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## **Macroeconomic Implications of Capital Inflows in India**

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**Abstract:**

*The study attempts to analyse the behaviour of some macroeconomic variables in response to Total Capital Inflows in India using quarterly data for the period 1994-2007.*

*The paper consist two sections, in first section we have analysed trend behaviour of macroeconomic variables included in the study. Time trend of all variables except NEERX, NEERT and CAB shows instability over the period of study.*

*In second section we have have made an attempt to empirically analyse the behaviour of some macroeconomic variables. With the help of DF, ADF and Schmidt & Phillips test we have concluded that CAB is the only variable which stationary in level form all othe variables are stationary in first difference form.*

*Cointegration test confirms the long run equilibrium relation between REERX & TCI, REET & TCI and between NEERX & TCI. Granger causality test confirms the bidirectional causality between REERX & TCI and between FOREX & TCI and unidirectional causality from TCI to REERT.*

**Key Words:** *Capital inflows, cointegration analysis.*

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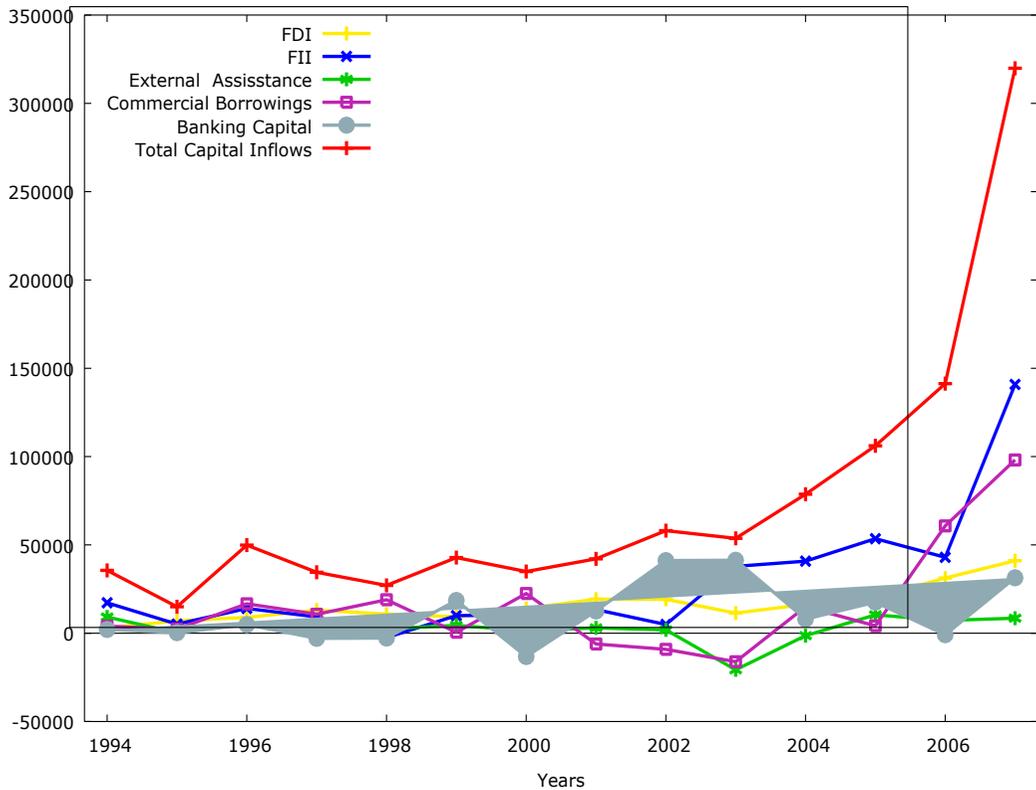
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**Introduction**

Since 1991 India has undertaken various reform measures to liberalize the economy. These measures include removal of industrial licensing system, reduction in trade barriers, and liberalization of capital flows. Over the last several years restrictions on various components on capital account have been relaxed. Due to the various policy measures undertaken by Indian Govt. to liberalize capital flows not only amount of capital inflows increases tremendously but also the composition of capital flows changed significantly. Net capital flows as percentage of GDP increases from 2.2% in 1990-91 to around 9% in 2007-08.

The composition of capital flows has undergone a complete change from official debt flows to non debt flows. The share of private capital flows viz. FDI, FII increases while the share of official flows decreases. Fig.1. shows the time series plot of total capital inflows and its components using yearly data for the period 1994-2006. Trend behavior of foreign direct investment does not show much fluctuation while all other component shows variability over the period.

Fig.1 Total Capital Inflows & its Components



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Various Latin American and Asian countries have opened their capital account in the past. Different countries have experienced different consequences in response to large capital inflows. Due to large capital inflows and flexible exchange rate various Latin American countries have experienced large appreciation of domestic currency and consequent deficit in the current account. Other possible effects of capital inflows are monetary expansion in the economy and consequent rise in inflation, rise in bank lending and effects upon savings and investment.

Calvo, Leiderman and Reinhart (1996) while analyzing the impact of capital inflows on a number of Asian and Latin American countries concluded that several Asian countries have experienced capital inflows similar to those in Latin America without associated sizable appreciation of the real exchange rate.

Cohli (2001) examined the trend of capital inflows in India and impact of these flows on some key macroeconomic variables. The study shows that the real exchange rate appreciates in response to capital inflows. The paper also highlights the pressure of capital inflows upon domestic money supply.

Chakraborty (2001) examined the effects of private foreign capital on some major macroeconomic variables in India using quarterly data for the period 1993-99. The analyses of trends in private foreign capital inflows and some other variables indicate instability. Net inflows of private foreign capital, foreign currency assets, wholesale price index, money supply, real and nominal effective exchange rate and exports follows an I(1) process, current account balance is the only variable that follows I(0) process. Cointegration test shows the presence of long run relationship between a few pair of variables. The Granger causality test shows the unidirectional from private foreign capital to nominal effective exchange rates- both trade based and export based.

