

Gross National Income Growth and Foreign Direct Investment: Causation in the presence of Crisis in India

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Abstract: Gross National Income (GNI) of an economy explicates the standard of living of the population residing in a country. The growth in GNI indicates a successful development for a nation. In this paper, an interrelation between GNI growth and Foreign Direct Investment (FDI) has been discussed in the presence of Indian economic crisis by implementing the Auto Regressive Distributed Lag (ARDL) Modelling approach. The data are ranging from the time of 1991 to 2017. The relationship is judged at the background of economic liberalization of India. The result shows that there exists a long-run impact of FDI on GNI growth. The existence of cointegration further necessitates the existence of short-run causality. In the short run, GNI growth Granger causes FDI. This proves that the model is significant for discussion both for the long and short run. The error correction term signifies that there exists a ninety-seven percent chance of the model to move back to its long-run equilibrium from short-run shocks. The reliability and stability of the whole model are judged by implementing CUCUM and CUSUMQ test. Finally, in conclusion, the model chosen for the study has indicated a few policy implications required for enhancing the GNI growth of India to fight back the situation of crisis.

Index Terms: ARDL Model, Foreign Direct Investment, Granger Causality, Gross National Income

I. INTRODUCTION

Foreign investment has always been significant support for developing countries for bridging the gap in Balance of Payment. It plays a crucial role in the exchange rate in determining the growth and the income level of the economy, as proved by Divya & Devi (2014). It is categorized as one of the most suitable inputs which give instant relief to a developing economy. The role of foreign funds in stabilizing an economy is permanent and long term. The extent of the flow of foreign aid varies due to policy restriction of the different countries.

The emerging economies have a significant impact on foreign investment on their domestic investment levels as indicated by Shah, et al. (2019). As a part of foreign investment, Foreign Direct Investment (FDI) assists emerging economies with providing a significant impact on different macroeconomic variables and institutional variables in it as analyzed by Uddin, et al. (2019). Also, the assistance in technological support in developing economies is always a factor attracting FDI in these economies. Apart from that, it aids to create an impact on the governance of the economy as analyzed by Kayalvizhi, et al. (2018). Sector-specific usage of FDI has also been observed in recent times. The impact on

the energy sector among other sectors is more specific in this case as summarized by Wang & Jiayu (2019). Along with energy, FDI significantly influences the power sector in a developing country like Bangladesh as indicated by Mahbub & Jongwanich (2019).

Surprisingly, according to recent report of United Nations Conference on Trade and Development (UNCTAD), the recent trend in FDI in developing countries shows a decline in movement by twenty-seven percent which amounts to near forty-seven billion dollars. The reason behind such a decline is analyzed as an unstable political environment in these economies. Although the total value of FDI is decreasing, there happens to be a rise in FDI as a percent of Gross Domestic Product (GDP). The results proving the long run cointegration between geographical income and FDI for European countries have been discussed by Sayari, et al. (2018). The recent trend in FDI is depicted in Figure(a).

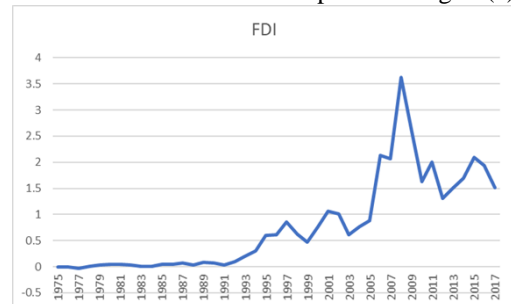


Figure (a): Graph showing trend in FDI (percent of GDP) in India.

Source: Author's own calculation

While many studies are focusing on geographical incomes measured by GDP and their relations with FDI, the concept of national income for a specific country is ignored. The total income earned by residents of a country, whether staying in the own geographical region or overseas is measured by Gross National Income (GNI). The optimal progress of the country is judged by the growth in GNI. In developing economies, GNI plays a vital role in the time of the business cycle. Especially, at the recession, the situation of developing economy becomes serious as it requires strong economic policies to overcome that period. Except for the help of foreign funds from outside, it is very difficult to adjust the shocks recurring from the economic cycle.

In this paper, the interrelation between GNI growth and net FDI inflow has been considered at the time of the Indian economic crisis. The period chosen for the study is 1991-2017.

