000).

Firstly, freedom of capital movement permits optimal use of the world's capital resources by allowing capital to move to countries where real rates of return on capital is highest or where, without sacrificing returns, it can reduce overall portfolio risk with respect to investment elsewhere, raising the risk adjusted return to capital. Secondly, countries always experience

domestic and external shocks from time to time, creating imbalances in the current account. Capital movements therefore will be necessary to finance the current account imbalance and equilibrate the balance of payments – to avoid deflation or the need to impose trade restrictions. Cross border capital flows, on the assumption that it is counter cyclical in nature can perform a ‘consumption and investment smoothing’ role for economies (Cooper, 1999).

However, from the perspective of developing economies, the most persuasive argument in favour of allowing freer cross-border capital flows is the benefit that developing economies can derive by accessing international market. It is argued that low level of capital per worker in these economies have held output down. Cross border capital flows and consequent increase in net foreign financial resource transfer – analogous to running current account deficit can augment domestic saving and help developing economies achieve higher rates of investment, capital accumulation and growth. Open capital accounts, it is argued, also provide the needed spur for countries to create an economic environment attractive to business and investment, thus, acting as a check on wrong government policies. More generally, the case for open capital accounts is often made by way of an analogy to free trade in goods and services and the optimality of liberal trade regimes in a neo-classical framework (Stiglitz, 2000).

But, whether developing economies can actually realize these benefits is a hotly debated issue. Firstly, it has been argued that global financial flows actually cause greater macro economic instability. Even when fluctuating capital flows do not precipitate instability, given the pro-cyclical nature of

capital flow, it exacerbates shocks to economies that might originate elsewhere (Rodrik & Stiglitz 2000). The analogy of open capital accounts to free trade regimes, moreover, is problematic. Given the difference between financial markets and that of goods and services (problems of information asymmetry being acute in financial markets) optimality of liberal capital account regimes do not obtain even in the neo-classical frame of analysis. Coming to the argument on resource transfer through capital flows, it is argued that the international financial architecture of our modern times places severe limits on the extent of net foreign financial resource transfer that developing economies can realize over a long period. Moreover, capital flows being volatile and prone to reversal, even in the short run, host economies try, as a policy option, to resist domestic absorption of foreign financial inflows and sterilize† it (Eichengreen, 2000). Foreign financial inflows, then, actually displace domestic investment rather than play a complementary role.

Cross-border capital flows are, however, much more than just financial flows and depending on its type, have other effects on the host economy. Capital inflows can take the form of official flows, which are concessional government credit – either as development aid or bilateral trade credit through official channels, or private capital flows – which again can take

† sterilization is broadly defined as operations by the central bank that either affect offsetting decline (or increase) in domestic assets of the central bank in response to an increase (decline) in its net foreign assets or influence the money/credit multiplier so as to moderate the monetary impact of changes in ‘high powered’ money due to changes in foreign exchange reserves.

the shape of foreign direct investment by multinational corporations or foreign firms, foreign portfolio investments by institutional investors in the securities (bonds or stock) market of the host economy, or inflows through banking channels in the form of bank credit or bank deposits. Each of these different categories of capital inflow, apart from having the general macro economics effects discussed above, also has other effects on the host economy. However, given the purview of our analysis in this study, we limit the discussion to private capital flows (foreign direct investment and portfolio investment alone).

Foreign portfolio investment by Foreign Institutional Investor's (FIIs) in equity and bond markets of developing economies serve to integrate the domestic capital market with international market. This integration helps the host economy, it is argued, in two ways. Investments by FIIs in secondary equity markets provide buoyancy to equity prices which can reduce the cost of fresh issue of equity for the corporate sector. Participation of FIIs also helps in improving the operating efficiency of these markets to international levels. This along with buoyant security prices, attract other domestic agents (household and other financial institutions) into investing in the stock market, leading to an enhancement of the depth and breadth of domestic financial markets (Levine, 1996, 1997, Obstfeld, 1998). However, critics argue that FII inflows, given their short term nature are destabilizing for developing economies (Stiglitz, 2000). Firstly, inflows on portfolio account are the most volatile component of foreign capital flows and it causes wide fluctuations in asset (equity or bond) prices. Large inflows of FII investment can lead to a boom in secondary prices that can become

unsustainable upon reversal of the inflow (Aitken, 1998). The volatile nature of FII inflow also exacerbates problems of macroeconomic management that we discussed above.

Foreign direct investment, however, has been a more pervasive phenomenon in developing economies than portfolio flows. Through the history of capitalism, the relation between foreign capital and domestic enterprises in developing economies has been fraught with contradiction and controversies. Opinion, therefore, has remained divided on the role of foreign capital in the industrialization of developing economies. While some argue that MNCs can play a positive role, others argue that unbridled entry and operation of MNCs in developing Economies would lead perpetuation of industrial backwardness and continuation of relation of 'dependence' with the more developed economies.

Foreign direct investment can have a positive effect on the host developing economy, mainly, through two channels. Foreign direct investment by multinational corporations, who are the repositories of advanced technological capabilities, can help developing economies gain access to technical know-how-which can become a positive externality for other domestic firms and raise the growth potential of the economy through technological diffusion (Bird & Raian 2000). The other major advantage that host economies can derive is through the positive contribution of multinational corporations in improving export performance of the economy. One way in which enhanced export performance can materialize, is through the diffusion channel – whereby, technological backwardness contributes to export competitiveness of the host economy.

Pattern of Capital Flows to Emerging Markets

Capital flows to emerging markets over the last century have followed a boom-bust pattern, notwithstanding the large regional and compositional variations. The major boom in capital flows that started around 1870s continued till the outbreak of the First World War. This was the period of *laissez faire*, marked by significant international flows of goods, labour and capital across nations, mainly directed towards infrastructure, especially utilities and railroads. Most of the foreign investment during this period was long-term with about two-thirds in the form of portfolio flows and the remaining being in the form of direct investment. The weak communication infrastructure and information base led investors to prefer debt instruments. This is in sharp contrast to the late 20th century scenario when direct investment became extremely important, accounting for more than 50 per cent of the private capital flows in the 1990s. The boom ended with the onset of World War I. The ensuing years (1920-1931) saw a modest revival of capital flows, mostly to emerging market economies to meet their developmental goals. The period from 1945 to 1972 was marked by large capital flows among different industrialized countries, with capital flowing to emerging markets only at the margin. The period since 1973, however, witnessed different phases: (1) 1973-82: boom in capital flows to developing countries averaging at about \$163 billion per annum, (2) 1983-89: stagnation in capital flows at about \$103 billion per annum, (3) 1990-97: dramatic surge in capital flows, with the peak of \$ 344 billion in 1997, (4) 1997-1999: sharp deceleration in the aftermath of South East Asian crisis and (5) 2000-01: moderate recovery in 2000 but heightened uncertainty amidst global recessionary conditions

and tendency for flight to safety. 1973-82 was the period of first two oil price shocks and the surge in capital flows during this phase was associated with the recycling of oil revenues. Bank loans to developing country governments, firms and banks were the main form of capital flows accounting for almost 57 per cent of total flows. Asia and Latin America received the maximum share. However, the worsening macroeconomic performance in the developing countries along with sluggishness of activity in mature markets turned the terms of trade against emerging markets. The emergence of debt servicing difficulties changed the scenario for the rest of the 1980s. Between 1983 and 1989, capital flows to developing economies almost stagnated at around \$105-110 billion, with private sector accounting for hardly one-third of these flows. While inappropriate economic policies kept the private investors away from the developing countries, the developed financial markets of the industrialized countries acted as a powerful attraction for private capital. By the end of the decade, aggregate direct investment flows into developing countries were one-eighth of the flows into developed countries (\$ 18.1 billion as against \$ 161.2 billion). Portfolio flows were rather limited (practically zero), given the underdeveloped and non-existent nature of the developing country equity markets. The disadvantages of contractual foreign capital as opposed to FDI became clearly evident during the external debt crisis of the 1980s. The earlier aversion to FDI - reflected in restrictive national FDI policies stipulating ownership norms, operational restrictions *viz.*, positive, negative and restricted lists, performance requirements *viz.*, export obligation - declined over time. In the competition to attract FDI, a combination of

preconditions and incentive package assumed increasing importance in the liberalization of FDI policy. With better economic performance and relatively open capital accounts, the 1990s saw a return of capital flows to emerging markets to the pre-1914 levels. Net capital flows to developing economies surged from \$ 80.5 billion in the late 1980s to \$ 344 billion in 1997. The composition of flows, however, altered significantly over time. In 1991- 92, for the first time since 1982, private flows exceeded official finance with their share rising from 42.6 per cent in 1990 to a peak of 90.1 per cent in 1996, before dropping to 82.1 per cent in 1999. Also, equity flows (direct and portfolio) replaced the bonds of the gold standard era and the syndicated bank loans of the 1970s reflecting growing securitizations and increasing role of institutional investors, trade liberalization, financial deregulation, financial innovation and the technological revolution. This also reflected a growing preference on the part of developing countries for non-debt flows. Although portfolio inflows remained important, it is FDI that showed a six-fold jump from about \$ 35 billion in 1991 to \$185 billion in 1999. The share of FDI in developing country's GDP rose from around 0.8 per cent to 2.5 per cent over the same period.