Indrani Chakraborty (2003) using VAR model for the period 1993Q2 to 2001Q4 concluded that unlike East Asian and Latin American countries, the real exchange rate depreciates with respect to one standard deviation innovation to capital inflows. The paper argues that monetary policy was effective in avoiding any serious distortion in the real exchange rate.

Pami Dua and Partha Sen (2006) while analyzing the relationship between the real exchange rate, level of capital flow, volatility of the flows, fiscal and monetary policy indicators and current account surplus for the period 1993Q2 to 2004Q1 concluded that variables are cointegrated and each Granger causes the real exchange rate. The generalized variance decomposition shows that determinants of the real exchange rate in descending order of importance include net capital inflows and volatility (jointly), government expenditure, current account surplus and the money supply.

Theories exploring the consequences of capital inflow are too complex and it is extremely difficult to formulate econometric model that reflect these complexities (Thalassinos *et al*, 2012a; 2012b; 2013; Hantias *et al*, 2007). The paper is not an

attempt to formulate econometric model of simultaneous determination of above variables but analyses the impact of capital inflows on individual variables. The paper consist of two sections, the first section analyses trend behaviour of some macroeconomic variables in response to capital inflow with the help of time series plot and second section with the help of econometric tecniques empirically analyses impact of capital inflow on some of the macroeconomic variables in india.

### **Data Source and Variables Included**

The Study attempts to analyse the impact of capital inflow on some macroeconomic variables in India using quarterly data for the period 1994Q1 to 2007Q2. Macroeconomic 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).

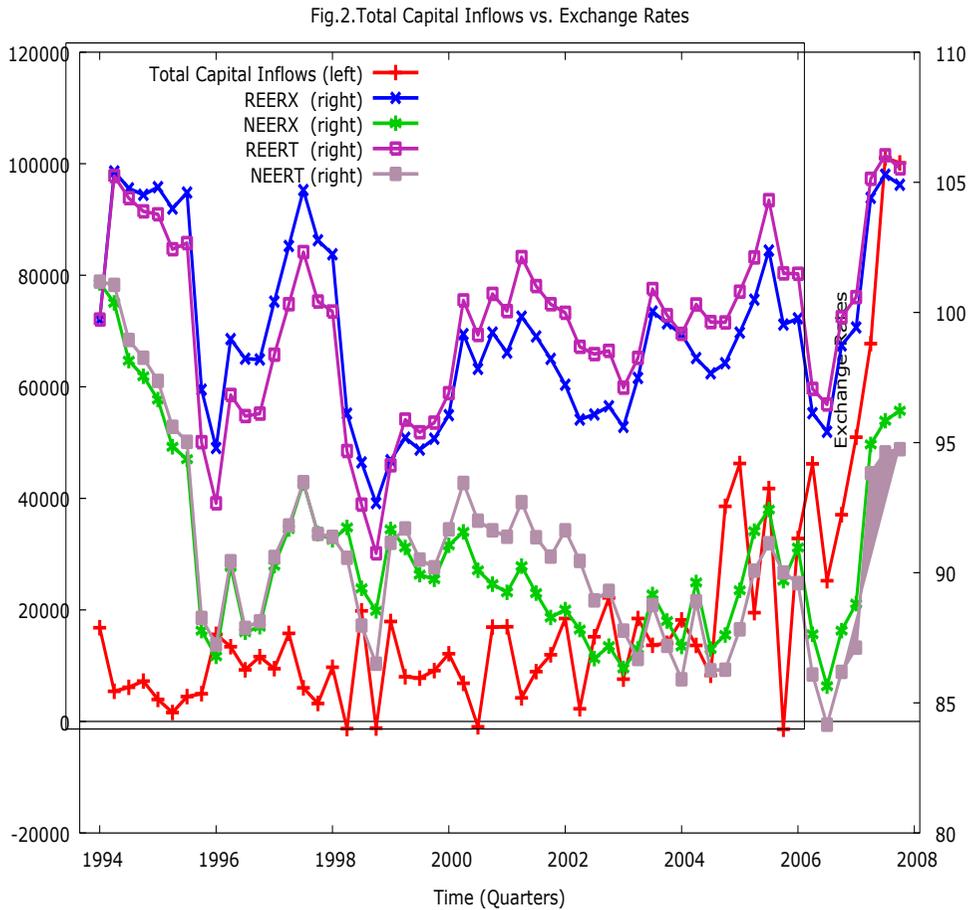
Two measures of real effective and nominal effective exchange rate based on export base and trade base using 36 countries weight have been taken. Total capital inflows (TCI) is the aggregate of foreign direct investment (FDI), foreign institutional investment (FII), external assistance (EA), banking capital (BC) and commercial borrowing (CB). All the variables are compiled from various publication of viz. Handbook of Statistics on Indian Economy and RBI Bulletin.

### **Trend Behaviour of Some Macroeconomic Variables in Response to Total Capital Inflows**

Under flexible exchange rate with no intervention by the central bank capital inflows generate no change in reserves and cause exchange rate to appreciate. Exchange rate policy in India is managed floating rather than pure floating. Central bank plays active role in minimising volatility in foreign exchange market. Fig.3 shows the behaviour of the real and nominal exchange rate over the period 1994Q1- 2007Q4.

Time series plot of nominal exchange rate (both export based & trade based) shows negative trend over the period of study. Time series plot of real effective exchange rate (both export & trade based) shows some upward trend specially after the year 1999. Behaviour of NEER shows the active interventionist role played by the RBI to reduce the volatility in foreign exchange market. Gap between NEER & REER increases over the time which is due to the price differential in domestic economy and World economy.

The pairwise correlation between TCI and NEER is very low and insignificant, but there is a positive significant correlation between TCI and REER. The year 2007 witnessed huge inflows of foreign capital mainly due to FIIs and also high appreciation of both real and nominal effective exchange rate.



