FDI Inflows, Exports, Imports and Economic Growth in India: A Time Series Analysis

Tahir Hussain Ansari

Research Scholar

Department of Economics, AMU Aligarh

U.P India

Email: tahirans100@gmail.com

Dr. Mohd. Azam Khan

Associate Professor

Department of Economics, AMU Aligarh

U.P India

Email: azamkhanamu@gmail.com

Abstract

The connection between foreign direct investment and economic growth is among the practical studies and attracting high interest in the economics literature. This paper analyses the relationship between foreign direct investments, exports, imports and economic growth in India using annual time series data for the period 1991 to 2018. To examine these linkages the autoregressive distributed lag (ARDL) bounds testing approach to co-integration for the long-run is applied. Also, the error correction model (ECM) is used to examine the short-run dynamics. The results confirm a long-run relationship between FDI, export and economic growth. Further, it appeared that FDI inflows and Exports in India had a positive and significant effect on economic growth and Imports shows negative and significant impacts. The paper finally suggests that a better government Policy toward FDI could make the Indian economy more dynamic.

Keywords: FDI Inflows, Exports, Imports, GDP, ARDL Bounds Test.

I. INTRODUCTION

It is generally accepted that commercial transaction and foreign direct investment are the most important factors in the economic growth processing of any country. The FDI increase the exporting capability of the host country, increase the provision of funds for the domestic investment, encourage the creation of a new job and reinforce the technology transfer in the total economic growth.

According to the World Trade Organization's (WTO), Foreign Direct Investment (FDI) means when an investor of one country acquires or possesses an asset in another country (the host country) to manage that particular asset. A country, be it developing or under-developed economies many a time run a shortage in investment from domestic sources that pose a problem for the growth of the economy. Foreign Direct Investment is often a bright-eyed source of capital from an external source and acts as a magic wand for the developing countries. The foreign direct investment (FDI) inflows have contributed to the economic growth of many developing countries in recent decades. Globalisation has significantly facilitated the flow of FDI and it plays a vital role in the development of the country.

The Indian economy witnessed a great degree of restrictions in the policies governing foreign investment before 1991. The FERA (Foreign Exchange Regulation Act) which acted upon till 1974, managed the inflow of foreign capital into the national boundaries to serve the motive of the Indian Government not to let loose the country again into the hands of foreign powers. The policy measures and acts adopted by the government until the 1980s reflected strict regulation and conservatism towards foreign investors.

The revolution in India's foreign investment started after 1991 with the efforts of the government to open their doors to let foreign investors step inside the economy as it involves foreign capital inflow for rapid industrialisation and increasing performance of the domestic investment. The Indian economy subjected to huge flows of Foreign Direct Investment after the adoption of LPG policies in 1991.Since then the economy saw major up-gradation in trade and investment and foreign policies were such which lure foreign investors to pool their capital as well as transfer their technological expertise for enhancing the skills of the masses.

The foreign Direct Investment inflows showed a huge bump in its figures from 75 US $ Millions in 1991 to 2151 US $ Million in 1995 and went on increasing to 12,492 US$ Million in 2006. However, it showed a declining trend in the period 2009-2010 but it again restored to its blooming position and reached to 44366 US $ Millions in 2018. The uneven growth of FDI in the global economy underscore the need to get a better handle on precisely how FDI affects economic welfare (Roy and Berg, 2006)

