TOM JACOB “IMPACT OF FOREIGN INVESTMENT FLOWS ON INDIAN ECONOMY IN THE POST LIBERALISATION ERA.” THESIS. RESEARCH DEPARTMENT OF COMMERCE ST THOMAS’ COLLEGE (AUTONOMOUS), UNIVERSITY OF CALICUT, 2019.

Chapter 5

Impact of Foreign Investment on the Macroeconomic Variables of Indian Economy

Economy is a system of organizations and institutions that either facilitate or play a role in the production and distribution of goods and services in a society and a large set of inter-related production and consumption activities. The macro economy on the other hand is an aggregate picture of an entire economic environment, such as the economy of a country. Macroeconomic variables like balance of payments, foreign exchange reserves, inflation, exchange rate, foreign direct investment, foreign portfolio investment, economic growth, export, import, interest rate, external debt, capital market etc. (Oliver, B. 2000)[185] are the basic structure or the most fundamental organs of an economy which exert pressure on the economy as a whole.

These variables are interrelated, inter-active and interdependent. Therefore the impact of each of the macroeconomic variables has its immediate reflections on the other macroeconomic variables and thus on the economy as a whole. The emergence of foreign investment as a prominent macroeconomic variable is the most important phenomenon of the post liberalization Indian economy. It impacts the Indian economy independently and in association with other macroe-

[185]Oliver, B. (2000). *Macroeconomics*. Second Edition Prentice Hall New York.

conomic variables of the Indian economy. Therefore the study of the impact of foreign investment on Indian economy essentially is the study of its impact as a macroeconomic variable on the other macroeconomic variables. Accordingly this chapter makes an empirical analysis to find out whether there exist a relationship between foreign investment and the main macroeconomic variables of the Indian economy based on the logical assumption that relationship implies impact. In short if the previous chapter examined how the macroeconomic variables impacted the foreign investment flows, this chapter examines how foreign investment impacts the macroeconomic variables of the Indian economy.

5.1 Impact of Foreign Investment on the Balance of Payments of Indian Economy

Since balance of payments is the best indicator of the financial health of an economy and the most reflective realm of the impact of foreign investment, an examination of the impact foreign investment on an economy must begin with the impact of foreign investment on its balance of payments. In fact as mentioned earlier, it was the balance of payments crisis of the 1990s[186] that paved the way for the arrival of foreign investment to India. Hence it is in the balance of payments of Indian economy that the impact of foreign investment ought to have reflected clearly.

India, like other developing countries, has been a victim of unfavorable balance of payments and it is mainly due to the excess of import over export

[186]Mid 1991 witnessed India plunging into its worst macroeconomic crisis since independence. This serious balance of payments crisis developed as a foreign exchange crisis. In June 1991, India's foreign reserve fell to less than $1 billion; this was only just sufficient to meet two weeks of import requirements. The State Bank of India was just two days away from defaulting on her international obligations. With the fiscal deficit exceeding 8 percentage of the GDP and the current account deficit exceeding 2.5 percentage of the GDP, the macroeconomic fundamentals had turned from bad to worse. NRIs withdrew funds from the NRE(E) accounts resulting in a flight of capital from the country. Inflation shot up to 16.7 percentages. International credit rating agencies like Standard and Poor, Moody's etc downgraded India's credit rating to speculative grade. An important factor that led to the foreign exchange crisis of 1991 was the spurt in India's foreign debt in the eighties. The first dose of liberalization initiated in the latter half of the 1980s necessitated substantial imports. This led to widening trade and current account deficits. Since these deficits were financed through borrowings, it led to sharp rise in the India's foreign debt which shot up from $20.63 billion in 1980 to $83.80 billion in 1981. The Debt Service Ratio spurted to an alarming 35.3 percent. This situation along with the oil crisis of 1991 led to a full blown balance of payments crisis by mid-1991.

and the consequent current account deficit. Therefore balance of payments is closely related to the current account deficit. The Table 5.1 shows how the flow of foreign investment has been balancing the balance of payments of the Indian economy since the 1990s through the reduction of current account deficit and continuing uninterested since then filling her capital account with foreign capital.

As is evident from the Table 5.1 foreign investment has played a crucial role in financing India's current account deficit. In the year 1991-92 the current account deficit was $1178 million. In that year foreign investment could not play any significant contribution for meeting the current account deficit as the contribution of FDI and FPI to the capital account in that year was as low as $129 million and $4 million respectively. The period 1992-93 also showed the same trend of foreign investment. But the following two years i.e., in 1993-94 and 1994-95 foreign investment flows could meet the current account deficit. But from 1995-96 to 1998-99 foreign investment flows dropped drastically and failed to meet the current account deficit.

During 1998-99, 2008-09 and 2015-16 the FPI flows became negative and failed to make any significant contribution to the capital account and thereby to meet the current account deficit. But in all the other years there was enough foreign investment to meet the entire current account deficit either exclusively by it or to make substantial contribution for meeting them. In this way foreign investment could relieve the country from its debt and enabled it for meeting the current account deficit. In other words India's BOP position became favorable since 2001 and this is explicitly due to high flow of foreign investment into India and the consequent hike of the capital account. Table 5.2 shows this improvement of India's balance of payments position and the hike of the capital account year after year.

Figure 5.1 shows that except for four years the entire current account deficit was met with the help of capital account, a component of foreign investment. when foreign investment failed to make significant contribution to meet the current account deficit, India met her current account deficit mainly through external debt. Thus India's unfavorable balance of payments which worsened in the early 1990s is now under control. It is true that despite high flow of foreign

Table 5.1: Foreign Investment and Current Account Deficit (US $ Million)

Year	FDI	FPI	Trade Deficit	CAD
1991-92	129	4	-2798	-1178
1992-93	315	244	-5447	-3526
1993-94	586	3567	-4056	-1159
1994-95	1343	3824	-9049	-3369
1995-96	2143	2748	-11360	-5912
1996-97	2842	3312	-14815	-4619
1997-98	3562	1828	-15507	-5499
1998-99	2480	-61	-13246	-4038
1999-00	2167	3026	-17841	-4698
2000-01	4031	2760	-12460	-2666
2001-02	6125	2021	-11574	3400
2002-03	5036	979	-10690	6345
2003-04	4322	11377	-13718	14083
2004-05	5987	9315	-33702	-2470
2005-06	8901	13492	-51904	-9902
2006-07	22739	7003	-61782	-9565
2007-08	34728	27271	-91468	-15738
2008-09	41737	-13855	-119520	-27914
2009-10	33109	32376	-118203	-38181
2010-11	29029	31471	-127322	-48053
2011-12	32952	17410	-189759	-78155
2012-13	26953	27769	-195656	-88163
2013-14	30763	5029	-147609	-32397
2014-15	35283	42193	-144940	-26859
2015-16	44907	-3643	-130079	-22151
2016-17	42215	7766	-112442	-14417
2017-18	39430	22165	-160036	-48717
Total	**463814**	**261391**	**-1826983**	**-475518**

Source: Handbook of Statistics on the Indian Economy, 2018, RBI Bulletin 2018.

investment, trade deficit and current account deficit existed but this deficit was easily overcome with the help of foreign exchange reserves, the credit of course goes to the capital inflows in the form of foreign investment. Thus in the case of balance of payments of India, the impact of foreign investment is not only positive but also highly substantial and thus the primary objective of

Table 5.2: India's Balance of Payments Position (US $ Million)

Year	Current Account Balance	Capital Account Balance	Overall Balance
1991-92	-1178	3777	2599
1992-93	-3526	2936	-590
1993-94	-1159	9694	8535
1994-95	-3369	9156	5787
1995-96	-5912	4690	-1222
1996-97	-4619	11412	6793
1997-98	-5499	10010	4511
1998-99	-4038	8260	4222
99-2000	-4698	11100	6402
2000-01	-2666	8534	5868
2001-02	3400	8357	11757
2002-03	6345	10640	16985
2003-04	14083	17338	31421
2004-05	-2470	28629	26159
2005-06	-9902	24954	15052
2006-07	-9565	46171	36606
2007-08	-15738	107902	92164
2008-09	-27914	7835	-20079
2009-10	-38181	51622	13441
2010-11	-48053	61103	13050
2011-12	-78155	65324	-12831
2012-13	-88163	91989	3826
2013-14	-32397	47906	15509
2014-15	-26859	88265	61406
2015-16	-22151	40055	17905
2016-17	-14417	35967	21550
2017-18	-48717	92292	43574

Source: Handbook of Statistics on the Indian Economy, 2018, RBI Bulletin 2018.

the initiation of foreign investment to India was achieved and fully justified.

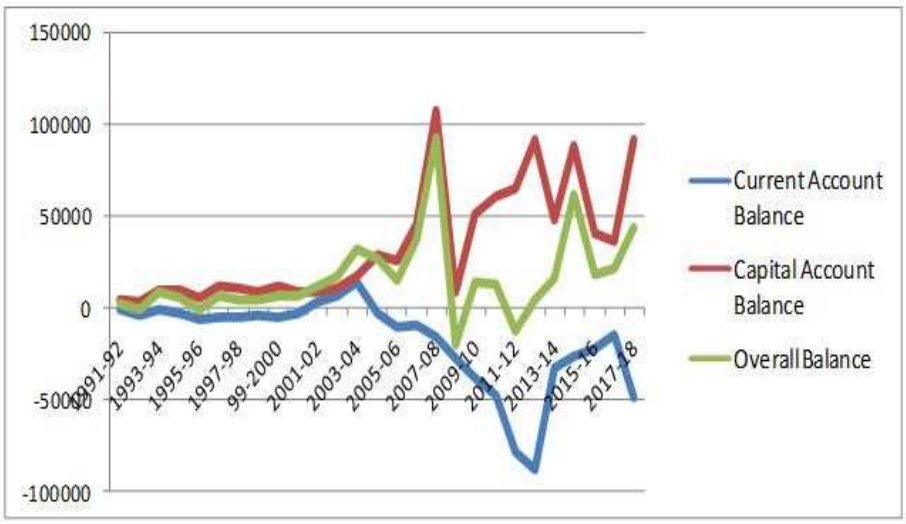

Figure 5.1: India's Balance of Payments

5.2 Foreign Investment - Creator of Foreign Exchange Reserves

Wenkai and Song (2009)[187], who analysed the real effect of foreign investment on the growth of foreign exchange reserves (also known as forex reserves) argue that there is a reciprocal relationship between foreign exchange reserves and foreign investment. According to them the higher the foreign investment the higher will be the foreign exchange reserves and the higher the foreign exchange reserves the higher will be the foreign investment. Foreign investment in India, as elsewhere, has become dominant creator of forex reserves. It works out in a simple and direct way i.e., RBI by taking and converting the dollars which foreign investment brings to the forex reserves and it is with the foreign exchange reserves that mainly foreign investment impacts the macroeconomic variables of the economy. In other words it is in and through the forex reserves, that foreign investment has been playing its decisive role in the Indian economy.

India's Foreign Exchange Reserves (FER) has four components - Foreign Currency Asset (FCA), Gold, Special Drawing Right (SDR) and Reserve Trench Position (RTP). As Figure 5.2 depicts their proportion is in the following way - Foreign Currency Asset 94 percent, Gold 5 percent, SDR and Reserve Trench

[187]Wenkai, S., and Song, M. (2009). FDI's Real Impact on Foreign Exchange Reserves: Evidence from China. *China Economist*, 1, 1-12.

Table 5.3: Composition of India's Foreign Exchange Reserves

YEAR	SDR	GOLD	FCA	RTP	FER (US $ Million)	FER (Rs. Billion)
1991-92	2.33	90.39	145.78	-	9220	238.5
1992-93	0.55	105.49	201.4	-	9832	307.44
1993-94	3.39	127.94	472.87	-	19254	604.2
1994-95	0.23	137.52	660.05	-	25186	797.8
1995-96	2.8	156.58	584.46	-	21687	743.84
1996-97	0.07	145.57	803.68	-	26423	949.32
1997-98	0.04	133.94	1025.07	-	29367	1159.05
1998-99	0.34	125.59	1254.12	-	32490	1380.05
1999-00	0.16	129.73	1529.24	-	38036	1659.13
2000-01	0.11	127.11	1844.82	-	42281	1972.04
2001-02	0.5	148.68	2491.18	-	54106	2640.36
2002-03	0.19	167.85	3414.76	31.9	76100	3614.7
2003-04	0.1	182.16	4662.15	56.88	112959	4901.29
2004-05	0.2	196.86	5931.21	62.89	141514	6191.16
2005-06	0.12	256.74	6473.27	33.74	151622	6763.87
2006-07	0.08	295.73	8365.97	20.44	199179	8682.22
2007-08	0.74	401.24	11960.23	17.44	309723	12379.65
2008-09	0.06	487.93	12300.66	50	251985	12838.65
2009-10	225.96	811.88	11496.5	62.31	279057	12596.65
2010-11	204.01	1025.72	12248.83	131.58	304818	13610.13
2011-12	228.6	1382.5	13305.11	145.11	294398	15061.3
2012-13	235.4	1397.4	14126.3	125.1	292046	15884.2
2013-14	268.3	1296.2	16609.1	110.2	304223	18283.8
2014-15	249.4	1991.6	19854.60	80	341638	21376
2015-16	99.6	1334.3	22190.60	162	360176	23787
2016-17	93.8	1288.3	22449.40	150	369955	23982
2017-18	100.20	1397.40	25975.70	135	424545	27608

Source: Handbook of Statistics on the Indian Economy, 2018, RBI Bulletin 2018.

position 0.5 percent each. Here one can observe that throughout the period under study foreign investment is the major component of foreign exchange reserves in India and in proportion to the increase in foreign investment, foreign exchange reserves also keep on growing. For example in 1991 when foreign

investment was $133 million, foreign exchange reserve was only $9220 million. But in 2018 when foreign investment became $61595 million, the foreign exchange reserves also witnessed a corresponding increase and reached a historical high of $424545 million. Even at the peak of the sub-prime crisis of 2008, India had sufficient foreign exchange reserves sufficient to cover 15 months of imports.

The Table 5.3 gives a clear picture of the rise in India's foreign exchange reserves since 1992.