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The study analyses the situation of the Indian economy post-liberalization period. Thus, the objectives of our study are as follows:

a. To find out a long run relation between FDI inflow and GNI growth rate for period 1991-2017 by Auto Regressive Distributed Lag (ARDL) model.

b. To find out the existence of short-run causality and the direction of causality by Granger Causality approach.

The article is spread over the different sections as follows: Section two will elucidate a brief review of the literature. Section three will discuss upon methodology chosen for the study. Section four will analyze the results. Section five will interpret the results and section six concludes the paper.

II. REVIEW OF LITERATURE

The study analyzes the long run cointegration and short-run causality between FDI and GNI growth based on a specific model of Foreign Direct Investment as Flying Geese Model postulated by Lee (2007). The model specifies FDI-Export-led growth analysis by exploiting economies of scale in developing countries. By allowing FDI in emerging economies the benefit of economies of scale will be utilized through engaging comparatively lower factor cost than the global rates. Being the overall cost of production less, the export of the developing economies grows faster. Thus, with a larger size of the market and with lower factor cost, these economies develop quicker than others with the existence of FDI. This theory is applied for testing the relationship between the market size of India measured by GNI growth and FDI in the presence of a crisis period in India.

According to the recent report of the Department of Industrial Policy Promotion (DIPP), the growth in FDI inflow in the service sector such as software, hardware, and telecommunication hit the highest in 2019. The channel of e-commerce, insurance intermediaries and airlines are also reflected with the results of improved FDI inflows since 2018. Besides transport, education and automobile, foods, hotels and tourism sectors also show a considerable percentage of growth from 2018. India, in recent years, has a target of reaching hundred percent towards the allowance of FDI from overseas.

The below review of literature explains the relationship of FDI with different macroeconomic variables for different economic regions. Zhang (2001) examined the causal nexus between FDI and economic growth in Asian economies. The analysis revealed that in many developing countries, the positive correlation between them does not always hold good. Choe (2003) explored the relationship between Gross Domestic Product (GDP), FDI and economic growth for eighty countries. The analysis discovered a positive nexus between them irrespective of the status of the economy for a period 1971-1995. Attari, et al. (2011) studied the long run relation between FDI, economic growth and exports in Pakistan. The result showed the economic growth of the country granger caused FDI. Pradhan (2013) analyzed a relationship between FDI and economic growth in India with providing importance on infrastructure in India. The study explored infrastructure needs to be strengthened to attract more FDI and speed up economic growth in India. Bayar (2014) studied the interrelation between FDI, economic

growth and domestic investments in one the developing economies, Turkey. The study explored the negative impact of FDI on economic growth while showing a positive correlation between domestic investment and growth of the economy. Pegkas (2015) found a positive long-run association between FDI flow and growth of the economy. Doytch and Narayan (2016) explored the causation between economic growth energy consumption and FDI flows. The analysis found that in the non-renewable energy sector, the effect is less and in the renewable sector, the impact is more.

Völlmecke, et al. (2016) explained the relationship of FDI with income in European economies. The results showed that there was less association of income with FDI, but a higher association with human capital. The study found more important input for income convergence as skilled labor. Goh (2017) examined the cointegration between FDI, GDP in Asian economies. The study found there are other factors than GDP to influence FDI in these economies. Demir and Duan, (2018) analyzed the effectiveness of FDI flows into host country growth in terms of productivity. The study showed that there was no significant impact of bilateral FDI on the growth. Gnanon (2018) found out a positive impact of FDI inflows on economic development in developing economies. The lower the extent of economic development, the higher is the extent of the impact of FDI. Kumari and Sharma (2018) explained the causal relationship between FDI, economic growth and energy consumption in India. The study indicated that energy plays an important role in the valuation of GDP and GDP creates a vital role in attracting FDI in India. Mimouni and Temimi (2018) analyzed the influence of FDI on imports and gross capital formation. The study revealed that the impact is inconclusive. Also, the developing economies were having less regulation over the economic environment. Sayari, et al. (2018) discussed the relationship between FDI and economic freedom. The result showed that there exists a long run association between these two variables. Brada, et al. (2019) examined the level of corruption and FDI inflows across countries. The result showed that home country economies are capable enough to deal with the corruption levels of host countries. Harb, N., & Hall (2019) analyzed a relationship between FDI inflow and economic growth in developing countries. The study revealed that the impact of FDI is positive on economic growth with diminishing returns. Ketteni and Kottaridi (2019) explained the effect of FDI on economic growth with the background of Multinational Enterprises. The study explored the growth in economies if correct policies are implemented for expanding MNEs. Nasir, et al. (2019) analyzed the relation between FDI, economic growth and financial development in southeast Asian countries. The result showed a positive integration between them. Sarkodie and Strezov (2019) explored the positive correlation between FDI and economic growth in the presence of technology transfer and labor management in developing countries. Shi (2019) discussed the impact of FDI is more resilient in the long run than preferably a short run impact. Uddin, et al. (2019) analyzed different factors imposing an effect on FDI in Pakistan.



