P: ISSN NO.: 2394-0344 RNI No.UPBIL/2016/67980 VOL-3* ISSUE-12* March- 2019
E: ISSN NO.: 2455-0817 *Remarking An Analisation*

Foreign Direct Investment and The Growth of Industrial Production in India : An Empirical Insight

Shib Sankar Jana
Assistant Professor,
Deptt. of Commerce,
Belda College,
Belda, West Bengal,
India

Abstract

The study attempts to examine as to how the Foreign Direct Investment (FDI) is empirically associated with industrial growth of India during the post-liberalization period of Indian economy represented by the period from 1995 to 2015. The monthly data of Index of Industrial Production (IIP) with base 2004-05 and FDI have been considered for this macroeconomic relational measure. The estimated results of the Johansen's cointegration test and Vector Error Correction Model (VECM) suggest that there exist a long run cointegrating relationship between FDI and IIP. The result of the VECM shows that any change in the value of FDI causes change the in long run. But in long run change in IIP do not have any causal effect on FDI. The results of short-run causality test among the variables based on VEC Granger Causality test documents a bidirectional short-run causal relationship between FDI and IIP, i.e. in short-run the value of FDI significantly affect the movement of IIP and vice- versa. Finally considering the results of time series analysis the study concludes that FDI plays a crucial role in enhancing the economic growth and industrial growth of the economy.

Keywords: Foreign Direct Investment, Index of Industrial Production, Economic Development.

JEL Classification

F21 F43, O11, O40

Introduction

There is no denying of the fact that, the sustainable growth of an economy in its different aspects largely depends on the two major macroeconomic aggregates i.e. Gross Domestic Capital Formation (GDCF) and Gross Domestic Savings (GDS). These two macro-economic aggregates show how much additional savings an economy is doing in a financial year because the amount of savings and capital formation has a direct bearing on the economic growth of a nation. But, in normal circumstances either countries have more than sufficient or shortage of investable funds. This savings-investment gap can commonly found to be met though taking loan from international financial institutions (for example IMF, IBRD etc), loan from foreign banks, portfolio investment by foreign institutional investors and mostly through allowing and promoting foreign direct investment. However among all FDI is widely known as the most effective source of finance for a country because of its features like non-debt creating source, contribution to home country's production, employment and income etc.. Although the positive features of FDI has not been accepted and recognized by all parties and people concerned to it. There exists a large perceptional and attitudinal difference towards the advantages and disadvantages of FDI in India and other countries as well. Possession of oligopolistic power, creation of unparalleled competition, exploitation of domestic workforce and abolition of local business are some of the well discussed and pointed out disadvantages of FDI for the host country.

Considering all the advantages and disadvantages of cross border direct investment this empirical study makes an endeavor to inquire the impact of FDI on one of the most recognized index indicating the state of the industrial sector of India, the index of industrial production, a composite indicator that accounts the changes in the volume of production of a basket of industrial products during a given period with respect to a chosen base period.

Review of Literature

Finding out the empirical relationship between the cross border investment especially in the form of FDI and the economic development of a country has been really a core interest of many academicians in India and abroad. The issue is highly controversial and different empirical investigation have got to different conclusions, however, these are highly country specific with time. FDI is considered by a school of thought as a propeller to economic growth as it brings in various tangible assets, technology, management and expertise and capital which ultimately enhance production and operational activities of a nation, boost up exports, substitute imports and add to the GDP. The impact of FDI has been continuously tried to be statistically correlated with economic growth of a nation mostly presented by GNP, GDP, Stock Indices etc and sometimes more specifically by export promotion, growth in industrial production (measured by IIP in India). From an empirical perspective, a substantial academic and professional literature explores the interrelationship between FDI and economic growth of a country. Radan (1961) in his study documents a favorable impact of FDI on the economic efficiency and growth of developing countries in short-run. The study of Bornschier (1980) went further and established that the growth rate reduces in long-run due to repatriation of investment or decapitalization by the firms. However, these two studies did not go with the line of earlier study of Singer (1950) which evidenced a negative impact of FDI on host countries economic health and established FDI as a capital flow to the primary sector of an economy which basically promote less market value. Furthermore, in line with this study, Griffin (1970) and Weisskof (1972) have also documented the negative relationship between FDI and economic growth. In Bangadesh, Aitken, et al. (1997) has considered the export industry and found the FDI by a Korean multinational company in garment exports led to the establishment of a number of other domestic export firms in the host country. However, FDI is also found to be effective to economic growth through industrial development only when there is sufficient absorptive capacity available in the host country's economy, mainly in the manufacturing sector (Borensztein, Gregorio and Lee 1998).