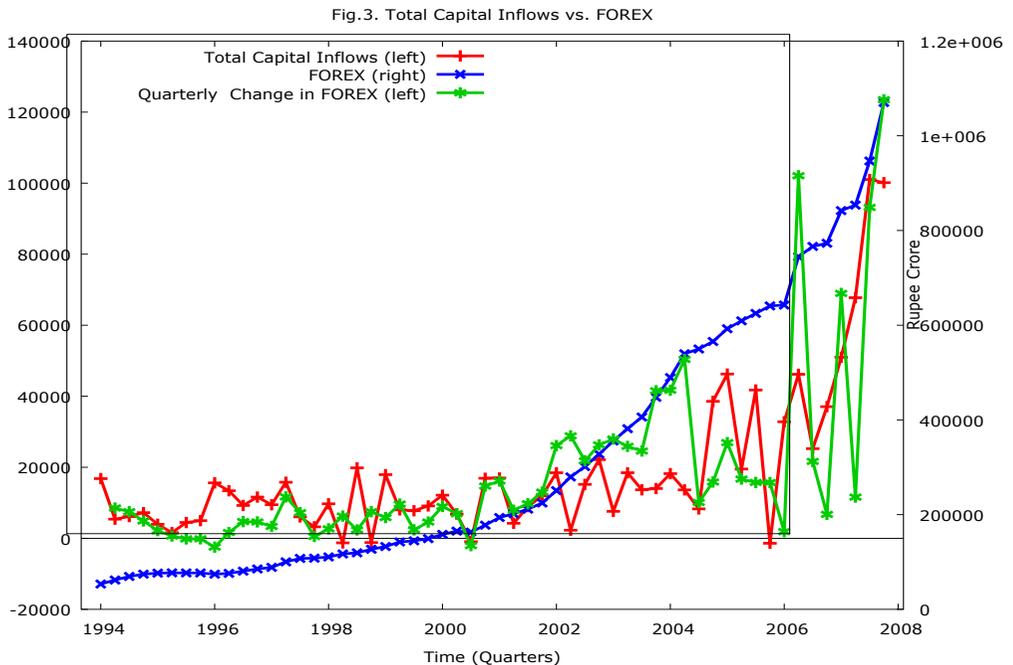
Intervention by the central bank in foreign exchange market results in changes in foreign exchange reserves so it will be fruitful now to analyse the behaviour of foreign exchange reserves in response to total capital inflows. Fig.3 shows foreign exchange reserves increases tremendously over the period. In level form there is a high correlation (0.796) between total capital inflows and foreign exchange reserves (Table 1).

**Table 1. Correlation Matrix**

	<b>TCI</b>	<b>REER</b>	<b>NEER</b>	<b>REER2</b>	<b>NEERT</b>	<b>WPI</b>	<b>M0</b>	<b>FOREX</b>	<b>CAB</b>
<b>TCI</b>	1	.271*	.138	.380**	-.041	.669**	.810**	.796**	-.254
<b>REERX</b>	.271*	1	.725**	.887**	.665**	-.074	.076	.115	-.164
<b>NEERX</b>	.138	.725**	1	.599**	.933**	-.370**	-.171	-.146	-.187

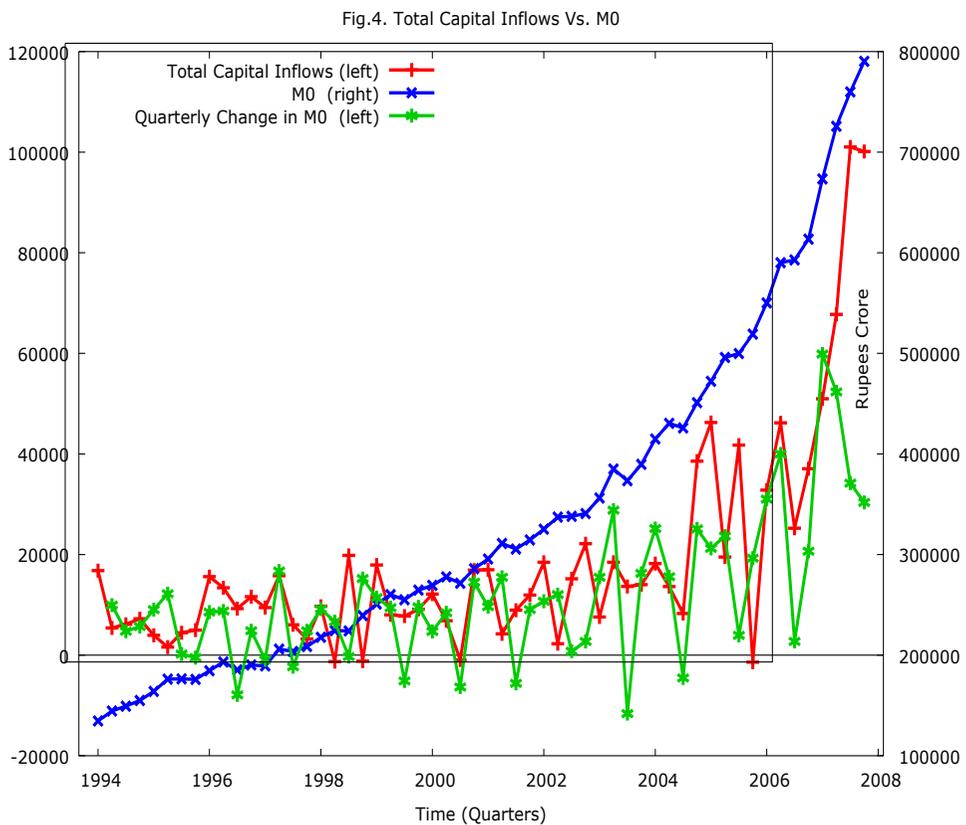
<b>REERT</b>	.380**	.887**	.599**	1	.586**	.238	.332*	.359**	-103
<b>NEERT</b>	-.041	.665**	.933**	.586**	1	-.497**	-.338*	-.336*	-.093
<b>WPI</b>	.669**	-.074	-.370**	.238	-.497**	1	.960**	.945**	-.137
<b>M0</b>	.810**	.076	-.171	.332*	-.338*	.960**	1	.988**	-.221
<b>FOREX</b>	.796**	.115	-.146	.359**	-.336*	.945**	.988**	1	-.218
<b>CAB</b>	-.254	-.164	-.187	-.103	-.093	-.137	-.221	-.218	1