The factors which were considered and influencing in recent times were rights in properties, the infrastructure of army force and trade liberalization.

Based on the past review of literature, it was found that various studies have been formulated on the interrelation between FDI and different macroeconomic variables. Also, a considerable amount of studies is analyzed on exploring a relationship between FDI and economic growth at the background of other macroeconomic variables. But no such study evaluated the relationship of FDI and economic growth taking the growth variable as Gross National Income (GNI). Also, the period of crisis has not been considered in the existing literature. Thus, the present study is specified on finding a relationship between market size, variable reframed as GNI growth rate and Foreign Direct Investment (FDI) inflow at the time of economic crisis in India

To prove the long-run association between the variables, the presence of cointegration needs to be tested. The hypotheses are stated as:

H1: There is cointegration between FDI and GNI growth in the Indian economy.

The above hypothesis testing the presence of cointegration between FDI and market size has been proposed by Adhikary (2017).

H2: In the short run, GNI growth granger causes FDI.

The above hypothesis is supported by Mughal and Akram (2011).

III. METHODOLOGY

Data taken for this study are as follows:

Foreign Direct Investment (FDI) is measured annually as current flow in terms of US dollars. It is the net calculation (total inflow minus total outflow of FDI). Gross National Income (GNI) is the income for residents of an economy, residing in the geographical area or outside. GNI is considered as the annual current international dollars.

For the analysis, growth in GNI (GNI_{gr}) has been taken into consideration. The formula used here is as:

$$GNI_{gr} = (GNI_t - GNI_{t-1}) / GNI_{t-1}$$

After finding the growth in GNI, the logarithmic values of the variable have been considered for further analysis.

FDI annual flow data have been taken and logarithmic of it has been measured. The variable showing the economic crisis has been transformed into a dummy variable. Through period 1991- 2017, the presence of crisis measures the variable as one and absence as zero.

The three variables are first checked with stationarity by Augmented Dicky Fuller (ADF) test. For analysis stationarity, Breakpoint Unit Root Test has been implemented. This method captures structural breaks in the system. Then these variables are run through a cointegration test specified by the Auto Regressive Distributed Lag (ARDL) model. Next, the short run causality has been checked. Through the Error Correction Model (ECM), the probability of movement from disequilibrium to long-run equilibrium is analyzed. The stability of the model is judged by CUSUM and CUSUMQ tests. Finally, to find out the direction of short-run causality, the Granger Causality test is implemented.

IV. RESULTS

The stationarity result of the variables is presented in Table I.

Table I: Analysis of ADF Test by BreakPoint Unit Root Test:

Variables	ADF with probability
log (GNI _{gr})	-6.86* (0.01)
log (FDI)	-5.92* (0.01)
Crisis	-6.27* (0.01)

*explains value as significant at 5% level

Source: Author's own calculation

According to Table I, all the variables are integrated to order zero. The notification here is mentioned as I (0). To run the ARDL model, all the underlying variables need to be either I (0) or I (1) or a combination of both. Here, at the first level, the data are achieved stationarity. Thus, the long run cointegration relationship can be examined in the next step.

The result of cointegration is presented in Table II.

Table II: Analysis of Long Run Cointegration:

Variables	F- value	Significance	Decision
Independent Variable: log (FDI) and Crisis	8.778259***	5%: I (0)- 3.1 I (1)- 3.87	Yes
		10%: I (0)- 2.63 I (1)- 3.35	
Dependent Variable: log (GNI _{gr})			Yes

*** explains value as significant at both 5 % and 10 % level

Source: Author's own calculation

After proving the presence of cointegration, the coefficient of the variables measured for long run are explained below in Table III.