Now coming to the Indian perspective we observe that the globalization and economic liberalization of Indian economy during 1991-92 has triggered great discussion and debate on the impact of FDI on Indian economic growth. The liberalization and privatization has brought in specific changes include a reduction in import tariffs, complete abolition of Licence Raj, deregulation of markets, reduction of taxes, and greater foreign investment through allowing automatic approval of foreign direct investment in many sectors. However, the effect of such policy decisions especially the impact of FDI on the growth of nation's economy still remained questionable for the economic policy makers, practitioners, and academicians. A number of studies have been conducted by different prominent researchers in this topic to inquire the true empirical association between FDI and economic growth of India.

Dua and Rashid (1998) investigated the relationship between FDI and economic activity in India in the post liberalization period (after 1991-92). In their study the amount approved as well as the actual flows of FDI are taken into consideration and economic activity is measured by the IIP. The study applied the Granger causality tests and innovation accounting analysis to establish the relationship. The test result suggested that the FDI flows (approvals and actual) influenced to the level of industrial production. Actual flows, however, do not Granger-cause industrial output. The finding of this study can be well aligned with the similar study conducted by Chen and Zhang (1995) in China, trying to contribute to this general debate of FDI's impact on economic growth by critically assessing the role of FDI in China's economic growtht since 1978 when its 'Open Door' policy was introduced. The study documented a positive association of FDI with economic growth and the enhance of total fixed asset investment in China has also forced an increasing number of domestic manufacturers to compete globally.

Further, the study of Chakraborty and Nunnenkamp (2008) tried to find out the effect of FDI on Indian economic development imposing industry specific analysis. The study employed Granger Causality test within a panel cointegration technique and found the growth effect of cross border direct investment is varying upon industry specifications. The FDI and output are observed to be mutually reinforcing in secondary sector whereas no causal relationship is found in the agricultural sector. However, the study has shown a transitory effect of FDI on tertiary sector of India. Besides, the manufacturing sector is again found to be impacted by the FDI in service sector through cross-sector spillover. Again, in the recent past the studies of Harding and Javorcik (2011), Shah and Parikh (2012), Haq (2013), Keho (2015) point out on export promotion effect of FDI. The study to a considerable extent went with the line and reinforced the study of Aitken, et al. (1997) in Bangladesh and found positive impact of FDI on host country's export promotion through the employment generation and use of sophisticated technology used for its production. This export promotion effect of FDI has also been reinforced by the study of Prasad and Sharma (2012) of similar time. This study also introduced a number of other important economic indicators like GDP, IIP and Employment. The study pointed out a positive effect of FDI on GDP, IIP and exports of India and reached to a conclusion that FDI makes nation self-sufficient by arranging required facilities and creating trade opportunities. Moreover, similar positive impact has also been documented by Gola, Dharwal and Agarwal (2013) and Hussain and Haque (2016) who described FDI as an important catalyst, stimulating economic growth by augmenting domestic investment, increasing human capital formation and by facilitating technology transfer in the host country. However, a long run equilibrium relationship between IIP as a

proxy for GDP and FDI has been restored by Sethi (2013) in his study in Indian context.

In a study, Srikanth and Kishore (2012) have made slightly diverse inquiry and considered monthly data of FDI and IIP and few other macro-economic variables for the period April 2005 to March 2011, before and after the eruption of Global Financial Crisis to establish the impact of FDI inflows on Indian economy. The study employed 'Granger Causality Test' to determine the linkages between FDI equity inflows and macro-economic variables such as IIP, interest rates, inflation, exchange rates and foreign exchange reserves. The study documented a unidirectional causality from FDI equity inflows to IIP and also from foreign exchange reserves to FDI. This unidirectional causality especially form FDI to IIP is not supported by further study of Alam and Mittal (2014) which attempted to establish the short run and long run relationship between FDI and economic growth using vector error correction model, pair wise co- integration test and pair wise Granger causality test for FDI and IIP (as a proxy of economic growth) and showed how economic growth Granger causes FDI and the FDI also granger causes economic growth. It implies a bi- directional causal relationship between economic growth and FDI in India. Furthermore, J. Maheswari (2015) in his study relating to the various macro-economic determinants of FDI in Indian context found FDI and IIP to move in the same direction, i.e. when IIP increases, FDI also increases significantly and vice versa. So, in this study also, the positive impact of FDI on IIP is reinforced.