The turbulence in the international financial markets continued to impinge on developments in the capital account as reflected by quantum, composition and degree of volatility in capital flows during 1998-99. Net capital inflows fell to US \$ 8.6 billion as against US \$ 9.8 billion during 1997-98. Inflows under foreign direct investment, external assistance and deposits under various nonresident schemes were relatively stable as against a steep fall in the portfolio investment by foreign institutional

investors (FIIs). External commercial borrowing through traditional channels showed a sharp decline but it was more than compensated by the successful mobilization of funds through the issue of RIBs. It may be noted that the proportion of relatively stable flows to total capital flows has also increased significantly in 1998-99 for the third successive year (Bleaney et al., 1999).

Net Capital Flows to Emerging Markets and Developing Economies

Item	2001	2002	2003	2004	2005	2006	2007P
1	2	3	4	5	6	7	8
Private Capital Flows	20.6	47.0	160.4	230.6	254.0	178.8	158.8
Direct Investment	189.1	139.3	157.5	184.3	212.3	220.6	217.5
Portfolio Investment	-95.7	-98.6	-3.7	34.5	38.5	-4.7	-
Others Flows	-72.8	6.3	6.6	11.8	3.2	-37.1	-
Official Capital Flows	25.8	3.3	-61.5	-81.5	-13.6	-161.3	-
	163.6						

P: IMF Projection

Source: World Economic Outlook, IMF, April 2006

Other private flows remained volatile. Official flows fluctuated around \$ 50 billion with a significant fall in 1996 and 1997. On the recipient side, the share of private borrowers has increased dramatically from the last two decades. The private sector receives more than 65 percent of the

total flows (a trend similar to the 1870-1913 period), unlike the other two period of surges (1920s and 1970s) when the share of the private sector had fallen to around 20 percent. Asia and Latin America accounted for around 70 percent of the total flows to emerging markets with Middle East and Sub Saharan Africa getting a minimal share. FDI occupied the dominant position for Asia while portfolio flows were more significant in Latin America. It is generally believed that the boom in capital flows of the late 20th century can no way match the degree of integration that prevailed during the gold standard era. The current account surplus of the major creditor nations in the 20th century never exceeded 3-4 percent of GDP, while during 1870-1913, Britain, the major lender, ran an average current account surplus of above 5 percent of GDP. On the receiving side, the current account deficit of the borrowing countries during the late 19th century averaged 3.8 percent, while it was around 2.3 percent for the period 1993-97. As a percentage of the world total, foreign investment in developing economies was 45 percent in 1914 as against only 22 percent in 1992. Many other indicators also point towards deeper integration in the late 19th century as compared with the late 20th century (Eichengreen et al., 1998). Following the financial crisis of 1997, private capital flows to emerging markets declined from a peak of \$ 344 billion in 1997 to \$ 280 billion in 1998 and further to \$ 219 billion in 1999. The fall was particularly sharp for market-based flows (bank loans, bonds and equity) owing to uncertainty and risk aversion of investors following the South East Asian crisis. FDI continued its rising trend in absolute terms, though as a share in global FDI, it fell by almost half from 36.5 per cent in 1997 to 18.9 percent in 1999 and further to 15.9 percent in 2000.

Concessional flows rose in 1997 reflecting increase in Japanese aid in response to the East Asian crisis. Private capital flows to developing countries saw a modest recovery in 2000 to \$ 257 billion; however, it still remains about 15 per cent below the peak 1997 level. For the first time in over a decade, FDI showed a decline though it still continues to be the dominant component of private capital in all regions. The slowdown of FDI inflows to Asia is maximum and Western Hemisphere reflecting slowdown in mergers and acquisitions activity in Asia and completion of large-scale privatization projects in Latin America. In 2000, there was a modest recovery in bond financing and bank lending commitments, though concerns over credit risks in developing countries remained high, as reflected in the rise in spreads and shortening of debt maturities since the crisis. Unlike FDI, portfolio flows have shown a rising trend for the past two years reaching \$ 48 billion in 2000. However, with the growing linkages between emerging market and US market stock prices, equity flows are guided apparently less by diversification motives and remain concentrated in few countries - particularly Brazil, China, Mexico and Turkey, that received more than 80 per cent of the flows. The future scenario remains uncertain with the absence of any counter cyclical trend in capital flows to emerging markets as in the past.

Net Capital Flows to Developing Countries, 1998-2006
(US \$ billions)

Item	1998	1999	2000	2001	2002	2003	2004	2005	2006 e
Current Account Balance	-96.7	-19.1	34.4	12.1	60.5	101.9	113.6	256.4	348.5
as % of GDP	-1.7	-0.3	0.6	0.2	1.0	1.5	1.4	2.7	3.1
<i>Financial Flows:</i>									
(a) Net private and official flows	-228.9	209.6	181.1	191.1	174.2	262.0	385.9	480.7	571.0
Net private flows (debt/equity)	193.4	195.6	187.0	164.5	169.2	274.1	412.5	551.4	646.8
Net equity flows	175.8	189.6	179.9	176.6	162.9	184.3	257.5	347.5	418.8
Net FDI inflows	170.0	178.0	166.5	171.0	157.1	160.0	217.8	280.8	324.7
Net portfolio equity flows	5.8	11.6	13.4	5.6	5.8	24.3	39.9	66.7	94.1
(b) Net debt flows	53.1	20.0	1.2	14.5	11.3	77.7	128.2	133.2	152.2
(c) Official creditors	35.5	14.0	-5.9	26.6	5.0	-12.1	-26.6	-70.7	-75.8
World Bank	8.7	8.8	7.9	7.5	-0.2	-0.8	1.4	2.5	-2.4
IMF	14.1	-2.2	-10.7	19.5	14.0	2.4	-14.7	-40.2	-25.1
(d) Others	12.7	7.4	-3.1	-0.4	-8.8	-13.7	-13.3	33.0	-48.3
Private creditors	17.6	60.0	7.1	-12.1	6.3	89.8	154.8	203.9	228.0
Net medium and long Term flows	82.9	23.3	13.4	11.6	5.8	34.8	86.4	136.2	156.0

Bonds	38.8	30.1	20.9	10.3	10.4	24.7	39.8	55.1	49.3
Banks	49.4	-5.3	-3.8	7.8	2.3	14.5	50.6	86.0	112.2
Others	-5.3	-1.5	-3.3	-6.5	-6.9	-4.4	-4.0	-4.9	-5.5
Net short debt flows	-65.3	-17.3	-6.3	-23.7	0.5	55.0	68.4	66.7	72.0
Balancing item ^a	-114.6	-158.1	-170.4	-122.4	-60.2	-69.1	-95.5	345.4	-286.5
Change in reserves	-17.6	-32.4	-45.1	-80.8	-174.4	-294.7	-404.0	391.7	-633.1
<i>Memo Items:</i>									
Bilateral aid grants	42.5	44.4	43.3	43.7	50.6	63.6	70.5	71.3	70.6
Technical cooperation grants	15.8	16.0	14.7	15.8	18.2	20.1	20.4	19.3	19.9
Others	26.7	28.4	28.6	27.9	32.4	43.5	50.1	52.0	50.7
Net official flows (aid = debt)	78.0	58.4	37.4	70.3	55.6	51.1	43.9	0.6	-5.2
Workers' remittances	72.7	76.6	83.8	95.3	116.2	143.8	163.7	189.5	199.0
Repatriated earnings on FDI	28.7	27.8	34.6	43.8	43.2	53.4	73.8	107.0	125.0

Sources: International Financial Statistics (IFS), IMF,

Note: e = estimate, a= combination of errors and omission and net acquisition of foreign assets (including FDI) by developing countries

III.1. Trends and Composition of Capital Flows into India

The 1990s saw a radical transformation in the nature of capital flow into India. From a mere absence of any private capital inflows till 1992 (except those by Non-Resident Indians), today such inflows represent a dominant

proportion of total flows. The official flows, shown as external assistance, represent grants and loans from bilateral and multilateral sources represented 75-80 per cent of flows till 1991. By 1994, this declined to about 20 per cent and fell below 5 per cent by late 1990s.