Graph 01: Trend in FDI Inflows, Export and Imports
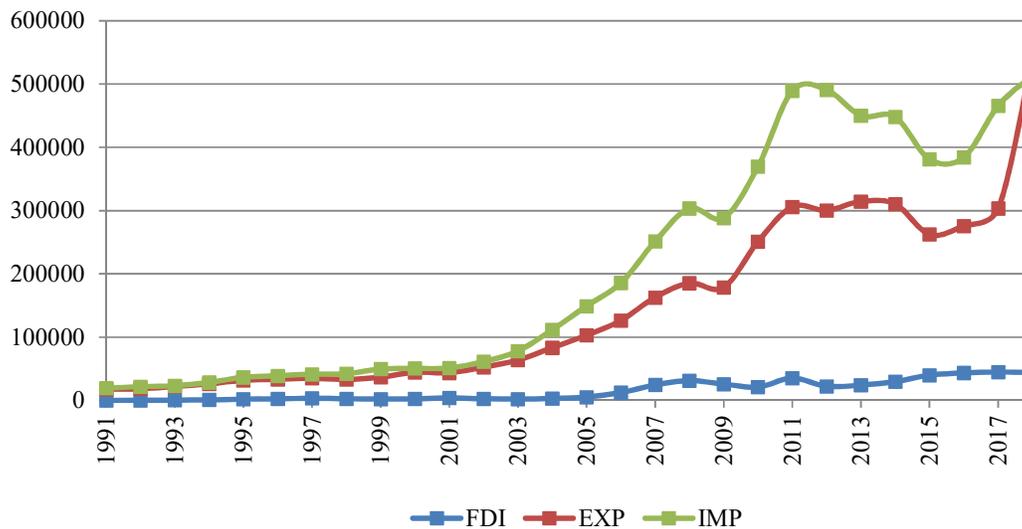
Therefore the primary aim of this study is to empirically analyse the role of foreign direct investments to determine its effect on the growth of the Indian economy during the examined period.

II. REVIEW OF LITERATURE

FDI inflows are considered as one of the basic factors for supporting the development and economic growth of an economy. There are many manuscripts which empirically analyse the impact of FDI, Export on Economic growth. The impact of each variable, i.e. FDI, exports and imports on economic growth has been studied in several countries using different time-span as well as different econometric models, approaches and methods.

The hypothesis that FDI promotes economic growth emerged with the development of neo-classical growth theory. According to the neoclassical growth theory proposed by Harrod (2015), Domar (1946) and Solow (1956) FDI is a promoter of economic growth identical to domestic investments and that in the short term. The endogenous growth theory provided by Lucas (1988), Romer (1993, 1986), Rebelo (1991) asserted that FDI is the promoter of economic growth by incorporating new technologies and knowledge spill over's.

Studies of Borensztein and Lee (1998) and Lim and Maisom (2000) have expressed that FDI accompanied by managerial practices, human capital, exports and technology transfer help in generating growth momentum.

Some authors state a positive relationship between trade flows and FDI disaggregated by industry (Lipsey and Weiss 1981, 1984).

Alexiou and Tsaliki (2007) examine the relationship between FDI and GDP for Greece for the period 1945-2003, which exhibits FDI-led growth in the long run. Miankhel et al., (2009) examines the causal relationship between FDI and GDP for six emerging countries (Chile, India, Mexico, Malaysia, Pakistan and Thailand). The result shows the long-run causality from GDP to other examines variables.

Katircioglu (2009) employ ARDL-Bounds test approach to investigates the long run and short-run relationship between FDI inflows and economic growth for Turkey over 1970-2005. The result of the analysis shows the existence of a relationship between FDI real GDP.

Belloumi (2014) examines the relationship between FDI, trade openness and economic growth in Tunisia by applying ARDL Bounds test) approach for the period 1970 to 2008. The result of the analysis shows the variables together in the long-run.

Sunde (2017) by applying the VECM Granger causality test found that there exists a unidirectional causality between economic growth and foreign direct investment and confirms the FDI-led growth hypothesis for South Africa.

With this point of view, this paper tries to survey the dynamic relationship between FDI inflows, exports, imports and gross domestic product for the period 1991 to 2018 in India by employing the Autoregressive Distributed Lag approach (ARDL-Bounds test).

This paper is organized as follows: Section 2 describes the econometrics methodology and database. In section 3 we report the empirical results and discussion and finally, the main conclusions and policy implication are provided in section 4.