It is clear from the above discussion that the studies on the relationship between FDI and economic growth have been extensive for many developed countries. Most of the distingush literatures in this domain have documented a significant statistical relation between volume of FDI inflows and economic growth of a nation. However, the available research into this phenomenon is limited with respect to the emerging economies like India. In India after the liberalization and globalisation, the regulatory authorities try to provide a different economic environment under which the manufacturing sector are performing now. Thus, it is worth to carry out studies on developing economy which has become increasingly attractive destination for a big volume of capital movement from major economies.

Objective of the Study

In this backdrop, the present study is an endeavor to investigate empirically the dynamic relationship between inbound foreign direct investment and Indian industrial production proxied by IIP.

Data and Methodology

Data

The empirical investigation is being carried out using the data during the period 1995 to 2015. The monthly data of index of industrial production with base of 2004-05 has been considered as a proxy of Indian industrial production.

The study deals with the secondary data that are collected and composed from different databases and web sites. The study pays due considerations to the nature of the data, its coverage, the definitions on which they are based, and their degree of reliability during the use of secondary data in the analysis. Most of the data is collected from different issues of Handbook of Statistics on the Indian Economy and Reserve Bank of India Bulletins, published by Reserve Bank of India, and the database of INDIASTAT. Beside these sources, the data are extracted from the database of World Bank, IMF World Economic Outlook. Microsoft Office Excel 2007 and Eviews-10 package are used for econometric analyses.

Methodology

In order to establish the relationship between FDI inflows and movement of industrial production of India, different set of techniques and tests have been employed. Given the nature of the problem and the quantum of data, we first study the data properties from an econometric perspective with the help of descriptive statistics and unit root test to show the nature and basic characteristics of the variables used in the analysis and to find out whether the data series are stationary or non stationary. This would help us applying Cointegration test, Vector Error Correction Model to establish the long and short-run dynamic relationship between the variables and Granger causality test to identify the direction of causality. Further the study employs advance forecast modeling, variance decomposition test and impulse response analysis that would helps us measuring the strength and direction of the causality.

As stationarity of a data series is a prerequisite for drawing meaningful inferences so,before conducting the cointegration analysis the present study applies most popular and commonly used unit root test namely Augmented Dickey-Fuller (ADF) test. Thenafter, the study estimates appropriate lag length based on the most commonly used criterian namely, Akaike Information Criteria (AIC), Schwarz Information Criteria (SIC) and Hannan-Quinn Information Criteria (HQC) as any vector auto regressive (VAR) model is sensitive to the selection of appropriate lag length. To determine the long-run relationship between foreign direct investment (FDI) and index of industrial production (IIP) the study considers VAR-based approach of cointegration test suggested by Johansen (1988). In this technique of cointegration test, Trace test (or Likelihood ratio test) as well as Maximum Eigen value test are applied to estimate the stated long term dynamics. The presence of cointegration indicates interdependence of the endogenous variables, which may be the consequence of macroeconomic linkage between the FDIand IIP. There often exists a long-run comovement between two or more variables but in the short run there may be disequilibrium. The nature of the relationship between FDI and IIP in the short-run can be inevstigated by considering the Vector Error Correction Mechanism (VECM). To determine the direction of causality I have applied either the Granger test (Granger, 1969) or Engle and Granger (1987) on the basis of the co-integration results between FDI and IIP. If there exists co-integration then I employ the Engle and Granger (1987) otherwise apply Granger

test (Granger, 1969). The short term causality between the variables is estimated through VEC Granger causality test or Block Exogeneity Wald test. Finally the study considers forecast analysis and justifies the strength and direction of causality by employing variance decomposition analysis and impulse response function.