During the last 10 years, India has attracted more than US \$ 40 billion of foreign investment (table-1 & 2). At a time, when the flow of private capital to developing countries has shrunk considerably, private flows to India have strengthened, and are currently running at US \$ 9 to 10 billion per year, of which more than 55 per cent constitute FDI and portfolio flows. As a matter of fact, there has been limited recourse to bank borrowing or floating of bonds abroad by Indian corporate sector, as RBI and government tried to limit access to such borrowings to few large private companies with high credit ratings, in a policy of limiting debt creating inflow. In some years though, such debt creating flows were significant and constituted about 40 per cent of inflows. The liberalization of the portfolio investment led to a surge in inflow of capital for investment in the primary and secondary market for Indian equity and corporate (and subsequently sovereign) bond market. About 460 foreign institutional investors (FIIs) have been allowed to enter the Indian market and together have brought in more than US \$ 14 billion GDR and ADR floated by Indian corporate sector brought in the remaining portfolio inflows.

Table-2 provides an overview of the total foreign capital that India attracted during the 1992-2004 period. As the table shows, India has attracted about \$ 22 billion in portfolio investments since 1993-94 and more than \$18 billion in FDI. These portfolio flows began in 1993 when

India attracted more than \$5 billion in few months and continued at the level of \$ 2-3 billion per year till the Asian crises. The year 1998 witnessed a marginal out flow from the Indian stock market but soon the inflows went back to the US \$ 2-3 billion per year level (Khanna, 2002).

The first phase of stock market liberalization also saw many Indian companies issuing GDR and listing them on European exchanges like Luxembourg. As table-2 shows during 1993-95 more than half of the portfolio investments was the Global Depository Receipts (GDR) floated by the Indian companies while the other half was FII investments. The FII investment was initially limited to a selected group of stocks and they were excluded from the growing market for bonds, and government securities. Their entry into the latter was permitted only in the late 1990s. The total amount of funds raised by India through GDR constituted roughly 40 percent of total inflows. However, during the second half of the 1990s there was a sharp decline in the funds raised through GDR and FII investment in the Indian equity (and recently bond market) became the main form of portfolio inflows (Khanna, 2002).

Table 1

INDIA'S: COMPOSITION OF CAPITAL INFLOWS (US \$ million)

Variable	1990-91	1991-92	1992-93	1993-94	1994-95	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Total Inflows (net) of which:(In percent)	7056	3910	3876	8895	8502	4089	12006	9844	8435	10444	10018	10573	12133	22112	31027	24693	45779	108031
1. Non Debt-creating inflows	1.5	3.4	14.3	47.6	57.9	117.5	51.3	54.8	28.6	49.7	67.8	77.1	46.6	72.5	46.7	81.7	34.5	41.5
a) Foreign Direct investment	1.4	3.3	8.1	6.6	15.8	52.4	23.7	36.2	29.4	20.7	40.2	58.0	38.5	21.1	18.0	31.1	18.8	14.4
b) Portfolio investment	0.1	0.1	6.2	41	42.1	65.1	27.6	18.6	-0.8	29	27.6	19.1	8.1	51.4	28.7	50.6	15.7	27.1
2. Debt-creating-inflows	83.3	77.5	39.0	21.3	25	57.7	61.7	52.4	54.4	23.1	59.4	9.2	-10.7	1.4	30.6	29.9	51.2	49.6
a) External assistance	31.3	77.7	48.0	21.4	17.9	21.6	9.2	9.2	9.7	8.6	4.3	11.4	-20.0	-12.0	6.5	6.2	3.9	1.9
b) External commercial Borrowing #	31.9	37.2	-9.2	6.8	12.1	31.2	23.7	40.6	51.7	3	37.2	-14.9	-19.4	-8.4	16.3	7.8	35.8	20.5

c) Short term Credits	15.2	-13.1	-27.8	-8.6	46	1.2	7	-1	-8.9	3.6	1.0	-8.4	8.1	7.1	12.2	6.9	7.3	16.4
d) NRI Deposits (\$)	21.8	7.4	51.6	13.5	2	27	27.9	11.4	11.4	14.7	23.1	26.0	24.6	16.4	-3.1	11.3	8.7	0.2
e) Rupee Debt-Service	-16.9	-31.7	-22.7	-11.8	-11.6	-23.3	-6.1	-7.8	-9.5	-6.8	-6.2	-4.9	-3.9	-1.7	-1.3	-2.3	-0.4	-0.1
3. Other Capital @	15.2	19.1	45.8	31.1	17.1	-75.2	-13	-7.2	17	27.2	-27.2	13.7	64.1	26.1	22.7	-11.6	14.2	8.9
Total (1+2+3)	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Memo Item: Stable flows *	84.7	112.9	121.6	67.6	53.3	33.7	65.4	82.4	109.7	67.4	68.2	88.1	84.5	85.6	59.1	42.5	91.6	56.5

refers to medium and long terms borrowings.

\$ including NRNR deposits.

@includes delayed export receipts, advance payment against imports, loans to non-residents by residents and banking capital.

* Stable flows are defined to represent all capital flows excluding portfolio flows and short-term trade credits.

Source: Report on Currency and Finance, 2008-09, RBI,

Thus in a span of less than a decade, private foreign investment to India constitute more than 55 per cent of all flows. The total inflow of \$ 22 billion as portfolio investment also constitutes a significant proportion of the total market capitalization in India.

Table 2
Official and Private Net Flows (US \$ Billions)

Year	Official Net Resource Flows (Average)				Private Net Resource Flows (Average)			
	All developing countries	East Asia & Pacific	South Asia	India	All Developing countries	East Asia & Pacific	South Asia	India
1975-79	22.54	2.76	3.60	1.37	39.01	4.33	0.33	0.21
1980-84	35.17	5.02	4.68	1.89	42.73	8.53	1.89	1.56
1985-89	42.08	6.89	6.96	2.88	33.61	11.57	3.61	3.40
1990-94	53.27	9.80	5.86	1.98	122.76	47.83	5.47	4.22
1995-99	37.93	10.23	4.08	0.83	240.35	62.62	7.80	6.34
2000-04	29.40	0.36	4.01	-0.63	261.86	69.63	14.25	11.73
2005	0.60	3.16	8.39	-0.32	483.00	138.18	23.29	17.02
2006	-5.20	1.63	24.49	-0.11	562.80	148.69	33.08	21.05

Source: Global Development Finance, 2007; RBI Handbook of Statistics, 2007

Table 3
Foreign Direct Investment and Portfolio Flows (US \$ Billions)

Year	Net FDI Flows (Averages)				Net Portfolio Equity Flows (Averages)			
	All Developing countries	East Asia & Pacific	South Asia	India	All developing countries	East Asia & Pacific	South Asia	India
1975-79	7.4	1.05	0.09	0.03	0	0	0	0
1980-84	11.28	2.65	0.18	0.06	0.03	0.01	0	0
1985-89	16.44	6.48	0.36	0.13	1.58	0.74	0.08	0.08
1990-94	66.34	32.87	1.35	0.8	18.03	2.02	2.12	1.75
1995-99	164.49	54.73	3.88	2.88	18.51	2.99	2.23	2.12
2000-04	174.48	53.82	6.02	4.92	17.8	8.74	4.58	4.7
2005	280.8	96.4	9.9	6.6	66.7	26.1	12.2	12.2
2006	324.7	88.3	12.9	8.0	94.1	48.4	10.0	8.7