Due to the trending behaviour of the foreign exchange reserves it is difficult to analyse its behaviour in response to total capital inflows. Fig.3 also shows the behaviour of reserves in first difference form which is simply quarterly change in reserves. Quarterly change in reserves is the variable which is more closely related to the total capital inflows. Periods of high capital inflows are associated with large increase in reserves and periods of low capital inflows are associated with the relatively lower increase or decrease in reserves. Close association between capital inflows and foreign exchange reserves also suggest the active role played by the central bank in foreign exchange market.



There are two types of intervention by the central bank in foreign exchange market. In first type, Central bank purchases foreign exchange against domestic currency to prevents appreciation of currency. Foreign exchange reserve being one component of reserve money, such intervention leads to the growth of high-powered money and consequently increases the money supply in the economy. The second type of central bank intervention is known as “sterilized intervention”.

In this process the central bank buys foreign exchange in exchange of government securities. It helps to curb the growth of money supply in the economy. Time series plot of money supply shows the explosive behavior. Money supply increases tremendously over the period of the study. To trace the behavior of the money supply in response to capital inflows we have also plotted quarterly change in money supply.

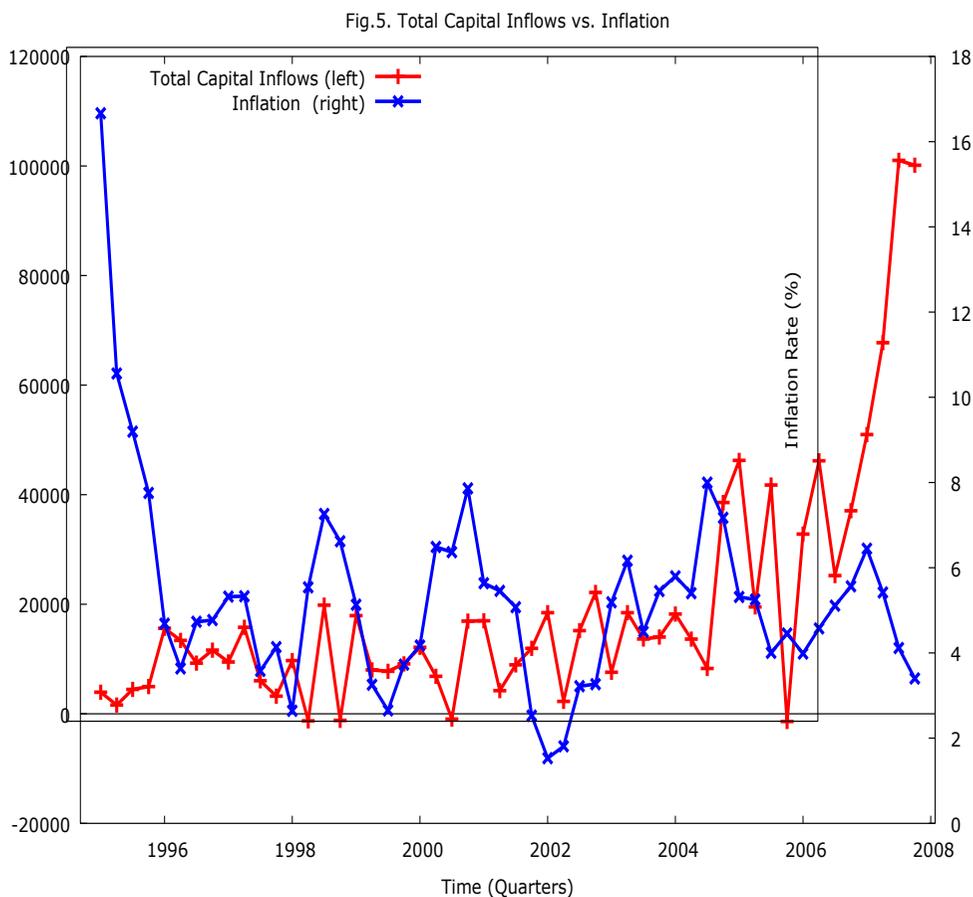


To analyse the behaviour of price level we plotted the quarterly inflation over the time period of 1995Q1 to 2007Q4. The behaviour of the variable under consideration does not show much divergence though there are some episodes of high inflation. Simple time series plot of inflation and capital inflows does not suggest much about the underlying relationship between two variables.

Due to the price stabilization policies of the Government price remains under control during the period of the study. High capital inflows are not always associated with high inflation specially during the year 2007 despite huge surge of capital inflows price level decelerates. The relationship between inflation and capital inflows is complex and one can not conclude much with simple time series plot.

