INFLOWS OF CAPITAL,EXCHANGE RATES AND BALANCE OF PAYMENTS: THE POST-LIBERALISATIONEXPERIENCE OF INDIA[1]

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ABSTRACT

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 results of vector error correction estimates show that total inflows of foreign capital are causing imports; and imports are causing inflows of foreign capital. This means that there is a bi-directional relationship between these two variables. This may be due to an increase in the imports in the industries where more and capital flows are coming in. During the period of Capital Account Convertibility (CAC) there is a positive growth in all the macro economic variables studied. Along with growth the variability has also increased. Both FDI and FPI have registered positive growth rates but along with this the variability also has increased. As expected, FPI is more volatile than FDI flows in India.

1. Introduction

Much of the empirical work on the benefits of capital flows has focused on the contribution of capital account openness to economic growth. Although capital inflows should at least in theory contribute to faster growth (especially in developing countries) through more efficient resource allocation, enhancing domestic savings, and transferring technological or managerial know-how, empirical evidence is inconclusive at best. Current literature has well established that capital account convertibility should be built on a sound domestic financial system as shown in recent works regarding the Mexican crisis and the Asian financial crisis. One debate on capital account convertibility has emerged in the wake of the crises; that is the desirability of full capital account liberalization. Or, in other words, is capital account liberalization beneficial? The theoretical rationale for capital account liberalization is based primarily on the argument that free capital mobility promotes an efficient global allocation of savings and a better diversification of risk, hence greater economic growth and welfare (Fischer 1998). An opposing view has held that information asymmetry is considerable in international financial markets, so that free capital mobility—especially when significant domestic distortions exist— does not necessarily lead to an optimal allocation of resources (Stiglitz 2003).

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Empirical works have addressed this issue from the standpoint of the effect of capital liberalization on economic growth. Unfortunately, the debate remains inconclusive because such empirical studies inherently involve a joint test of the effect of liberalization on growth and the particular method of quantifying the degree of liberalization or effectiveness of capital controls. As it turns out, empirical results are sensitive not only to the quantitative measure of capital controls but also to the choice of sample and methodology. For example, while Quinn (2008) finds a positive association between capital account liberalization and economic growth, Grilli and Milesi-Ferretti (1995) and Rodrik (1998) fail to find any such relationship. This ambiguity may reflect the role of institutions, macroeconomic stability, and other factors in determining the effect of liberalization on growth. Empirical evidence on the other theoretical benefits of capital account openness is limited, but available evidence seems to suggest that, contrary to a theoretical prediction, developing countries with larger financial flows typically experience greater volatility in consumption.

The more recent study of Prasad et al. (2003), by using the ratio of the gross stock of foreign financial assets and liabilities to GDP as the measure of capital account openness, concludes that financial integration is neither a necessary nor a sufficient condition for achieving a high rate of growth. Stanley Fischer (2001) observes that: "Each of the major international capital market-related crises since 1994–Mexico, in 1994, Thailand, Indonesia and Korea in 1997, Russia and Brazil in 1998, and Argentina and Turkey in 2000–has in some way involved a fixed or pegged exchange rate regime. For instance, As Krueger (1997) and Corden (1993) have shown, a desired level of the current account balance is linked to a particular level of real domestic expenditures and of the real effective exchange rate. This means that, under certain circumstances, the level of the nominal exchange rate may provide inadequate protection to domestic industries, resulting in deterioration in the current account imbalance. This is also the reason why both Krueger and Corden warn of the dangers of a trade liberalization that is not accompanied by rational exchange rate policies, that is, by devaluation. When most of the arguments regarding the choice of exchange rate regime and the level of the exchange rate of transition economies were originally put forward, the great majority of these countries maintained various payments restrictions that precluded a flexible management of the balance of payments. Capital flows were restricted, and governments could not rely on capital inflows to finance current account deficits. Once these restrictions were liberalized, the governments' options widened.

Capital Account Convertibility, whether it is full or partial, increases the inflows of capital in the economy and these inflows have far and wide implications on the economy. Prasad *et al.* (2003) widely believed that financial globalization can contribute significantly to promoting growth in developing countries by augmenting domestic savings, reducing cost of capital, transferring technology, developing domestic financial sector and fostering human capital formation. At the same time, sudden and large inflows of capital cause major destabilization at the macroeconomic level. It may push up monetary aggregates,

aggravate inflationary pressures, destabilize exchange rates, exacerbate the current account position, adversely affect the domestic financial sector, and disrupt domestic growth trajectories in case of sudden stop (Reddy, 2008 cited in Pradhan 2011). In 1996 100% FDI were permitted.