Source: Global Development Finance, 2007; RBI Handbook of Statistics, 2007

Table-4
Capital Flows Into India after 1990s (Yearly) Us \$ Million

Year	FDI	FPI	FII	NRI	ADR/GDR	TCF
1990-91	97	6	-	-	-	103
1991-92	129	4	-	-	-	133
1992-93	315	244	1	42	240	559
1993-94	586	3567	1665	89	1520	4153
1994-95	1314	3824	1503	171	2082	5138
1995-96	2144	2748	2009	169	683	4892
1996-97	2821	3312	1926	135	1366	6133
1997-98	3557	1828	979	202	645	5385

1998-99	2462	-61	-390	179	270	2911
1999-00	2155	3026	2135	171	768	5181
2000-01	4029	2760	1847	67	831	6789
2001-02	6130	2021	1505	35	477	8151
2002-03	5035	979	377	NA	600	6014
2003-04	4673	11377	10918	NA	459	16050
2004-05	5653	9313	8684	NA	613	14966
2005-06	7751	12492	9926	NA	2552	20243
2006-07	19531	7003	3776	NA	3225	26534
2007-08	34,835	27,271	20,328	NA	6,645	89,079
2008-09 ^P	37,838	13,855	15,017	NA	1,162	67,872
2009-10 ^P	37,763	32,376	29,048	NA	3328	102,515

Source: *Hand Book of Statistics on Indian Economy*, Reserve Bank of India (RBI).

@¹ FIIs, NRI, and GDR are introduced in 1993 September, so data before the 1993 is not available. TCF²; Total Capital Flows, P³: Projection value.

Thanks to the large inflows, the Indian economy faced, for the first time, a comfortable foreign exchange position. The rising reserves also reduced the vulnerability of the economy to minor shocks and also brought in large amount of investments from Non-Resident Indians (NRIs). The liberalization of gold imports and overall trade liberalization led to a sharp decline in capital flight and the black market premium on foreign exchange disappeared. This led to a diversion of transfer payments (mainly remittances from workers abroad) from illegal to banking channels. The transfer payments rose sharply from \$ 2-3 billion in 1991-92 to \$ 11-13 billion by the end of the decade.

Data and Methodology

IV.1. Data

The data for the study have been collected from the secondary source such as Handbook of Statistics in Indian Economy published by RBI and International Financial Statistics (IFS) published by IMF. The monthly data have been taken for the period from 1995:04 to 2011:07.

The data of the study are private foreign capital inflows (FINV), Foreign Direct Investment (FDI), Foreign Portfolio Investment (FPI), Foreign Institutional Investment (FII) money supply (M3), exchange rate (EXR), wholesale price Index (WPI), export (EXP), import (IMP), foreign exchange reserve (FOREX), rate of interest (RI) and index of industrial production (IIP). The index of industrial production (IIP) has been taken as the proxy of GDP, because this study is based on monthly time series data and the monthly data of GDP is not available. The choice of IIP as a proxy for economic growth is for two other reasons. First, IIP is significantly correlated with real GDP (0.97 with a significance level of 0.01) as well as with the real output of the services as a robust proxy for economic growth. Second, IIP is found to be reliable leading indicator of business cycles in India (Mazumdar, 2005). The period of study is constrained due to the unavailability of data after the liberalization period from 1991. Hence, the period of the study has been taken from 1995:04 to 2011:07.

IV.2. Methodology

Firstly, in order to examine the effect of private foreign capital inflows on macro economic variables namely, wholesale price index, exchange rate, money supply, export, import, foreign exchange reserve, rate of interest, index of industrial production, Vector Autoregressive (VAR) method, impulse response function and variance decomposition technique are employed to examine the short-term dynamics and casual relationship between variables.

Before estimating the VAR model, the unit root tests examine the stationary properties of the variables. In this study two unit root tests, *viz.* Dickey Fuller (DF) and Augmented Dickey Fuller (ADF) tests have been conducted to examine the stationarity properties of the variables.

IV.2.1. Vector Autoregression (VAR)

To examine the dynamic relationship between private foreign capital inflows with macroeconomic variable, a vector auto regression (VAR) model is employed. There is no need to elaborate on the VAR methodology as it is available from standard references which include Hamilton (1994), Enders (1995) and Mills (1990), among others. This approach has two major advantages over the extent of empirical research on this issue. First, VAR superficially resembles simultaneous equation modeling in that all the variables are considered to be endogenous. However, each endogenous variable is explained by its lagged or past values and lagged values of the other endogenous variables included in the model. Usually there are no exogenous variables in the model. Thus, by avoiding the imposition of a priori restriction on the model the VAR adds significantly to the flexibility of the model. Second, the VAR methodology can accommodate the general dynamic relationship among economic variables. Because most of the relevant empirical analyses utilize a partial equilibrium framework and do not account fully for dynamic interrelations, previous studies related to this topic may yield misleading inferences.

IV.2.2. *Impulse Response Function (IRF) and Variance Decomposition Technique*

The impulse response function (IRF) shows the dynamic responses of all the variables in the system to a shock or innovation in each variable. For computing IRFs, it is essential that the variables in the system are ordered and that the system is represented by a moving average process.

Variance decomposition is used to detect the causal relation among the variables. It explains the extent to which a variable is explained by the shocks in all the variables in the system. The forecast error variance decomposition explains the proportion of the movement's

private foreign capital inflows in a sequence due to its own shock versus shocks to the other macroeconomic variable.

Empirical Findings

This section empirically analyses the effect private foreign capital inflows on some of the major macroeconomic variables in India using the monthly time series data for the period 1995:04 to 2011:07. We try to understand if the observed fluctuations in the time-series data of some macroeconomic variables, viz., interest rate, wholesale price index, money supply, exchange rates, exports, import and foreign exchange reserve, which can be explained in relation to the fluctuations in the time series of inflows of foreign capital. Research done over the past decades shows that before indulging in any econometric modeling using time-series data, one should be concerned about the problem of non-Stationarity or unit root problem. Results from a regression exercise involving non-stationary data is observed to be spurious (Granger and Newbold, 1974, Granger, 1981). Therefore, the following empirical analysis is carried out in the light of the recent developments in the time series analysis.

The results of various unit root tests namely DF and ADF tests are shown in table 1 below. Result shows that all the variables are non-stationary at level, but achieve stationarity at on first differences. Hence, they are said to be integrated of order one, and are usually denoted I (1). If all the variables in model are I (1), then it is important to discover whether a linear combination between them is stationary or not and one should move on to investigate the possibility of cointegration among these variables.

A series of economic reform measures including liberalization of private foreign capital inflows was initiated in India since the 1990s. To examine the dynamic relationship between private foreign capital inflows with macro economic variables, a vector auto-regression (VAR) model is employed. It is well known that the result of VAR is

sensitive to lag length and order of the variables entering each of the VAR models. Prior to using the VAR technique, optimal lag length used for modeling is selected through three lag length selection criteria namely: Akaike Information Criteria (AIC), Schwarz Info Criteria (SIC) and Hannan-Quinn Information Criteria (HQIC) tests (see table 2).

We have estimated a series of unrestricted vector auto-regression (VAR). While estimating VAR, however, one should take note of two main issues: (i) the order of integration of endogenous variable and (ii) lag length to be included. We start with a very large number of lags. If the estimated t-statistic for the last differenced lag is not significant, we reduce the number of differenced lags by one to carry out the test. This process is continued until we find a differenced lag which is statistically significant. For the choice of lag length, we estimate several alternative VAR model selection criteria, viz., AIC, SIC and HQIC to select the best model. Since the number of observation is small we have not been able to consider lags larger than three. Other than VAR model, the study has also carried out impulse response function and variance decomposition analysis to establish a dynamic relationship among the variables. As it is well known that VAR results may acquire influence by the ordering of the endogenous variable, we have tried with various orderings and the results have been compared.

