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Impact of foreign direct investment on economic growth: A study on the Indian economy

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Abstract
Every country frames different monetary, fiscal and investment policies for the economy's growth, and these policies play a vital role in the nation's economic development. GDP is considered the most significant indicator of economic growth. However, GDP itself affects and is affected by numerous factors. Hence it has become pre-eminent for researchers to study their interplay in different economies and their overall impact on economic growth. This research paper aims to study the impact of Foreign Direct Investment (FDI) on Gross Domestic Product (GDP). The current study is based on secondary data collected from the Word Bank database from 1991-2021. Econometrics model Autoregressive Distributed Lag model has been used to process the data. The study revealed mixed results, i.e. some lags have a significant and positive effect while others have no significant effect. However, FDI has a significant and positive impact on GDP.

Keywords: foreign direct investment, Indian economy, GDP

Introduction

Due to the globalisation of economic activities, a dynamic business environment creates both opportunities and threats for businesses, ultimately affecting the health of an economy. Democratic governments across the world have to deal with different economic and social problems, such as shortage of demand, GDP growth, inflation, unemployment, low investment etc., and it has to frame many economic and trade policies to overcome them. Developing and less developing economies face a scarcity of resources in terms of technology, skilled manpower and finance. Opposite developed nations have capital, technology and tech-savvy human resources with them. Investment plays a vital role in developing a nation's economy. Government has to take the initiative to encourage investment to boost economic activities for growth and development. It has to liberalise trade and investment policies. A nation's economic growth depends greatly on Foreign Direct Investment, particularly in developing countries. Foreign Direct investment may be defined as an investment made by a High Net Worth individual/ Foreign Companies or Institutions in the domestic firm of a country. It may be by subscribing to the measured chunk of equities or by providing technologies in the host countries' firms. Economic growth may be defined as an increase in the number of goods and services over a period of time in an economy. If there is a sustained increase in the level of economic activity and the aggregate output, that may lead to an increase in per capita income and the standard of living of people of that country. GDP is one of the main indicators of Economic Growth. Foreign direct investment helps the host countries' firms to exploit the resources such as its large market, inexpensive labour, and cutting-edge technology. Further FDI-providing firms may also be benefitted from tax breaks and other incentives offered by host nations which leads to improvement in their performance. FDI is not just restricted to resources; it also refers to capital flows at the international level where one company established a subsidiary in another country.

It is mainly of two types horizontal and vertical FDI. Horizontal FDI means investing in the host country in the same type of business in which it deals in the home country. In contrast, vertical FDI means investing either in the upstream or downstream value of the supply chain in the host country. The government's economic and Foreign policies play a significant role in promoting investment through FDI. It has been observed globally that governments of host countries liberalise the norms for attracting FDI Government of the host country has to liberalise the norms of investment to promote FDI. Foreign Investment helps in boosting the economic growth of nations as it is an effective tool for acquiring Financial Resources, Managerial Skills, Technologies and Information. FDI is considered a tool to gauge the level of global economic integration, the strength of the economy and maintaining foreign exchange reserves. That is why every nation makes all possible efforts to attract foreign investment. Many studies across the nations revealed that FDI had helped their economic growth. There are different studies available with mixed results. Some of them are in favour that FDI was having a positive and significant effect on economic growth.

In contrast, some others have concluded the negative impact of FDI on Economic Growth. A substantial empirical literature has been prompted by the association between foreign direct investment (FDI) and economic growth. The effects of exports and FDI on economic growth have been the subject matter for researchers and academicians. Using various time periods, econometric techniques, and research methods, these variables' effects on economic growth have been researched in many countries. The results of previous research reflect both positive and negative impacts on the economic growth of a nation, so it cannot be concretely concluded that FDI contributes to or hamper the economic growth of a country. Hence continuous research is going on the impact of FDI on GDP. This paper emphasises the impact of FDI on the economic growth of India. The current research paper consists of four sections. Section 1 includes a Literature review; section 2 contains Research Methodology; section 3 will cover the data analysis and results and conclusion to be interpreted in section 4.

1. Literature Review

The factors that influence foreign direct investment (FDI) and its contribution to economic development were examined by (Bjorvatn 2001) [1]. The author stated that while FDI is not required to accomplish economic development, the entry of foreign enterprises may play a significant role in bringing technology and competition to the host economies. It was based on empirical and theoretical literature. Foreign competitors might, however, cause local businesses to lose market share and, with it, revenues. This issue is likely to be more significant if foreign entrance occurs in markets protected from the competitive forces of global trade.