Findings of the Study

Findings from the Descriptive Statistics

The basic statistical values of the variables are calculated in the first phase of our study. The descriptive statistics provide a historical background for the behavior of the data used in the study. From the descriptive statistics [See Table 1] it is observed that the variables used in the study are not stable at all during the study period. During the study period the IIP and FDI are found to be very high and significant variability from their mean especially in case of FDI. In respect of foreign direct investment the maximum value of Rs. 365.14 billion and minimum value of Rs. 2.75 billion are found with an average of Rs. 62.80 billion, which justify its instability during the study period. The high value of standard deviation in this regard also confirms the instability. However, in most of the cases values of the data series lie within $\bar{X} \pm 3\sigma$, where, $\bar{X}$ and σ represent mean and standard deviation respectively.

From the descriptive information it can be said that both of the variables are normally distributed, though, in most of the cases, the median values of variables are very close to average values. The measures of skewness suggest that the variables are not distributed symmetrically. Results obtained from Jarque-Bera statistic confirm that both of the series are almost normally distributed.

Findings from Long-Run Analysis

For long-run analysis the study employs Johansen's cointegration test that consists of three general steps. First, estimates whether all variables in the model are integrated of the same order or not, which can be established by unit root tests. Second, estimate the optimal lag length for the VAR model to verify that the estimated residuals are not auto-correlated. Third, determine the VAR model to construct the cointegration vectors in order to determine the cointegrating relationship. For this, it is necessary to establish the trace and the maximum eigen value statistics tests. The following subsections present the results for each step.

Results of Unit Root Test

As already stated, testing stationarity of a data series is a prerequisite for drawing meaningful inferences in a time series analysis. It enhances the accuracy and reliability of the models constructed. So, it is necessary to determine the unit root property and order of integration for each variable included in the system. Most popular Augmented Dickey-Fuller (ADF) unit root tests is applied with intercept for all variables in their levels and then the tests are performed with their first difference values, and so on.

Table 2 resent the augmented dickey-fuller unit root test results of the variables in their level and first difference. From the result presented in the tables, it is clear that the null hypothesis i.e. the existence of a unit root in its levels cannot be rejected for both the series since the t- statistic of ADF tests of the variables are less than the critical values at any significance level, i.e., 1%, and 5%. Therefore, the unit root tests result concludes that all the series are non-stationary in level. Applying the same tests to their first differences shows that the null hypothesis of a unit root is rejected in all cases. So, from the unit root tests results, it is observed that the values of FDI and IIP are stationary at their first difference i.e., I(1).

Selection of Optimum Lag Length

As the autoregressive model is sensitive to the selection of appropriate lag length, the study is to determine the appropriate lag length before conducting the cointegration analysis. The optimum lag length based on the three commonly used criteria, namely AIC, SIC and HQC are reported in Table 3. The study select eleven period is optimum lag length as both AIC and HQC suggest that lag.

Results of Johansen Cointegration Test

Since FDI and IIP have stationary property at their first difference, the study conducts a cointegration test suggested by Johansen's for the purpose of determining whether these variables have a long-term common stochastic trend.

The calculated values of Trace statistics [See Table 4] and maximum eigen statistics [See Table 5] of Johansens cointegration test, when the null hypothesis is r = 0 (i.e., no cointegration), are 22.36222 and 20.44738 respectively. Here the null hypothesis of no cointegration when r = 0, is rejected at 5 per cent level of significance, as the calculated value of trace statistics and maximum eigen statistics are higher than the MacKinnon-Haug-Michelis critical value at 5 percent level of significance. This indicates the existence of a cointegrating vector between FDI and IIP. So the Johansen's cointegration test result indicates that FDI and IIP are cointegrated and there exist long-ru co-movement between DFI and IIP. The long run cointegrating equation is

$$\mathbf{FDI = 115.5594 + 1.482942\ IIP}_{(t=13.8269)} \mathbf{+ \mu_t}$$

Based on the above cointegrating equations, the study concludes that, in long-run there exists a positive and significant (on the basis of t test statistics) relationship between FDI and IIP i.e. in the long-run they move together in the same direction, as the t-valus associated with the coefficient of the FDI in the cointegrating equation is significant at 1 percent level of significance.