We begin with testing the order of integration of all the variables. Results of DF and ADF tests are reported in table 1. It appears that all the variables have one unit root and they become stationary after taking first difference of these series. We therefore carry out the VAR analysis with the first difference series of all these variables. As stated earlier, we have estimated a number of unrestricted VAR model with lags from 1 to 3 (table 2). Following the Akaike Information Criteria (AIC), Schwarz Criteria (SC) and Hannan-Quinn Information Criteria (HQIC), however, it is found that the model with 3 lags is the best model. It is observed that lagged values of some of the variables

included in this model have a significant effect on private foreign capital inflows (FINV). Lagged values of EXR, IIP, FOREX and M3 affect FINV and FINV affect them. Some of the variables such as CMR, IMP, EXP and WPI do not affect FINV. It shows that a private foreign capital inflow has a dynamic relationship with exchange rates, economic growth, foreign exchange reserves and money supply in India during the study period. On the other hand, a private foreign capital inflow has no effect on interest rate, import, export and inflation during the period. It also shows that increase in private foreign capital inflows leads to the appreciation of exchange rate and increase in economic growth. It also helps to raise the foreign exchange reserve and money supply in India which will help to boost the economic growth of the country. The result indicates that a private foreign capital inflow into India has no impact on import, export, interest rates and inflation rates.

V.1. Choice of Lag Length

While determining lag length, econometricians have either fixed the lag length arbitrarily or chosen it through some statistical procedure. The study uses five lag order selection criterion such as Likelihood Ratio (LR), Final Prediction Error (FPE), Akaike Information Criterion (AIC), Schwarz Information Criterion (SIC) and Hannan-Quinn Information Criterion (HQIC) as shown in table 2. Except LR and FPE, all other criteria unanimously select lag order 3, and, thus we take that as optimum lag length. A lag of three months seems to be appropriate for an analysis of private foreign capital flows and macroeconomic variables because the external sector policy or monetary policy is revised twice every year in India. During the period of study, policy changes have become frequent in a bid to deregulate the economy and strengthen the market forces. Under such circumstances, the lag of three months is justifiable.

V.2. Ordering of the Variables

The ordering of the variable is a crucial aspect in VAR estimation. The implication of such ordering is that a current innovation in the variable is placed first in the ordering, which affects the rest of the variables. However, the current innovations in variables towards the end are not expected to affect the variables at beginning of the order. The present study experimented with several ordering of the variables. However, as the different ordering of the variables does not substantially alter the results, the study reports the results for only one ordering.

Ordering of VAR is specified as:

{CMR, EXPO, EXR, FINV, M3, FOREX, IIP, IMP, WPI}

The above-mentioned orderings imply that current innovations in FINV can affect the entire system, but a shock in WPI cannot affect the current period of FINV. Similarly by the assumed ordering, CMR cannot affect the current period FINV and M3, but can affect all the remaining variables in the system. With this logic WPI has been placed at the end of ordering with the presumption that current innovations in all variables affect the current period, where as innovation in WPI and IMP cannot affect the current period of any of the variables in the model except itself.

The above ordering, to some extent is in conformity with macroeconomic logic. Assuming that a positive shock is injected into private foreign capital inflows, it will force an increase in foreign exchange reserves, money supply and economic growth through wealth effect. A sudden increase in money supply will push the short-term interest rate up in the economy. Rising interest rates will attract more foreign capital inflows into the domestic economy. Higher foreign capital inflows lead to further increase in reserve money and increase liquidity in the local money market.

However, unlike the econometric models, in the case of the VAR model more important insights are drawn from the impulse response analysis and variance decomposition. The details of variance

decomposition and impulse response function and their implication are discussed below.

V.3. Variance Decompositions Technique

Variance decompositions give the proportion of the periods a head forecast error variance of a variable that can be attributed to another variable. These, therefore, measure the proportion of the forecast error variance of FINV that can be explained by shocks given to its determinants. Note that the forecast error variance decompositions only give us the proportion of the forecast error variance of FINV that is explained by its determinants.

Table 3 reports the results for variance decomposition of RFINV. It follows that apart from its own contribution, the highest contribution to variation of RFINV comes from REXR. It shows that the average contribution of private foreign capital inflows to variation of REXR, RFOREX, REXPO, and RM3 are 9.7%, 7.29%, 6.28%, and 5.28% respectively. Thus, private foreign capital inflows have played the most important role in explaining the dynamic changes with macroeconomic variables. At the end of the 24 forecast horizon, around 57% of the forecast error variance of RFINV is explained by its own innovation.

It is found that all the macroeconomic variables have a dynamic relationship with private capital inflows. In some cases, the relationship does not exist among few variables, for some period, but later the dynamic relationship exists. Overall, we can conclude that Variance decomposition method shows a dynamic relationship among all variables throughout the period.

The variance decompositions give the proportion of the forecast error variance of RFINV which is explained by its determinants. It does not indicate the direction (positive or negative) or the nature of the variation. Thus, impulse response analysis is used to analyze the dynamic relationship among variables.

V.4. Impulse Response Function

An investigation of the dynamic interaction of various shocks in the post-sample period is examined using the variance decomposition and impulse response functions. Instead of the orthogonalised impulse responses, we use the generalised impulse responses and variance decompositions. The advantage of using the generalised response is that the orthogonalised impulse response and variance decompositions depend on the ordering of the variables. If the shocks to the respective equations in VAR are contemporaneously correlated, the orthogonalized and generalised impulse responses may be quite different. On the other hand, if shocks are not contemporaneously correlated, then the two types of impulse response may not be different and also the orthogonalised impulse responses will not be sensitive to a reordering of the variables.

Figure 1 explains the impulse response function of RCMR. It is obvious that with respect to one standard deviation shock to private foreign capital inflow (RFINV), the call money rate (RCMR) increases the 0.3% and this shock is persistent up to 24 horizons. The effect on RCMR of a one-standard deviation shock to private foreign capital inflows is positive in short run. In long run the standard deviation shock to private foreign capital inflows have negative impact on RCMR.

Figure 2 describes the impulse response function of RWPI. It is evident that with the respect to one standard deviation shock to private foreign capital inflows (RFINV), the RWPI increases by 1.5% which creates inflation in the economy and these shocks persistent up to 24 horizons. In the short run, the effect of private foreign capital inflows on WPI creates inflation, but in long run it does not work.

Figure 3 demonstrates the impulse response function of REXR. It is evident that with respect to one standard deviation innovation to private foreign capital inflows (RFINV), the change of exchange rate depreciates by 0.10% and this shock persists up to 24 horizons. In the

short run, the effect of private foreign capital inflows on exchange rate is negative and the volatility is very high, but in the long run, the fluctuation of exchange rate is stable. Since it is known that impulse response function gives different results if the ordering of the variable changes, we have tried several alternative orderings. In all the cases, however, impulse response analysis shows that the first difference in REXR depreciates with respect to one standard deviation innovation to private foreign capital inflows.

Figure 4 presents the impulse response function of REXPO. It shows that one standard deviation shock to private foreign capital inflows, the REXPO increases by 4% and this shock is persistent up to 24 horizons. The effect of private foreign capital inflows on export is very significant in the short term, but in the long run, the effect is very less.

Figure 5 discusses the impulse response function of RFOREX. It shows that, one standard deviation shock to private foreign capital flows, the RFOREX increases by 50% and the shock is persistent up to 24 horizons. The effect of private foreign capital flows on foreign exchange reserve is very significant both in short and long run. Higher the private foreign capital inflow induces the higher foreign exchange reserve in the economy.

The figure 6 describes the impulse response function of RIIP. Here one standard deviation shock on RFINV leads to an increase in RIIP which explains the phenomenon of additional private capital inflows into the country and hence enhances economic growth. The effect of private foreign capital inflows on IIP is very volatile, still very significant. The high capital inflow into India has positive impact on economic growth.

The figure 7 explains the impulse response function of RIMP. It shows that one standard deviation shock to private foreign capital flows, the RIMP increases by 1% and the shock is persistent up to 24 horizons. The effect of private foreign capital inflows on import is

very volatile in nature. The effect is very less both in short and long term due to the volatile nature. The figure 8 also demonstrates the impulse response function for RM3. In this case, one standard deviation shocks to RFINV induce M3 to increase. It explains that the rise in foreign capital inflows helps in increasing money supply.

Findings from impulse response analysis reflect the fact that impact of private foreign capital inflows on the macroeconomic variables during liberalisation in India is significant in some variables like IIP, M3, EXR and FOREX. As the findings based on Indian data set contradict the established belief, it may be taken by some policy implication as indication of efficient management of capital inflows during the 90s. In the same vein, henceforth, one may be praising the monetary and fiscal policies pursued in India during the liberalised regime.