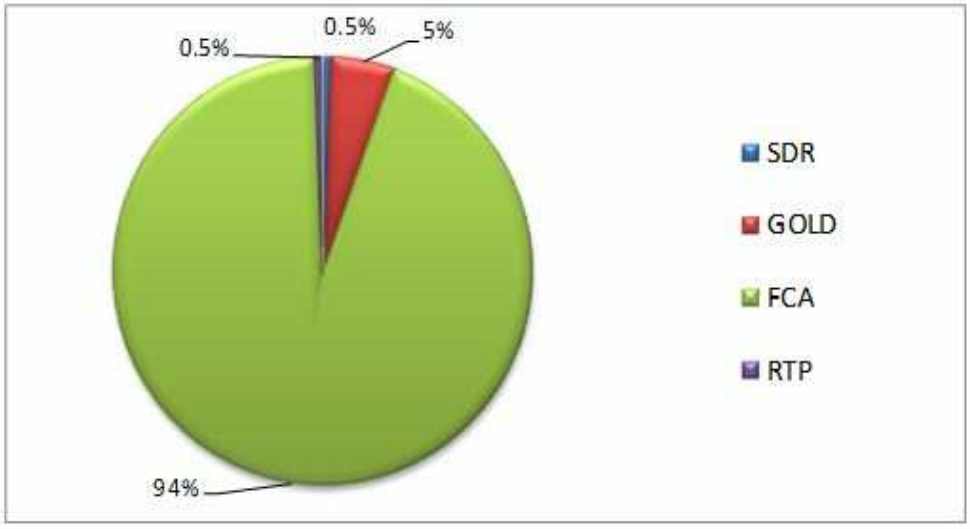

Figure 5.2: Composition of India's Foreign Exchange Reserves

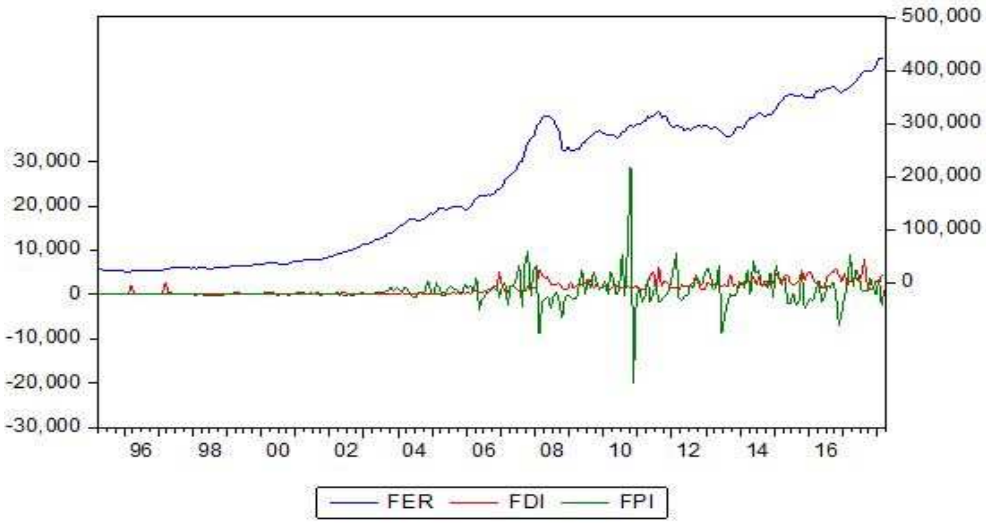

Figure 5.3: Foreign Investment and Foreign Exchange Reserves in India

The Figure 5.3, further represents and substantiates the positive relationship

and parallel increase between foreign investment and foreign exchange reserves in India (Appendix C.1).

It is true that foreign investment is not the only source of forex reserves in India. Besides foreign investment (FDI and FPI), accumulation of India's foreign exchange reserves takes place due to consistent positive balance of trade, appreciation of exchange rate, increase or decrease in export and import i.e., international trade, NRI inflows etc. For example exchange rate is an important factor which influences the foreign exchange reserves. When RBI acts with the foreign exchange reserves it will impact exchange rate and consequent increase or decrease of FER. That is when RBI sells some dollars from its forex reserves and buys rupees from the market, this increases the supply of the dollar and the demand of the rupee. This increases the value of the rupee and thereby its appreciation consequent decrease of forex reserves. In other words, when the dollar supplies are huge, the dollar will depreciate and the rupee will appreciate significantly. On the other hand when RBI buys dollars from the market to reduce the dollar supply and sells rupee the value of rupee will decrease and thereby its depreciation and the consequent increase of foreign exchange reserves. Thus by selling or buying the US dollar through money market operations, the rupee can be made to appreciate or depreciate respectively. Romero (2011)[188] made a comparative analysis of the factors affecting foreign exchange reserves and found the existence of an inverse relationship between exchange rate and foreign exchange reserves. When Olayungbo and Akinbobbola (2011)[189] found foreign exchange reserves are significant in influencing nominal exchange rates in the short run, Kasman and Ayhan (2008)[190] found the existence of long run relationship between them. Gokhale and Ramana (2013)[191] established a causal relationship between exchange rate and foreign exchange reserves in the Indian context also.

[188]Romero, A.M. (2011). Comparative Study: Factors that Affect Foreign Currency Reserves in China and India. *The Park Place Economist*, X111, 79-88.

[189]Olayungbo, D.O., and Akinbobola, T.O. (2011). Foreign Exchange Reserves and Exchange Rates in Nigeria. Structural Breaks, Unit Roots and Co-integration Tests, *Journal of Social and Economic Development*, 13(2), 153-162.

[190]Kasman, A., and Ayhan, D. (2008). Foreign Exchange Reserves and Exchange Rate in Turkey: Structural Breaks, Unit Roots and Co-integration. *Journal of Economic Modeling*, 25(1), 83-92.

[191]Gokhale, M.S., and Ramana, J.V. (2013). Causality between Exchange Rate and Foreign Exchange Reserves in the Indian Context. *Global Journal of Management and Business Research Finance*, 13(7), 449-456.

Similarly international trade also affects foreign exchange reserves. That is if the difference between exports and imports is positive FER will accumulate and the value of the currency will move up. On the contrary if imports exceed exports there will be reduction in foreign exchange reserves and value of currency will go down. Chowdhury et al. (2014)[192] confirmed the existence of a strong relationship between foreign exchange reserves, export and import of the country.

5.2.1 Relationship between Foreign Investment and Foreign Exchange Reserves in India - Econometric Analysis

For further verification of the relationship between foreign investment and other macroeconomic variables which have the potential to impact the foreign exchange reserves in India, following econometric tests are conducted. On the basis of the above observations the expected relationship between foreign exchange reserves, foreign investment and other macroeconomic variables is projected in Table 5.4 by taking FER as dependent variable and other variables as independent variables.

Table 5.4: Expected Relationship between Foreign Exchange Reserves and its Linkage with Macroeconomic Variables in India

Dependent Variable	Independent Variable	Expected Relationship
FER	FDI	Positively related
	FPI	Positively related
	REER (Depreciation)	Negatively related
	EXP	Positively related
	IMP	Negatively related

5.2.2 Model Specification

This model considered Foreign Exchange Reserves (FER) as the dependent variable and Exchange Rate (REER), Export (EXP), Foreign Direct Investment

[192] Chowdhury, M.N.M., Uddin, M.J., and Islam, M.S. (2014). An Econometric Analysis of the Determinants of Foreign Exchange Reserves in Bangladesh. *Journal of World Economic Research*, 3(6), 72-82.

(FDI), Foreign Portfolio Investment (FPI) and Import (IMP) as the independent variables. It is algebraically expressed as follows,

$$\text{FER} = \text{f(LFDI, LFPI, LREER, EXP, IMP, } \epsilon)$$

where,
FER = Foreign Exchange Reserves
LFDI = Natural Logarithm of Foreign Direct Investment
LFPI = Natural Logarithm of Foreign Portfolio Investment
LREER = Natural Logarithm of Real Effective Exchange Rate
EXP = Export
IMP = Import
ϵ = Error Term

5.2.3 Stationarity Test

The stationarity of the data series is tested using the Augmented Dickey-Fuller (ADF) Test. The results of the ADF Unit Root Test are shown in Table 5.5. It shows that all the variables are non-stationary at level, but become stationary after first difference. In other words, they are found integrated of the same order, hence it is in order one i.e., I(1).

Table 5.5: Unit Root Test for Foreign Exchange Reserves and Macroeconomic Variables in India

Variables	Level						I Difference						Result
	Intercept		Intercept & Trend		None		Intercept		Intercept & Trend		None		
	t-stat	p-value	t-stat	p-value	t- stat	p-value	t- stat	p-value	t- stat	p-value	t- stat	p-value	Stationarity
FER	-0.34545	0.9147	-2.739331	0.2217	1.377	0.957	-5.69163	0.0	-5.693467	0.0	-5.29	0.0	Stationary at I(1)
LFDI	-1.558809	0.5022	-3.578758	0.0336	0.457969	0.8127	-14.65816	0.0	-14.62863	0.0	-14.65137	0.0	Stationary at I(1)
LFPI	-4.859453	0.0001	-5.020565	0.0002	0.532217	0.8303	-19.30987	0.0	-19.27196	0.0	-19.33417	0.0	Stationary at I(1)
REER	-1.864328	0.3489	-1.601361	0.7902	-0.641107	0.4388	-14.99905	0.0	-15.02706	0.0	-15.018	0.0	Stationary at I(1)
EXP	-0.437642	0.8992	-2.543206	0.3071	0.947188	0.9087	-4.107119	0.0011	-4.105713	0.007	-3.801645	0.0002	Stationary at I(1)
IMP	-0.842574	0.8048	-2.104925	0.5402	0.467222	0.815	-23.87569	0.0	-23.8294	0.0	-23.81519	0.0	Stationary at I(1)

Source: Compiled by the Researcher

5.2.4 Optimum Lag Length Selection Criteria

The study used five lag order selection criteria - Likelihood Ratio (LR), Final Prediction Error (FPE), Akaike Information Criterion (AIC), Schwarz Infor-

mation Criterion (SC) and Hannan-Quinn Information Criterion (HQ) - to determine the appropriate lag length of the model and as seen in the Table 5.6. Since all criteria except LR and SC, unanimously select lag order 2, it is taken as the optimum lag length.

Table 5.6: VAR Lag Order Selection Criteria for Foreign Exchange Reserves (FER) and Macroeconomic Variables in India

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-7673.712	NA	5.26e+19	62.43669	62.52218	62.47111
1	-6130.545	2998.513	2.51e+14	50.18329	50.78176*	50.42427
2	-6061.479	130.8310	1.92e+14*	49.91447*	51.02591	50.36199*
3	-6027.654	62.42620	1.96e+14	49.93214	51.55657	50.58622
4	-5999.811	50.02669	2.09e+14	49.99846	52.13586	50.85909
5	-5976.664	40.45898	2.33e+14	50.10296	52.75334	51.17015
6	-5950.267	44.85374	2.54e+14	50.18104	53.34438	51.45477
7	-5934.021	26.81344	3.00e+14	50.34163	54.01796	51.82192
8	-5897.182	59.00203*	3.02e+14	50.33481	54.52411	52.02165

** 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

5.2.5 Johansen Co-integration Test

The presence of a long run relationship or co-movement between foreign exchange reserves and macroeconomic variables in India is tested using Johansen Multivariate Co-integration Test and the result is presented in Table 5.7.

Trace Statistic and Maximum Eigenvalue Statistic are specifically used to identify the number of co-integrating vectors. Both tests indicate one and two co-integrating equations respectively at 5 percent level. However, in case of a multivariate frame i.e., (with variables more than two) it has been seen that Max Eigen value has greater power. Hence, in a multivariate structure it is better to follow the Max Eigen value statistic and the estimated Johansen Co-integration Test results indicate that the variables are co-integrated and have

two co-integration equations at the 5 percent level. From these results, it is possible to infer that there is a long run relationship or co-integration between foreign exchange reserves and macroeconomic variables in India.

Table 5.7: Johansen Co-integration Test for Foreign Exchange Reserves (FER) and its Linkage with Macroeconomic Variables in India

Unrestricted Cointegration Rank Test (Trace)				
Hypothesized No. of CE(s)	**Eigenvalue**	**Trace Statistic**	**0.05 Critical Value**	**Prob.****
None *	0.256624	142.0553	95.75366	0.0000
At most 1	0.133337	66.13774	69.81889	0.0949
At most 2	0.071097	29.50278	47.85613	0.7440
At most 3	0.021701	10.62245	29.79707	0.9695
At most 4	0.017540	5.005892	15.49471	0.8082
At most 5	0.001857	0.475820	3.841466	0.4903
Trace test indicates 1 cointegrating eqn(s) at the 0.05 level				
** denotes rejection of the hypothesis at the 0.05 level*				
***MacKinnon-Haug-Michelis (1999) p-values*				
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized No. of CE(s)	**Eigenvalue**	**Max-Eigen Statistic**	**0.05 Critical Value**	**Prob.****
None *	0.256624	75.91752	40.07757	0.0000
At most 1 *	0.133337	36.63496	33.87687	0.0228
At most 2	0.071097	18.88033	27.58434	0.4238
At most 3	0.021701	5.616556	21.13162	0.9894
At most 4	0.017540	4.530072	14.26460	0.7996
At most 5	0.001857	0.475820	3.841466	0.4903
Max-eigenvalue test indicates 2 cointegrating eqn(s) at the 0.05 level				
** denotes rejection of the hypothesis at the 0.05 level*				
***MacKinnon-Haug-Michelis (1999) p-values*				

Source: Compiled by the Researcher

5.2.6 VECM Model

Since the Co-integration Test confirmed the existence of a long run relationship between macroeconomic variables and foreign exchange reserves in India, Vector Error Correction Model (VECM) is used to analyse the long run causality and the short run dynamics of macroeconomic variables and foreign exchange reserves in India (Appendix C.2).

5.2.7 Normalized Co-integrating Coefficients

In order to find out the long run coefficients between foreign investment and foreign exchange reserves, Normalized Co-integration Coefficient is used and its result is depicted in Table 5.8. It reveals that in the long run Foreign Direct Investment (FDI), Foreign Portfolio Investment (FPI) and Exports (EXP) have positive impact on Foreign Exchange Reserves (FER) while Import (IMP) and Exchange Rate (REER) volatility have negative impact on Foreign Exchange Reserves (FER) in India. All these variables are statistically significant at five percent level in the long run (Appendix C.2).

Table 5.8: Normalized Co-integrating Coefficients (Long Run Coefficient) of Foreign Exchange Reserves and Macroeconomic Variables in India

FER	LFDI	LFPI	LREER	EXP	IMP
1.000000	-148307.2	-1006602	212394.0	-41.0103	31.53232
	(18298.0)	(141211.)	(73593.6)	(8.23062)	(5.55572)
**(standard error in parentheses)*					

Source: Compiled by the Researcher

The estimated equation by co-integration is given in Equation 5.1. The signs of the normalized co-integrating coefficients are reversed to enable their proper interpretation.

$$FER = 148307.2LFDI + 1006602LFPI - 212394LREER + 41.01EXP - 31.53IMP \quad (5.1)$$

In order to find out the short run relation between foreign investment and foreign exchange reserves VEC Granger Causality/ Block Exogeneity Wald Test is used and its result is given in Table 5.9. It reveals that in the short run Foreign Direct Investment (FDI), Foreign Portfolio Investment (FPI) and Export (EXP) are statistically significant variables causing variation of Foreign Exchange Reserves (FER), while Import (IMP) and Exchange Rate (REER) are statistically insignificant variables, having no impact on Foreign Exchange Reserve (FER) in India.