(Ramar 2019) [2] identified the variables that affect FDIT inflows in India and also examined the variables that have an impact on FDIT inflows. In this study, the nine-year period between 2010 and 2018 has been chosen by the researcher to determine the variables affecting the country's FDI inflow. To examine the relationship between the variables' significance, the author conducted a ONE-WAY ANOVA. Based on the findings, the author concluded that the determinants affecting FDI inflows into India are the GDP, coal production, wages, inflation, and trade openness.

(Ahmad 2018) [3] sought to examine how much economic growth (GDP) is dependent on exports and foreign direct investment (FDI). A correlation test was utilised (GDP)to determine the nature of the relationship between export, FDI, and economic growth and a straightforward linear regression model was utilised (GDP)to determine how exports and FDI (foreign direct investment) affect economic growth. The author acknowledged the link between exports, foreign direct investment (FDI), and economic expansion (GDP). In our example, a moderate regression in the relationships between export, foreign direct investment (FDI), and economic growth was also found.

According to (Helpman 2004) [4], depending on the nature of FDI, the relationship between exports and FDI can be either complementary or subsidiary. FDI comes in two flavours: horizontal (where multinational corporations establish subsidiaries in each target nation to cut down on transportation expenses) and vertical (multinational companies locate each stage of their production process in several countries according to the cost advantages). The author claimed that commerce and vertical FDI might have a beneficial relationship (complimentary). It was indicated that both developed and emerging countries are likely to engage in vertical FDI.

2. Research Methodology

The current research is based on a descriptive research design and a secondary database. World Bank Database is sourced for the collection of data. The time period of this study will be from 1991 to 2021. Econometrics Tools and Techniques have been used to process the data—the autoregressive distributive lag model is used for testing the impact of Foreign Direct Investment on Economic Growth**.**

Pearson and Shin developed Autoregressive Distributed Lag Model (ARDL) model in 1996 to test the number of cointegration and the existence of long-run relationships between variables. This model can be applied only to series with I (0) and I (1) or a mixture of both series. If it is applied in series with integrated at order two I (2), then the results will be invalid.

Firstly, the researcher will apply the unit root test using the Augmented Dickey-Fuller (ADF) test to test the stationarity of data. If the series is Integrated at level zero, then it means the series is stationarity; else, we have to transform a non-stationary series into stationary series with the help of difference. Then Autocorrelation of the series will be tested using the correlogram Q statistics and the serial residual correlation LM test. At the same time, heteroscedasticity will also be tested with the help of the correlogram of residual squared.

3. Data Analysis

1: Unit Root Test FDI

Insert Table 1

Table 1

Null Hypothesis: FDI has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, maxlag=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-0.364827	0.9027
Test critical values:	1% level	-3.679322	
	5% level	-2.967767	
	10% level	-2.622989	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(FDI)
Method: Least Squares
Date: 09/25/22 Time: 21:56
Sample (adjusted): 3 31
Included observations: 29 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
FDI(-1)	-0.039558	0.108429	-0.364827	0.7182
D(FDI(-1))	-0.533965	0.243447	-2.193350	0.0374
C	-2.55E+09	1.98E+09	-1.286030	0.2098

R-squared	0.221122	Mean dependent var	-9.97E+08
Adjusted R-squared	0.161208	S.D. dependent var	8.17E+09
S.E. of regression	7.48E+09	Akaike info criterion	48.40747
Sum squared resid	1.46E+21	Schwarz criterion	48.54892
Log likelihood	-698.9084	Hannan-Quinn criter.	48.45177
F-statistic	3.690671	Durbin-Watson stat	2.081516
Prob(F-statistic)	0.038824		

Sources: Researcher Computation using E-Views

As shown in Table 1 null hypothesis was assumed that FDI has a unit root, which means the series is not stationary. Then compare the actual p-value with the table value, i.e., 0.05. if the p-value >0.05, accept the null hypothesis; else, do not accept the null hypothesis. As shown in Table 1, p-value > 0.05, we will accept the null hypothesis. FDI series should be transformed into Stationary Series.