Effects of Capital Flows on Macroeconomic Variables

This section theoretically explains the economic relationship between capital inflows and macroeconomic variables such as exchange rate, money supply, foreign exchange reserve and interest rates, etc, in India. Some commonly observed effects of capital inflows are exchange rate appreciation, monetary expansion, foreign exchange reserve accumulation and interest rate.

VI.1. Impact of Capital Flows on Exchange Rate

Foreign capital inflows will raise the level of domestic expenditure in economy, which will raise the demand for non-tradable goods that result in an appreciation of the real exchange rate. The price adjustment process then leads to a reallocation of resources from tradable and non-tradable goods. The rise in aggregate expenditure also increases the demand for tradable, leading to rise in imports and widening of the trade deficit. During the capital surge in 1992-95 and 1996-97, the real exchange rate appreciated by 10.7 in Aug 1995 and 14 percent by August 1997 respectively over its March 1993 level. The

policy responses of India were directed towards capital outflows through early servicing of external debt. The timing of these inflows also facilitated India's external adjustment as they coincided with trade reforms of current account convertibility and liberalization of overseas investment by India firms (Kohli, 2001). The capital inflows have been associated with real exchange rate appreciation in India.

Both real exchange rate behaviour and policy responses in India bear a closer with East Asian economies than the Latin America ones. A similar comparison for India shows a 3.5 percent increase in the investment/GDP ratio between 1992-93 and 1994-95, the capital inflows period. During this time, private saving rose by an approximately similar amount while consumption fell. Thus, the composition of aggregate demand could also have curtailed a real appreciation. The circumstances indicate that policy responses is undoubtedly a major factor in thwarting appreciation pressure upon the real exchange rate closer to the march 1993 level.

A policy response prevailed in India over the real exchange rate appreciated in response to capital inflows in 1996-97 and the appreciation was reduced by 9 percent in December 1997. The capital inflows contributed both to real exchange rate appreciation and reserve accumulation in this country. This can be affected by changes in terms of trade, Government spending and monetary as well as exchange rate policies.

VI.2. Effects of Capital Flows on Reserve Accumulation

Capital inflows can be traced to either international reserves accumulation or a current account deficit, depending upon the exchange rate regime of a country. If there is no intervention by the central bank, i.e., the exchange rate regime is a pure float, then the net increase in capital asset via capital inflows can be associated with a similar increase in imports.

In 1992, the first year of the capital surge, almost the net capital inflows were absorbed as foreign exchange reserves in India. In 1994, almost one third of net capital inflows were utilized. From 1996 onwards the RBI has typically absorbed 50 percent of net capital inflows into international reserves. The stock of international reserves in 1999-2000 (US \$38 billion) represents an increase of nearly 52 percent over the 1991 level. From 1991 to 2000, growth of foreign exchange reserves in India averaged 58 percent, net average 58.8 percent against negative average of 16.8 percent for 1985-90 (Kletzer, 2004).

VI.3. Capital Flows and its Impact upon Monetary Aggregates

In India, the monetary impact of reserved accumulation is neutralized primarily through reserve requirement changes in commercial banks liabilities. India still relies on direct monetary control instead of indirect monetary management due to structural problems like interest rate rigidity and less developed countries short-term monetary market, which limits optimal utilization of Open Market Operation (OMO). Open Market Operations (OMO) are increasing as being used since 1991, though they are limited by the ability of bond and equity markets to absorb Government Securities.

In accordance to the percentage to M_3 , OMO is 0.28 percent in 1994, increasing to 2.2 percent by 2000. OMO appears to be used more to neutralize foreign exchange market intervention than monetary policy instrument. During the capital surge episode in India, the CRR has raised from 14-15% in 1991-95, which offset the effect of capital inflows upon money-supply growth.

Conclusion

Several developing countries liberalized capital controls over the late 1980s and 1990s, facilitating foreign investor's liberal access to enter their economies. Foreign financial inflows into the developing world

rose significantly. In this chapter, we began by providing an estimate of the magnitude and nature of the surge in capital flows into the developing countries in the 1990s. The magnitude of the surge of inflows in the 1990s was found to be similar to that in the pre-debt crises period in the late 1970s/early 1980s, in scaled terms. Total capital flows into all developing countries, both in absolute and scaled terms, rose sharply in the 1990s and 2000s compared to inflows in the 1980s, when developing economies lost access to international capital markets in the aftermath of the debt crises in Latin American economies. So, the surge in 1990s can be viewed as a recovery to the levels of capital flows prevailing prior to the debt crises of 1980s. The surge of capital flows to developing economies in the 1990s – like that in 1980s, was also followed by a sharp reversal of flows to several countries in the wake of the Asian currency crises from 1997 and a consequent decline in the levels of capital flows after that.

However, the surge in the 1990s differed in some important respects from those in the late 1970s. While inflows in the late 1970s were dominated by bank loans mostly destined for Latin American economies, inflows in the 1990s were composed predominately of portfolio and direct investment, and Latin American and East Asian Economies were the prime destination, of the flows. The inflows in the 1990s, like that in the last surge episode in late 1970s, were concentrated in a few economies – the 18 emerging markets which were taken for the study, accounting for about 90% of the total inflows into developing economies. For the economies where inflows were directed, the surge in inflow was quite substantial. The surge was also quite sustained – continuing for about 6-7 years in many East Asian economies.

The main focus of this study lies in analyzing the behaviour of some selected macro-economic indicators in relation to the surge in inflows of private foreign capital in India since 1995 the year in which several major reform programmes were initiated. A review of the analytical

literature shows that macroeconomic consequences of financial liberalization are the results of the combined effect of monetary, fiscal as well as trade and exchange rate policies followed by the government of a country.

The trends of total international capital flows into India are positive, where portfolio investment flows are negative in the year of 1998-99. The Foreign Direct Investment (FDI) does not reveal stable trend so far in India. The composition of capital inflows in India makes a significant size both in terms of impact and smooth management. We have examined the dynamic relationship between private foreign capital inflows with macroeconomic variables including growth. As far as the literature is concerned, it suggests the existence of dynamic relationship among all macroeconomic variables with private foreign capital inflows. However, our empirical findings strongly show that there is dynamic short and long equilibrium relationship between few macroeconomic variables like exchange rate (EXR), foreign exchange reserve (FOREX), index of industrial production (IIP) and money supply (M3) with private foreign capital inflows (FINV) during the study period from 1995:04 to 2008:07.

References:

- Agarwal, R.N., (1997), *“Foreign Portfolio Investment in Some Developing Countries: A Study of Determinants and Macro Economic Impact”*, The Indian Economic Review, 32 (2), 217-229.
- Alfaro Laura., Kalemli-Ozcan Sebnem.,and Volosovych Vadym., (2005), *“Why doesn't Capital Flow from Rich to Poor Countries? An Empirical Investigation”*, Harvard Business School.
- Beck, Roland (2000), *“The Volatility of Capital Flows to Emerging Markets and Financial Service Trade”*, Centre for Financial Studies, Working Paper, No. 2000/11.
- Brenan, Micheal J and Henery, H., (1997), *“International Portfolio Investment Flows”*, Journal of Finance, 13(5), 151-93.

- Chakrabarti, Rajesh., (2001), "FII Flows to India: Nature and Causes", *Money and Finance*, 2 (7).
- Chakraborty, Indrani., (2003), "Liberalization of Capital Flows and the Real Exchange Rate in India: A VAR Analysis", CDS Working Paper, No. 351.
- Chakraborty, Indrani., (2001) "Economic Reforms, Capital Inflows and Macro Economic Impact in India", *CDS Working Paper*, No.311.
- Chitre, Vikas., (1996), "Foreign Capital Flows and Financial Market in India", *Journal of Foreign Exchange and International Finance*, 4, 275-282.
- Dicky, D.A. and W.A Fuller., (1981), "Likelihood Ratio Statistics for Autoregressive Time Series with a Unit Root", *Econometrica*, 49, 1057-72.
- Dua, Pami and Sen, Partha., (2006), "Capital Flow Volatility and Exchange Rates: The Case of India", Centre for Development Economics, Working Paper No. 144, Department of Economics, Delhi School of Economics, Delhi University, New Delhi.
- Edward, Sabastian., (2000), "Capital Flows and Emerging Economies: Theory Evidence and Controversies", The University of Chicago Press, London.
- Enders, Walter., (1995), *Applied Econometric Time Series*, John Wiley & Sons.
- Engle, R.F. and Granger, C.W.J., (1987), "Cointegration and Error Correction: Representation, Estimation and Testing", *Econometrica*, 55.
- Granger, C.W.J., (1981), "Some Properties of Time-Series Data and their Use in Econometric Model Specification", *Journal of Econometrics*, 16.
- Kaminsky, Graciela., (2005), "International Capital Flows, Financial Stability and Growth", DESA Working Paper, No.10.
- Khanna, Sushil., (2002), "Has India Gained from Capital Account Liberalization? Private Capital Flows and Indian Economy in the 1990's", Paper Presented at the IDEAS Conference, "International Money and Developing Countries", Dec.16-19.
- Kohli, Renu (2001), "Capital Flows and Their Macro Economic Effects in India", Working Paper ICRIER, No. 64, 11-42.