Table 5.9: VEC Granger Causality/ Block Exogeneity Wald Test of Foreign Exchange Reserves (FER) and Macroeconomic Variables in India

Excluded	**Chi-sq**	**df**	**Prob.**
D(LFDI)	4.474665	2	0.0067***
D(LFPI)	6.827568	2	0.0329**
D(LREER)	2.420409	2	0.2981
D(EXP)	5.748145	2	0.0565**
D(IMP)	2.355763	2	0.3079
All	**30.32417**	**10**	**0.0008**
Dependent Variable: (FER)			

** Significant at 5% ***Significant at 1%

VECM Estimated Model

$$
\begin{aligned}
D(FER) = {} & C(1) * (FER(-1) + 2730943.31 * LFPI(-1) - 269054.82 \\
& * LREER(-1) + 145.89 * EXP(-1) - 106.91 * IMP(-1) - 25853483.646) \\
& + C(2) * (LFDI(-1) + 25.20 * LFPI(-1) - 3.24 * LREER(-1) \\
& + 0.00126 * EXP(-1) - 0.000933 * IMP(-1) - 239.74) \\
& + C(3) * D(FER(-1)) + C(4) * D(FER(-2)) + C(5) \\
& * D(LFDI(-1)) + C(6) * D(LFDI(-2)) + C(7) \\
& * D(LFPI(-1)) + C(8) * D(LFPI(-2)) + C(9) \\
& * D(LREER(-1)) + C(10) * D(LREER(-2)) + C(11) \\
& * D(EXP(-1)) + C(12) * D(EXP(-2)) + C(13) \\
& * D(IMP(-1)) + C(14) * D(IMP(-2)) + C(15)
\end{aligned}
\tag{5.2}
$$

The Error Correction Term (ECT) measures the speed of adjustment or the amount of time taken by the co-integrated equation to restore the long run equilibrium of dependent variable if a shock occurs in the system. The Error Correction Term of the short run model is also statistically significant with a negative sign (Table 5.10). The negative value of coefficient of ECT or C(2) which is (-0.62), indicates the very high speed of convergence towards equilibrium. Since ECT is found negative and significant it is possible to say that there is a long run causality running from macroeconomic variables to

Table 5.10: Estimates of Error Correction Term for Foreign Exchange Reserves

	Coefficient	**Std. Error**	**t-Statistic**	**Prob.**
C(1)	6.12E-005	0.005928	0.010333	0.0218
C(2)	-0.62691	0.069301	-9.045374	0.0003***
C(3)	0.284876	0.071906	3.961769	0.0001
C(4)	0.104271	0.073766	1.413539	0.1577
C(5)	-974.9814	638.4484	-1.527111	0.127
C(6)	93.87256	530.492	0.176954	0.8596
C(7)	-7472.702	3094.227	-2.415046	0.0159
C(8)	-6284.079	2225.647	-2.823485	0.0048
C(9)	13790.91	9818.955	1.404519	0.1604
C(10)	-8647.53	9778.839	-0.884311	0.3767
C(11)	0.471067	0.243046	1.938177	0.0528
C(12)	-0.08463	0.226938	-0.372919	0.7093
C(13)	-0.200603	0.16708	-1.200638	0.2301
C(14)	-0.243015	0.150164	-1.618333	0.1058
C(15)	827.4832	279.0267	2.965606	0.0031

*** Significant at 1%

foreign exchange reserves in India. If disequilibrium exists in the system then Error Correction Term corrects such disequilibrium and provides guidance to variables of the system to come back towards equilibrium at the speed of 62 percent.

5.2.8 Variance Decomposition Analysis

Variance Decomposition Analysis (Lutkepohl, H. 2007)[193] which determines how much of the forecast error variance of each of the variables can be explained by exogenous shocks to the other variables, is used to examine how foreign exchange reserves react to their own shocks and the shocks in other variables. The last ten periods variance decomposition results are shown in the Table 5.11. The columns provide the percentage of the forecast variance due to each innovation in VECM system with each row adding up to 100. In the first

[193]Lutkepohl, H. (2005). *New Introduction to Multiple Time Series Analysis.* Springer-Verlag, Berlin.

month all of the variance in the foreign exchange reserves is explained by its own shocks. The empirical evidence indicates that 87% of Foreign Exchange Reserves (FER) change is contributed by its own innovative shocks. Further, shock in Import (IMP) explains the Foreign Exchange Reserves (FER) by 10.5%. Foreign Portfolio Investment (FPI) contribute 2%, Export (EXP), Foreign Direct Investment (FDI) and Exchange Rate (REER) contribute 0.40%, 0.03% and 0.01% respectively with the Foreign Exchange Reserves (FER).

In short, Foreign Portfolio Investment (FPI) and Import (IMP) are the main factors or determinants of Foreign Exchange Reserves (FER) in India. Whereas, Exchange Rate (REER), Foreign Direct Investment (FDI) and Export (EXP) are found having only a minor role in the fluctuation of foreign exchange reserves in the Indian Economy. Similarly it can be seen that when compared to FDI, FPI is found to be more significant factor in the fluctuation of foreign exchange reserve. Thus this analysis shows that Import (IMP) and Foreign Portfolio Investment (FPI) are the largest components of variation in the Foreign Exchange Reserves (FER) followed by Foreign Direct Investment (FDI), Export (EXP) and Exchange Rate (REER).

Table 5.11: Variance Decomposition of Foreign Exchange Reserves

Period	S.E.	FER	LFDI	LFPI	LREER	EXP	IMP
1	4062.433	100.0000	0.000000	0.000000	0.000000	0.000000	0.000000
2	6933.852	96.77785	0.342915	0.093265	0.172491	1.050430	1.563045
3	9686.433	94.93436	0.180940	0.062321	0.088454	0.662598	4.071325
4	12250.20	93.43012	0.114173	0.480179	0.056409	0.545125	5.373995
5	14672.58	91.64376	0.081101	0.805461	0.039324	0.485029	6.945326
6	16863.59	90.35061	0.061786	1.002087	0.029780	0.472965	8.082774
7	18893.30	89.33392	0.050623	1.235661	0.023727	0.436728	8.919337
8	20766.04	88.50645	0.043098	1.424754	0.019706	0.424539	9.581453
9	22506.71	87.84440	0.038370	1.556401	0.016779	0.416805	10.12724
10	24135.20	87.32879	0.035205	1.675808	0.014596	0.407215	10.53838

Source: Compiled by the Researcher

5.2.9 Impulse Response Analysis

Impulse Response Analysis which studies the reaction of any dynamic system in response to some external changes, is used to trace out the responsiveness of the dependent variables in the Vector Error Correction Model (VECM) to shocks to

each of the variables. Impulse Response Function (IRF) indicates the positive or negative direction or the nature of the variation of the endogenous variables. X-axis (horizontal axis) represents the time horizon or the duration of the shock while the Y-axis (vertical axis) gives the direction and intensity of the impulse. Figures 5.4 depicts that the impulse response of foreign exchange reserves for the one unit standard deviation innovation in macroeconomic variables in India.

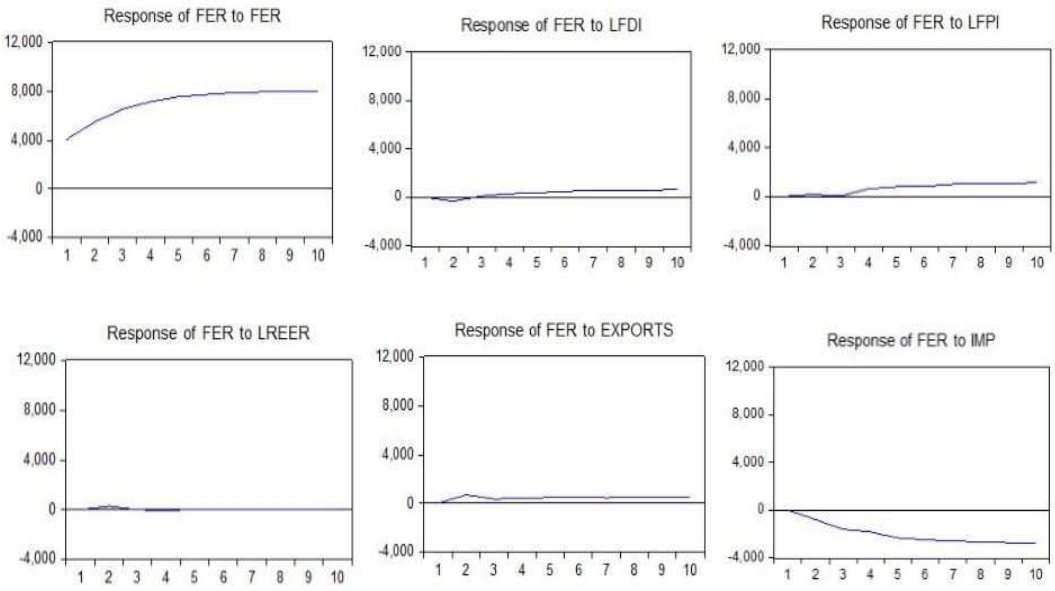

Figure 5.4: Impulse Response of Foreign Exchange Reserves

An immediate and permanent effects of a one standard deviation shock to Foreign Direct Investment (FDI), Foreign Portfolio Investment (FPI) and Export (EXP) are positive towards Foreign Exchange Reserves in the long run. It implies that foreign investment helps the country to raise the foreign exchange reserves. A significant and positive impact throughout the period by foreign exchange reserves responds to its own shocks. The innovation in Exchange Rate (REER) is found insignificant effect on Foreign Exchange Reserves (FER) during the entire period. It is found that the signs of response innovation to Import (IMP) always have a negative impact on the variation in foreign exchange reserves in Indian economy.

The above analysis related to foreign investment and foreign exchange reserves in India can be summarized in the following way.

- Foreign investment is the major component of FER
- Increase in foreign investment is always followed by a corresponding increase in FER
- The statistical test confirmed the above finding i.e., it is found that there is a long run and short run positive relationship between both form of foreign investment and FER
- FPI is found to be more significant factor in the fluctuation of FER in India when compared to FDI.

All these findings establish the strong positive relationship that exists between foreign investment and foreign exchange reserves in India. This relationship is the greatest testimony of the positive impact of foreign investment on Indian economy as foreign exchange reserves is one of the most prominent indicator of the strength of an economy. In other words foreign investment strengthens the Indian economy by contributing immensely to the foreign exchange reserves and thereby enabling the economy to absorb sudden shocks.

5.3 Impact of Foreign Investment on the Inflation in India

Inflation, usually measured by the Wholesale Price Index (WPI) is one of the characteristic features of all the economies of the world especially of the developing ones like that of India. It is highly vulnerable, sensitive and even contagious to the other macroeconomic variables of the economy. In fact all attempts in the direction of the economic development will become futile if they lead to high rate of inflation or are incapable to contain or control it. Therefore how to reconcile inflation with attempts for economic development including invitation of foreign investment has become one of the major hurdles confronting the economists and policy makers.

Inflation, the result of increased money supply, is bound to be antithetical to foreign investment which is nothing other than flow of foreign capital to the

economy. Therefore all the positive contributions of foreign investment to the Indian economy must go through a final as well as crucial test in relation to its role in the inflation of the Indian economy. The factors generally attributed to inflation in India are Foreign Investment (FDI & FPI), Crude Oil Price (COP), Exchange Rate (NEER), Economic Growth (IIP) etc. Among these foreign investment has a major role and it can cause inflation in the following way. The inflow of huge amount of foreign investment into India creates a lot of demand for rupee. In order to meet this demand it become necessary for the RBI to pump more money to the market. This situation leads to excess liquidity and the floating of excess cash in the market thereby creating inflation (Raj et al. 2008[194]).

The Figure 5.5 shows how foreign investment and inflation go hand in hand in India. It indicates that in India there is a positive relationship between foreign investment and inflation i.e., increase in foreign investment flows leads to an increase in inflation. A further and closer analysis made with the help of Correlation Matrix reinforces the positive relationship between foreign investment and inflation in India. From the Correlation Matrix (Appendix C.3) it can be seen that both form of foreign investment has positive influence on the inflation in India - Foreign Direct Investment (FDI) have high positive correlation (0.77) whereas Foreign Portfolio Investment (FPI) has only a moderate positive influence (0.13).

Another factor which is explicitly responsible for inflation in India is crude oil price. Shaari et al. (2012)[195] found that, in the short run, crude oil price affects inflation. According to Tweneboah and Adam (2008)[196] rise in oil price increases the production cost and thus inflation appears in the economy. India is one of the largest importer of crude oil in the world. India imports nearly 80 percent of her total oil requirements. Hence a rise in oil price leads to an increase in the prices of all goods and services and the consequent rise in inflation. Therefore a fall in crude oil price is favorable to the Indian economy as

[194]Raj, J., Dhal, S., and Jain, R. (2008). *Imported Inflation: The Evidence from India*. Reserve Bank of India Occasional Papers, 29(3), 69-117.

[195]Shaari, M.S., Hussain, N.E., and Abdullah, H. (2012). The Effects of Oil Price Shocks and Exchange Rate Volatility on Inflation: Evidence from Malaysia. *International Business Research*, 5(9), 106-119.

[196]Tweneboah, G., and Adam, A.M. (2008). *Implications of Oil Price Shocks for Monetary Policy in Ghana: A Vector Error Correction Model*. University Library of Munich, Germany, MPRA Paper Series. 11968.

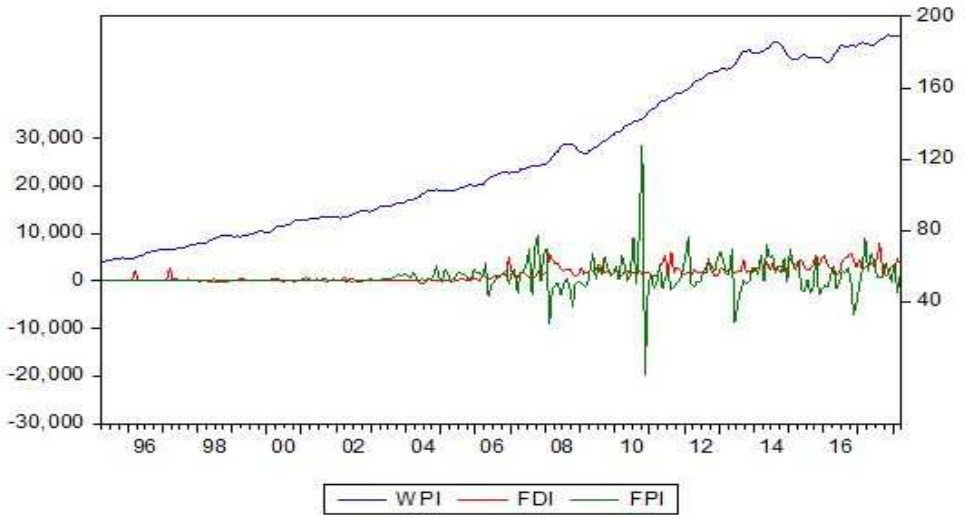

Figure 5.5: Trends in Foreign Investment Flows and Inflation in India

it helps the country to save on import bill and narrowing trade deficit, leading to lower inflation.

The other factor which has the potential to cause inflation in India is exchange rate. Any appreciation or depreciation of the national currency can have a significant impact on inflation. If there is depreciation in the exchange rate it is likely to cause an increase in inflation as the import price will soar high. A depreciation means the currency buys less foreign exchange, therefore imports become more expensive and exports cheaper. On the contrary an appreciation in the exchange rate will tend to reduce inflation as import price become cheaper. According to Philip and Oseni (2012)[197] increase or decrease in the exchange rate of a country affects prices of imported goods and services, and thus inflation increases or decreases there. Imimole and Enoma (2011)[198] also described how exchange rate depreciation increases the cost of imported goods and the consequent increase in inflation.

Similarly economic growth especially industrial production becomes another factor which is related for inflation. Industrial production which is insufficient to meet the huge demand for industrial goods emerged due to the increase of

[197] Philip, I.N., and Oseni, I.O. (2012). Monetary Policy, Exchange Rate and Inflation Rate in Nigeria: A Co-integration and Multi-Variate Vector Error Correction. *Research Journal of Finance and Accounting*, 3(3), 62-69.