Table 2: Unit Root Test D (FDI)

Null Hypothesis: FDI1 has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.485229	0.0000
Test critical values:	1% level	-3.679322	
	5% level	-2.967767	
	10% level	-2.622989	

Sources: Researcher Computation using E-Views

The researcher has transformed the FDI non Stationary series into FDI(1) stationary using one-level differencing and tested the unit root test as shown in table 2, p value < 0.05, do not accept the null hypothesis, which means the series is stationary.

Table 3: Unit Root Test GDP

Null Hypothesis: GDP has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		1.881458	0.9997
Test critical values:	1% level	-3.670170	
	5% level	-2.963972	
	10% level	-2.621007	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(GDP)
Method: Least Squares
Date: 09/25/22 Time: 21:57
Sample (adjusted): 2 31
Included observations: 30 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDP(-1)	0.050725	0.026960	1.881458	0.0703
C	3.59E+10	3.98E+10	0.903099	0.3742

R-squared	0.112235	Mean dependent var	9.68E+10
Adjusted R-squared	0.080529	S.D. dependent var	1.32E+11
S.E. of regression	1.27E+11	Akaike info criterion	54.03360
Sum squared resid	4.50E+23	Schwarz criterion	54.12702
Log likelihood	-808.5040	Hannan-Quinn criter.	54.06349
F-statistic	3.539885	Durbin-Watson stat	2.201213
Prob(F-statistic)	0.070345		

Sources: Researcher Computation using E-Views

Table 4: Unit Root Test D (GDP)

Null Hypothesis: GDP1 has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.997075	0.0004
Test critical values:	1% level	-3.679322	
	5% level	-2.967767	
	10% level	-2.622989	

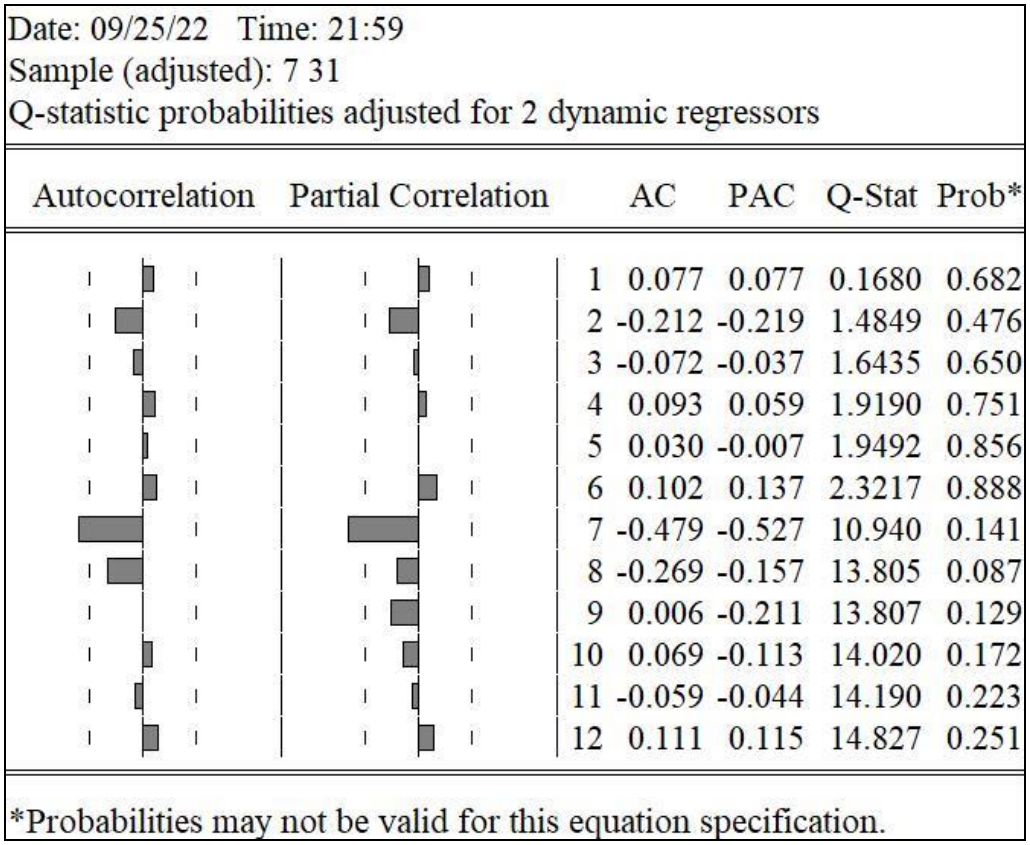
*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(GDP1)
Method: Least Squares
Date: 10/08/22 Time: 23:59
Sample (adjusted): 3 31
Included observations: 29 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDP1(-1)	-1.166451	0.233427	-4.997075	0.0000
C	1.13E+11	3.16E+10	3.581569	0.0013