III. Methodology and Database

3.1 Data

The present study is based on the secondary source of data consisting of annual observation on the Indian economy for the period of 1991-2018. We have taken the growth rate of Gross Domestic Product (GDP) as a dependent variable to analyse the relationship between Foreign Direct Investment (FDI) inflows, Export of good and Services, Imports of goods and services and GDP. The data for the examined variables are taken from UNCTAD.

3.2 Model

We consider the following functional form and econometric model:

$$GDP = f\ (FDI, EXP, IMP)$$

$$LnGDP = \beta_0 + \beta_1 LnFDI + \beta_2 LnEXP + \beta_3 LnIMP + \mu_t \quad \ldots\ldots.. (1)$$

Where, LnGDP is the log of growth of Gross Domestic Product (GDP) and LnFDI is the log of Foreign Direct Invest (FDI) inflows, the log of Export of good and Services (EXP), log of Imports of goods and services (IMP). This equation describes how FDI inflows, exports and imports affect economic growth.

3.3 Co-integration test (ARDL bound test)

In this Study, the bound test approach developed by Pesaran et. al (2001) was utilised to know the effect of FDI inflows on economic growth. The use of ARDL model is the most appropriate and effective model to examine the dynamic relationship between the variables, which is proved by many studies (Pesaran and Smith, 1995; Pesaran et. al, 2001; Zachariadis, 2006). The bound test can test the existence of the co-integration relationship. The ARDL approach consists of estimating the following equation.

$$\Delta LnGDP = \alpha_0 + \beta_1 LnGDP_{t-1} + \beta_2 LnFDI_{t-1} + \beta_3 LnEXP_{t-1} + \beta_4 LnIMP_{t-1} + \sum_{J=0}^{n} \delta_j \Delta LnGDP_{t-j} + \sum_{J=0}^{n} \gamma_j \Delta LnFDI_{t-j} + \sum_{J=0}^{n} \theta_j \Delta LnEXP_{t-j} + \sum_{J=0}^{n} \omega_j \Delta LnIMP_{t-j} + \mu_t \ldots \ldots (2)$$

Where, δ, γ, θ and ω represent the short-run dynamics of the model whereas the β_1, β_2, β_3 and β_4 parameters represent the long-run relationship.

The null hypothesis of the model is:

H_0: $\beta_1 = \beta_2 = \beta_3 = \beta_4 = 0$ (There is no long-run relationship)

H_0: $\beta_1 \neq \beta_2 \neq \beta_3 \neq \beta_4 \neq 0$

We start by conducting a bound test for the null hypothesis of no co-integration. The calculated F-statistic is compared with the critical value tabulated by Pesaran (1997) and Pesaran et. al. (2001).

The ARDL model estimates $(n+1)^K$ number of regression to obtain the optimal lag length for each variable, where n is the number of lags to be used and k is the number of variables in the equation.

In the second step, if there is evidence of long-run relationship (co-integration) among the variables, the following long-run model (equation 3) is estimated,

$$LnGDP = \alpha_0 + \sum_{J=0}^{n} \delta_j LnGDP_{t-j} + \sum_{J=0}^{n} \gamma_j \Delta LnFDI_{t-j} + \sum_{J=0}^{n} \theta_j \Delta LnEXP_{t-j} + \sum_{J=0}^{n} \omega_j \Delta LnIMP_{t-j} + \mu_t \ldots \ldots (3)$$

If we find the evidence of a long-run relationship, we then estimate the error correction model (ECM), which indicates the speed of adjustment back to long-run equilibrium after a short-run disturbance. The standard ECM involves estimating the following equation.

$$\Delta LnGDP = \alpha_0 + \sum_{J=0}^{n} \delta_j \Delta LnGDP_{t-j} + \sum_{J=0}^{n} \gamma_j \Delta LnFDI_{t-j} + \beta_3 LnEXP_{t-1} + \beta_4 LnIMP_{t-1} + v_j ECM_{t-1} + \mu_t \ldots \ldots (4)$$

To ascertain the goodness of fit of the ARDL model, diagnostic and stability tests are conducted. The diagnostic test examines the serial correlation, normality and Heteroscedasticity associated with the model. The structural stability test is conducted by employing the cumulative sum (CUSUM) and the cumulative sum of squares of recursive residuals (CUSUMQ).