[198] Imimole, B., and Enoma, A. (2011). Exchange Rate Depreciation and Inflation in Nigeria. *Business and Economics Journal*, 28(1), 1-12.

money supply in the economy and this leads to price rise and inflation.

5.3.1 Relationship between Foreign Investment and Inflation in India - Econometric Analysis

In order to verify the relationship between foreign investment and inflation in India, the following econometric tests are conducted. The expected relationship between inflation (WPI), foreign investment and other inflation causing macroeconomic variables are presented in the Table 5.12.

Table 5.12: Expected Relationship between Inflation (WPI) and its Linkage with Macroeconomic Variables in India

Dependent Variable	Independent Variables	Expected Relationship
WPI	FDI	Positively related
	FPI	Positively related
	COP	Positively related
	NEER (Depreciation)	Positively related
	IIP (Inadequate)	Positively related

5.3.2 Model Specification

On the basis of this expected relationship between inflation in India and the macroeconomic variables, a model is developed in the following way.

$$\text{WPI} = \text{f(LFDI, LFPI, LCOP, IIP, NEER, } \epsilon)$$

where,
WPI = Wholesale Price Index
$LFDI$ = Natural Logarithm of Foreign Direct Investment
$LFPI$ = Natural Logarithm of Foreign Portfolio Investment
$LCOP$ = Natural Logarithm of Crude Oil Price
IIP = Index of Industrial Production
$NEER$ = Nominal Effective Exchange Rate
ϵ = Error Term

5.3.3 Stationarity Test

The stationarity property of macroeconomic variables and inflation in India is tested with the help of Unit Root Test and its results presented in Table 5.13 show that all the variables used in the study are not stationary at level but stationary at first difference I(1).

Table 5.13: Unit Root Test for Inflation (WPI) and the Macroeconomic Variables in India

Variables	Level						I Difference						Result
	Intercept		Intercept & Trend		None		Intercept		Intercept & Trend		None		
	t-stat	p-value	t-stat	p-value	t- stat	p-value	t- stat	p-value	t- stat	p-value	t- stat	p-value	Stationarity
WPI	0.580273	0.989	-1.963988	-1.963988	4.38	1	-9.446943	0.0	-9.497427	0.0	-8.02	0.0	Stationary at I(1)
LFDI	-1.558809	0.5022	-3.578758	0.0336	0.457969	0.8127	-14.65816	0.0	-14.62863	0.0	-14.65137	0.0	Stationary at I(1)
LFPI	-4.859453	0.0001	-5.020565	0.0002	0.532217	0.8303	-19.30987	0.0	-19.27196	0.0	-19.33417	0.0	Stationary at I(1)
LCOP	-1.570214	0.4964	-2.264153	0.4516	0.896319	0.9008	-12.50597	0.0	-12.51105	0.0	-12.45769	0.0	Stationary at I(1)
NEER	-1.244568	0.6555	-3.384999	0.0556	-1.994339	0.0444	-12.90082	0.0	-12.88259	0.0	-12.72284	0.0	Stationary at I(1)
IIP	-0.400662	0.9057	-1.713438	0.7427	2.228	0.994	-3.954859	0.002	-3.945539	0.0117	-2.83	0.004	Stationary at I(1)

Source: Compiled by the Researcher

5.3.4 Optimum Lag Length Selection Criteria

In order to determine the optimum lag length of the model Likelihood Ratio (LR), Final Prediction Error (FPE), Akaike Information Criterion (AIC), Schwarz Information Criterion (SC) and Hannan-Quinn Information Criterion (HQ) are used and as can be seen from Table 5.14, except LR all other criteria unanimously select lag order 2 (lower the value, better the model) as optimal lag for the model.

5.3.5 Johansen Co-integration Test

Since the variables are found stationary at the same order Johansen Co-integration Test is used to check the co-integration or long run association between macroeconomic variables and inflation in India. It is based on two test statistic, i.e., Trace Statistic and the Maximum Eigenvalue Statistic. The resultant Table 5.15 shows that both Trace test and Max-Eigenvalue Test indicate two co-integrated equations at 5 percent level. Therefore there is a long run relationship or co-integration between macroeconomic variables and inflation in India

Table 5.14: VAR Lag Order Selection Criteria for Inflation (WPI) and Macroeconomic Variables in India

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-3053.441	NA	2556.100	24.87350	24.95900	24.90793
1	-1288.222	3429.978	0.002004	10.81481	11.41328	11.05579
2	-1161.917	239.2591	0.000962*	10.08063*	11.19208*	10.52816*
3	-1134.943	49.78205	0.001037	10.15401	11.77843	10.80809
4	-1116.037	33.96953	0.001194	10.29298	12.43038	11.15361
5	-1095.458	35.97053	0.001359	10.41836	13.06873	11.48554
6	-1059.884	60.44828*	0.001372	10.42182	13.58517	11.69555
7	-1034.181	42.42038	0.001503	10.50553	14.18186	11.98582
8	-1011.112	36.94650	0.001688	10.61067	14.79997	12.29751

** 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

i.e., the presence of co-integration implies the existence of a stable long run relationship between macroeconomic variables and inflation in India.

5.3.6 VECM Model

Vector Error Correction Model (VECM) has been used to examine the long run coefficients and short run dynamics among the macroeconomic variables and inflation in India. The most important criteria of employing the VECM techniques is that all variables must be non-stationary at level i.e., I(0) but stationary at their first difference I(1). The VECM results are presented in Appendix C.4.

5.3.7 Normalized Co-integrating Coefficients

The Normalized Co-integrating Coefficients presented in Table 5.16 describes the long run, clear and reliable positive relationship of Foreign Direct Investment (FDI), Foreign Portfolio Investment (FPI) and Crude Oil Price (COP)

Table 5.15: Johansen Co-integration Test for Inflation (WPI) and its Linkage with Macroeconomic Variables in India

Unrestricted Cointegration Rank Test (Trace)				
Hypothesized No. of CE(s)	**Eigenvalue**	**Trace Statistic**	**0.05 Critical Value**	**Prob.****
None *	0.212004	141.3833	95.75366	0.0000
At most 1 *	0.124051	80.38820	69.81889	0.0056
At most 2	0.077066	46.48160	47.85613	0.0669
At most 3	0.055801	25.95114	29.79707	0.1302
At most 4	0.040075	11.25216	15.49471	0.1964
At most 5	0.003049	0.781795	3.841466	0.3766
Trace test indicates 2 cointegrating eqn(s) at the 0.05 level				
** denotes rejection of the hypothesis at the 0.05 level*				
***MacKinnon-Haug-Michelis (1999) p-values*				
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized No. of CE(s)	**Eigenvalue**	**Max-Eigen Statistic**	**0.05 Critical Value**	**Prob.****
None *	0.212004	60.99506	40.07757	0.0001
At most 1 *	0.124051	33.90660	33.87687	0.0496
At most 2	0.077066	20.53047	27.58434	0.3056
At most 3	0.055801	14.69897	21.13162	0.3106
At most 4	0.040075	10.47037	14.26460	0.1828
At most 5	0.003049	0.781795	3.841466	0.3766
Max-eigenvalue test indicates 2 cointegrating eqn(s) at the 0.05 level				
** denotes rejection of the hypothesis at the 0.05 level*				
***MacKinnon-Haug-Michelis (1999) p-values*				

Source: Compiled by the Researcher

with the Inflation (WPI) in India. However, Exchange Rate (NEER) and Index of Industrial Production (IIP) are found to have significant negative effects on inflation in India.

Table 5.16: Normalized Co-integrating Coefficients (Long Run Coefficient) of Inflation (WPI) and Macroeconomic Variables in India

WPI	**LFDI**	**LFPI**	**LCOP**	**NEER**	**IIP**
1.000000	-214.71	-952.4348	-24.65635	10.97137	9.791471
	(31.3956)	(179.630)	(42.2458)	(1.92892)	(1.52301)
** (standard error in parentheses)*					

Source: Compiled by the Researcher

The estimated equation by co-integration is given in Equation 5.3. The signs of the normalized co-integrating coefficients are reversed to enable proper **interpretation.**

$$WPI = 214.71LFDI + 952.43LFPI + 24.65COP - 10.97NEER - 9.79IIP \tag{5.3}$$

Table 5.17: VEC Granger Causality/ Block Exogeneity Wald Test of Inflation (WPI) and Macroeconomic Variables in India

Excluded	**Chi-sq**	**df**	**Prob.**
D(LFDI)	3.281549	2	0.1938
D(LFPI)	0.917663	2	0.6320
D(LCOP)	42.47768	2	0.0000***
D(NEER)	3.375283	2	0.1850
D(IIP)	15.61699	2	0.0004***
All	**83.32796**	**10**	**0.0000**
Dependent variable: D(WPI)			

*** Significant at 1%

The result of the Block Exogenity Wald Test Model used to check the short run impact of the macroeconomic variables on inflation in India is presented in the Table 5.17. It is found that in the short run Crude Oil Price (COP) and Economic Growth (IIP) are the main influencing factors of inflation in India. But the influence of Foreign Direct Investment (FDI), Foreign Portfolio Investment (FPI) and Exchange Rate (NEER) on inflation in India are found statistically insignificant.

VECM Estimated Model

$$\begin{aligned} D(WPI) = {} & C(1) * (WPI(-1) - 162.053 * LFPI(-1) + 12.32 \\ & * LCOP(-1) + 1.430 * NEER(-1) - 0.4434 \\ & * IIP(-1) + 1312.39) + C(2) * (LFDI(-1) + 3.68 \\ & * LFPI(-1) + 0.1722 * LCOP(-1) - 0.0444 \\ & * NEER(-1) - 0.0476 * IIP(-1) - 34.37) \\ & + C(3) * D(WPI(-1)) + C(4) * D(WPI(-2)) + C(5) \\ & * D(LFDI(-1)) + C(6) * D(LFDI(-2)) + C(7) \\ & * D(LFPI(-1)) + C(8) * D(LFPI(-2)) + C(9) \\ & * D(LCOP(-1)) + C(10) * D(LCOP(-2)) + C(11) \\ & * D(NEER(-1)) + C(12) * D(NEER(-2)) + C(13) \\ & * D(IIP(-1)) + C(14) * D(IIP(-2)) + C(15) \end{aligned} \tag{5.4}$$

Table 5.18: Estimates of Error Correction Term for Inflation (WPI)

	Coefficient	**Std. Error**	**t-Statistic**	**Prob.**
C(1)	-0.004226	0.003146	-1.3433	0.1794
C(2)	-0.330879	0.094093	-3.516494	0.0005***
C(3)	0.441631	0.06582	6.709625	0.000
C(4)	0.024298	0.062228	0.390467	0.6962
C(5)	0.155142	0.095037	1.632444	0.1028
C(6)	0.02502	0.080918	0.309202	0.7572
C(7)	-0.101517	0.480347	-0.21134	0.8327
C(8)	0.235956	0.36958	0.638443	0.5233
C(9)	3.454223	0.529681	6.521332	0.000
C(10)	-0.257611	0.574734	-0.448226	0.6541
C(11)	-0.023448	0.025593	-0.916158	0.3597
C(12)	0.044604	0.025447	1.752799	0.0798
C(13)	0.016584	0.008183	2.026759	0.0429
C(14)	-0.012532	0.007913	-1.583709	0.1135
C(15)	0.227159	0.051696	4.39411	0.000

*** Significant at 1%

In the presence of co-integration, there always exists a corresponding error correction representation, captured by the Error Correction Term (ECT). Error

correction is the best way for the correction of disequilibrium position and in this way it enables the variables to come back to the equilibrium position. If the ECT or C(2) is negative and significant then one can say that there is a long run causal relationship between inflation and macroeconomic variables in India. This implies that the speed of adjustment between the short run dynamics and the long run equilibrium relationship is at the rate of 33% as shown in the Table 5.18.

5.3.8 Variance Decomposition Analysis

The Variance Decomposition Analysis is used to understand the proportion of the fluctuation of dependent variable i.e., inflation in future. It is explained by its own shocks versus shocks from other macroeconomic variables. In other words, Variance Decomposition gives the proportions of the movement in the inflation i.e., WPI (dependent variable) in future that are due to their 'own' shocks, versus shocks to the other variables. The result of the Variance Decomposition Analysis is presented in Table 5.19. It shows the extent to which these shocks are responsible for the volatility of WPI by the end of the 10 months period. In the first month all the variance in WPI is explained by its own shock. This share reduces in subsequent period to 69% and explanatory variables explain the remaining 31%. The empirical evidence indicates that FDI and Crude Oil Price (COP) explain 12 percent each whereas IIP is 6 percent. But FPI and NEER are found at 0.66 and 0.18 percent respectively.

Table 5.19: Variance Decomposition of Inflation (WPI)

Period	S.E.	WPI	LFDI	LFPI	LCOP	NEER	IIP
1	0.650433	100.0000	0.000000	0.000000	0.000000	0.000000	0.000000
2	1.231556	92.29555	0.345110	0.117167	5.037223	0.033293	2.171656
3	1.735258	87.97479	1.688856	0.109419	8.527891	0.049013	1.650032
4	2.199968	84.20344	3.239544	0.072479	10.24097	0.183253	2.060318
5	2.604505	80.34262	5.047266	0.064005	11.49480	0.264780	2.786527
6	2.957058	77.25471	6.888586	0.094529	12.09425	0.281716	3.386207
7	3.273689	74.66376	8.521759	0.196505	12.32800	0.266592	4.023383
8	3.560123	72.44450	9.955465	0.328528	12.41725	0.240733	4.613520
9	3.823050	70.58196	11.17775	0.485417	12.41161	0.213555	5.129704
10	4.067492	69.00304	12.19966	0.664932	12.36128	0.189606	5.581486

Source: Compiled by the Researcher

5.3.9 Impulse Response Analysis

As per Impulse Response Analysis (IRA) it is seen that a one standard deviation of impulse in Foreign Portfolio Investment (FPI), Crude Oil Price (COP), Exchange Rate (NEER) and Index of Industrial Production (IIP) are positive towards WPI in India. But with regard to Foreign Direct Investment (FDI) it is negative towards inflation in the long run as seen in Figure 5.6.