Findings from Short-Run Analysis

Having established that both the variables are cointegrated, the study applies vector error correction mechanism (VECM) to determine the nature of the dynamic relationship between FDI and IIP in the short run.

Result of the Vector Error Correction Model

The results of the vector error correction model reported in Table-6 shows that the t-values associated with the coefficient of the lag value of the FDI are statistically significant when IIP is used as a dependent variable, which advocates that the foreign direct investment has a significant positive impact on the Indian industrial production. The result also indicates that the level of industrial production also

positively affect the movement of foreign direct investments only for last few lags.

The VECM result also suggests that the values of IIP adjust the disturbances to restore long-run equilibrium significantly and in right direction, but the inflows of foreign direct investment do not react significantly. The coefficients of error correction term -0.060638 is significant at 1 percent level.

Stability Results

Lastly, the study provides the justification regarding stability of the VECM results with the help of Cumulative Sum of Recursive Residuals (CUSUM). The figure of the CUSUM test suggests that at 5 percent level of significance the parameters of the model are stable over the period of the study. So, this part of investigation ensures the acceptability of the models and the robustness of the results.

Findings from Causality Test

As the variables are cointegrated, the standard Granger test is misspecified and the error correction strategy suggested by Engle and Granger (1987) is used to determine the long and short run causal relationship among the variables. The result of the long-run and the short-run causality tests under VECM are reported below:

Long-run Causality

The t-values associated with the error correction terms of VECM, reported in Table 7 indicate the existence of significant unidirectional long-run causality. The coefficients of the error correction term -0.060638 is statistically significant at 1 percent level which indicates that any change in the value of FDI causes change the value of IIP in long run. But in long run change in IIP does not have any causal effect on FDI.

Short-run Causality

The results of short-run causality test among the variables based on VEC Granger Causality test are reported in Table 7. According to the obtained results, it can be documented that there exists a unidirectional short-run causal relationship between FDI and IIP, i.e. in short-run the inflows of FDI significantly affect the movement of IIP but not vice-versa.

Results of Variance Decomposition Test and Impulse Response Function Analysis

The study estimates the variance decomposition and impulse response function under the VECM framework to re-explore the dynamic relationship between the flow of FDI and movement of IIP in India.Table-8 indicates that foreign direct investment is strongly exogenous because almost 94 percent of its variances is explained by its own shocks even after 36 months i.e. three years and in this way, shock in the FDI itself remains the main driver behind its movement, while the explanatory power of IIP is found insignificant. A very small portion of the forecast error variance of FDI is explained by IIP. Conversely, the forecast error variance of IIP is explained more than 52 percent by inflows of FDI. This is due to the fact that, during the study period, the volume of industrial productions is more dependent on the FDI inflows.

The results of the impulse response analysis for a time horizon of 24 months to a one standard deviation shock in IIP and FDI are shown in Figure-2. The responses generated from a positive shock **of** IIP to FDI are continuously fluctuating at a certain level but after one year it generates positive responses. However, the responses in the reverse case i.e. for a positive shock of FDI to IIP are found to be mostly negative throughout the period.

Conclusion

The study investigates the impact of foreign direct investment on growth of Indian industrial production over the period from 1995 to 2015. Existing financial and economic literatures professes the presence of relationship between flows of foreign direct investment and Indian industrial growth. However, these literatures suggest some contradictory findings regarding the nature of the relationship and the degree of influencing power. These contradictory findings of the earlier studies are the principal drive behind conducting this research work in Indian post liberalization context.

Findings of this study give a comprehensive understanding of the dynamic relationship between the net FDI inflows and the movement of IIP which is used as a proxy of Indian industrial growth. In line with the findings of some earlier studies done especially in Indian post liberalization context like Prasad and Sharma (2012), J. Maheswari (2015) etc our present study based on vector autoregressive estimation confirms the existence of a significant long-run as well as short-run relationship between the flow of foreign direct investment and the movement of IIP in India.

Thus, with the help of the obtained results the study concludes that there exist a significant long-run and short-run relationship between the FDI and IIP. So, the impact of FDI on industrial growth of India is reinforced by this study. The suppositions relating to advantages of FDI regarding gathering of tangible assets, technology transfer, expertise skills, flow of non-debt creating capital, contribution to home country's production and thereby favorable movement of industrial production are found to hold good in this present study.