IV. RESULTS AND DISCUSSION

Statistical Analysis

Before going through the time series econometric analysis, a detailed statistical analysis is carried out. The descriptive statistics for all the variables are shown in table 1. To achieve the stationarity in the variance and to account for the expected non-linearity's in the relationship, all the data has been applied in natural logarithm form. The results of the descriptive analysis exhibit that average of log gross domestic product (GDP) growth is 13.16 with a standard deviation of 0.78.

Table 1:
Descriptive Statistics

Variables	LnGDP	LnFDI	LnEXP	LnIMP
Mean	13.61	8.72	11.42	11.70
Median	13.54	8.46	11.43	11.76
Maximum	14.82	10.71	13.19	13.15
Minimum	12.53	4.31	9.79	9.87
Std. Dev.	0.78	1.71	1.06	1.16
Skewness	0.10	-0.67	-0.01	-0.10
Kurtosis	1.48	2.82	1.53	1.41
Jarque-Bera	2.74	2.16	2.52	2.96
Prob-Value	0.25	0.33	0.28	0.22

Source: Author's calculation

The next step is to test the stationarity of the variables. ARDL bound test is indifferent to I(0) and I(1) order of integration, however, ARDL fails to provide valid results in case the variables are integrated of I(2) or above (Ouattara, 2004). In all these tests, the null hypothesis is that the variable contains a unit root i.e., it is non-stationary. The Stationary of time series data is necessary for avoiding spurious regression analysis because it is impossible to get reliable results.

Therefore, using ARDL to investigate a stable long long-run relationship between FDI Inflows, Exports, Imports and Economic Growth, first, we need to investigate the order of integration among the variables.

Time series uni-variate properties were searched by ADF (Augmented Dickey-fuller) and PP (Phillips-Perron) test, given in Table 2.

Table 2:
Unit Root Test Results

Variables	ADF test		PP test	
	Level	First difference	Level	First difference
LnGDP	0.39 (0.97)	-3.83* (0.00)	0.39 (0.97)	-3.82 (0.00)*
LnFDI	-3.35 (0.02)	-3.82* (0.00)	-2.96 (0.05)	-3.81* (0.00)
LnEXP	-0.06 (0.94)	-2.99** (0.04)	-0.11 (0.93)	-2.99** (0.04)
LnIMP	-1.47 (0.53)	-3.44** (0.01)	-1.44 (0.54)	-3.43 (0.01)**

Notes: *, **, ***, denotes statistical significance at 1%, 5%, 10% respectively
Source: Author's Calculation

When ADF and PP test is employed to check the stationary of variables, we find that both logarithms of gross domestic product (LnGDP) and logarithms of Foreign Direct Investment (LnFDI) are stationary at first difference at 1% level of significance whereas logarithms of exports (LnEXP) and logarithms of imports (LnIMP) are stationary at first difference at 5% level of significance.

The appropriate lag order is also one of the criteria for the ARDL method. The information criteria for selecting the lag-lengths are determined based on Akaike's information criterion (AIC) and the results display that the optimal lag length of the variables is 4.

Co-integration relation has been discussed in tables 3. In the case of ARDL co-integration test F-statistic values should be more than the lower and upper bound.

Table 3:
Bound Testing Results

Dependent Variable: LnGDP		
F-Statistics Value: 5.63		
Significance Level	**Lower Bound I(0)**	**Upper Bound I(1)**
1%	4.29	5.61
5%	3.23	4.35
10%	2.72	3.77

Source: Author's Calculation

Table 3 shows that F-statistic value (5.63) is more than lower and upper bound at 5 % level of significance. Hence, we have a long-run relationship between LnGDP, LnFDI, LnEXP and LnIMP. The model fulfils the assumptions of normality, autoregressive conditional Heteroscedasticity (ARCH), functional forms and serial correlation of the model. Since the existence of the co-integration relationship is determined by this way, the process for the estimation of Autoregressive Distributive Lag (ARDL) model began to search the long and short term relationships.