Table III: Analysis of Long-Term Coefficient of the Variables of Model ARDL (1,0,0)

Variables	Coefficient	t value (Prob)
C	-0.1281	-0.8628 (0.40)
Log (FDI)	0.0100	0.2842 (0.78)
Crisis	-0.0164	-0.3306 (0.74)

Source: Author's own calculation

After the long-run coefficient analysis, the next step is to analyze the short-run Error Correction Model (ECM). Table IV exhibits ECM.

Table IV: Analysis of Error Correction Term(ECT) of ARDL Model (1,0,0):

Variables	Coefficient	t value (Prob)
ECT _{t-1}	-0.974743*	-6.316738(0.00)
R square:	0.6101	
Durbin -		
Watson (DW):	2.044326	

*explains value as significant at 5 % level

Source: Author's own calculation

After the results of the short-run error correction term, the next stage is to find the direction of causality in the short run. Granger Causality Approach has been chosen for this analysis and results are presented in Table V.

Table V: Analysis of Granger Causality:

Null Hypothesis	F value (Prob)
log (FDI)- log (GNI _{gr})	0.30582 (0.7399)
log (GNI _{gr})-log (FDI)	6.03765* (0.0089)
Crisis - log (GNI _{gr})	0.95145 (0.4030)
log (GNI _{gr}) - Crisis	1.10249 (0.3514)
Crisis - log (FDI)	1.15612 (0.3349)
log (FDI) - Crisis	9.74372* (0.0011)

*explains value as significant at 5 % level

Source: Author’s own calculation

The stability of the whole model is checked by applying CUSUM and CUSUMQ test. The results of the two tests are given below in Figure (b) and figure (c).

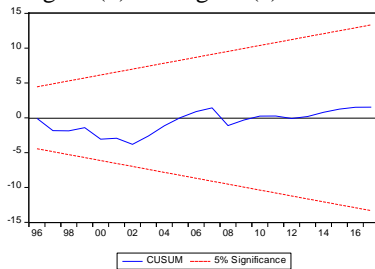


Figure (b): Analysis of Stability by CUSUM Test

Source: Author’s own calculation

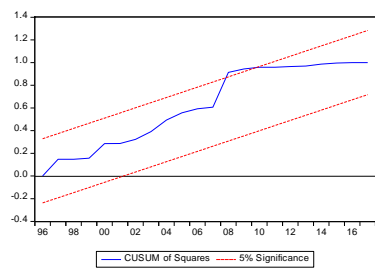


Figure (c): Analysis of Stability by CUSUMQ Test

Source: Author’s own calculation

V. DISCUSSION

The study analyses the relation between variables, GNI growth (GNI_{gr}), FDI and Crisis for a period 1991-2017. For finding out long-run relation and short-run causation, it adopts Auto Regressive Distributed Lag (ARDL) model. Finally, to show the direction of short-run causality it relies on the process of Granger Causality.

To begin the ARDL model, the foremost requirement is to check the data stationarity. The variables underlying can be integrated to zero or one or combination of both as per the requirement of the model. For stationarity, the variables here are put into Augmented Dicky Fuller (ADF) test. The results are shown in Table I. it explains all the three variables are I (0). This clarifies all the data are stationary at level.

After proving the data is stationary, the next stage is to find out the existence of cointegration between them.

To prove the existence of cointegration, the following mathematic equation has been considered.

$$\begin{aligned} \Delta \ln GNI_{grt} &= \alpha \\ &+ \sum_{i=1}^n \beta_{1i} \Delta \ln GNI_{gr(t-i)} \\ &+ \sum_{j=0}^n \beta_{2j} \Delta \ln FDI_{t-j} \\ &+ \sum_{k=0}^n \beta_{3k} \Delta Crisis_{t-k} \\ &+ \gamma_1 GNI_{t-1} + \gamma_2 FDI_{t-1} \\ &+ \gamma_3 Crisis_{t-1} + \delta_1 \end{aligned} \tag{1}$$