So, the study would enrich our understanding on the dynamic relationship between net inflow of inbound foreign direct investment and growth of Indian industrial health. This study is expected to offer some insights of our policymakers for formulating economic policies towards vibrant industrial development. Further research efforts could either eliminate some of the backdrops or expand the scope of investigation of this study. The possible extension of this study is to consider the affect of FDI along with other significant macroeconomic determinants such as interest rate, inflation rate, growth rate in real sector etc. which are not included in this study. Moreover, instead of using only the quantitative macroeconomic variables the study suggests the incorporation of socio-economic and political factors as dummy variables on these grounds. Further, the study could empirically test the association by considering the potential structural

breaks in the time series data. But, this is beyond the aim of this present study.

References

Aitken, B., Hanson, G. H., & Harrison, A. E. (1997). Spillovers, foreign investment and export behavior. Journal of International Economics, 43(1), 103-32.

Alam, I. and Mittal, A. (2014). Foreign direct investment and economic growth in India: An empirical analysis. International Journal of Society and Humanities, 4(1), 59-70.

Borensztein, E., Gregorio,J. D. and Lee, J. W. (1998). How does foreign direct investment affect economic growth?. Journal of International Economics, 45(1), 115-135.

Bornschier, V. (1980). Multinational corporations and economic growth: A cross national test of the decapitalization thesis. Journal of Development Economics, 7(2), 191-210.

Chakraborty, C., Nunnenkamp, P. (2008). Economic reforms, FDI and economic growth in India: A sector level analysis. World Development, 36(7), 1192-1212.

Chen, C., Chang. L. and Zhang, Y. (1995). The role of FDI in China's post 1978 economic development. World Development, 23(4), 691-703.

Dua, P., and Rashid, A.I. (1998). Foreign direct investment and economic activity in India. Indian Economic Review, 33(2), 153-168.

Engle, R. F., and Granger, C. W. J. (1987). Cointegration and error correction: representation estimation and testing. Econometrica, 55(2), 251-276.

Gola, K. R., Dharwal, M., Agarwal, A. (2013). Role of foreign direct investment in the development of Indian economy. Gyanpratha – Accman Journal of Management, 5(1)

Granger, C. W. J. (1969). Investigating causal relations by econometric models and cross spectral methods. Econometrica, 37(3), 424-438

Griffin, K. (1970). Foreign capital, domestic savings and development. Oxford Bulletin of Economics and Statistics, 32(2), 99-112.

Haq, S. G. (2013). Impact of foreign direct investment on export: a case study of Pakistan. Retrieved from: http://www.iises.net/download/Soubory/soubory-puvodni/Haq.pdf., Dated: 09.03.2017.

Harding, T. & Javorcik .B. S (2011). FDI and export upgrading. Discussion Paper, Oxford University, ISSN 1471-0498.

Hussain, M. E. and Haque, M. (2016). Foreign Direct Investment, Trade, and Economic Growth: An Empirical Analysis of Bangladesh. Economies, 4(7), 01-14.

Johansen, S. (1988). Statistical analysis of cointegrating vectors. Journal of Economic Dynamics and Control, 12(2), 231-254.

Keho, Y. (2015). Foreign direct investment, export and economic growth: some African evidences. Journal of Applied Economics and Business Research, 5(4), 209-219.

Kumar, R. (2014). FDI and economic growth – a case study of India. International Conference on Business, Law and Corporate Social Responsibility, 1(2), 107-110.

Kumar, V. (2012). Trend of FDI in India and its impact on economic growth. International Journal of Science and Research, 3(10), 639-642.

Maheswari, J. (2015). Macro-economic determinants of foreign direct investment in India. EPRA International Journal of Economic and Business Review, 3(2), 59-65.

Prasad, G.V.B and Sharma, E.H.P. (2012). Impact of FDI on economic development of India. International Journal of Marketing and Technology, 2(6), 131-149.

Rosenstein-Rodan, P. N. (1961). International aid for underdeveloped countries. Review of Economics and Statistics, 43(2), 107-138.

Sethi, N. (2013). Causal relationship between foreign capital inflows and economic growth: Empirical evidence from India. International Journal of Economics, Finance and Management, 2(2), 64-69.