Once the co-integration is established, the long-run model can be estimated according to equation 2. The results obtained by estimating equation 2 are reported in Table 4.

Table 4:
Long Run Coefficient

Variables	Coefficients	Prob-Value	T-Value
LnFDI	0.09	0.00	4.48
LnEXP	1.06	0.00	5.75
LnIMP	-0.36	0.04	-2.20
Constant	4.44	0.00	5.35

Source: Author's Calculation

The coefficients of the estimated variables are significant in the long-run. We can see that in the long-run economic growth and the Indian economy in 1991 have involved a new boost, meaning these variables i.e. FDI and Export have a positive impact on FDI at 5% level of significance. With the coefficient, a 1% increase in FDI will lead to a 0.09% increase in the growth of GDP. Also, a 1% increase in exports will cause GDP to increase by 1.06 % in the long run. Also, the coefficient of imports implies that a 1% increase in import will lead to a 0.36 % decrease in the GDP growth in the long-run.

The final step of the ARDL model is the error correction estimation for the short-run parameter which shows the speed of adjustment. Following Odhiambo (2007) and Narayan et al. (2008), we obtain short-run dynamic parameters by estimating an error correction model associated with the long-run estimates. The coefficient on lagged error correction term is negative and significant which implies that the series is non-explosive and that a long-run equilibrium is attainable. Because the ECM_{t-1} measures the speed at which the endogenous variable adjusts to changes in the explanatory variables.

The result of the error correction model is presented in table 5.

Table 5:
Short Run Coefficient

Variables	Coefficients	Prob-Value	T-value
LnGDP(-1)*	-0.87	0.00	-4.12
LnFDI	0.07	0.00	3.20
ΔLnEXP	0.17	0.00	3.05
ΔLnEXP$_{t-1}$	-0.76	0.00	-4.17
ΔLnEXP$_{t-2}$	-0.57	0.00	-4.26
ΔLnEXP$_{t-3}$	-0.21	0.01	-2.72
ΔLnIMP	0.32	0.00	5.13
ΔLnIMP$_{t-1}$	0.39	0.01	2.74
ΔLnIMP$_{t-2}$	0.30	0.01	3.02
ECM$_{t-1}$	-0.87	0.00	-5.30
Diagnostics tests			
R-squared	0.90		
Adjusted R-squared	0.85		
Durbin-Watson stat	2.56		
F-Stat	18.53(0.00)		
Breusch-Godfrey LM test	7.37(0.11)		

Jarque-Bera	0.13(0.93)
Breusch-Pagan-Godfrey Heteroscedasticity test	12.11(0.35)

In the short-run, FDI Inflow, exports and imports are significant at the 5 % level and have an important impact on economic growth (GDP).

The error correction coefficient is negative (-0.87), as required, and is significant at 1% confidence level, so indicates that any deviation from the long-run equilibrium between variables is corrected about 87% for each year.