R-squared	0.480477	Mean dependent var	1.68E+10
Adjusted R-squared	0.461235	S.D. dependent var	1.84E+11
S.E. of regression	1.35E+11	Akaike info criterion	54.15978
Sum squared resid	4.91E+23	Schwarz criterion	54.25408
Log likelihood	-783.3168	Hannan-Quinn criter.	54.18931
F-statistic	24.97076	Durbin-Watson stat	1.713180
Prob(F-statistic)	0.000031		

As shown in Table 3, the researcher has tested the unit root of the GDP series. P value > 0.05, accept the null hypothesis, i.e., GDP series has a unit root. Hence GDP series should be transformed using differencing. The researcher has transformed the GDP series with one difference and tested the stationary as shown in table 4; GDP 1 is a stationary series I (1).



Date: 09/25/22 Time: 21:59
Sample (adjusted): 7 31
Q-statistic probabilities adjusted for 2 dynamic regressors

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob*
		1	0.077	0.077	0.1680	0.682
		2	-0.212	-0.219	1.4849	0.476
		3	-0.072	-0.037	1.6435	0.650
		4	0.093	0.059	1.9190	0.751
		5	0.030	-0.007	1.9492	0.856
		6	0.102	0.137	2.3217	0.888
		7	-0.479	-0.527	10.940	0.141
		8	-0.269	-0.157	13.805	0.087
		9	0.006	-0.211	13.807	0.129
		10	0.069	-0.113	14.020	0.172
		11	-0.059	-0.044	14.190	0.223
		12	0.111	0.115	14.827	0.251

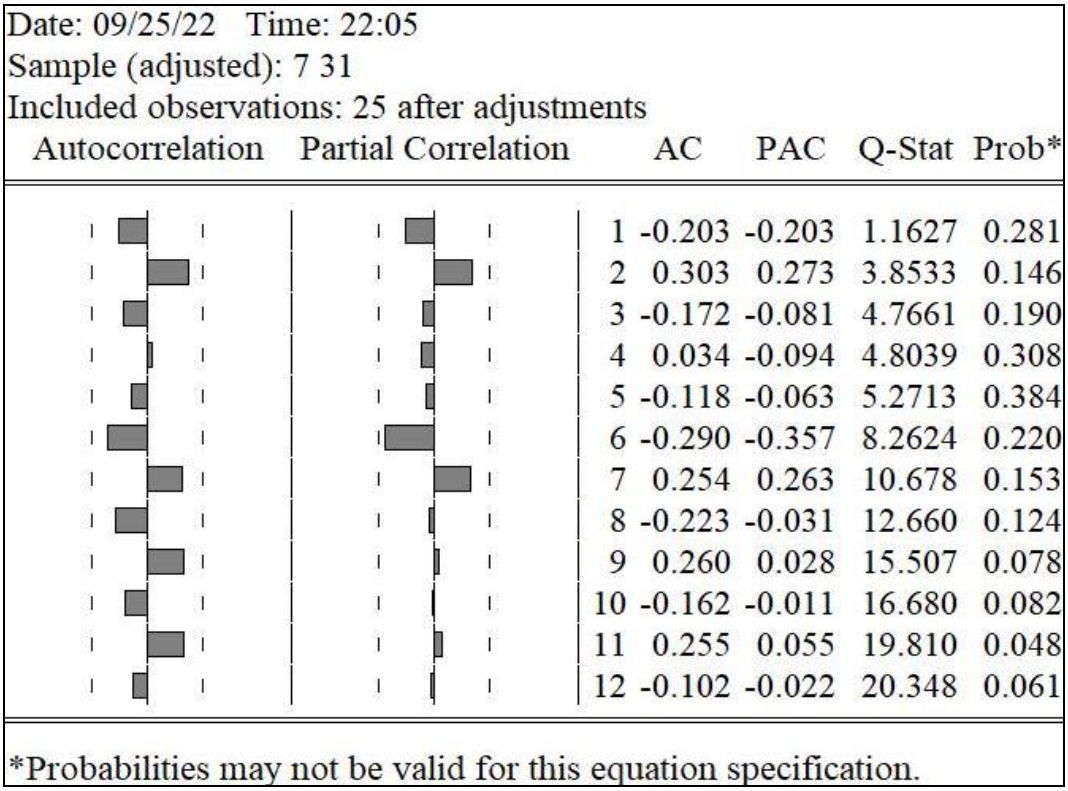
*Probabilities may not be valid for this equation specification.