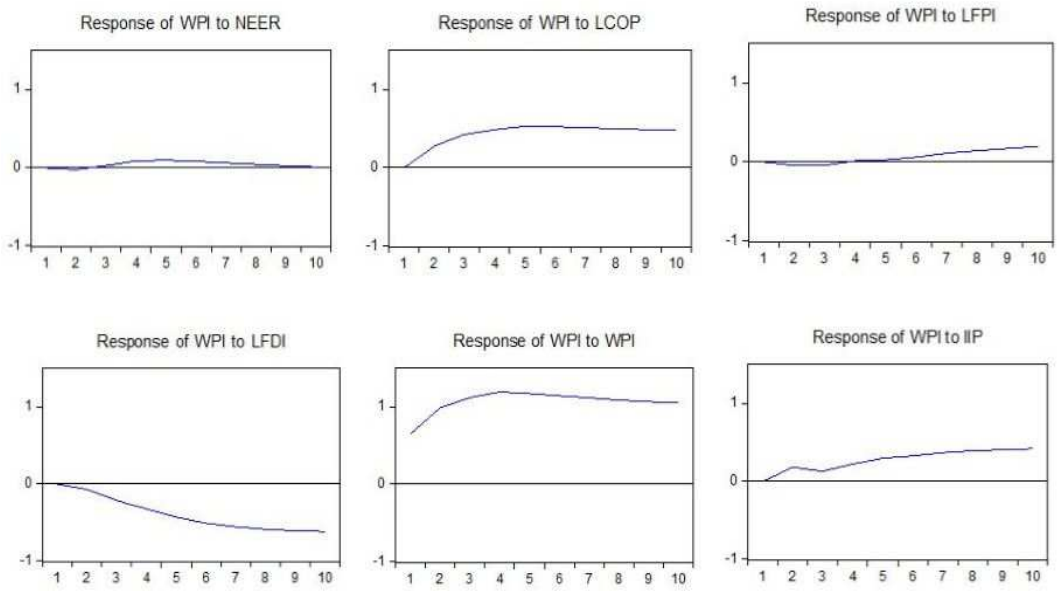

Figure 5.6: Impulse Response of Wholesale Price Index

In short the above analysis leads to the conclusion that among the inflation causing factors in India both form of foreign investment (FDI and FPI) play significant roles. This implies that there is a positive relationship between inflation and foreign investment in India indicating that foreign investment in India causes inflation. Prima fascia it appears as negative impact of foreign investment on Indian economy. No economy in the world can claim to be totally free from inflation. Hence what matters is not inflation but the rate or level of inflation. This is a consoling fact to foreign investment in India because though the relation between foreign investment and inflation is positive, it never caused to cross a single digit inflation in India.

Empirical evidence emphasizes that the growth-inflation relationship depends on the level of inflation - at some low level, inflation may be positively correlated with growth, but at higher level inflation is likely to be detrimental

to growth. Mubarik (2005)[199] concluded that high inflation i.e., inflation beyond 9 percent only adversely affects growth. Thus as already seen low level of inflation i.e., inflation below two digit will not adversely affect the economy.

Hence it can be argued that the positive and significant relationship existing between foreign investment and inflation in India is not really a negative impact of foreign investment on her economy as it did not generate high rate of inflation. It follows that the negative impact of foreign investment via inflation is not a damaging one for the Indian economy.

5.4 The Impact of Foreign Investment on the Exchange Rate in India

Foreign investment as already seen has the potential to impact exchange rate. An increase in Nominal Effective Exchange Rate (NEER)[200] which is a measure of the value of a currency against a weighted average of several foreign currencies, indicates an appreciation of the local currency against the weighted basket of currencies of its trading partners. In this way with regard to exchange rate of India, foreign investment has a decisive role. Huge amount of foreign investment in India leads to the rise in the demand and appreciation of the domestic currency and the consequent increase (appreciation) in exchange rate. In other words large capital inflows through foreign investment witness an appreciation of domestic currency because of the rise of its demand. Every dollar foreign investment brings to the country is in effect is the creation of demand for Indian currency. That is when foreign investors convert their currency into domestic currency, the demand for domestic currency increases and domestic currency is

[199] Mubarik, Y.A. (2005). Inflation and Growth: An Estimate of the Threshold Level of Inflation in Pakistan, State Bank of Pakistan. *Research Bulletin*, 1(1), 35- 44.

[200] Exchange rate has two aspects - Nominal Effective Exchange Rate (NEER) and Real Effective Exchange Rate (REER). The indices of NEER and REER are used as indicators of external competitiveness. NEER is the weighted average of bilateral nominal exchange rates of the home currency in terms of foreign currencies. Conceptually, the REER, defined as a weighted average of nominal exchange rates adjusted for relative price differential between the domestic and foreign countries, relates to the purchasing power parity (PPP) hypothesis. The NEER and REER indices show the appreciation (Index above 100) or depreciation (Index below 100) of the national currency against a basket of selected currencies for a certain period relative to a base period. Indices of REER and NEER of the Indian Rupee (6-Currency Trade Based Weights) with common base year 2004-05 is taken in this study for analysis of the model.

appreciated which in turn boosts the exchange rate. Thus increased demand of Indian currency results in the increase of its value and its appreciation increases the exchange rate.

According to Morrissey et al. (2004) [201] FDI inflows lead to real exchange rate appreciation i.e., FDI has direct impact on the performance of exchange rate. Chaudhary et al. (2012)[202] applying the Vector Auto Regressive Model found a positive relation between FDI and real exchange rate in the long run. In the same way FPI also impacts the exchange rate. That is FPI leads to rupee appreciation and their disinvestment and selling lead to depreciation. According to Klein and Rosengren (1992)[203] foreign institutional investment in India will lead to rupee appreciation with several other currencies and their selling and disinvestment will lead to depreciation of the rupee.

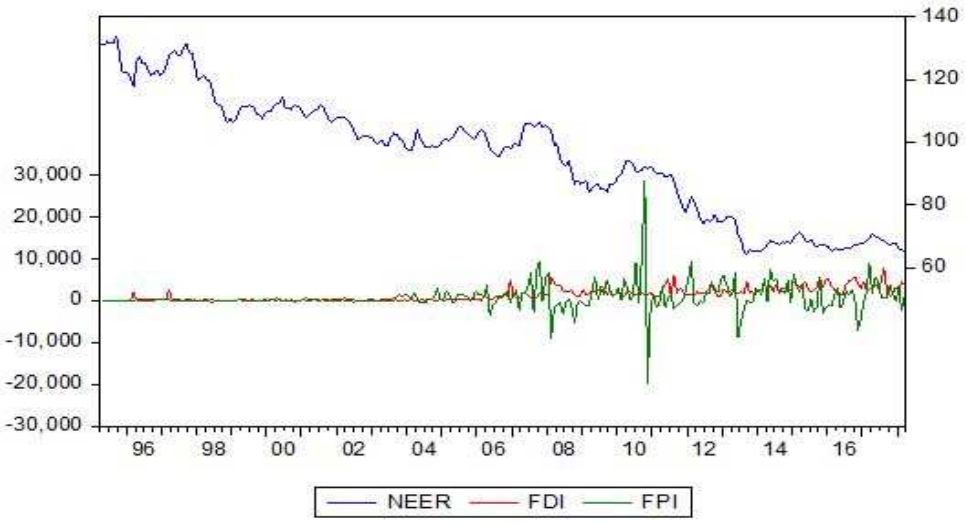

Figure 5.7: Foreign Investment and Exchange Rate in India

Of course, besides the foreign investment there are some other macroeconomic factors which affect the exchange rate in India. One such macroeconomic factor is inflation. Inflation affects exchange rate by influencing the demand and supply side of domestic currency in the foreign exchange market. Changes

[201] Morrissey, O., Udomkerdmongkol, M., and Gorg, H. (2009). Exchange Rates and Outward Foreign Direct Investment: US FDI in Emerging Economies. *Review of Development Economics*, 13(4), 754-764.

[202] Chaudhary, G.M., Shah, S.Z.A., and Bagram, M.M.M. (2012). Do Exchange Rate Volatility Affects Foreign Direct Investment? Evidence from Selected Asian Economies. *Journal of Basic and Applied Scientific Research*, 2(4), 3670-3681.

[203] Klein, M.W., Rosengren, E. (1992). *The Real Exchange Rate and Foreign Direct Investment in the United States: Relative Wealth vs. Relative Wage Effects.* NBER Working Paper, 4192.

in the inflation rate lead to the changes in the exchange rate. Achsani (2010)[204], Mirchandani (2013)[205] and Hsing (2006)[206] argue that countries with higher inflation face depreciation in their currency in relation to the currencies of their trading partners. Similarly a country with consistently lower inflation rate exhibits appreciation of domestic currency as its purchasing power increases in relation to other currencies.

Other two factors which impact exchange rate are import and export. In the case of India since she is importing more goods and services than exporting, more currencies will leave the country which in turn will lead to current account deficit and the consequent depreciation of currency and the fall of exchange rate. On the other hand in countries which have strong export growth and current account surplus, their currencies will appreciate and this will improve their exchange rate (Jhingan 2005)[207], (De Grauwe P. 1988)[208] etc.

However Figure 5.7 and Correlation Matrix (Appendix C.5) betray the above arguments. They show a negative influence of foreign investment on exchange rate in India (Depreciation of Indian Rupee). Hence the relationship between foreign investment and exchange rate is scrutinized with the following econometric analysis.

5.4.1 Relationship between Foreign Investment and Exchange Rate in India - Econometric Analysis

In the light of the above analysis of the influencing factors (i.e., macroeconomic variables) of exchange rate in India, the expected relationship between exchange rate and macroeconomic variables is projected in Table 5.20 by taking NEER as the dependent variable and the macroeconomic variables as the independent

[204] Achsani, N.A. (2010). The Relationship between Inflation and Real Exchange Rate: Comparative Study between ASEAN, the EU and North America. *European Journal of Economics, Finance and Administrative Sciences*, 18, 69-76.

[205] Mirchandani, A. (2013). Analysis of Macroeconomic Determinants of Exchange Rate Volatility in India. *International Journal of Economics and Financial Issues*, 3(1), 172-179.

[206] Hsing, Y. (2008). Application of Monetary Models of Exchange Rate Determination for Poland. *South East European Journal of Economics and Business*, 3(2), 19-24.

[207] Jhingan, M.L. (2005). *Macroeconomics Theory.* 10^{th} Edition, Vrinda Publication Ltd, New-Delhi

[208] De Grauwe P. (1988). *Exchange Rate Variability and the Slowdown in International Trade.* IMF Staff Papers No.35, 35(1), 63-84.

variables.

Table 5.20: Expected Relationship between Exchange Rate and its Linkage with Macroeconomic Variables in India

Dependent Variable	Independent Variables	Expected Relationship
NEER	FDI	Positively related
	FPI	Positively related
	WPI	Negatively related
	EXP	Positively related
	IMP	Negatively related

5.4.2 Model Specification

The impact of foreign investment and other macroeconomic variables on Exchange Rate (NEER) in India formulated in the following model and empirical test.

$$\text{NEER} = f(\text{LFDI, LFPI, LWPI, LEXP, LIMP, } \epsilon)$$

where,
$NEER$ = Nominal Effective Exchange Rate
$LFDI$ = Natural Logarithm of Foreign Direct Investment
$LFPI$ = Natural Logarithm of Foreign Portfolio Investment
$LWPI$ = Natural Logarithm of Whole sale Price Inflation
$LEXP$ = Natural Logarithm of Export
$LIMP$ = Natural Logarithm of Import
ϵ = Error Term

5.4.3 Stationarity Test

The stationary properties of the time series of the variables of the above model are determined by Augmented Dickey- Fuller (ADF) Test. As Table 5.21 manifests all variables are non-stationary at level but become stationary at first difference or all variables are integrated at first difference or same order. In

short, all the variables have unit root in their level but became stationary in their first difference.

Table 5.21: Unit Root Test for Exchange Rate and Macroeconomic Variables in India

Variables	Level						I Difference						Result
	Intercept		Intercept & Trend		None		Intercept		Intercept & Trend		None		
	t-stat	p-value	t-stat	p-value	t- stat	p-value	t- stat	p-value	t- stat	p-value	t- stat	p-value	Stationarity
NEER	-1.244568	0.6555	-3.384999	0.0556	-1.994339	0.0444	-12.90082	0.0	-12.88259	0.0	-12.72284	0.0	Stationary at I(1)
LFDI	-1.558809	0.5022	-3.578758	0.0336	0.457969	0.8127	-14.65816	0.0	-14.62863	0.0	-14.65137	0.0	Stationary at I(1)
LFPI	-4.859453	0.0001	-5.020565	0.0002	0.532217	0.8303	-19.30987	0.0	-19.27196	0.0	-19.33417	0.0	Stationary at I(1)
LWPI	-0.7403	0.8331	-1.9952	0.6008	5.388	1	-10.3133	0.0	-10.3127	0.0	-8.287	0.0	Stationary at I(1)
LEXP	-0.586	0.8699	-1.6297	0.7798	-2.269	0.994	-4.6684	0.001	-4.65	0.001	-3.997	0.001	Stationary at I(1)
LIMP	-1.0269	0.7441	-1.1871	0.9104	2.3107	0.9952	-26.673	0.0	-26.656	0.0	-26.3114	0.0	Stationary at I(1)

Source: Compiled by the Researcher

5.4.4 Optimum Lag Length Selection Criteria

The optimum lag length of the model is selected by using Likelihood Ratio (LR), Final Prediction Error (FPE), Akaike Information Criterion (AIC), Schwarz Information Criterion (SC) and Hannan-Quinn Information Criterion (HQ) on the basis of the minimum value of each criterion. And as can be seen in Table 5.22 the optimum lag length is 2 based on AIC, FPE, SC and HQ.

Table 5.22: VAR Lag Order Selection Criteria for Exchange Rate and Macroeconomic Variables in India

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-579.8409	NA	4.72e-06	4.762934	4.848430	4.797359
1	942.1545	2957.373	2.67e-11	-7.318329	-6.719858	-7.077353
2	1044.420	193.7232	1.56e-11*	-7.857077*	-6.745630*	-7.409549*
3	1073.826	54.26837*	1.65e-11	-7.803462	-6.17904	-7.149382
4	1094.878	37.82549	1.87e-11	-7.681935	-5.544537	-6.821304
5	1112.587	30.95511	2.17e-11	-7.533229	-4.882856	-6.466047
6	1137.814	42.86570	2.39e-11	-7.445645	-4.282297	-6.171912
7	1158.742	34.53896	2.72e-11	-7.323105	-3.646782	-5.84282
8	1189.015	48.48650	2.88e-11	-7.276546	-3.087248	-5.589711

** 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

5.4.5 Johansen Co-integration Test

Johansen Co-integration Test is used for testing the long run relationship or co-integration among exchange rate and macroeconomic variables in India. On the basis of two likelihood estimators - Trace Test and Maximum Eigenvalue Test the two co-integrated equations are at 5 percent level as is seen in Table 5.23. Therefore, it can be inferred that there exists a long run relationship or co-integration between macroeconomic variables and exchange rate in India.

Table 5.23: Johansen Co-integration Test for Exchange Rate and its Linkage with Macroeconomic Variables in India

Unrestricted Cointegration Rank Test (Trace)				
Hypothesized No. of CE(s)	**Eigenvalue**	**Trace Statistic**	**0.05 Critical Value**	**Prob.****
None *	0.190712	143.4856	95.75366	0.0000
At most 1 *	0.152767	89.31588	69.81889	0.0007
At most 2	0.091134	46.87619	47.85613	0.0616
At most 3	0.064590	22.41342	29.79707	0.2761
At most 4	0.017426	5.320335	15.49471	0.7739
At most 5	0.003198	0.819940	3.841466	0.3652
Trace test indicates 2 cointegrating eqn(s) at the 0.05 level				
** denotes rejection of the hypothesis at the 0.05 level*				
***MacKinnon-Haug-Michelis (1999) p-values*				
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized No. of CE(s)	**Eigenvalue**	**Max-Eigen Statistic**	**0.05 Critical Value**	**Prob.****
None *	0.190712	54.16975	40.07757	0.0007
At most 1 *	0.152767	42.43969	33.87687	0.0038
At most 2	0.091134	24.46277	27.58434	0.1194
At most 3	0.064590	17.09308	21.13162	0.1677
At most 4	0.017426	4.500394	14.26460	0.8031
At most 5	0.003198	0.819940	3.841466	0.3652
Max-eigenvalue test indicates 2 cointegrating eqn(s) at the 0.05 level				
** denotes rejection of the hypothesis at the 0.05 level*				
***MacKinnon-Haug-Michelis (1999) p-values*				

Source: Compiled by the Researcher

5.4.6 VECM Model

Since it is seen that there is co-integrating relationship between macroeconomic variables and exchange rate in India, Vector Error Correction Model (VECM) is used to estimate their short run dynamics, long run relationship and the speed of adjustment towards long run equilibrium (Appendix C.6).