The R^2 value is 0.90, which means that 90 % change in the dependent variable is explained by the independent variables jointly. Also, the adjusted R^2 is 0.85. The Durbin-Watson (D-W) value is 2.56, which confirms that there is no autocorrelation among the variables.
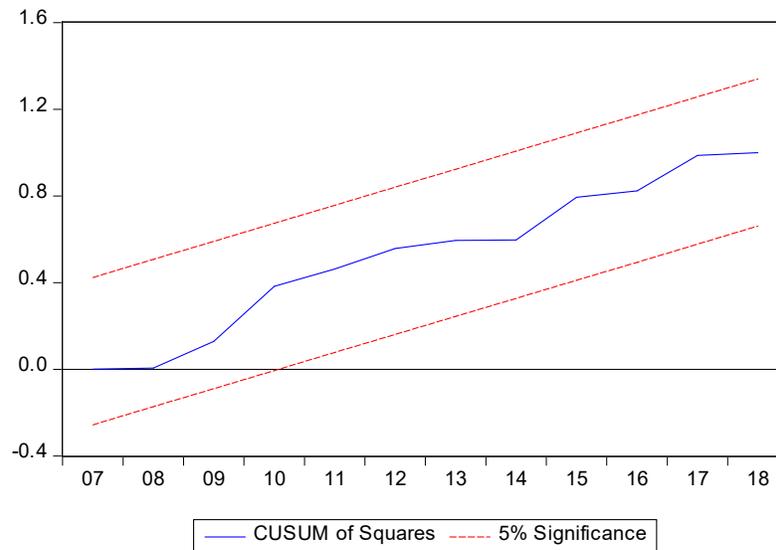
To make the ARDL results more robust, in the final stage we have to assess parameter stability of the regression coefficients using the cumulative sum of recursive residuals (CUSUM) and the CUSUM of a square i.e CUSUMQ. (Pesaran and Pesaran, 1997)

Figures 2 and 3 plot the results for both tests.

Figure 2:
CUSUM test
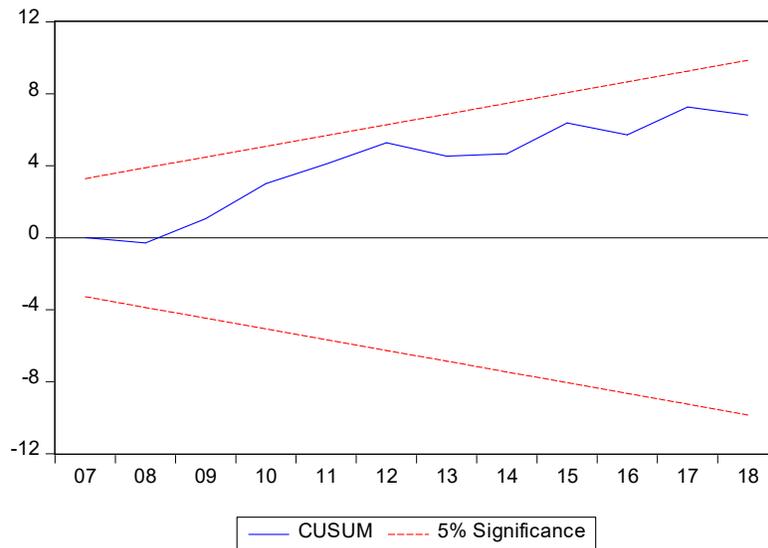
Figure 3:
CUSUM SQ. test

The existence of co-integration does not necessarily imply that the estimated coefficients are stable. This is why Pesaran et al. (1999) suggested the test of the stability of the estimated coefficients in the estimated model using the tests of Brown et al. (1975), which is known as the cumulative sum (CUSUM) and the cumulative sum of squares (CUSUMSQ). The error correction model of equation 4 is chosen to apply the stability tests of Brown et al. (1975). The results indicate the absence of any instability of the coefficients because the plot of CUSUM and CUSUMQ statistic falls inside the critical bands of the 5% confidence interval of parameter stability.

V. CONCLUSION AND POLICY IMPLICATIONS

In this study, we have investigated the impact of Foreign Direct Invest inflows, Exports and Imports on the Economic growth of India for the time frame 1991 to 2018. We have implemented an ARDL bound testing approach to study the existence of the long-run and short-run relationship among the specified variables i.e. GDP, FDI inflows, Exports and Imports. The results of the co-integration analysis indicate that there exists a positive and significant relationship between GDP, FDI and Export of good and services and the negative relation between GDP and Imports.

As a general conclusion, it can be mentioned that FDI inflows and exports constitute the catalyst for the economic growth of India. Greater export opportunities should be forwarded and FDI inflows should be made in other sectors of the economy. Thus, the results can generate an important implication for the policymaker in India and recommend the focussing of FDI and export-led growth. Moreover, this study recommends undertaking reforms with clear objectives and commitments through more structural policies.

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