- Kohli, Renu., (2003), *“Capital Flows and Domestic Financial Sector in India”*, Economic Political Weekly, 22, 761-68.
- Lensik, R., Oliver, M. and Osei, R., (1999), *“The Impact of Uncertain Capital Flows on Economic Growth in Developing Countries: An Empirical Analysis For the 1999’s”*, Paper Presented in University of Groningen.
- Lucas, R.E., (1990), *“Why Does Capital Flows From Rich to Poor Countries”*, American Economic Review, 80, 92-96.
- Mazumdar, T., (2005), *“Capital Flows into India: Implications for its Economic Growth”*, Economic Political Weekly, May.
- Mishra, D. Mody, A. and Murshid, A.P., (2001), *“Private Capital Flows and Growth”*, A Quarterly Magazine of IMF, 38, (2).
- Neumann, Rebecca M., (2003), *“The Effects of Capital Controls on International Capital Flows in the Presence of Asymmetric Information”*, Department of Economics, University of Wisconsin – Milwaukee.
- Phillips, P. C.B and P. Perron., (1988), *“Testing for Unit Root in Time Series Regression”*, Biometrika, 7, 335-46.
- Prasad, E. Rogoff, K. S.J Wei and M.A Kose., (2003), *“Effects of Financial Globalization on Developing Countries: Some Empirical Evidence”*, Economic Political Weekly, 38, 4319-4330
- Rakshit, Mihir., (1994), *“Issues in Financial Liberalization”*, Economic Political Weekly, 24, 2547-52
- Rangarajan, C., (2000), *“Capital Flows: Another Look”*, Economic Political Weekly, 9, 4421-27.
- Reserve Bank of India, RBI (2008), *“Report on Currency and Finance”*, Govt. of India,
- India _____, (2006), RBI Annual Report, Govt. of India
- Saha, Biswatosh., (2000), *“Effects of Foreign Financial Inflows on the Domestic Financial System: Indian Experience in the 1990s”*, Paper presented at the Fourth Capital Markets Conference: *Development, Prospects & Policy Issues* at UTI Institute of Capital Markets, Mumbai, India.

Sethi, Narayan and Patnaik, Uma Shankar K. (2007), "International Capital Flows on India's Economic Growth-In View of Changing Financial Market", The Indian Journal of Economics , 45 (348).

APPENDICES

Table 1: Unit Root Tests Results of Macro Variables

LEVELS				
Variable	Without Trend		With Trend	
	DF	ADF	DF	ADF
CMR	-5.727*	-2.415	-6.829*	-3.255*
EXPO	-0.736	1.783 (2)	-3.899*	-0.449 (4)
EXR	-2.528	-2.568 (2)	-1.494	-1.675 (4)
FINV	-8.559*	2.413 (6)	-9.566*	-2.960 (7)
FOREX	-4.378*	2.065 (8)	-0.485	-0.502 (4)
IIP	-1.212	-0.207 (4)	-6.046*	-2.021 (6)
IMP	0.560	3.919 (4)*	-1.589	1.585 (4)
M3	2.106	2.399 (1)	-0.791	1.363 (4)
WPI	1.211	1.267 (4)	1.211	-2.11 (4)
FIRST DIFFERENCE				
Variable	Without Trend		With Trend	
	DF	ADF	DF	ADF
RCMR	-15.221*	-6.805 (4)*	-15.165*	-6.782 (4)*
REXPO	-21.836 *	-8.194 (2)*	-22.023*	-8.842 (4)*
REXR	-10.149*	-5.379 (4)*	-10.402*	-6.066 (2)*
RFINV	-17.122*	-9.666 (2)*	-17.057*	-6.635 (4)*
RFOREX	-7.471*	-3.671 (4)*	-8.461*	-6.814 (2)*
RIIP	-20.544*	-6.572 (2)*	-20.490*	-7.309 (4)*
RIMP	-23.874*	-4.443 (4)*	-24.795*	-5.765 (4)*
RM3	-12.309 *	-7.066 (2)*	-12.855*	-7.245 (4)*

RWPI	-10.248	-5.847 (4)*	-10.358*	-6.080 (4)*
------	---------	-------------	----------	-------------

Notes: The critical values for unit root tests are -3.47, -2.88 and -2.57 without trend and -4.02, -3.44 and -3.14 with trend. Figures in brackets against ADF statistics are the numbers of lags used to obtain white noise residuals and these lags are selected using AIC. *, **, *** imply significance at 1%, 5% and 10% level respectively.

Table 2:
VAR Lag order selection by different criteria in the case of macroeconomic variables

Lag	LR	FPE	AIC	SC	HQ
0	NA	1.5523	78.93714	79.13467*	79.0174
1	312.5537	4.0422	77.59069	79.56602	78.39335*
2	216.5536	2.0422	76.89382	80.64694	78.41888
3	162.1642*	1.5222*	76.55605*	82.08696	78.80351
4	99.4349	1.9722	76.73487	84.04358	79.70473

Notes: - * indicates lag order selected by the criterion, LR: sequential modified LR test statistic (each test at 5% level), FPE: Final prediction error, AIC: Akaike information criterion, SC: Schwarz information criterion, HQ: Hannan-Quinn information criterion.

Table.3
Variance Decomposition of RFINV

Horizon	RCMR	REXPO	REXR	RFINV	RFOREX	RIP	RIMP	RM3	RWPI
1	0.237545	0.021496	17.50431	82.23665	0	0	0	0	0
4	0.423279	5.174487	9.176205	66.8982	8.330061	1.24295	4.075414	4.088857	0.590543
8	1.060136	6.137316	9.748484	58.80903	7.376223	2.941225	7.862046	4.857543	1.207994
12	1.300562	6.303737	9.803894	57.62484	7.270951	3.230726	7.851045	5.285241	1.329002
16	1.372703	6.288677	9.796857	57.45038	7.294655	3.272176	7.867369	5.276499	1.380682
20	1.380576	6.286497	9.795924	57.41951	7.293405	3.275742	7.875148	5.28459	1.388609
24	1.382511	6.288259	9.795768	57.41444	7.293184	3.276151	7.875217	5.284448	1.390025