Now even though, capital outflows by individuals are in principle still restricted, each individual is allowed to take up to $200,000 of capital out of India each year, a generous ceiling by any standards. The restrictions on outflows on the Indian corporate sector are even weaker. As for inflows, FDI inflows into certain sectors such as retail and banking are restricted, and foreign investors are not allowed to participate in the government debt market. These restrictions are gradually may be lifted. Equity market investments are permitted by registered foreign institutional investors (although there are limits on their ownership shares in certain types of Indian firms), and those who do not wish to register can invest only indirectly through an instrument called participatory notes, which are tightly regulated by the government. In terms of overall de facto financial integration, India has come a long way and has experienced significant volumes of inflows and outflows in recent years.

In the light of above discussion, the present paper attempts to study the impact of foreign capital inflows on macro-economic variables of Indian economy such as (proxy for growth), Exports, Imports, exchange rates and balance of payments. The objectives of the study are: to study the trends in capital inflows such as FDI, Foreign Portfolio Investment (FPI) and other macro variables such as exports, imports, exchange rates and balance of payments for the period 1990-91 to 2010-2011; to study the linkages between capital inflows &exports, imports, exchange rates and balance of payments of India.

2 Review of Earlier Studies

The empirical evidence on capital flows and economic growth is mixed and inconclusive. Several authors studied the link between financial integration and economic growth. The adverse effect of financial repression on economic growth is well documented in McKinnon (1973) and Shaw(1972). Although, most authors believe that the relationship between financial development and growth is one of mutual interdependence, there is a substantial debate on the exact nature of the relationship between financial development and economic growth. The positive correlation between financial development and growth has been first documented by Goldsmith (1969), McKinnon, (1973) and Shaw, (1973). The cross-country evidence provided by King and Levine (1993) indicates that financial liberalization promotes long-term economic growth by fostering financial development (Levine1997; Quinn1997). This is in support ofMcKinnon-Shaw,Stoneman (1975) argues that developing countries should refuse foreign aid and other inflows and concentrate on raising domestic investment. He concludes that foreign capital is neither necessary nor sufficient for economic

development. The experience of some countries in Latin America showed that liberalization could cause crisis, especially if the pace of reform is too fast or the fundamentals are not sound.

The recent evidence provided by Edison, Rose, Ricci and Slok (2002) is in support of financial integration promoting economic growth. Studying the impact on 57 countries, they could not reject the hypothesis that financial integration does not accelerate growth. Kohli (2001) presents evidence for the relation between capital inflows and some macroeconomic variables in India. She concludes that portfolio flows are more volatile than domestic investment flows. FDI is long-term in nature, less susceptible to sudden withdrawals and leads to productive use of CapitaLand economic growth. However, it does not reveal a stable and dominating trend. Wade andVeneroso (1998) stating that capital controls have become fashionable largely due to the Asian economy crises argue that capital inflows, especially the borrowing of foreign money, and outflows in the region should be regulated. Rangarajan (1993) argues that free capital inflows in a flexible exchange rate regime would lead to exchange rate overshooting. Increase in imports would lead to a deficit in the current account of BOP. IMF (1998) believes that the main reason for the crisis was the weak financial system in the East Asian countries. It argues that inefficient investment spending; over-investments in excessively risky projects lead these countries to the crisis. It was also felt that capital account liberalization was undertaken before the domestic banking and financial sector was sufficiently liberalized. Krugman (1998) feels that the crisis is due to crony capitalism and these countries can have a respite with temporary capital and exchange controls. Rodrik (1998) argues that the benefits of removing capital controls are yet to be demonstrated and the judicious application of capital controls might have prevented the volatility observed in these countries. There has been some effort in studying the link between financial integration and economic volatility also. The evidence is limited, hence far from conclusive. Razin and Rose(1994) studied the impact of trade and financial openness on the volatility of output, consumption and investment for a sample of 138 countries for the period 1950-98 and found that there is no significant empirical link between openness and macroeconomic variability.

Easterly, Islam and Stiglitz (2001) have shown that higher level of development of the domestic financial sector is associated with lower volatility and on the other hand trade openness leads to macroeconomic volatility especially in developing economies. Buch, Dopke and Pierdzioch (2002) using the data of 25 OECD countries conclude that there is no consistent empirical relationship between financial openness and the volatility of output.