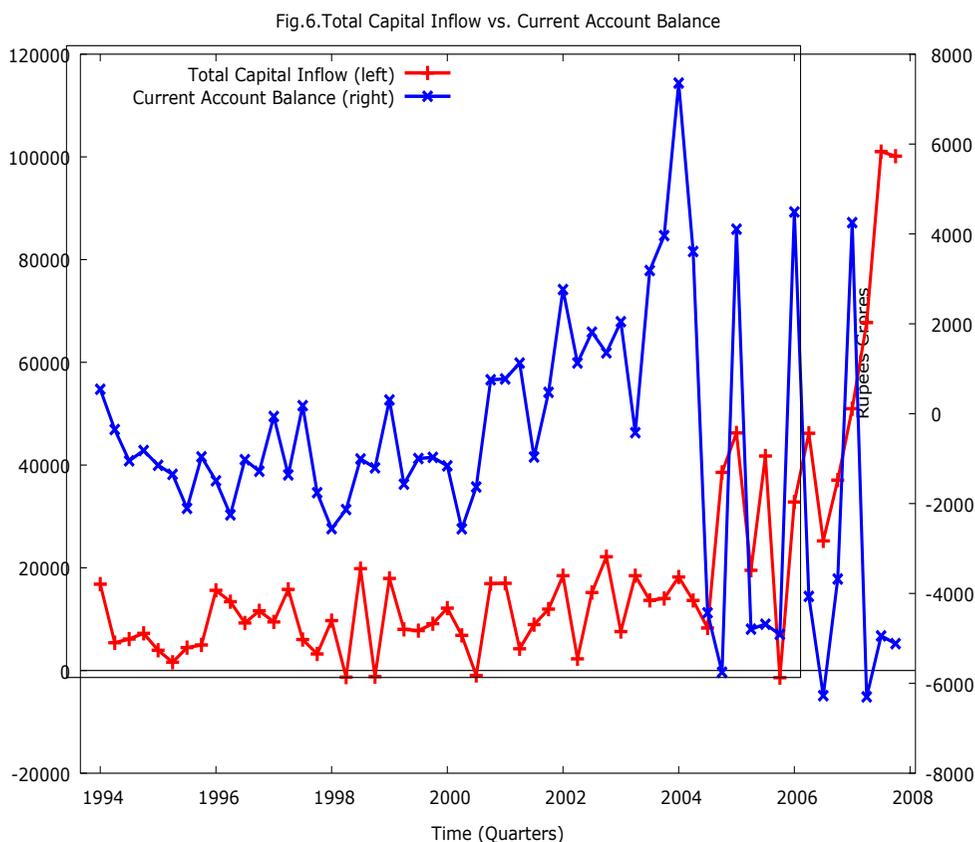
At last we have analysed behaviour of current account balance (fig.6). In literature ‘Dutch Disease Dilema’ suggests the deterioration of current account in response to large capital inflows in the long run. Time series plot of current account balance does not show any trend over the period of the study.

Correlation coefficient (-0.25) between total capital inflows and current account balance shows some inverse relationship between the two variables (Table 2) but the value of correlation coefficient is not significant. Thus the notion of Dutch Disease Dilema has not been observed in the context of India.



**Table 2. Summary Statistics**

<b>Variables</b>	<b>Range</b>	<b>Minimum</b>	<b>Maximum</b>	<b>Mean</b>	<b>Std. Dev.</b>	<b>Variance</b>
<b>FDI</b>	18089	-3374	14715	4017.34	3360.128	1.129E7
<b>FII</b>	60161	-2301	57860	7100.66	10990.970	1.208E8
<b>EA</b>	17601	-12138	5463	650.82	2754.345	7586417.93
<b>CBs</b>	47578	-18756	28822	3970.68	9131.27	8.338E7
<b>BC</b>	40923	-14004	26919	2824.50	7428.84	5.519E7
<b>TCI</b>	102430	-1400	101030	18564.0 0	21342.13	4.555E8
<b>REERX</b>	12.74	92.67	105.41	99.19	3.37	11.391
<b>NEERX</b>	15.49	85.64	101.13	90.64	3.54	12.568
<b>REERT</b>	15.29	90.74	106.04	99.49	3.41	11.660
<b>NEERT</b>	17.02	84.16	101.18	90.80	3.75	14.103
<b>WPI</b>	116	100	216	158.17	31.55	995.942
<b>M0</b>	655718.6 6	134552.66	790271.33	338472. 25	168133.67	2.827E10
<b>FOREX</b>	1016870	53412	1070282	318374. 67	274282.22	7.523E10
<b>CAB</b>	13658	-6301	7357	-802.30	2922.90	8543378.21



### Econometric Analysis and Findings

In this section we have applied some econometric test to empirically analyze the behavior of some macroeconomic variables in response to total capital inflows. First, tests of stationarity are applied to each variable. Three tests of stationarity viz. DF test, ADF test and Schmidt and Phillips test have been applied. Since there is no universal test for unit root we will conclude with the help of three tests. DF test is based on the following regression:

$$\Delta Y_t = C + \alpha t + \rho Y_{t-1} + \varepsilon_t \quad (1)$$

Where C is constant and t is trend.

Null Hypothesis  $H_0: \rho = 1$  or  $Y_t$  is non stationary

$H_1: \rho < 1$  or  $Y_t$  is stationary

The null hypothesis is rejected if  $\rho$  is negative and statistically significant.

The ADF test is based on the following regression:

$$\Delta Y_t = C + \alpha t + \rho Y_{t-1} + \sum_{i=1}^n \beta_i \Delta Y_{t-i} + \varepsilon_t$$

If  $C$  and  $\alpha$  failed to be statistically significant we run above regression again dropping the constant and trend. For the choice of appropriate number of lags we have followed Enders (1995). We start with a large lag ( $n$ ), if the estimated  $t$ -statistics for the last lag is not significant, we drop the last lag and repeat the process. The process will continue until we find a lag which is significant.

DF test confirms the presence of non stationarity in the level form for the variables TCI, REERX, REERT WPI, FOREX, and MO. NEERX and NEERT follows  $I(0)$  process at 5% level of significance. CAB is stationary at 1% level of significance. ADF test confirm the presence of non stationarity in the level form for variables TCI, REERX, WPI, FOREX and MO. NEERX and NEERT are stationary in level form at 1% level of significance. REERT is stationary at 10% level of significance and CAB is stationary at 5% level of significance.

Schmidt and Phillips (1992) have proposed a test for the null hypothesis of a unit root when a deterministic linear trend is present. They suggest estimating the deterministic term in a first step under the unit root hypothesis. Then the series is adjusted for the deterministic terms and a unit test is applied to the adjusted series. Schmidt and Phillips test confirms that all variables except CAB are non stationary. In first difference form WPI is stationary at 5% level of significance; all other variables (TCI, REERX, NEERX, NEERT, FOREX and MO) are stationary at 1% level of significance.