Ordering: RCMR, REXPO, REXR, RFINV, RFOREX, RIIP, RIMP, RWPI

Figure-1

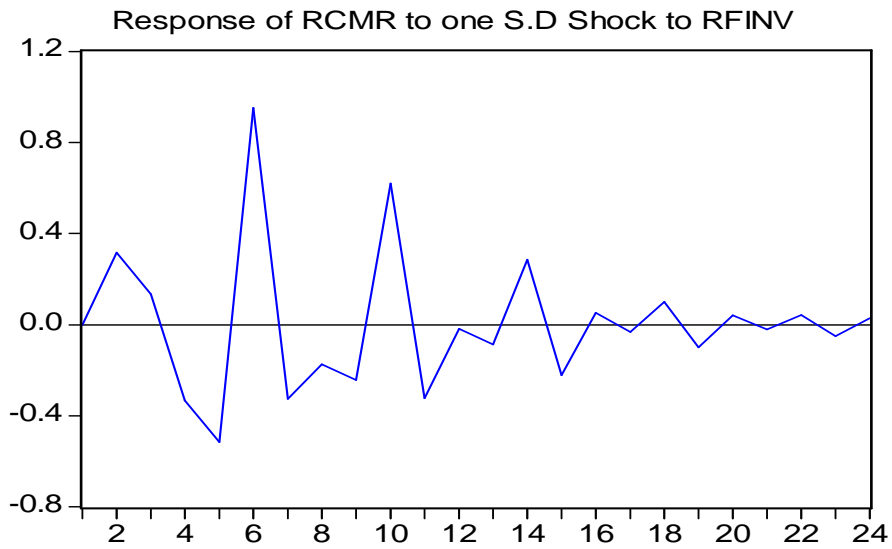


Figure-2

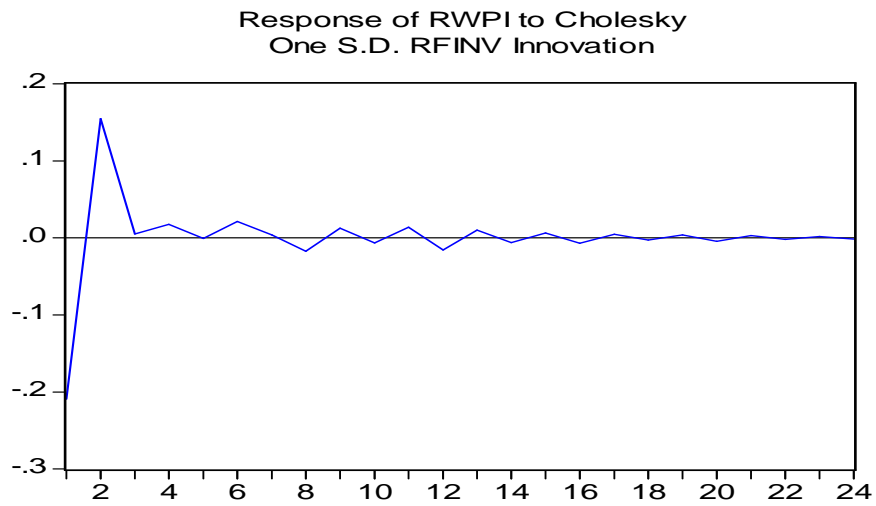


Figure-3

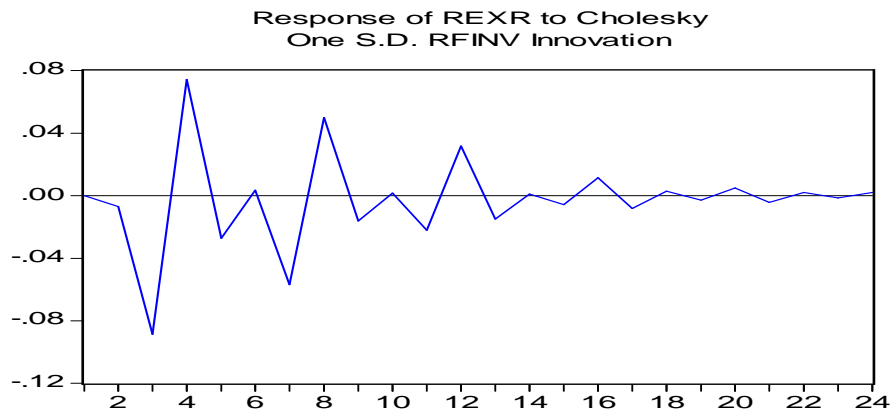


Figure-4

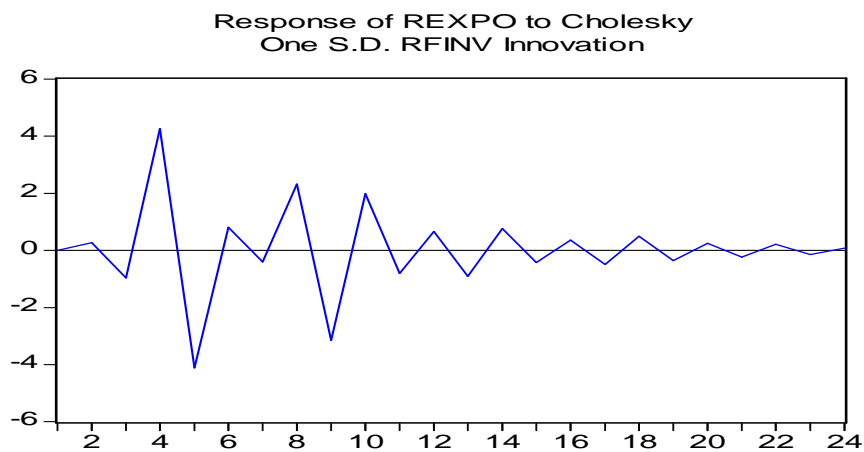


Figure-5

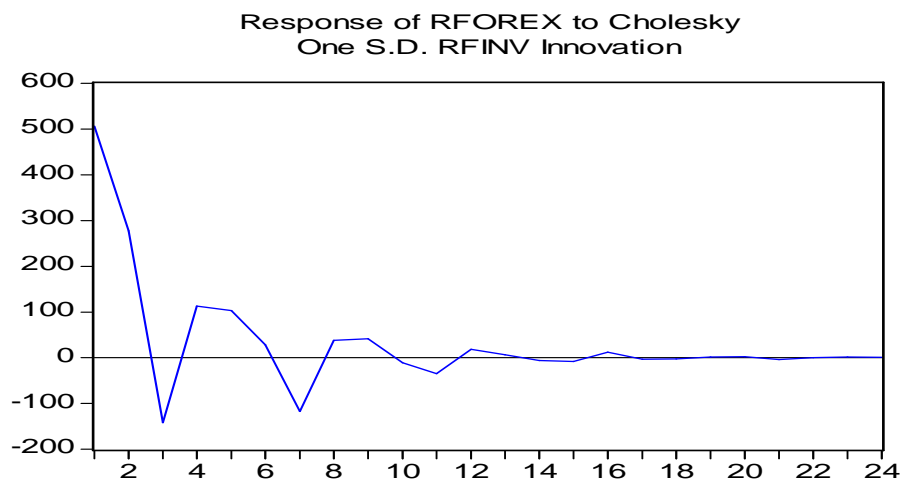


Figure-6

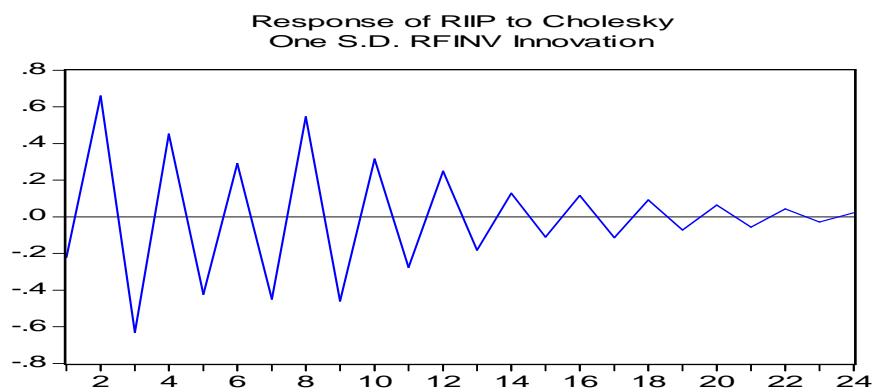


Figure-7

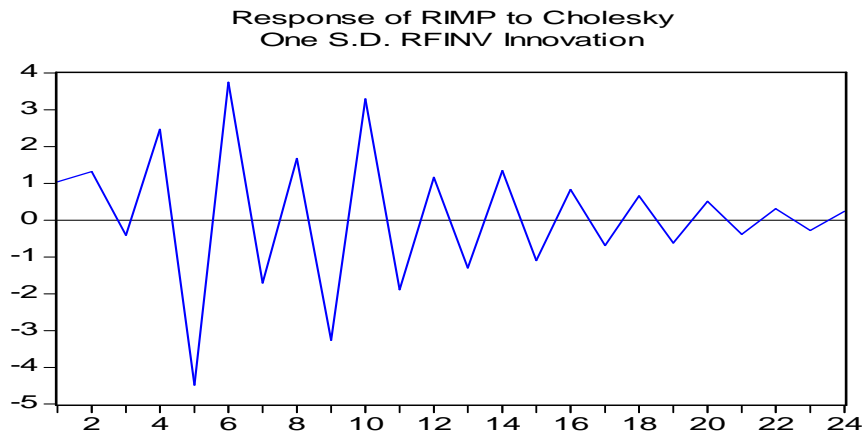


Figure-8