5.4.7 Normalized Co-integrating Coefficients

The Normalized Co-integration Coefficient values of the variables expressed in Table 5.24 reveal that in the long run Foreign Direct Investment (FDI), Foreign Portfolio Investment (FPI) and Export (EXP) have positive impact on Exchange Rate (NEER) i.e., in the appreciation of Indian rupee while Inflation (Wholesale Price Index - WPI) and Import (IMP) have negative impact on exchange rate in India, i.e., depreciation of Indian rupee.

Table 5.24: Normalized Co-integrating Coefficients (Long Run Coefficient) of Exchange Rate and Macroeconomic Variables in India

NEER	LFDI	LFPI	LWPI	LEXP	LIMP
1.000000	-5.405585	-85.25537	113.2436	-82.99756	61.42720
	(2.28038)	(15.2110)	(15.7121)	(17.2283)	(12.6341)
** (standard error in parentheses)*					

Source: Compiled by the Researcher

The estimated equation by co-integration is given in Equation 5.5. The signs of the normalized co-integrating coefficients are reversed to enable their proper interpretation.

$$NEER = 5.4055LFDI + 85.255LFPI - 113.24LWPI + 82.99LEXP - 61.42LIMP \quad (5.5)$$

The result of VEC Granger Causality/ Block Exogeneity Wald Test, shown in Table 5.25, reveals that in the short run the role of Foreign Portfolio Investment (FPI) and Export (EXP) are statistically significant in influencing the Exchange Rate (NEER) while the impact of Foreign Direct Investment (FDI),

Table 5.25: VEC Granger Causality/ Block Exogeneity Wald Test of Exchange Rate and Macroeconomic Variables in India

Excluded	Chi-sq	df	Prob.
D(LFDI)	0.374172	2	0.8294
D(LFPI)	4.726415	2	0.0941*
D(LWPI)	3.432224	2	0.1798
D(LEXP)	7.019810	2	0.0299**
D(LIMP)	0.131187	2	0.9365
All	**18.26422**	**10**	**0.0507**
Dependent Variable: D(NEER)			

* Significant at 10% **Significant at 5%

Import (IMP) and Inflation (WPI) are seen statistically insignificant.

VECM Estimated Model

$$\begin{aligned} D(NEER) = {} & C(1) * (NEER(-1) - 75.19 * LFPI(-1) + 168.06 \\ & * LWPI(-1) - 179.91 * LEXP(-1) + 123.04 \\ & * LIMP(-1) + 334.98) + C(2) * (LFDI(-1) + 1.86 \\ & * LFPI(-1) + 10.14 * LWPI(-1) - 17.92 \\ & * LEXP(-1) + 11.39 * LIMP(-1) - 17.17) \\ & + C(3) * D(NEER(-1)) + C(4) * D(NEER(-2)) + C(5) \\ & * D(LFDI(-1)) + C(6) * D(LFDI(-2)) + C(7) * D(LFPI(-1)) \\ & + C(8) * D(LFPI(-2)) + C(9) * D(LWPI(-1)) + C(10) \\ & * D(LWPI(-2)) + C(11) * D(LEXP(-1)) + C(12) \\ & * D(LEXP(-2)) + C(13) * D(LIMP(-1)) \\ & + C(14) * D(LIMP(-2)) + C(15) \end{aligned} \tag{5.6}$$

Error Correction Term (ECT) is used to find out the speed of adjustment from the short run equilibrium to the long run equilibrium of the model. As can be seen in the Table 5.26, ECT or C(1) is negatively signed and significant indicating that the speed of adjustment between the short run dynamics and the long run equilibrium relationship is at the rate of 3 percent. It shows that

in India there is a long run causal relationship between exchange rate, foreign investment and other macroeconomic variables.

Table 5.26: Estimates of Error Correction Term for Exchange Rate

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-0.036308	0.013401	-2.709471	0.0068***
C(2)	0.325858	0.140426	2.320488	0.0205
C(3)	0.187137	0.064917	2.882711	0.004
C(4)	-0.085077	0.063858	-1.332288	0.183
C(5)	-0.100312	0.20511	-0.489062	0.6249
C(6)	-0.083982	0.191956	-0.437504	0.6618
C(7)	-2.458714	1.127046	-2.181557	0.0293
C(8)	-1.637736	0.884481	-1.851634	0.0643
C(9)	-31.14818	18.77269	-1.659228	0.0973
C(10)	-3.945411	18.8837	-0.208932	0.8345
C(11)	3.961157	1.706073	2.321799	0.0204
C(12)	3.483321	1.469043	2.37115	0.0179
C(13)	0.037566	1.464649	0.025648	0.9795
C(14)	-0.484585	1.378807	-0.351452	0.7253
C(15)	-0.129917	0.12835	-1.012211	0.3116

*** Significant at 1%

5.4.8 Variance Decomposition Analysis

Variance Decomposition Analysis used to find out the breakdown of the forecast error variance for a specific time horizon, is presented in Table 5.27. It exhibits that in the long run (i.e., after a period of 10 months), 84 percentage of fluctuation of Exchange Rate (NEER) is by itself and 16 percentage by other macroeconomic factors i.e., 8% by FPI, 4% by WPI, 2.73% by FDI, 1% by EXP and 0.14% by IMP. In short FPI and inflation are seen as the main factors which are responsible for the fluctuation of exchange rate in India.

Table 5.27: Variance Decomposition of Exchange Rate in India

Period	S.E.	NEER	LFDI	LFPI	LWPI	LEXP	LIMP
1	1.615456	100.0000	0.000000	0.000000	0.000000	0.000000	0.000000
2	2.587077	96.63058	0.446372	0.379101	0.359021	2.148805	0.036116
3	3.273508	93.47083	0.901443	1.233249	0.999500	3.097849	0.297128
4	3.839967	91.29886	1.361046	2.810571	1.638810	2.569964	0.320751
5	4.355461	89.51567	1.717363	4.126906	2.184785	2.171669	0.283604
6	4.815432	88.11741	1.995372	5.050362	2.711877	1.877833	0.247142
7	5.241639	86.88562	2.235421	5.890951	3.149250	1.626028	0.212732
8	5.641822	85.85724	2.432835	6.602764	3.495057	1.427600	0.184501
9	6.016079	85.02796	2.595352	7.161462	3.781571	1.271317	0.162339
10	6.370010	84.32660	2.732768	7.636149	4.015779	1.143854	0.144845

Source: Compiled by the Researcher

5.4.9 Impulse Response Analysis

Impulse Response Analysis (IRA) is used to indicate the positive or negative direction or the nature of the variation of the macroeconomic variables. Figure

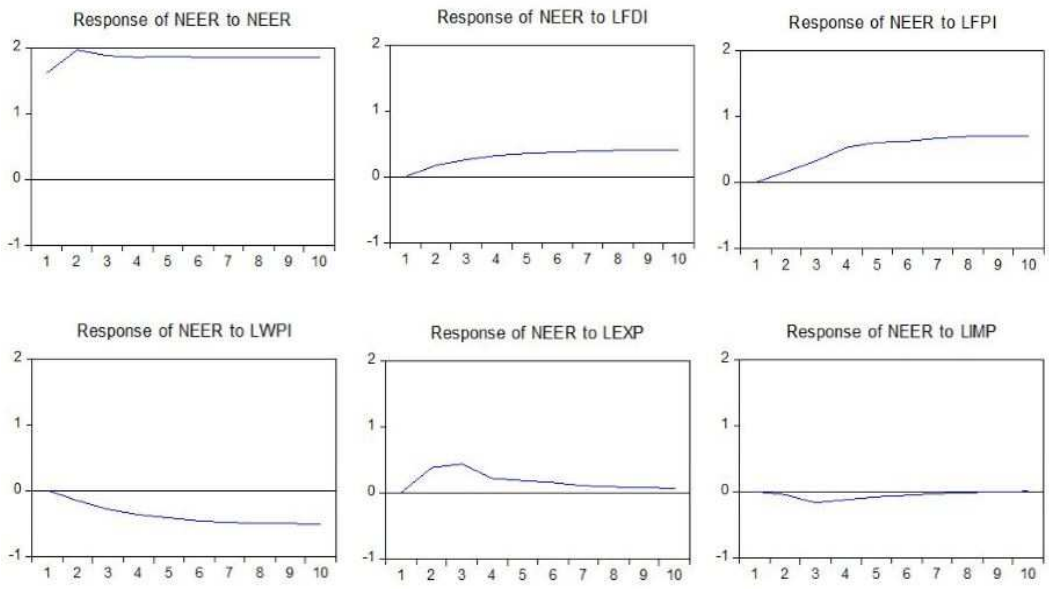

Figure 5.8: Impulse Response of Exchange Rate

5.8 depicts the impulse response of exchange rate for the one unit standard deviation shock in the macroeconomic variables in India. If a positive shock is given to the foreign investment inflows (FDI and FPI) and export i.e., it will lead to the appreciation of the exchange rate and this shock will persists upto 10 months. This means that additional foreign investment flows help to raise or

appreciate the exchange rate in India. At the same time one standard deviation shock to inflation and import cause depreciation of the exchange rate in India.

Thus it may be concluded that foreign investment could stabilize the exchange rate and produce a positive impact on the Indian economy. Hence it is yet another positive impact of foreign investment on Indian economy.

5.5 Impact of Foreign Investment on the Economic Growth of India

The relevance and importance of foreign investment must be judged ultimately by its contribution to the economic growth of the host countries which is usually measured by the Index of Industrial Production (IIP)[209]. Since the major hurdle in the path of the economic growth in India is capital scarcity, the potential of foreign investment, which is nothing other than capital flows, is self-explanatory and self-evident for its economic growth. Thus by bringing huge amount of non-debt capital foreign investment directly influences the economic growth. Besides, foreign investment influences economic growth indirectly too by aiding the other agents of the economic growth. Similarly, all the positive contributions of foreign investment to balance of payments, foreign exchange reserves, exchange rate etc. will definitely aid economic growth. Foreign investment can even neutralize the obstacles of economic growth like interest rate and inflation by way of its very presence. For example government will be forced to maintain a moderate interest rate and a moderate inflation in the country to attract foreign investment as high interest rate or high inflation rate will repel foreign investors from the country.

Figure 5.9 and the Correlation Matrix (Appendix C.7) show the positive

[209]Index of Industrial Production (IIP) is used as a proxy to measure the growth rate in real sector. Industrial production index measures monthly developments of real activity in the industrial sector, comprising mining and quarrying, manufacturing, and electricity and it is calculated according to production quantity of a sample representing most domestic industries, and weighted by the production values for industry in base year (2004-05), according to the production survey carried by Department of Statistics. There are some other indicators also that explicitly reflect the industrial activities in the economy. In this way economic growth can be defined as an increase in the capacity of an economy to produce goods and services within a specific period of time.

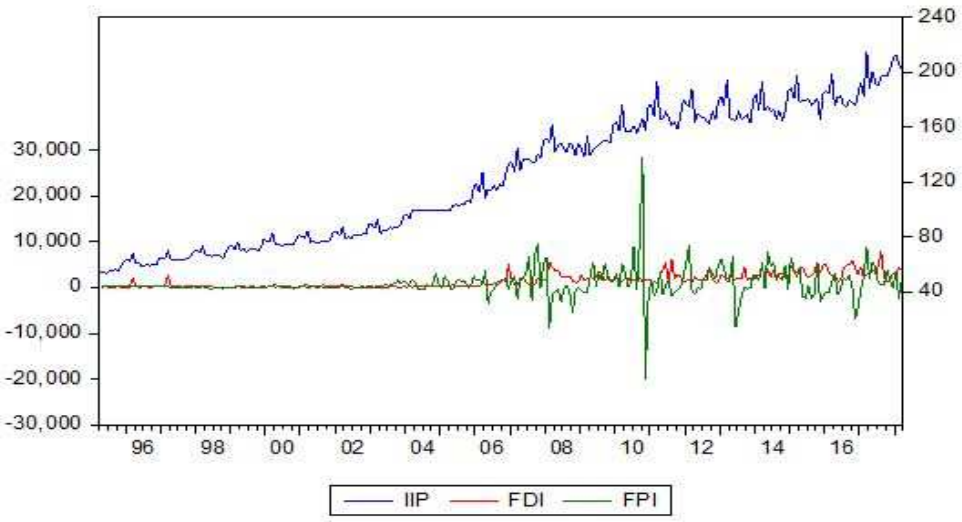

Figure 5.9: Foreign Investment and Economic Growth in India

influence of foreign investment on the economic growth of India. The empirical finding also reinforces that foreign investment (FDI and FPI) has a significant relation with the economic growth of Indian economy.

Of course other than foreign investment there are also other macroeconomic variables which influence the economic growth. For example, interest rate and economic growth are negatively associated (Barro and Becker 1989)[210]. Semuel and Nurina (2015)[211] also argued that there is a negative association between interest rate and economic growth. Foreign investment in India helps to maintain a moderate or balanced interest rate by two ways. India which is keen to attract foreign investment cannot hike interest rate arbitrarily because such an attempt will repel foreign investment from the country. At the same time reasonable interest rate is necessary to control inflation because high rate of inflation not only curb economic growth but also prevent easy flow of foreign investment to the country.

Similarly, foreign investment has the potential to boost export which is a necessary condition for economic growth. There is a reciprocal relationship between foreign investment and export i.e., increase in export will attract more

[210]Barro, R.J., and Becker, G.S. (1989). Fertility Choice in a Model of Economic Growth. *Econometrica*, 57(2), 481-501.

[211]Semuel, H., and Nurina, S. (2015), *Analysis of the Effect of Inflation, Interest Rates, and Exchange Rates on Gross Domestic Product (GDP) in Indonesia.* International Conference on Global Business, Economics, Finance and Social Sciences (GB15 - Thai Conference), Bangkok, Thailand.

foreign investment and increase in foreign investment leads to more export and the both contribute to the economic growth, (Jordan and Eita 2007)[212], (Awokuse 2007)[213], (Konya 2006)[214] etc. Though it is not possible to attribute

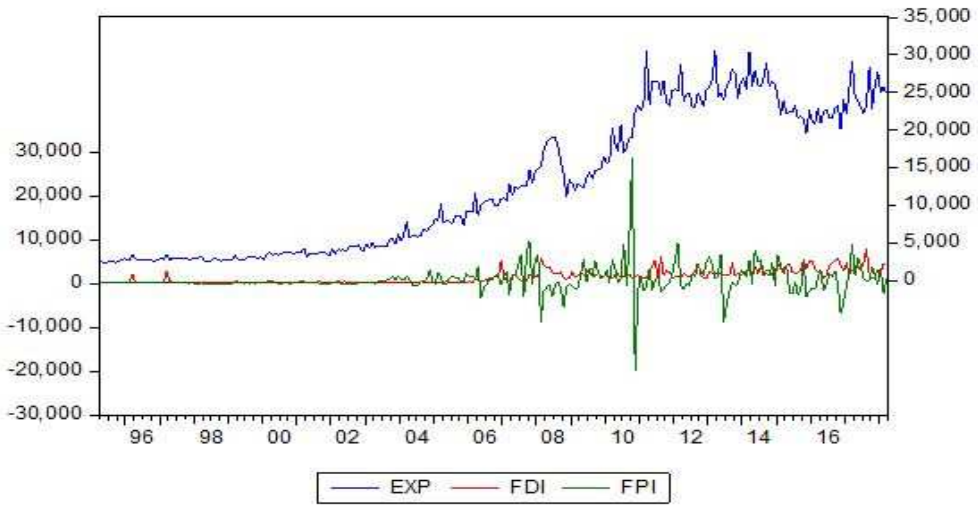

Figure 5.10: Relationship between Foreign Investment and Export

the full credit of the increase in export in India exclusively to the foreign investment, since Figure 5.10 shows a trend line between foreign investment and export, the existence of a positive relationship between them can be inferred. It can be seen that corresponding to the increase of foreign investment there is a corresponding increase of export (Appendix C.9).