With the help of the above three test we have concluded that TCI, REERX, REERT, WPI, FOREX, and MO are variables which follows  $I(1)$  process. DF and ADF test shows that NEERX and NEERT follows  $I(0)$  while Schmidt and Phillips test shows they follows  $I(1)$  process. All the three test confirms CAB follows  $I(0)$  process hence we leaves CAB for further analysis.

Non stationarity of a variable shows that the time path of the variable concerned is diverging from equilibrium. Hence time path of CAB does not diverge from equilibrium. There is also evidence that NEERX and NEERT follow  $I(0)$  and hence time path shows stability over time.

After tests of stationarity we have applied the test of Cointegration to explore the long run equilibrium relation between a set of variables. If two or more variables which are integrated of the same order are cointegrated then it follows that there exist long run equilibrium relation between them. To test the cointegrating relation between pair of variables we have followed the methodology suggested by Engle and Granger (1987). Engle Granger co integration test is based on two stage regression. In the first stage we have run the following regression

$$Y_t = \beta_0 + \beta_1 t + \beta_2 X_t + u_t$$

If the coefficient of time trend  $t$  comes out insignificant we have re run the above regression by dropping the time trend  $t$ . In second stage we have run following regression

$$\Delta \hat{u}_t = \delta \hat{u}_{t-1} + \alpha_i \sum \Delta \hat{u}_{t-1} + \varepsilon_t$$

The figures given in table (5) are  $t$  values of  $\delta$ . Co integration exist between following pair of variables: REERX and TCI, NEERX and TCI, REERT and TCI. No other variable is cointegrated with TCI. In addition cointegration exists between following pair of variables: REERT and WPI, REERT and MO, REERT and FOREX, NEERT and WPI, NEERT and FOREX and between Mo and FOREX.

In last we have applied the causality test to explore the unidirectional or bidirectional causality between pair of variables. If a variable  $X$  causes  $Y$  and also  $Y$  causes  $X$  then there is a feedback or bidirectional causality and if only one variable causes other then there is unidirectional causality. In literature number of tests for detecting causality have been discussed but we have used one of the oldest test of causality namely Granger test. The intuition behind the granger causality test is that if  $X$  Granger causes  $Y$  but  $Y$  does not Granger cause  $X$ , then past values of  $X$  should be able to help predict future values of  $Y$ , but past values of  $Y$  should not be helpful in predicting  $X$ . Since stationarity of variables is precondition for Granger causality test we have used first difference form of variables. The following model has been applied:

$$Y_t = \sum_{i=1}^p \alpha_i X_{t-i} + \sum_{j=1}^p \beta_j Y_{t-j} + u_{1t}$$

$$X_t = \sum_{i=1}^p \gamma_i X_{t-i} + \sum_{j=1}^p \delta_j Y_{t-j} + u_{2t}$$

$P$  is the order of the lag. Lag selection is a difficult choice for which we have used Akaike criterion. The null hypothesis that  $X$  does not granger causes  $Y$  is that  $\alpha_i = 0$  for  $i = 1, 2, \dots, p$ . the figures reported in table.6 are Wald  $F$  statistics and corresponding  $p$  values.

The first significant result which we get is bidirectional causality exist between TCI & REERX and unidirectional causality from TCI to REERT. There is no causality between TCI & NEERX or between TCI & NEERT. Again bidirectional causality exist between TCI & FOREX. In addition unidirectional causality from REERT to FOREX, MO to NEERT, WPI to FOREX and bidirectional causality between MO & WPI exists (Tables 3-5).

**Table 3. DF & ADF Test**

Variables	DF Test		ADF Test	
	Level	First Difference	Level	First Difference
<b>TCI</b>	-2.5949 With C & T	-11.3428*** With C	4.793 With C, Lag-10	-4.1755*** With C, Lag-11
<b>REERX</b>	-2.307 With C	-7.01939*** With C	-1.6872 With C, Lag-15	-5.2671*** With C, Lag-5
<b>NEERX</b>	-3.0908** With C	-7.4581*** With C	-3.9235*** With C, Lag-6	-4.5001*** With C, Lag-5
<b>REERT</b>	-2.31964 With C	-7.08713*** With C	-3.305* With C&T, Lag-1	-4.9903*** With C, Lag-5
<b>NEERT</b>	-3.09247** With C	-6.79982*** With C	-3.9067*** With C, Lag-6	-4.1277*** With C, Lag-5
<b>WPI</b>	-2.22089 With C & T	-7.99156*** With C	-1.707 With C&T, Lag-4	-4.0573*** With C&T Lag-3
<b>FOREX</b>	6.4428 With C	-5.5367*** With C & T	3.0328 With C, Lag-11	-3.1655*** With C&T Lag-8
<b>M0</b>	6.1548 With C	-6.37034*** With C & T	3.2604 With C&T, Lag-11	-3.6879*** With C, Lag-4
<b>CAB</b>	-5.46898*** With C		-3.149** With C, Lag-13	-4.1440*** With C, Lag-3

**Notes:**

- (i) Critical Values at 1% , 5% & 10% With C & T are -3.96 , -3.14 , -3.13 resp. , with C without T are -3.43, -2.86 , -2.57 resp. and without C&T are -2.56, -1.94, -1.62 resp. Davidson, R. and MacKinnon, J. (1993), "Estimation and Inference in Econometrics" p 708, table 20.1, Oxford University Press, London
- (ii) 'C' stands for constant and 'T' stands for trend
- (iii) \*\*\* signifies statistically significant at 1 % level
- (iv) \*\* signifies statistically significant at 5 % level
- (v) \* signifies statistically significant at 10 % level