Contrary to this, Gravin and Hausmann (1996) produced an evidence for significant and positive association between the volatility of capital and output volatility. O' Donnell (2001) using the data of 93 countries finds an evidence for higher degree of financial integration associated with lower output variability in OECD countries. His results also

suggest that countries with more developed financial sectors are able to reduce output volatility through financial integration. Equity market liberalization resulting in output and consumption volatility has been presented by Geert, Harvey and Lundblad (2002). However, they present evidence for capital account openness increasing the volatility of output and consumption in emerging market countries. IMF (2002) provides evidence for negative relation between financial openness and output volatility in developing economies. Using quarterly data for the period, 1993-99, Chakravarthy (2003) attempts to explain the effects of inflows of private foreign capital on some macroeconomic variables in India. Her conclusion is that there is unidirectional causality running from foreign investments to a few macro variables.Izhar (2009), attempts to analyse the impact of capital inflows on some macroeconomic variables in India using quarterly data for the period 1994Q1 to 2007Q2. The Variables included in the study are Total Capital Inflows (TCI), Real & Nominal Effective Exchange Rate (both export based &trade based), Whole sale Price index (WPI), Money Supply (M0), Foreign Exchange Reserve (FOREX) and Current Account Balance (CAB). He tested these variables for stationarity and found that they are I(1). Using Granger- Engel cointegration test, he concludes that there is long run equilibrium relation between real effective exchange rate and total capital inflows. Causality tests show the bidirectional causality between REERX & TCI and between FOREX & TCI and unidirectional causality from TCI to REERT. Pradhan (2011) also used several macro variables such as Net Capital Flows, Excess Capital Flow over Current Account Balance, Gross Domestic Capital Formation, Reserve Money, Wholesale Price Index and Index of Real Effective Exchange Rate. He has tested these variables for stationarity, cointegration and Engel Granger tests for causality. The tests on causality results do not reveal any causation between capital inflows and economic growth. In Sethi'sand Sanhita (2009) work cointegration test confirms the presence of long-run equilibrium relationships between a few pairs of variables like private capital inflows (FINV) and economic growth (IIP as proxy of GDP) and FINV and Exchange Rate (EXR). They conclude that capital inflows have not contributed much towards industrial production or economic growth. They mention two reasons for this. One, the amount of capital inflows to the country has not been enough. Two, the amount of capital that does flow in, is not utilized to its full potential (Ramakrishna, 2005; Gupta, 2007). Similarly, most of the other studies have used time series annual data for their analysis. However, yearly data does not capture seasonal variations in the variables and also places a restriction on the robustness of the empirical results involving advanced cointegration methods. Moreover, these studies have not presented conclusive evidence on the linkages between macro variables and capital inflows. There are a few studies available on panel cointegration methods in studying the capital flows and economic growth involving several countries.

Portfolio capital flows are invariably short term and speculative and are often not related to economic fundamentals but rather to whims and fads prevalent in international financial markets. There are three-policy implications, which emerge from this analysis.

First, India should move to influence both the size and composition of capital flows. Second, India should focus on strengthening its banking system rather than promoting financial markets. Banks can provide the surest vehicle for promoting long-term growth and industrialization. Thirdly, since financial markets in India are here to stay, Government should try to shield the real economy from their unexpected actions. Economic growth in India is financed either by its domestic savings or foreign saving that flow into the country. We had to largely depend on domestic savings to give impetus to our growth, prior to financial sector reform in the country. Though, the foreign capital flows into the country in the form of aid, External Commercial Borrowing (ECB) and NRI deposits, it did not and was not expected to contribute much towards capital formation or economic growth. After 1993, when capital account was partially liberalized, it was hoped that capital inflows would contribute towards our economic growth.

The study, therefore, made a modest attempt to analyze the dynamics of some major macroeconomic variables during the post-reform period in India. 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. So, there is no straightforward way of predicting the resulting macro- economic effects of financial liberalization in any country. The trends in the variables are studied using graphs and regression methods. The following graph presents a preliminary analysis of the trends in capital inflows and other macroeconomic variables for the period 1990-91 to 2010-11.

4 Methodology and Econometric Models

The time period chosen for the study is from 1990-91 Q1 to 2010-11 Q4. Trends for all the variables are estimated using linear and semi-log forms and growth rates are computed using semi-log functional form for all the variables. To verify the linkages between capital flows and macro-economic variables we have used time series methodology involving Johansen's cointegration and the Error Correction Methods (ECM) methods. The empirical results suggest that the inflow of foreign capital (INFK) and FPI cause positively the change in the Index of Industrial production (IIP) i.e. economic growth in India. The study also reveals that there is a bi-directional causal relationship between inflows of capital and imports; there is an evidence for economic growth influencing the inflows of FDI but not vice versa and Inflows of foreign capital causing an increase in exports. There is no evidence of causality between exchange rates and capital flows while current account balance appears to have been causally related the inflow of capital. In view of these findings some policy measures relating capital inflows are suggested.

a)Statistical Techniques Chosen: Trends for all the variables are estimated using linear and semi-log forms and growth rates are computed using semi-log functional form for all the variables. In order to verify the first hypothesis i.e. the growth rates of macro variables such as FDI, FPI etc. is positive, we have used a semi-log functional form for the study period taking time as an independent variable. In a semi log time trend model the growth rate is measured as follows:

$$\text{Ln } Y_t = b_0 + b_1 t$$

Where Ln Yt = The natural log of a variable say, FDI and b_1*100 is the growth rate. This growth rate is the constant proportional growth rate. In order to compute the growth rates of the said macro variables all the variables are transformed to their natural logs.