In the same manner in the context of import also, especially certain types of import like import of capital goods which is a necessary condition for economic growth, foreign investment has an important role to play. Foreign investment and the consequent foreign capital it brings relieves India not only from the burden of import but also make import easy. In this way, foreign investment in India contributes to her economic growth. The Figure 5.11, illustrates this positive relationship between foreign investment and import in India and shows the increase of import corresponding to the increases of foreign investment[215].

[212] Jordaan, A.C., and Eita, J.H. (2007). Export and Economic Growth in Namibia: A Granger Causality Analysis. *South African Journal of Economics*, 75 (3), 540-547.

[213] Awokuse, T.O. (2007). Causality between Exports, Imports, and Economic Growth: Evidence from Transition Economies. *Economics Letters*, 94 (3), 389-395.

[214] Konya, L. (2006). Exports and Growth: Granger Causality Analysis on OECD Countries with Panel Data Approach. *Economic Modelling*, 23(6), 978-992.

[215] It is not arguing that high rate of import is an indication of economic growth. But so far as developing

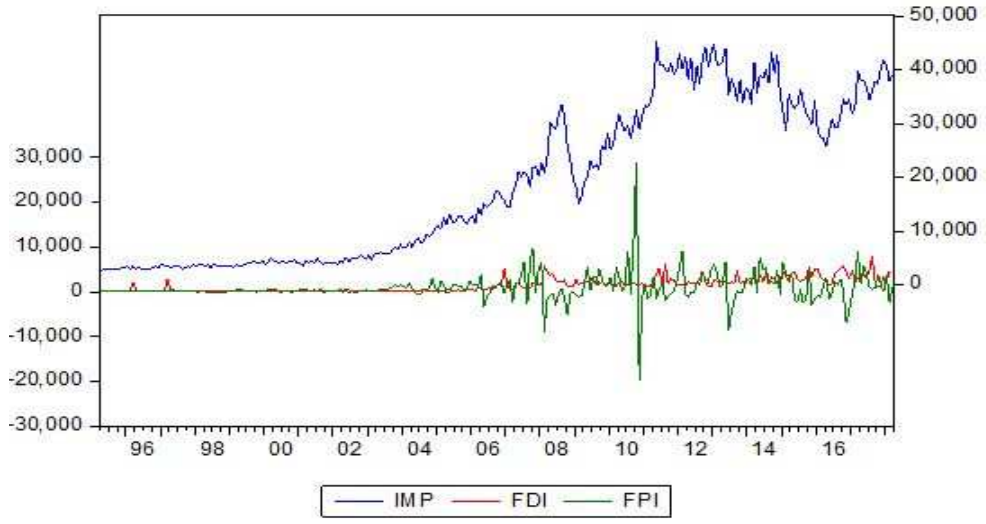

Figure 5.11: Relationship between Foreign Investment and Import

Exchange rate stability is another factor which is essential for economic growth and the role of foreign investment in stabilizing the exchange rate is already examined. It is also seen in the previous section that how foreign investment strengthens the domestic currency and brings down the price of imported goods and thereby stabilizes the exchange rate and thus boosts the economic growth.

Yet another factor which influences - economic growth - generally adversely - is inflation which is partially a byproduct of foreign investment. The relationship between economic growth and inflation, is a controversial question. Though higher level of inflation may adversely affect economic growth, inflation at some low levels, may be positively correlated with growth. High inflation is always correlated with increased price variability, leading uncertainty about the future profitability of investment projects and this brings down the lower levels of investment and dampens the economic growth. So their expected relationship is negative (Bruno and Easterly 1998)[216]. Therefore all the attempts by the government to control inflation to attract foreign investment indirectly boosts economic growth also.

countries are concerned import is an inescapable fact and is highly necessary too for their economic growth. The relevance of foreign investment with regard to import is that it facilitates imports without much burden and in this way indirectly helps economic growth.

[216]Bruno, M., and Easterly, W.(1998). Inflation Crises and Long-run Growth. *Journal of Monetary Economics*, 41(1), 3-26.

In the aforesaid ways foreign investment is an aid and ally of economic growth in India also.

5.5.1 Relationship between Foreign Investment and Economic Growth - Econometric Analysis

The web of this relationship between foreign investment and economic growth in the Indian context is studied with the help of the following model taking Index of Industrial Production as the dependent variable and other factors of economic growth as the independent variables and their likely relationship is expressed in Table 5.28.

Table 5.28: Expected Relationship between Economic Growth (IIP) and its Linkage with Macroeconomic Variables in India

Dependent Variable	Independent Variables	Expected Relationship
IIP	FDI	Positively related
	FPI	Positively related
	IR	Negatively related
	NEER	Negatively related
	WPI	Negatively related
	EXP	Positively related

5.5.2 Model Specification

On the basis of the above relationship between foreign investment (FDI and FPI) and other macroeconomic variables with Economic Growth (IIP) the following model is formulated.

$$\text{IIP} = \text{f(LFDI, LFPI, LIR, LNEER, LWPI, LEXP, } \epsilon)$$

where,
IIP = Index of Industrial Production
$LFDI$ = Natural Logarithm of Foreign Direct Investment
$LFPI$ = Natural Logarithm of Foreign Portfolio Investment

LIR = Natural Logarithm of Interest Rate

$LNEER$ = Natural Logarithm of Nominal Effective Exchange Rate

$LWPI$ = Natural Logarithm of Wholesale Price Index

$LEXP$ = Natural Logarithm of Export

ϵ = Error Term

5.5.3 Stationarity Test

The stationary properties of the data are studied using Augmented Dickey-Fuller (ADF) Test. Table 5.29 shows that all variables are non-stationary in their level. But when they are converted into first difference they become stationary. Hence it is possible to conclude that all the variables become stationary at first difference and they are integrated of order one I(1).

Table 5.29: Unit Root Test for Economic Growth (IIP) and Macroeconomic Variables in India

Variables	Level						I Difference						Result
	Intercept		Intercept & Trend		None		Intercept		Intercept & Trend		None		
	t-stat	p-value	t-stat	p-value	t- stat	p-value	t- stat	p-value	t- stat	p-value	t- stat	p-value	Stationarity
IIP	-0.400662	0.9057	-1.713438	0.7427	2.228	0.994	-3.954859	0.002	-3.945539	0.0117	-2.83	0.004	Stationary at I(1)
LFDI	-1.558809	0.5022	-3.578758	0.0336	0.457969	0.8127	-14.65816	0.0	-14.62863	0.0	-14.65137	0.0	Stationary at I(1)
LFPI	-4.859453	0.0001	-5.020565	0.0002	0.532217	0.8303	-19.30987	0.0	-19.27196	0.0	-19.33417	0.0	Stationary at I(1)
LIR	-4.292291	0.0006	-4.28032	0.0039	-1.023218	0.2752	-16.36911	0.0	-16.34742	0.0	-16.39664	0.0	Stationary at I(1)
LNEER	-0.8897	0.7905	-2.8436	0.1831	-1.8436	0.0622	-12.8876	0.0	-12.8623	0.0	-12.7055	0.0	Stationary at I(1)
LWPI	-0.7403	0.8331	-1.9952	0.6008	5.388	1	-10.3133	0.0	-10.3127	0.0	-8.287	0.0	Stationary at I(1)
LEXP	-0.586	0.8699	-1.6297	0.7798	-2.269	0.994	-4.6684	0.001	-4.65	0.001	-3.997	0.001	Stationary at I(1)

Source: Compiled by the Researcher

5.5.4 Optimum Lag Length Selection Criteria

Akaike Information Criterion (AIC), Schwartz Information Criterion (SC), Final Prediction Error (FPE), LR Statistics (LR) and Hannan-Quinn Information Criterion (HQ) are used for determining the best lag length of the model and their estimated results are given in Table 5.30. The lag lengths are chosen based on the lowest values over the lags considered (allowed for a maximum of eight lags in this case). As per the Akaike Information Criterion (AIC) lag three is found optimal for the model.

Table 5.30: VAR Lag Order Selection Criteria for Economic Growth (IIP) and Macroeconomic Variables in India

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-595.8723	NA	3.17e-07	4.901401	5.001146	4.941564
1	1025.628	3137.538	8.89e-13	-7.883158	-7.085197*	-7.561856
2	1141.328	217.2902	5.18e-13	-8.425435	-6.929257	-7.822993*
3	1194.067	96.04459	5.03e-13*	-8.455831*	-6.261437	-7.572251
4	1232.488	67.78251*	5.51e-13	-8.369819	-5.477208	-7.205099
5	1261.519	49.56509	6.53e-13	-8.207469	-4.616642	-6.76161
6	1296.916	58.41981	7.37e-13	-8.096878	-3.807834	-6.369879
7	1330.327	53.23967	8.49e-13	-7.970135	-2.982874	-5.961997
8	1368.647	58.88189	9.44e-13	-7.883305	-2.197828	-5.594028

** 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

5.5.5 Johansen Co-integration Test

Since all the variables are co-integrated in the first order I(1), Johansen Co-integration test is used to analyse the long run relationship among economic growth and the macroeconomic variables of the Indian economy. The result of this test given in Table 5.31 shows that both the Trace and Maximum Eigenvalue Test accept the presence of long run relationship or co-integrating vectors among the variables of the model. The Trace Statistics reveals that the existence of four co-integrated equation at five percent level of significance and Maximum Eigenvalue reveals the existence of one co-integrated equation at five percent level of significance. This indicates the presence of a long run relationship between economic growth and other macroeconomic variables of India including foreign investment.

5.5.6 VECM Model

Since the results of the Co-integration Test indicates that the variables have co-integrated or long run relationship, Vector Error Correction Model (VECM) is

Table 5.31: Johansen Co-integration Test for Economic Growth (IIP) and its Linkage with Macroeconomic Variables in India

Unrestricted Cointegration Rank Test (Trace)				
Hypothesized No. of CE(s)	**Eigenvalue**	**Trace Statistic**	**0.05 Critical Value**	**Prob.****
None *	0.226325	177.2967	125.6154	0.0000
At most 1 *	0.138020	112.1195	95.75366	0.0023
At most 2 *	0.096936	74.39461	69.81889	0.0206
At most 3 *	0.076485	48.49619	47.85613	0.0435
At most 4	0.062170	28.28591	29.79707	0.0739
At most 5	0.038351	11.98262	15.49471	0.1578
At most 6	0.008037	2.049723	3.841466	0.1522
Trace test indicates 4 cointegrating eqn(s) at the 0.05 level				
** denotes rejection of the hypothesis at the 0.05 level*				
***MacKinnon-Haug-Michelis (1999) p-values*				
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized No. of CE(s)	**Eigenvalue**	**Max-Eigen Statistic**	**0.05 Critical Value**	**Prob.****
None *	0.226325	65.17725	46.23142	0.0002
At most 1	0.138020	37.72485	40.07757	0.0899
At most 2	0.096936	25.89842	33.87687	0.3270
At most 3	0.076485	20.21028	27.58434	0.3268
At most 4	0.062170	16.30329	21.13162	0.2076
At most 5	0.038351	9.932902	14.26460	0.2164
At most 6	0.008037	2.049723	3.841466	0.1522
Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level				
** denotes rejection of the hypothesis at the 0.05 level*				
***MacKinnon-Haug-Michelis (1999) p-values*				

Source: Compiled by the Researcher

used to analyze the long run causality and short run dynamics of macroeconomic variables and economic growth in India (Appendix C.8). In the presence of co-integration, there always exists a corresponding error correction representation, captured by the Error Correction Term (ECT) which captures the long run adjustment of co-integration variables.

Table 5.32: Normalized Co-integrating Coefficients (Long Run Coefficient) of Economic Growth (IIP) and Macroeconomic Variables in India

IIP	LFDI	LFPI	LIR	LNEER	LWPI	LEXP
1.000000	-13.72089	-47.18273	4.878619	8.954999	-70.74676	-2.692716
	(1.72640)	(13.0643)	(2.44605)	(22.2014)	(26.9959)	(6.96624)
** (standard error in parentheses)*						

Source: Compiled by the Researcher

5.5.7 Normalized Co-integrating Coefficients

The Normalized Co-integration Coefficients is depicted in Table 5.32 and the estimated equation by Co-integration is given in Equation 5.7. Here signs of the Normalized Co-integrating Coefficients are reversed to enable proper interpretation.

$$IIP = 13.72LFDI + 47.18LFPI - 4.8LIR - 8.95LNEER + 70.74LWPI + 2.69LEXP \tag{5.7}$$

Accordingly it can be seen that in the long run Foreign Direct Investment (FDI), Foreign Portfolio Investment (FPI), Export (EXP) and Inflation (WPI) have significant positive effect on the Index of Industrial Production (IIP) which represents Economic Growth, while Interest Rate (IR) and Exchange Rate (NEER) are found negatively related to Index of Industrial Production (IIP) in India.

The result of VEC Granger Causality Block Exogeneity Wald Test, given in Table 5.33, shows that in the short run Foreign Direct Investment (FDI), Foreign Portfolio Investment (FPI) and Inflation (WPI) have statistically significant effect on the Economic Growth (IIP) in India, while Export (EXP) and Exchange Rate (NEER) have only insignificant effect on economic growth.

The coefficient of the Error Correction Term (ECT) or C(1) of the model is -0.21, and is significant (Table 5.34). It implies that the system corrects its previous periods disequilibrium at a speed of approximately 21 percent monthly. Since the Error Correction Term (ECT) is negative in sign and significant it is possible to say that there is a long run causality running from economic growth and macroeconomic variables of Indian economy including foreign investment.