**Table 4. Schmidt-Phillips Test**

Variable	Level Form	First Difference
<b>TCI</b>	-2.5711	-11.1641***
<b>REERX</b>	-2.4810	-4.2808***
<b>NEERX</b>	-2.4803	-6.0020***
<b>REERT</b>	-2.5923	-4.2808***
<b>NEERT</b>	-2.6472	-5.7530***
<b>WPI</b>	-1.8108	-3.2599**
<b>FOREX</b>	-1.2473	-4.5933***
<b>M0</b>	-1.1747	-7.0589***
<b>CAB</b>	-5.8991***	

**Notes:**

- (i) Critical values at 1%, 5% & 10% for Schmidt and Phillips test are -3.56, -3.02 & -2.75 respectively. Source : Schmidt, P. and Phillips, P. C. B. (1992), "LM tests for a unit root in the presence of deterministic trends", *Oxford Bulletin of Economics and Statistics*, vol. 54, p. 257-287.
- (ii) \*\*\* signifies statistically significant at 1 % level
- (iii) \*\* signifies statistically significant at 5 % level
- (iv) \* signifies statistically significant at 10 % level

**Table 5. Engle Granger Test for Pairwise Co-Integration**

Equation $Y_t$ on $X_t$	Trend	Statistic	p-value	Conclusion(Cointegration Present )
<b>TCI on REERX</b>	YES	-1.1668 (Lag-8)	0.9647	NO
<b>REERX on TCI</b>	YES	-3.9584 (Lag-1)	0.0308	YES
<b>TCI on NEERX</b>	YES	-2.2363 (Lag-6)	0.6613	NO
<b>NEERX on TCI</b>	YES	-3.9147 (Lag-3)	0.0348	YES
<b>TCI on REERT</b>	YES	-3.2122 (Lag-0)	0.2121	NO

<b>REERT on TCI</b>	NO	-3.9983 (Lag-1)	0.0071	YES
<b>TCI on NEERT</b>	YES	-1.4489 (Lag-6)	0.9299	NO
<b>NEERT on TCI</b>	YES	-2.2782 (Lag-8)	0.6397	NO
<b>TCI on WPI</b>	YES	-2.5047 (Lag-6)	0.5173	NO
<b>WPI on TCI</b>	YES	-1.6708 (Lag-7)	0.8833	NO
<b>TCI on M0</b>	YES	-3.8180 (Lag-6)	0.4531	NO
<b>M0 on TCI</b>	YES	-2.6992 (Lag-1)	0.4116	NO
<b>TCI on FOREX</b>	YES	-2.5621 (Lag-6)	0.4858	NO
<b>FOREX on TCI</b>	YES	-2.1288 (Lag-6)	0.7142	NO
<b>REERT on WPI</b>	YES	-3.7079 (Lag-1)	0.0612	YES
<b>WPI on REERT</b>	YES	-1.5327 (Lag-8)	0.9147	NO
<b>REERT on M0</b>	YES	-3.5710 (Lag-1)	0.0842	YES
<b>M0 on REERT</b>	YES	-0.1010 (Lag-0)	0.999	NO
<b>REERT on FOREX</b>	YES	-3.6618 (Lag-1)	0.0676	YES
<b>FOREX on REERT</b>	YES	-0.0608 (Lag-0)	0.9424	NO
<b>NEERT on WPI</b>	NO	-3.3073 (Lag-3)	0.0537	YES
<b>WPI on NEERT</b>	YES	-1.5182 (Lag-8)	0.9175	NO
<b>NEERT on M0</b>	YES	-3.8045 (Lag-3)	0.0469	YES
<b>Mo on NEERT</b>	YES	-1.0978 (Lag-3)	0.9703	NO
<b>NEERT on FOREX</b>	YES	-3.5267 (Lag-3)	0.0934	YES
<b>FOREX on NEERT</b>	YES	-1.0144 (Lag-5)	0.976	NO

<b>WPI on M0</b>	YES	-2.6311 (Lag-8)	0.4482	NO
<b>Mo on WPI</b>	YES	-1.3032 (Lag-8)	0.9506	NO
<b>WPI on FOREX</b>	YES	-2.565 (Lag-8)	0.4841	NO
<b>FOREX on WPI</b>	YES	-0.8809 (Lag-8)	0.9831	NO
<b>M0 on FOREX</b>	YES	-3.6164 (Lag-8)	0.0755	YES
<b>FOREX on M0</b>	NO	-2.9021 (Lag-8)	0.1354	NO

**Table.6.** Pairwise Granger Causality Test

Dependent Variable	Explanatory Variables	Lags	F-Statistic	p-value	Remarks
<b>ΔTCI</b>	ΔTCI, ΔREERX	1	3.1677	0.0238	Causality From REERX→TCI
<b>ΔREERX</b>	ΔREERX, ΔTCI	1	3.2383	0.0209	Causality From TCI→REERX
<b>ΔTCI</b>	ΔTCI, ΔNEERX	1	0.0981	0.7554	No Causality From NEERX→TCI
<b>ΔNEERX</b>	ΔNEERX, ΔTCI	1	0.0404	0.8413	No Causality From TCI→NEERX
<b>ΔTCI</b>	ΔTCI, ΔREERT	1	0.4542	0.5033	No Causality From REERT→TCI
<b>ΔREERT</b>	ΔREERT, ΔTCI	1	2.1837	0.0416	Causality From TCI→REERT
<b>ΔTCI</b>	ΔTCI, ΔNEERT	1	0.0165	0.8981	No Causality From NEERT→TCI
<b>ΔNEERT</b>	ΔNEERT, ΔTCI	1	0.0711	0.7908	No Causality From TCI →NEERT
<b>ΔTCI</b>	ΔTCI, ΔWPI	4	1.5788	0.1972	No Causality From WPI →TCI
<b>ΔWPI</b>	ΔWPI, ΔTCI	4	0.5752	0.6821	No Causality From TCI→WPI
<b>ΔTCI</b>	ΔTCI, ΔM0	4	4.5652	0.0037	Causality From M0→TCI
<b>ΔM0</b>	ΔM0, ΔTCI	4	0.9405	0.4498	No Causality From TCI→M0
<b>ΔTCI</b>	ΔTCI, ΔFOREX	4	3.4956	0.0148	Causality From FOREX →TCI
<b>ΔFOREX</b>	ΔFOREX, ΔTCI	4	5.6405	0.0010	Causality From TCI→FOREX
<b>ΔREERT</b>	ΔREERT, ΔWPI	1	0.0990	0.7542	No Causality From WPI→REERT
<b>ΔWPI</b>	ΔWPI,	1	0.0160	0.8997	No Causality From REERT →WPI