Shah, V. and Parikh, A. (2012). Trends, changing composition and impact of foreign direct investment in India. International Journal of Economic Research, 3(4), 134-144.

Singer, H. (1950). The distributions of gains between investing and borrowing countries. American Economic Review, 40(2), 473-485.

Srikanth, M. and Kishore, B. (2012). FDI and its impact on Indian economy- An empirical investigation. Foreign Trade Review January, 46(4), 03-17.

Weisskof, T.E. (1972). The impact of foreign capital inflow on domestic savings in underdeveloped countries. Journal of International Economics, 2(1), 25-38.

Tables

Table- 1: Descriptive Statistics

Statistics	IIP	FDI
Mean	118.8032	62.80385
Median	106.0162	21.40008
Maximum	206.5739	365.1385
Minimum	54.65251	2.747895
Standard Deviation	45.52600	74.45838
Skewness	0.261851	1.547566
Kurtosis	1.562630	5.026102
Jarque-Bera Test Statistics	24.28057	141.9812
Probability	0.000005	0.000000

Source: Calculated by Authors

Table- 2: Results of Augmented Dickey-Fuller (ADF) Unit Root Test

Variables	Level	First Difference	Result
	Intercept	Intercept	
FDI	-0.660571 (0.8531)	-14.95150 (0.0000)	I(1)
IIP	0.597238 (0.9894)	-4.335016 (0.0005)	I(1)

Notes: ( ) MacKinnon (1996) one-sided p-values; for ADF Test; I(1): Stationary after first difference
Source: Calculated by Authors

Table-3: VAR Lag Order Selection Criteria for FDI and IIP

Lag Length	AIC	SIC	HQC
0	20.86943	20.89870	20.88123
1	17.16837	17.25617	17.20376
2	16.70953	16.85586	16.76851
3	16.61300	16.81786*	16.69557
4	16.58953	16.85293	16.69570
5	16.59930	16.92123	16.72905
6	16.57984	16.96030	16.73319
7	16.50051	16.93951	16.67745
8	16.50090	16.99843	16.70144
9	16.44980	17.00586	16.67393
10	16.33993	16.95452	16.58765
11	16.32202	16.99515	16.59333
12	16.15460*	16.88626	16.44950*

Notes: * Indicates optimum lag order selected by the criterion
Source: Calculated by Authors

Table- 4: Results of Johansen Cointegration Test (Trace Statistics) for FDI & IIP

H_0	H_1	Trace Statistics	5% Critical Value	Probability*
r = 0	r = 1	22.36222	15.49471	0.0039
r ≤ 1	r = 2	1.914842	3.841466	0.1664

* MacKinnon-Haug-Michelis (1999) p-values
Source: Calculated by Authors

Table- 5: Results of Johansen Cointegration Test (Maximum Eigen Statistics) for FDI & IIP

H_0	H_1	Maximum Eigen Statistics	5% Critical Value	Probability*
r = 0	r = 1	20.44738	14.26460	0.0047
r ≤ 1	r = 2	1.914842	3.841466	0.1664

* MacKinnon-Haug-Michelis (1999) p-values Source: Calculated by Author

Table- 6: Results of Vector Error Correction Model for FDI & IIP

Independent Variables	Dependent Variables	
	D(FDI)	D(IIP)
ECT (γ_1)	-0.150268 [-1.16760]	-0.060638** [-4.26424]
D(FDI(-1))	-0.668928** [-4.84477]	0.062870** [0.4.12104]
D(FDI(-2))	-0.466191** [-3.36223]	0.011968** [2.73945]
D(FDI(-3))	-0.423191* [-3.21980]	0.038543** [2.65404]
D(FDI(-4)	-0.265506* [-2.11557]	0.029679* [2.14033]
D(FDI(-5))	-0.234818 [-1.19169]	0.029665* [2.24288]
D(FDI(-6))	-0.199902 [-1.71336]	0.030668* [2.37896]
D(FDI(-7))	-0.303460** [-2.66966]	0.058717** [4.67506]
D(FDI(-8))	-0.322672** [-2.281098]	0.047286** [3.72816]
D(FDI(-9))	-0.369018** [-3.36982]	0.033872** [2.79942]
D(FDI(-10))	-0.280191**	0.013348