Sources: Researcher Computation using E-Views

Fig 1: Correlogram Q Statistics

Correlogram Q statistics help to trace the autocorrelation present in the study. If the P value of Q stat is < 0.05, then it means there is the presence of Autocorrelation in the series. The result of that series will be spurious or biased, so it is necessary to test the Autocorrelation.

Results of Q statistics, as shown in Figure 1, P values of all lags are > 0.05. which means there is no Autocorrelation in series.



Date: 09/25/22 Time: 22:05
Sample (adjusted): 7 31
Included observations: 25 after adjustments

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob*
		1	-0.203	-0.203	1.1627	0.281
		2	0.303	0.273	3.8533	0.146
		3	-0.172	-0.081	4.7661	0.190
		4	0.034	-0.094	4.8039	0.308
		5	-0.118	-0.063	5.2713	0.384
		6	-0.290	-0.357	8.2624	0.220
		7	0.254	0.263	10.678	0.153
		8	-0.223	-0.031	12.660	0.124
		9	0.260	0.028	15.507	0.078
		10	-0.162	-0.011	16.680	0.082
		11	0.255	0.055	19.810	0.048
		12	-0.102	-0.022	20.348	0.061

*Probabilities may not be valid for this equation specification.

Fig 2: Correlogram squares Residual Statistics

Table 5: Heteroskedasticity White Test

Heteroskedasticity Test: White
Null hypothesis: Homoskedasticity

F-statistic	1.123659	Prob. F(9,15)	0.4042
Obs*R-squared	10.06745	Prob. Chi-Square(9)	0.3451
Scaled explained SS	3.418306	Prob. Chi-Square(9)	0.9454

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 09/24/22 Time: 16:11
Sample: 7 31
Included observations: 25
HAC standard errors & covariance (Bartlett kernel, Newey-West fixed bandwidth = 3.0000)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	9.85E+20	9.72E+20	1.013473	0.3269
GDP(-1)^2	0.006887	0.002817	2.444538	0.0273
GDP(-2)^2	-0.003486	0.001861	-1.872480	0.0808
FDI^2	-1.697016	3.212326	-0.528282	0.6050
FDI(-1)^2	0.036806	1.709747	0.021527	0.9831
FDI(-2)^2	-9.751376	4.109627	-2.372813	0.0315
FDI(-3)^2	1.021488	3.738360	0.273245	0.7884
FDI(-4)^2	-14.68654	2.217728	-6.622337	0.0000
FDI(-5)^2	1.864665	1.677117	1.111827	0.2837
FDI(-6)^2	3.459675	4.001009	0.864701	0.4008

R-squared	0.402698	Mean dependent var	3.53E+21
Adjusted R-squared	0.044317	S.D. dependent var	4.95E+21
S.E. of regression	4.84E+21	Akaike info criterion	102.9889
Sum squared resid	3.51E+44	Schwarz criterion	103.4765
Log likelihood	-1277.361	Hannan-Quinn criter.	103.1241
F-statistic	1.123659	Durbin-Watson stat	2.563600
Prob(F-statistic)	0.404186		

Sources: Researcher Computation using E-Views.

Correlogram Squared residual statistics will be helpful in the testing of heteroscedastic. If P values > 0.05, that means there is no heteroscedastic present in the series. As shown in figure 2, the p-value > 0.05 means there is no heteroscedastic in the series. Results are verified with the help of a heteroskedastic white test. The null

hypothesis of the White test is that series is homoscedastic. Accept and reject decision depends on p values. Results are shown in table 5; the P value is > 0.05, null hypothesis is accepted, which means the series is homoscedastic.