The long-run association between GNI growth, FDI and Crisis are checked in (1) by stating H0 as no cointegration in the long run which is specified as $\gamma_1 = \gamma_2 = \gamma_3 = 0$ against H1 as the existence of cointegration that is $\gamma_1 \neq \gamma_2 \neq \gamma_3 \neq 0$. At 5 and 10 percent level of significance, that study rejects H0 and accepts H1. Table II elucidates the result of cointegration. Keeping FDI and Crisis as independent variables and GNI growth as the dependent variable, the model proves the existence of long-run relation, a long run trend of the three. Table II explicates the F value of cointegration as 8.778259 which is more than the tabular values at 5 percent [I (0)- 3.1, I (1)- 3.87] and at 10 percent [I (0)- 2.63, I (1)- 3.35]. The rule of cointegration explains that value calculated as F statistic should be greater than the tabular value of I (1). Here, both at 5 percent and at 10 percent, the calculated value exceeds the tabular ones. Thus, the existence of long-run cointegration is proved here.

The coefficients of the long run are expressed in (2).

$$\begin{aligned} \ln GNI_{grt} &= \phi \\ &+ \sum_{i=1}^n \epsilon_{1i} \ln GNI_{gr(t-i)} \\ &+ \sum_{j=0}^n \epsilon_{2j} FDI_{t-j} \\ &+ \sum_{k=0}^n \epsilon_{3k} Crisis_{t-k} \\ &+ \delta_2 \end{aligned} \tag{2}$$

The long-run coefficients (ϵ_1 , ϵ_2 , and ϵ_3) that are expressed in (2) are depicted with respective values in Table III, explain that if FDI increases, GNI growth will increase and if Crisis is present, the GNI growth declines. Though there is no statistical significance of the coefficients, the importance of them can be found out while analyzing short run model. as Once long-run relation is proved, the model confirms to proceed further to check with short-run causality and extent of short-run shock adjustable to long-run equilibrium.

The short-run equation is shown in (3).

$$\begin{aligned} \ln GNI_{grt} &= \eta \\ &+ \sum_{i=1}^n \gamma_{1i} \Delta GNI_{gr(t-i)} \\ &+ \sum_{j=0}^n \gamma_{2j} \Delta \ln FDI_{t-j} \\ &+ \sum_{k=0}^n \gamma_{3k} \Delta Crisis_{t-k} \\ &+ \gamma_4 ECT_{t-1} + \delta_3 \end{aligned} \tag{3}$$

The short-run analysis with Error Correction Term (ECT) is expressed in (3). the coefficient of ECT is illustrated in Table IV. The results display there exists 97.47 percent chance of the underlying variables to correct the short run shocks and move towards stability.



The corresponding significant probability value explains the model is stable. R squared value (0.6101) displays the model is significant enough to judge the actual scenario. Also, Durbin- Watson (DW) test value (2.044326) explains there is no autocorrelation between the residuals in the system.

Table V illustrates the results of Granger Causality. The presence of granger causality from GNI growth to FDI (H2) was proved with 95 percent confidence in Table V. The second shows FDI granger causes Crisis. The second result gives a surprising outcome. For a country like India where growth is a crucial variable, it signifies that GNI growth is ultimately bringing Crisis here.

Finally, to check the overall stability of the model, CUSUM test and CUSUMQ tes0t have been implemented. The results of CUSUM and CUSUMQ have been depicted in Figure (b) and Figure (c).

VI. CONCLUSION

The study analyses the role of FDI in crisis for the Indian economy. Since liberalization, India was gradually moving towards global markets. Thus, after 1991, foreign funds were not restricted from outside. The trend in Foreign Direct Investment (FDI) is clearly showing the accelerated growth in FDI inflow in India even in the period of crisis. At this juncture, the impact of FDI inflow on the Gross National Income (GNI) growth of India has been depicted here. Though the data considered here is annual, the result shows the relevance of short-run rather than the long run. Although there exists the long run cointegration between the variables in the model, the short run analysis shows the significant outcome and inferences of the study. It gives surprising results as growth in Gross National Income, in the short run, granger causes Foreign Direct Investment. FDI, on the other hand, granger causes a crisis. For developing economies where growth is the crucial variable, it is shocking to find accelerated growth eventually brings the development of the crisis in India. Hence, it is advisable to find out the other possible macroeconomic variables along with GNI growth which granger causes FDI but not a crisis. Thus, distinct fiscal and monetary policies should be formed strengthening the other variables which will help to overcome the situation of crisis in India while hosting Foreign Direct Investment inflow for future sustainable development.

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