	[-2.76649]	[1.18971]
D(FDI(-11))	-0.065578 [-0.82646]	-3.84E-05 [-0.00437]
D(IIP(-1))	0.939862 [1.50142]	-0.927162 [-13.4049]
D(IIP(-2))	1.324289 [1.64188]	-0.535976** [-6.01413]
D(IIP(-3))	1.164519 [1.46231]	-0.283122** [-3.21762]
D(IIP(-4))	-0.013501 [-0.01907]	-0.502028** [-6.41939]
D(IIP(-5))	0.665270 [0.96397]	-0.529519** [-6.94409]
D(IIP(-6))	0.565289 [0.78982]	-0.459053** [-5.80485]
D(IIP(-7))	0.186553 [0.27094]	-0.448118** [-5.89017]
D(IIP(-8))	0.801474 [1.19323]	-0.541356** [-7.29436]
D(IIP(-9))	1.502148* [2.06116]	-0.454364** [-5.64250]
D(IIP(-10))	1.487341* [2.03839]	-0.332805** [-4.12796]
D(IIP(-11))	0.533110 [0.94639]	-.0414410** [-6.65816]
C	-0.415410 [-0.11413]	3.200184** [7.95723]

Notes: ** Statistically significant at 1% level; * Statistically significant at 5% level; [ ] t-values
Source: Calculated by Authors

Figure 1: Plot of Cumulative Sum of Recursive Residuals for FDI and IIP

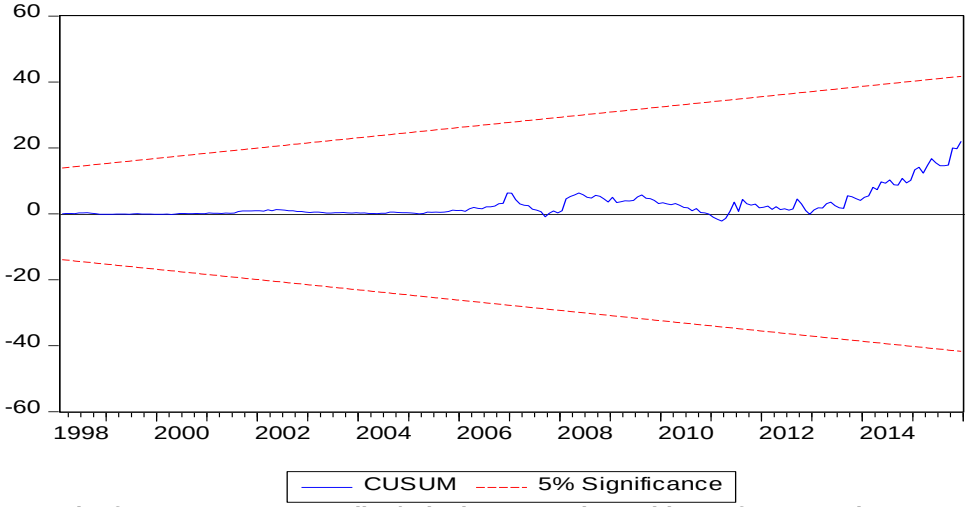

Table- 7: Result of VEC Granger Causality / Block Exogeneity Wald Test for FDI and IIP

Dependent Variables	Independent Variables	Chi-Square Value	Probability Value	Implication
IIP	FDI	42.19532	0.0000	Causality Exists
FDI	IIP	11.24839	0.4227	No Causality Exists

Source: Calculated by Authors

Table- 8 : Variance Decomposition of IIP and FDI

Variance Decompositions of	Period	Percentage of Forecast Error Variance Explained by Innovation in:	
		FDI	IIP
FDI	1	100.0000	0.000000
	6	96.48058	3.519417
	12	95.69354	4.306459
	18	95.25216	4.747844
	24	94.56207	5.437931

	30	94.29453	5.705471
	36	93.78855	6.211445
IIP	1	0.147588	99.85241
	6	6.794131	93.20587
	12	16.63415	83.36585
	18	28.13877	71.86123
	24	35.84139	64.15861
	30	46.04657	53.95343
	36	52.54146	47.45854

Source: Calculated by Authors

Figure-2: Impulse Responses of IIP and FDI to One Standard Deviation Shock in the Variables