Table 5.33: VEC Granger Causality/Block Exogeneity Wald Test of Economic Growth (IIP) and Macroeconomic Variables in India

Excluded	**Chi-sq**	**df**	**Prob.**
D(LFDI)	13.46931	3	0.0037^{***}
D(LFPI)	17.45036	3	0.0006^{***}
D(LIR)	4.372607	3	0.2239
D(LNEER)	4.100970	3	0.2508
D(LWPI)	19.68391	3	0.0002^{***}
D(LEXP)	5.650352	3	0.1299
All	**73.34587**	**18**	**0.0000**
Dependent Variable: D(IIP)			

*** Significant at 1%

VECM Estimated Model

$$\begin{aligned} D(IIP) = C(1) * (IIP(-1) &- 13.72 * LFDI(-1) - 47.18 \\ &* LFPI(-1) + 4.87 * LIR(-1) + 8.95 \\ &* LNEER(-1) - 70.74 * LWPI(-1) - 2.69 \\ &* LEXP(-1) + 745.83) + C(2) * D(IIP(-1)) \\ &+ C(3) * D(IIP(-2)) + C(4) * D(IIP(-3)) + C(5) \\ &* D(LFDI(-1)) + C(6) * D(LFDI(-2)) + C(7) \\ &* D(LFDI(-3)) + C(8) * D(LFPI(-1)) + C(9) \\ &* D(LFPI(-2)) + C(10) * D(LFPI(-3)) + C(11) \\ &* D(LIR(-1)) + C(12) * D(LIR(-2)) + C(13) \\ &* D(LIR(-3)) + C(14) * D(LNEER(-1)) + C(15) \\ &* D(LNEER(-2)) + C(16) * D(LNEER(-3)) + C(17) \\ &* D(LWPI(-1)) + C(18) * D(L_W PI(-2)) + C(19) \\ &* D(LWPI(-3)) + C(20) * D(LEXP(-1)) + C(21) \\ &* D(LEXP(-2)) + C(22) * D(LEXP(-3)) + C(23) \end{aligned} \tag{5.8}$$

Table 5.34: Estimates of Error Correction Term for Economic Growth (IIP)

	Coefficient	**Std. Error**	**t-Statistic**	**Prob.**
C(1)	-0.218551	0.052478	-4.164643	0.000***
C(2)	-0.42179	0.080819	-5.218941	0.000
C(3)	0.098329	0.083632	1.175735	0.2399
C(4)	0.243067	0.072841	3.33697	0.0009
C(5)	-2.854222	0.801999	-3.558885	0.0004
C(6)	-1.220805	0.787036	-1.551143	0.1211
C(7)	-0.85604	0.662741	-1.291666	0.1967
C(8)	-12.22075	3.549151	-3.443289	0.0006
C(9)	-5.32678	3.484721	-1.52861	0.1266
C(10)	2.28673	3.026288	0.755622	0.45
C(11)	0.756088	1.277579	0.591813	0.5541
C(12)	2.604495	1.302818	1.999124	0.0458
C(13)	1.534783	1.277293	1.20159	0.2297
C(14)	-34.71733	21.72305	-1.598179	0.1102
C(15)	-13.61986	21.49926	-0.633504	0.5265
C(16)	-12.29221	21.62851	-0.568334	0.5699
C(17)	-285.521	64.33492	-4.43804	0.000
C(18)	107.3574	71.40453	1.503509	0.1329
C(19)	22.94736	63.36417	0.36215	0.7173
C(20)	-8.718767	4.390075	-1.986018	0.0472
C(21)	-10.33829	5.074745	-2.037205	0.0418
C(22)	-4.750767	4.65878	-1.019745	0.308
C(23)	1.220936	0.473279	2.579739	0.01

*** Significant at 1%

5.5.8 Variance Decomposition Analysis

Variance Decomposition Analysis is used to estimate the proportion of variance of economic growth affected by macroeconomic variables in India in the long run and Table 5.35 shows the variance decomposition of the dependent variable of economic growth for a period of ten months time horizon. It is seen that 70 percent of IIP change is contributed by its own innovative shock and the

rest 30 percent variability is explained by other macroeconomic determinants of IIP. Further shock in Foreign Direct Investment (FDI) and Foreign Portfolio Investment (FPI) contributes to the 12 and 6 percent variation of IIP respectively. Variable Inflation (WPI) contributes to 3 percent and variable Export (EXP) contributes to 4 percent variation of IIP. But Exchange Rate (NEER) and Interest Rate (IR) are found having only minor role for explaining the variation of IIP. Therefore it is concluded that in the long run Foreign Investment (FDI and FPI) is the crucial determining factor of the Economic Growth (IIP) of India.

Table 5.35: Variance Decomposition of Economic Growth (IIP)

Period	S.E.	IIP	LFDI	LFPI	LIR	LNEER	LWPI	LEXP
1	5.262190	100.0000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
2	5.760470	91.24725	0.002070	0.488463	0.024989	0.302784	6.718749	1.215698
3	6.698735	86.94521	1.575240	1.185629	0.299028	0.427670	5.828881	3.738342
4	7.559468	84.40898	2.073112	2.393723	0.270699	1.069863	6.100710	3.682916
5	7.961444	80.35884	4.690919	2.497670	0.267317	1.246118	6.822009	4.117127
6	8.610937	77.27507	6.682855	4.012975	0.230588	1.543687	5.983140	4.271683
7	9.058479	74.97494	8.509452	4.996639	0.220975	1.642290	5.633187	4.022519
8	9.464110	73.24336	10.17622	5.515907	0.209441	1.637771	5.257544	3.959760
9	9.919428	71.96484	11.18658	6.339650	0.218574	1.646456	4.832091	3.811808
10	10.30806	70.98877	12.09701	6.828243	0.225434	1.623194	4.564442	3.672904

Source: Compiled by the Researcher

5.5.9 Impulse Response Analysis

Impulse Response Analysis is used to identify whether macroeconomic variables' impact is positive or negative to the economic growth and also to detect the dynamic behavior of the variables. As can be seen in Figure 5.12 when a one standard deviation of impulse in Foreign Direct Investment (FDI) and Foreign Portfolio Investment (FPI) is found positive towards Economic Growth (IIP), Exchange Rate (NEER), Inflation (WPI) and Export (EXP) are found negative towards IIP in the long run. But it is seen that Interest Rate (IR) has no impact on Economic Growth (IIP) during the entire period.

All these lead to the conclusion that both form of foreign investment i.e., FDI and FPI impact the economic growth directly and indirectly - directly by bringing huge amount of non-debt capital and indirectly by impacting the

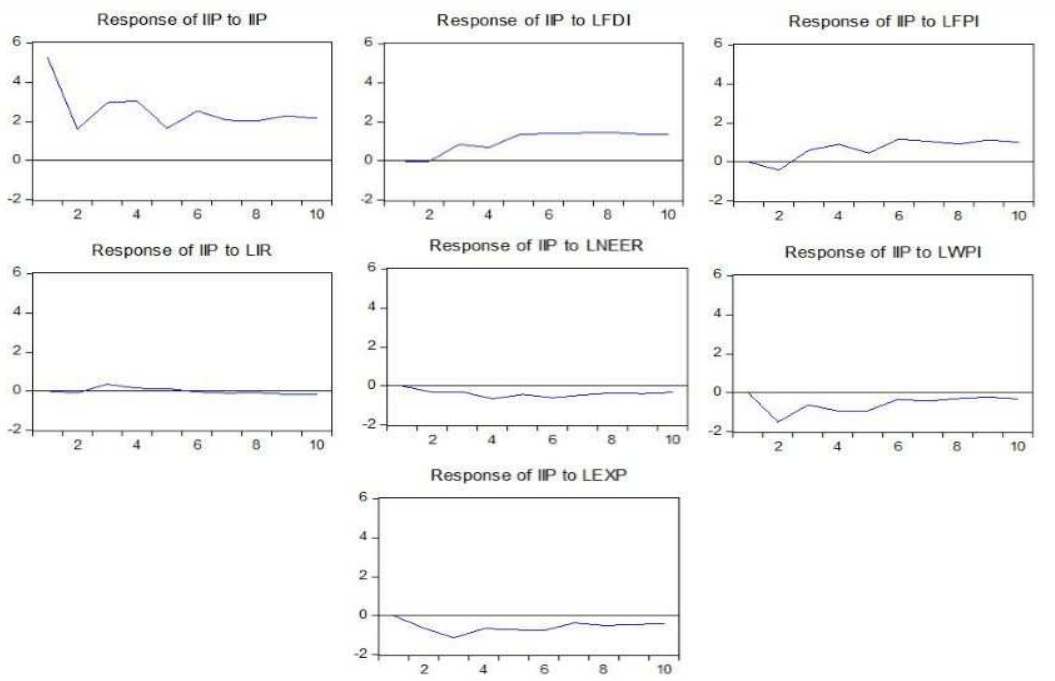

Figure 5.12: Impulse Response of Economic Growth (IIP)

other variables which help the economic growth. And this is the most crucial testimony of the positive impact of foreign investment on Indian economy.

5.6 Impact of Foreign Investment on the External Debt Burden of India

The most distinguishable characteristic of foreign investment is that it is non-debt capital and obviously it is this characteristic of foreign investment which tempts India like all other developing countries to go after foreign investment. Therefore an analysis of the impact of foreign investment on the macroeconomic variables of the Indian economy cannot be completed without examining how this quality of foreign investment operates in the Indian economy.

The striking feature of the capital inflows into India since 1991 is the change in its composition from debt to non-debt creating capital. External commercial borrowing, which had been the major source of foreign capital inflows during the eighties and which created repayment burden, became less important during the nineties when the dominant forms of foreign investment became Foreign

Table 5.36: Non Debt Creating and Debt Creating Capital Inflows

Year	Non-Debt Creating Inflows (US $ Million)	Debt Creating Capital Inflows (US $ Million)	Total Capital Inflows	Percentage of Non-debt Creating Capital Flows of the Total Capital Flows	Percentage of Debt Creating Capital Flows of the Total Capital Flows
1991-92	151	21625	21776	0.69	99.31
1992-93	589	22292	22881	2.57	97.43
1993-94	4609	21791	26400	17.46	82.54
1994-95	5753	17948	23701	24.27	75.73
1995-96	5629	17784	23413	24.04	75.96
1996-97	7817	25738	33555	23.3	76.7
1997-98	9169	26211	35380	25.92	74.08
1998-99	5743	23669	29412	19.53	80.47
1999-00	12121	23719	35840	33.82	66.18
2000-01	17650	33550	51200	34.47	65.53
2001-02	15389	25471	40860	37.66	62.34
2002-03	13928	30526	44454	31.33	68.67
2003-04	32540	38865	71405	45.57	54.43
2004-05	46899	44844	91743	51.12	48.88
2005-06	77082	61113	138195	55.78	44.22
2006-07	132360	91831	224191	59.04	40.96
2007-08	268408	137982	406390	66.05	33.95
2008-09	166348	127353	293701	56.64	43.36
2009-10	197659	135563	333222	59.32	40.68
2010-11	283556	198949	482505	58.77	41.23
2011-12	231299	230894	462193	50.04	49.96
2012-13	208060	238812	446872	46.55	53.45
2013-14	238379	242885	481264	49.53	50.47
2014-15	301195	213449	514644	58.52	41.48
2015-16	271266	209207	480473	56.45	43.55
2016-17	297734	204201	501935	59.31	40.69
2017-18	354503	242784	597287	59.35	40.65
Total	**3205836**	**2709056**	**5914892**		

Source: Handbook of Statistics on Indian Economy: 2018, RBI DATABASE

Portfolio Investment (FPI) and Foreign Direct Investment (FDI). It reveals the increase of the non-debt creating capital flows when compared to the debt creating capital. For example in 1991-92, 99.31 percentage of the total capital inflows became debt creating capital. The situation was more or less the same in 1992-93 also i.e., 97.43 percentage of the total capital inflows was debt creating capital. But gradually the situation began to change and by 2004-05 the percentage of debt creating capital to the total capital inflows was reduced to less than 50 percent i.e., 48.88 percent. Since then one can see a consistent

decline in the percentage of the debt creating capital. In the year 2007-08, the percentage of non-debt creating capital in the total capital inflows has reached its zenith i.e., 66.05 percentage and in the year 2017-18 also the percentage of non-debt creating capital maintained its position and reached at 59.35 percent. Table 5.36 shows this sharp decline in the debt creating capital in the total capital inflows to India since the advent of non-debt capital by way of foreign investment. This aspect will become very vivid from the analysis of the debt service ratio[217], which is considered to be a key indicator of a country's debt burden, presented in Table 5.37.

It is true that Table 5.36 shows an increase in the total debt also in proportion to the increase of foreign investment and it may tempt one to view as the betrayal of the non-debt quality of foreign capital. But what is relevant and significant in the Table 5.37 is not the quantity of debt and non debt creating capital but the exceptional decline of debt service ratio from 30.2 in 1991 to 7.5 in 2017-18 in accordance with the increase of foreign investment. The credit of which can solely be attributed to the huge foreign investment flows to the country during the post liberalization era.

Similarly as Table 5.37 shows at present India's external debt to GDP ratio is only around 24 percent, which is quite good in comparison to the international standard. This becomes more clear when comparing to some countries like Spain, Portugal etc. whose external debt to GDP is higher than 100 percent. This is yet another positive impact of foreign investment on Indian economy. Thus for reasons galore the presence of foreign investment in the Indian economy is justified.

The above discussion reinforced the potential of foreign investment to impact host economies particularly their macroeconomic variables in the Indian context also. It played a significant role in reducing current account deficit and thus insulated or relieved the economy from the probable balance of payments problem; proved to be a major contributor of foreign exchange reserves. By enriching the foreign exchange reserves, foreign investment indirectly and at the same time positively impacted the exchange rate stability and thus strength-

[217] A country's debt service ratio measures the amount of debt interest payments to the country's export earnings. A rising debt service ratio is very often a sign of an imminent economic crisis.

Table 5.37: India's Debt Service Ratio 1991-2018

Year	Debt Service Ratio	Debt Stock - GDP Ratio (%)
1991-92	30.2	38.7
1992-93	27.5	37.5
1993-94	25.4	33.8
1994-95	25.9	30.8
1995-96	26.2	27
1996-97	23	24.6
1997-98	19.5	24.6
1998-99	18.7	23.6
1999-00	17.1	22
2000-01	16.6	22.5
2001-02	13.7	21.1
2002-03	16	20.3
2003-04	16.1	18
2004-05	5.9	18.1
2005-06	10.1	16.8
2006-07	4.7	17.5
2007-08	4.8	18
2008-09	4.4	20.3
2009-10	5.8	18.2
2010-11	4.4	18.2
2011-12	6	21.1
2012-13	5.9	22.4
2013-14	5.9	23.9
2014-15	7.6	23.9
2015-16	8.8	23.4
2016-17	8.3	20
2017-18	7.5	20.5

Source: Handbook of Statistics onIndian Economy: 2018, RBI DATABASE

ened the financial health of the economy; has produced a negative impact on Indian economy by fueling the inflation as it is found that there is a positive relation between foreign investment and inflation in India. However, since this positive relation is only a moderate one, it implies that the negative impact of

foreign investment on Indian economy via inflation is not highly adverse as a moderate level of inflation is not considered as very harmful for an economy; helped to appreciate the domestic currency and thereby helped to stabilize the exchange rate in India; positively contributed to the economic growth in India as it is found that there is a positive relation between foreign investment and all the other factors which help the economic growth of India; played significant role in bringing down the debt service ratio and the ratio of external debt to GDP.

All the above findings led to the conclusion that foreign investment not only achieved the rank of a macroeconomic variable of the Indian economy but also exerted tremendous impact on the economy in that capacity both directly and indirectly either by impacting the other macroeconomic variables or in association with them. All such impacts, except those related to inflation, are indicating the positive impact of foreign investment on the Indian economy via other macroeconomic variables and as a macroeconomic variable by itself.

However it is in the capital market of the Indian economy that foreign investment made its strongly felt and strongly feared presence and impacts which actually enabled the foreign investment to make the aforesaid impacts on the macroeconomic variables of the Indian economy. Next chapter is meant for the analysis of the foreign investment on the Indian economy through the capital market.