Finally, we apply the ARDL model to find how many lags of dependent and independent variables significantly affect the dependent variable,i.e., GDP.

Table 6: ARDL model

Dependent Variable: GDP
Method: ARDL
Date: 09/23/22 Time: 12:36
Sample (adjusted): 7 31
Included observations: 25 after adjustments
Maximum dependent lags: 7 (Automatic selection)
Model selection method: Akaike info criterion (AIC)
Dynamic regressors (7 lags, automatic): FDI
Fixed regressors: C
Number of models evaluated: 56
Selected Model: ARDL(2, 6)
Note: final equation sample is larger than selection sample
HAC standard errors & covariance (Bartlett kernel, Newey-West fixed bandwidth = 3.0000)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
GDP(-1)	0.879187	0.299696	2.933599	0.0103
GDP(-2)	0.433078	0.265433	1.631594	0.1236
FDI	8.843983	4.308952	2.052467	0.0580
FDI(-1)	-3.933878	4.370755	-0.900045	0.3823
FDI(-2)	-6.707841	3.805553	-1.762645	0.0983
FDI(-3)	3.736201	4.072208	0.917488	0.3734
FDI(-4)	14.89026	3.868339	3.849264	0.0016
FDI(-5)	8.396743	4.761701	1.763392	0.0982
FDI(-6)	-7.534716	4.993142	-1.509013	0.1521
C	-3.81E+10	6.01E+10	-0.633830	0.5357

R-squared	0.995413	Mean dependent var	1.49E+12
Adjusted R-squared	0.992660	S.D. dependent var	8.95E+11
S.E. of regression	7.67E+10	Akaike info criterion	53.25375
Sum squared resid	8.83E+22	Schwarz criterion	53.74130
Log likelihood	-655.6718	Hannan-Quinn criter.	53.38897
F-statistic	361.6514	Durbin-Watson stat	1.821736
Prob(F-statistic)	0.000000		

*Note: p-values and any subsequent tests do not account for model selection.

Sources: Researcher Computation using E-Views

Model Formation

Equation: 1

GDP =C+ β1*GDP(-1)+β2*GDP(-2) + β3*FDI + β4*FDI(-1) + β5*FDI(-2) + β6*FDI(-3) +β7*FDI(-4) +β8*FDI(-5)+β9*FDI(-6) +μ.

GDP= Dependent Variable C= Fixed Regressor β= Coefficient of Regressor

Regressor Variables= FDI; Lags of FDI; Lags of GDP

Equitation:2

GDP = 0.879186697333*GDP (-1) + 0.43307838172*GDP (-2) + 8.84398328383*FDI - 3.93387811787*FDI(-1) - 6.70784109886*FDI(-2) + 3.73620125388*FDI(-3) + 14.8902565379*FDI(-4) + 8.39674298856*FDI(-5) - 7.53471595738*FDI(-6) - 38112340509.4

Table 6 shows the results of the ARDL model. Firstly, we will check how many lags in GDP and FDI are significantly affecting the GDP using P values. If the p-value < 0.05, that means there is a significant effect; else, there is no significant effect. The first leg of the dependent variable has a significant effect on GDP, while the second lag has no significant effect on GDP. FDI has a significant partial impact on GDP; only the First and Fourth lags of FDI have a significant impact on GDP, while other lags have no significant impact on the forecasting of GDP. As shown in Equation 2; 1 unit of GDP will be increased due to an increase in: 0.879 units of GDP (-1); 8.844 units of FDI;14.89 units of FDI (-4), while FDI (-1) has a negative impact on GDP that means if FDI decrease with 3.93 units GDP will be increasing with 1 unit.

Results and Conclusion

GDP is the main indicator of the Economic growth of an economy. In the present research paper, the researcher tried to find the impact of FDI on GDP using the Econometrics model. As shown in Table 6, there are mixed results that some of the lags of GDP and FDI have a positive and significant impact on forecasting GDP while others have insignificant results. The analysis of overall results indicates that there is a positive impact of FDI on GDP. On the basis of the results of the present study, it is suggested that the government should make more efforts to promote Foreign Direct Investment inflow to boost economic growth and development. Further, there is also space for more research by introducing different variables that are contributing to GDP as well as by using some different techniques. This study was limited to the Indian Economy; hence there is scope to explore the study in different economies.

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