Similarly in order to verify second hypothesis and to measure the variability we have used the method of finding the average of the deviations from the trend using exponential trend. These deviations are squared and used to know the trend by estimating a simple regression as follows:

$$VarY_t = \left[\frac{Y_t - \widehat{Y}_t}{n}\right]^2$$ Value of Variable using exponential trend

Y_i=Actual value of the variable

$\overline{Y}$ =Average of the variable

$\widehat{Y}$ = Estimated value of the variable

After getting $VarY_t$ values, the following equation has been estimated.

$$VarYt = \beta_0 + \beta_1 t + U_t$$

If $\beta_1 \succ 0$ then variability is increasing over time

If $\beta_1 \prec 0$ then variability is decreasing over time

If β_1 is not significant then the variable is said to be stable

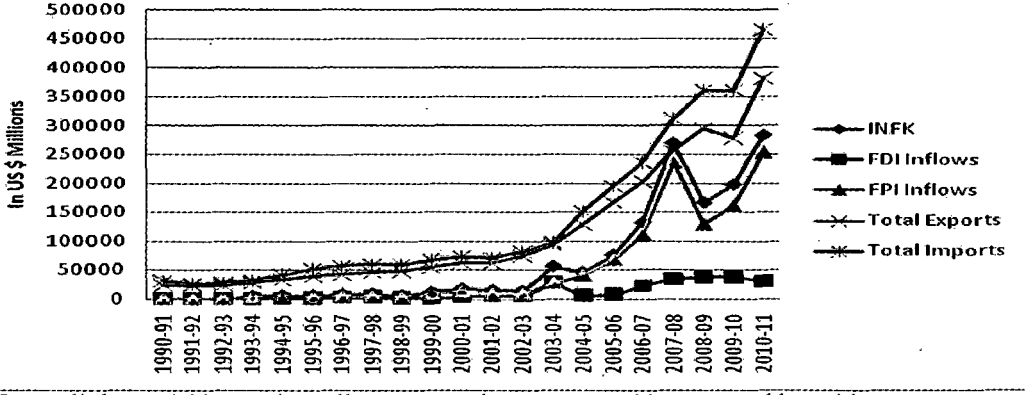
To verify the third hypothesis i.e. the linkages between capital flows and macro-economic variables we have used time series methodology which includes three stages:

In stage one,all the variables were translated into their natural logarithms (which also avoids the problem of hetroscedasticity) and tested for the presence of unit roots in the variables using Augmented Dickey Fuller (ADF) test. This is a popular method of testing for unit roots in variables. As most of the time series economic relationships present spurious relations among the variables, testing for the presence of unit root in the variables is a must.

In the second stage, if the variables are found to be I(1), i.e. is integrated of order one, then they are to be tested for the cointegration among the pairs of variables using Johansen Cointegration methods. Johansen test is a multi-variatecointgration test and can also be used for testing for cointegration among the pairs of variables. Using Trace test and Maximum Eigen value test, whether the variables are cointegrated or not is verified.

In stage three, if the variables are found to be cointgrated, we verify the linkages among the pairs of variables using the Vector Auto-regressive /Vector Error Correction (VAR / VEC) methodology.

Graph : Trends in Macro Economic Variables of Indian Economy



Note: All the variables are in Dollar terms and not converted into natural logarithms.

The above graph indicates that all the variables are showing an upward trend during the study period. The variables also indicate some fluctuations and FPI flows appear more volatile compared to FDI. The gap between exports and imports is also widening over the study period.

b. To understand the growth and variability of the capital flows and other macro variables a semi log time trend model has been used and the variability among the variables is measured as mentioned in the methodology. The results are presented in the following table:

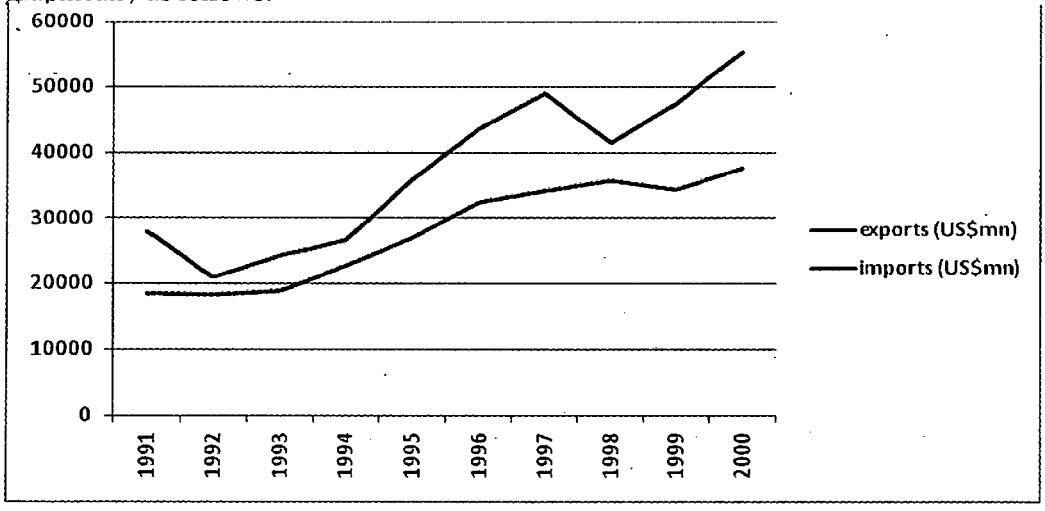
Table 1: Growth and Variability of Capital Inflows and other Macro Variables (1990-91 to 2010-11)

Variable	Growth Rate	Variability
Inflows of Foreign Capital (INFK)	9.28%	1.8%
Foreign Direct Investment (FDI)	5.36%	0.82%
Foreign Portfolio Investment (FPI)	8.50%	1.30%
Exports (EX)	3.20%	0.74%
Imports (IM)	3.45%	0.82%
Index of Industrial Production (IIP)	6.81%	68.89%

Note: The growth rates were computed using exponential functional form for the quarterly data and the estimated values of the function are used to compute the variability in growth.

A look at the table of growth rate and variability shows that the growth rate of FPI is very high it is 8.50%, FDI has growth rate of 5.36%, exports have risen by 3.20%, imports grew by 3.45%, and IIP registered a growth rate of 6.81%. The results of the variability indicate that IIP has highest degree of variability followed by LINFK, LIM, LFPI, LFDI and LEX.

India's exports and imports during the period 1991-2000 are presented graphically as follows:



The above graph shows the patterns of country's exports and imports. An analysis of the export import ratio shows that it has not improved during the decade. There was a short- lived spurt during 1991-94, but it has steadily declined after 1995 (except 1997-98) and is almost back to 1990-91 levels. The trade gap in absolute terms has been widening from US$ 9049m in 1990-91 to US$ 17841m in 1999-2000, accentuating the foreign exchange crisis that has not started biting for various reasons. It may be added here that the export/import ratio of all the developed countries except U.S.A., has been more that 100% and of all the developing countries other than China and Mexico has been less that 100%.

5. Data Analysis and Interpretation of the Results

Capital Account Convertibility (CAC) in India has increased the inflows of foreign capital in the country by leaps and bounds. There is a debate going on amongst economists regarding whether capital flows help in accelerating the economic development or not. The relationship between Capital Flows and Economic growth is highly debated issue. Large number of studies examined the relationship between these two. Some of the studies have found positive relationship and some have found negative relationship. Some even found inconclusive relationship. In this article an attempt is made to study the impact of CAC on economic growth via capital inflows.

In the empirical analysis of nexus between capital flows and growth, the dependent variable is change in Index of Industrial Production (IIP) which is taken as a proxy for real GDP growth. The choice of IIP is dictated by the fact that capital inflows are mainly absorbed in the industrial sector. The independent variables are inflow of foreign capital (INFK), Foreign Direct Investment (FDI), Foreign Portfolio Investments (FPI), Exports (EX) and Imports (IM). All the variables are in dollar terms and converted to their natural logarithms. The prefix L stands for the natural logarithm of the respective series and D denotes the first differences of the respective time series. All the series are quarterly time series collected from Handbook of Statistics on Indian Economy 2009-10 of the RBI.

In order to pre-empt the possibility of running spurious regressions, the time series properties of variables used in the analysis was tested. The time series univariate properties were examined using ADF test. All the variables including LINFK, LFDI, LIIP, LEX and LIM and LREER were found to be non – stationary at levels and stationary at I (1) i.e. first difference level. The ADF equations for the individual are used as follows:

$$\Delta LINFK_t = \alpha + \beta LINFK_{t-1} + \sum_{i=1}^{p} \lambda_i \Delta LINFK_{t-i} + u_t$$

$$\Delta LINFK_t = \alpha + \beta LINFK_{t-1} + \sum_{i=1}^{p} \lambda_i \Delta LINFK_{t-i} + u_t$$

Same equation is used for other variables

The results of ADF test are summarized the table below:

Table 2: ADF test for Capital Flows and macro variables in India

Variable	Levels	Prob	First Difference	Prob
LINFK	-2.63495	0.2661	-13.47475*	0.0001
LIIP	-3.51600	0.0647	-28.85081*	0.0001
LFDI	3.67985	0.0294	-8.396914*	0.0000
LFPI	-2.80916	0.1986	-8.334864*	0.0000
LEX	-1.77106	0.7092	-4,105,854*	0.0017
LIM	-2.06855	0.5551	-9.307885*	0.0000

Note: * Significant at 0.01 level. ADF test includes intercept and slope for variables in levels while for the variables in first difference the intercept is included. Lag length has been chosen based on Schwartz crieteria.ADF. values are compared with McKinnon critical values.