	$\Delta REERT$					
<b><math>\Delta REER</math> <b>T</b></b>	$\Delta REERT,$ $\Delta M0$	4	1.0488	0.3934	No Causality From $M0 \rightarrow REERT$	
<b><math>\Delta M0</math></b>	$\Delta M0,$ $\Delta REERT$	4	0.4230	0.7912	No Causality From $REERT \rightarrow M0$	
<b><math>\Delta REER</math> <b>T</b></b>	$\Delta REERT,$ $\Delta FOREX$	1	0.6463	0.4251	No Causality From $FOREX \rightarrow REERT$	
<b><math>\Delta FORE</math> <b>X</b></b>	$\Delta FOREX, \Delta$ $REERT$	1	4.7445	0.0339	Causality From $REERT \rightarrow FOREX$	
<b><math>\Delta NEER</math> <b>T</b></b>	$\Delta NEERT,$ $\Delta WPI$	4	0.5630	0.6907	No Causality From $WPI \rightarrow NEER$	
<b><math>\Delta WPI</math></b>	$\Delta WPI,$ $\Delta NEERT$	4	1.6480	0.1797	No Causality From $NEERT \rightarrow WPI$	
<b><math>\Delta NEER</math> <b>T</b></b>	$\Delta NEERT, \Delta$ $M0$	4	2.6760	0.0444	Causality From $M0 \rightarrow NEERT$	
<b><math>\Delta M0</math></b>	$\Delta M0,$ $\Delta NEERT$	4	1.5353	0.2090	No Causality From $NEERT \rightarrow M0$	
<b><math>\Delta NEER</math> <b>T</b></b>	$\Delta NEERT,$ $\Delta FOREX$	1	0.3271	0.5698	No Causality From $FOREX \rightarrow NEERT$	
<b><math>\Delta FORE</math> <b>X</b></b>	$\Delta FOREX,$ $\Delta NEERT$	1	4.1326	0.0472	Causality From $NEERT \rightarrow FOREX$	
<b><math>\Delta WPI</math></b>	$\Delta WPI, \Delta M0$	5	2.3144	0.0615	Causality From $M0 \rightarrow WPI$	
<b><math>\Delta M0</math></b>	$\Delta M0, \Delta WPI$	5	5.3932	0.0007	Causality From $WPI \rightarrow M0$	
<b><math>\Delta WPI</math></b>	$\Delta WPI,$ $\Delta FOREX$	4	1.7871	0.1490	No Causality From $FOREX \rightarrow WPI$	
<b><math>\Delta FORE</math> <b>X</b></b>	$\Delta FOREX,$ $\Delta WPI$	4	2.9880	0.0291	Causality From $WPI \rightarrow FOREX$	
<b><math>\Delta M0</math></b>	$\Delta M0,$ $\Delta FOREX$	5	1.2155	0.3196	No Causality From $FOREX \rightarrow M0$	
<b><math>\Delta FORE</math> <b>X</b></b>	$\Delta FOREX,$ $\Delta M0$	5	3.5077	0.0101	Causality From $M0 \rightarrow FOREX$	

## Conclusion

Theoretical literature exploring the consequences of capital inflow is complex and cannot be generalized for all the countries. Different countries have experienced different consequences in response to capital inflow. Hence empirical assessment of possible implication of capital inflows is necessary.

Trend behavior of total capital inflows and its components shows that total capital inflows increases tremendously over the period especially after the year 2000-01. Trend behavior of foreign direct investment shows steady upward trend without much fluctuation while foreign institutional investment shows upward trend with fluctuations over the period.

Trend behavior of real effective exchange rate (both export based and trade based) shows upward trend especially after 1999, while net effective exchange rate (both export based and trade based) shows some negative trend.

Foreign exchange reserve highly upward trend behavior of nominal effective and foreign exchange reserve shows the active interventionist role played by the RBI for maintaining exchange rate fluctuations. Due to the intervention by the RBI domestic currency does not appreciate much over the period though there are some short episodes of appreciation of currency in response to large capital inflows. Money supply increases tremendously over the period but it is difficult to say how much of it is due to the capital inflows.

Divergence between real and nominal exchange rate shows that price level in home country increases in relation to trading partners. Current account balance does not experience any significant deterioration in response to total capital inflows.

Capital account balanced (CAB) is the only variable which is stationary in level form. There are also some evidence that nominal effective exchange rate (both export based & trade based) is stationary in level form. All other variables are non stationary in level form.

Hence time trend of all variables except current account balance and nominal exchange rate are diverging from equilibrium. Cointegration test confirms the long run equilibrium relation between real effective exchange rate and total capital inflows. Causality test shows the bidirectional causality between REERX & TCI, between FOREX & TCI and unidirectional causality from TCI to REERT.

Some of the important findings of our analysis are as follows (a) nominal effective exchange in India does not appreciate in response to capital inflows. (b) there is some linkage between real effective exchange rate and capital inflows. The trend behavior shows that gap between real and nominal effective exchange rate increases which means price level in India increases in relation to trading partners. (c) Foreign exchange reserve increases tremendously due to the intervention by the RBI in foreign exchange market. (d) Current account balance does not deteriorate much as in case of some Latin American countries.

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