The second stage in the empirical analysis is the computation of cointegration test. Two or more variables are said to be cointegrated if they share common trends i.e. they have long run equilibrium relationships. According to Engel and Granger (1987), if a set of non-stationary variables are co-integrated then it follows that the variables will come back to equilibrium in the long run. The cointegration test has been conducted using Johansen's Cointegration test. The equations used are of the following type:

$$LIIP = \beta_0 + \beta_1 LINFK + \varepsilon_t$$

The results of Johansen's cointegration test are summarized in the table below: The results indicate that the pairs of variables such as capital inflows and IIP are cointegrated. Thus, there exists longrun equilibrium among these pairs of variables. However, to know the linkages between these variables we have to verify the short run dynamics of the variables. For this purpose Vector error correction models are estimated in the VAR framework.

Table 3: JohansonCointegration test: Trace and Maximum Eigen Vector Test

Variable	Normalised Cointgration Equation	λ max *test*	Prob	λ *trace*	Prob
LIIP LINFK	LIIP=1.00+0.01968LINFK (0.00060)	117.7787	0.0001	120.3569	0.0001
LIIP LFDI	LIIP=1.00+0.0025000 LFDI (0.00106)	112.6428	0.0001	116.3020	0.0001
LIIP LFPI	LIIP=1.00+0.002768 LFPI (0.00072)	83.5886	0.0001	84.2616	0.0001
LIIP LEX	LIIP=1.00+0.001962LEX (.00207)	85.73591	0	87.24454	0
LIIP LIM	LIIP=1.00+0.000873 LIM (0.00173)	120.7884	0.0001	121.2705	0.0001

Note: The Trace and Maximum Eigen value tests indicate that the pairs of variables are cointegrated at 0. 05 Significance level.

The third stage in the empirical analysis is the use of Vector Auto Regressive / Vector Error Correction Models (VAR/VEC Models). For this purpose we use bi-variate models. The results are summarized as follows:

a)VAR Model/VECM for Index of Industrial Production and Total Inflows of Capital:

If the presence of co-integration is confirmed by the Johansen test, the vector error correction (VEC) model can be used to study the links between the variables. According to Engle and Granger (1987), the VEC model will be:

$$\Delta Y_t = a_{21}(1)\,\Delta Y_{t-1} + a_{22}(1)\,\Delta X_{t-1} + \lambda_y \mathrm{ECT}_{t-1} + \varepsilon_{2t} \quad (1)$$

$$\Delta X_t = a_{11}(1)\,\Delta Y_{t-1} + a_{12}(1)\,\Delta X_{t-1} + \lambda_x \mathrm{ECT}_{t-1} + \varepsilon_{1t} \quad (2)$$

Where, Y_t, X_t and ε are, IIP, capital flows variable and the error term respectively. Also, Δ, (l) and ECT are difference operator, polynomials in the lag operator "L" and the coefficient of the lagged error correction term. The model in the estimable form will be as follows:

Table 4:Vector Error Correction Estimates, LIIP and LINFK.

Error Correction	D(LIIP)	D(LINFK)
Cointegartion Eq.1	-3.891839	-0.800922
	(0.13241)	(3.53322)
	[-29.3923]	[-0.50971]
D[LIIP(-1)]	1.925273	3.258379
	(0.10111)	(2.69803)
	[19.0412]	[1.20769]
D[LIIP(-2)]	0.955666	1.569971
	(0.04923)	(1.31367)
	[19.4119]	[1.19510]
D[LINFK (-1)]	-0.035506	-1.021527
	(0.00332)	(0.08867)
	[-10.6851]	[-11.5208]
D[LINFK(-2)]	-0.013220	-0.699729
	(0.00310)	(0.08279)
	[-4.26095]	[-8.45190]
C	0.009972	0.012676
	(0.00372)	(0.09935)
	[2.6783]	[0.12760]
R Squared	0.975597	0.686964
Adjusted R Squared	0.973879	0.664919

The coefficients of LINFK are statistically significant which implies that inflow of foreign capital causes positively the change in the Index of Industrial production i.e. economic growth in India. This is not surprising as the capital flows are flowing into manufacturing sector and enhancing growth acting as the complementary to domestic investments.

b)VAR Model/VECM for Index of Industrial Production and Total Inflows of Foreign Portfolio Investment:

Table 5: Vector Error Correction Estimates: LIIP and LFPI

Error Correction	D(LIIP)	D(LFPI)
Cointegartion Eq. 1	-3.756277	8.081776
	(0.16039)	(6.21536)
	[-23.4204]	[1.30029]
D[LIIP(-1)]	1.907876	1.282607
	(0.12604)	(4.88458)
	[15.1365]	[-0.26258]
D[LIIP(-2)]	0.951588	0.214205
	(0.06246)	(2.42059)
	[15.2346]	[0.08849]
D[LFPI(-1)]	-0.022719	-0.561626
	(0.00318)	(0.123111)
	[-7.15165]	[-4.56214]
D[LFPI(-2)]	-0.008508	-0.371886
	(0.00309)	(0.11992)
	[-2.74946]	[-3.10117]
C	-0.016284	-0.063091
	(0.00506)	(0.19609)
	[-3.21816]	[-0.32174]
R Squared	0.976687	0.531733
Adjusted R Squared	0.973258	0.462871

The results indicate that the coefficients of LFPI are significant, which implies that portfolio investments influencing the change in IIP. This is something unexpected since FPI is more volatile. However, this could be because of volatility in IIP that may be due to the policy environment in terms of rising interest rates, and due to inflation and a reduction in rupee value in terms of Dollar in recent times.

c)VAR Model/VECM for Imports and Total Inflows of Capital:

The VAR model used for Imports and Total inflows of capital is

Table 6: Vector Error Correction Estimates: LIM and LINFK

Error Correction	D(LIM)	D(LINFK)
Cointegartion Eq. 1	-1.148790	-2.177594
	(0.19900)	(1.665215)
	[-5.77272]	[-1.31804]
D[LIM(-1)]	0.077228	0.554505
	(0.16186)	(1.34378)
	[0.47713]	[0.41264]
D[LIM(-2)]	0.135252	1.947620
	(0.11409)	(0.94717)
	[1.18550]	)[2.05624]
D[LINFK(-1)]	-0.029010	-0.999957
	(0.01058)	(0.08783)
	[-2.74918]	[-11.3845]
D[LINFK(-2)]	-0.008139	-0.734679
	(0.01000)	(0.01154) conted...

Error Correction	D(LIM)	D(LINFK)
	[-0.81391]	[-8.84988]
C	-0.000766	0.008037
	(0.01154)	(0.9578)
	[-0.06643]	[0.08391]
R Squared	0.565966	0.698737
Adjusted R Squared	0.535825	0.677816

The results of vector error correction estimates show that total inflows of foreign capital are causing imports and imports are causing inflows of foreign capital. It implies that more the imports more will be the inflows of capital and more inflows of capital, causes more imports. This means that there is a bi-directional relationship between the two. This may be due to an increase in the imports in the industries where more and capital flows are coming in.

d)VAR Model/VECM for Exports and Total Inflows of Capital:

In this work an attempt is made to find out whether Exports are causing inflows of foreign capital or inflows of foreign capital are leading to more of exports. The model fitted is given below in the following equation:

Table 7:Vector Error Correction Estimates: LEX and LINFK

Error Correction	D(LEX)	D(LINFK)
Cointegartion Eq. 1	-1.889642	-1.192760
	(0.22709)	(2.279060
	[2.79024]	[-0.52336]
D[LEX(-1)]	0.498038	-0.576095
	(0.17849)	(1.79136)
	[2.79024]	[-0.32160]
D[LEX(-2)]	0.407625	-0.998300
	(0.10574)	(1.06124)
	[3.85488]	[-0.94070]
D[LINFK (-1)]	-0.067102	-1.005728
	(0.01245)	(0.12497)
	[-5.38900]	[-8.04804]
D[LINFK(-2)]	-0.03166	-0.693729
	(0.00969)	(0.09725)
	[-3.26776]	[-7.13329]
C	-0.002559	0.008197
(0.00998)	(0.10013)	
	[-0.25644]	[0.08186]
R Squared	0.757833	0.670742
Adjusted R Squared	0.741016	0.647877

Inflows of capital are causing an increase in exports. This is understandable, as capital flows increase the productivity of exporting industries and increase their exports by making them cheaper due to productivity gains.

e)VAR Model/VECM for Index of Industrial Production and Total Inflows Foreign Direct Investment:

The VAR/ECM model for Index of Industrial Production and inflow of FDI is as given below:

Table 8: Vector Error Correction Estimates: LIIP and LFDI

Error Correction	D(LIIP)	D(LFDI)
Cointegartion Eq. 1	-3.789600	6.671214
	(0.13144)	(2.85228)
	[-28.8316]	[2.33891]
D[LIIP(-1)]	1.829781	-3.995970
	(0.10091)	(2.18983)
	[18.1324]	[-1.82479]
D[LIIP(-2)]	0.891125	-1.542674
	(0.04942)	(1.07246)
	[18.0311]	[-1.43844]
D[LFDI (-1)]	-0.003458	-0.683240
	(0.00500)	(0.10856)
	[-0.69126]	[-6.29365]
D[LFDI(-2)]	-0.006063	-0.366151
	(0.00502)	(0.10889)
	[-1.20834]	[-3.36261]
C	0.009603	-0.016299
	(0.00384)	(0.08332)
	[2.50110]	[-019562]
R Squared	0.974035	0.424032
Adjusted R Squared	0.972206	0.38471

The results reveal that, there is an evidence for economic growth influencing the flows of FDI and not vice versa. India is following a cautious FDI policy and therefore FDI flows are connected to economic growth and not vice versa.

VAR Model/VECM for Index of Industrial Production and Total Exports:

VECM model used for examining the relationship between the Index of Industrial production and Total Exports is as follows:

Table 9: Vector Error Correction Estimates: LIIP and LEX

Error Correction	D(LIIP)	D(LEX)
Cointegartion Eq. 1	-3.538288	1.828604
	(0.16297)	(0.44769)
	[-21.7119]	[4.08455]
D[LIIP(-1)]	1.623768	0.732055
	(0.12838)	(0.35268)
	[12.6481]	[-2.07569]
D[LIIP(-2)]	0.315572	0.697919
	(0.07031)	-(0.19314)
	[9.92700]	[-1.63392]
D[LEX (-1)]	0.059825	0.645217
	(0.04241)	-(0.11650)
	[1.41067]	[-5.53823]
D[LEX(-2)]	-0.120357	0.324248
	(0.04401)	-(0.12091)
	[-2.73458]	[-2.68174]
C	0.009240	-0.002727
	(0.00352)	(0.00968)
	[2.62296]	[-0.28180]
R Squared	0.978230	0.779716
Adjusted R Squared	0.976697	0.764203

From the table it is clear that there is an evidence of mutual relationship between exports and economic growth. Therefore there is a bi-directional causation between exports and economic growth in India.

6.Conclusions and Policy Implications :

During the period of CAC there is a positive growth in all the macro economic variables studied. Along with growth the variability has also increased. Both FDI and FPI have registered positive growth rates but along with this the variability also has increased. As expected, FPI is more volatile than FDI flows in India.

The inflow of foreign capital (INFK) causes positively the change in the Index of Industrial production (IIP) i.e. economic growth in India.

The inflows of portfolio investments cause positively the change in IIP. This is something unexpected since FPI is more volatile. However, this could be because of volatility in IIP and also may be due to the policy environment in terms of rising interest rates, and due to inflation and a reduction in rupee value in terms of Dollar in recent times.

The results of vector error correction estimates show that total inflows of foreign capital are causing imports; and imports are causing inflows of foreign capital. This

means that there is a bi-directional relationship between these two variables. This may be due to an increase in the imports in the industries where more and capital flows are coming in.

Inflows of foreign capital are causing an increase in exports. This is understandable, as capital flows increase the productivity of exporting industries and increase their exports by making them cheaper due to productivity gains.

The results also reveal that, there is an evidence for economic growth influencing the inflows of FDI but not vice versa. This may be due India is following a cautious FDI policy and therefore FDI flows are connected to economic growth and not vice versa. There is an evidence of mutual relationship between exports and economic growth in India for the study period. Thus there is bi-directional causation i.e. both are influencing each other.

Policy Implications:

Based on our empirical analysis on capital flows and the macro economic variables such as economic growth, exports and imports for the period 1990-91 to 2010-11, the following policy interventions may be suggested:

1.CAC convertibility has increased the inflows of capital in to the country. Along with the growth of these flows the variability, mainly in FPI has increased. This is understandable due to the short term nature of portfolio investments. However, to curtail this and to allow the smooth flows, the issues of corruption, high inflation and increasing interest rates have to be addressed immediately. Along with reducing interest rates, the supply rigidities have to be reduced. Persistent inflation and rising interest rates are not good for investments in the economy.

2.The inflow of foreign capital should be encouraged as it positively influences the economic growth of the country. Liberalization of FDI should be encouraged in other sectors such as services, education, insurance, etc. in the country's interest despite the opposition protests. A conducive environment in terms of political stability, minimum inflation has to be provided.

3.Capital flows also influence both exports and imports of the country positively. However the policy should concentrate on cheap credit and also reducing the inflation rates. Trade liberalization and liberal flow of capital should be given importance. The capital flows have to be encouraged in to export sectors by providing various incentives.

4.The cautious policy of FDI is understandable but it should be encouraged in the other sectors of the economy at least gradually. FDI inflow may be encouraged in service sector, infrastructure, education, etc. as long as it promotes growth with equity.

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