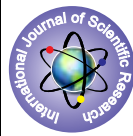


Granger Causality Modeling of Foreign Direct Investment (FDI) and GDP for India



Economics

KEYWORDS: FDI inflows, GDP, Granger Causality and Unit root test

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ABSTRACT

This paper empirically investigates and analyzing the causality Relationship between the inflows foreign Direct investment and GDP per capita in context of India. The study Reference during the period of 1975 to 2010. Paper has used the Granger-causality test to examine the relationship between FDI and growth. The direction of causality has important policy implications that there is a unidirectional Granger causality from foreign direct investment. Unit root and ADF test has used for the integrated FDI and GDP, the empirical analysis on basis of ordinary Least Square Method suggests that there is positive relationship between foreign direct investment (FDI) investment and GDP

Introduction:

Foreign direct investments flows are one of the most dynamic and prospective part of the world's economy. FDI, being a non-debt capital flow, is a leading source of external financing, especially for the developing economies like India. It not only brings in capital and technical know-how but also increases the competitiveness of the economy. Overall it supplements domestic investment, much required for sustaining the high growth rate of the country. Also the global economic and financial crisis had a dampening effect on overall FDI flows. Foreign direct investment plays an important role of bridging the gap between the available resources or funds and the required resources or funds. In India, FDI is considered as a developmental tool, which helps in achieving self-reliance in various sectors and in overall development of the economy.

The gap formed between intended investment and the actual savings of the country was lifted up by portfolio investments by Foreign Institutional Investors, loans by foreign banks and other places, and foreign direct investments. Foreign investments mean both foreign portfolio investments and foreign direct investments (FDI). FDI brings better technology and Management, access to marketing networks and offers competition, the latter helping Indian companies improve, quite apart from being good for consumers.

India adopted a regime that was perceived to be restrictive towards FDI. These policies continued until the policy of creeping liberalization of the Indian economy was initiated in the 1980s. Liberalization of the Indian economy introduced in 1991 brought with it a radical shift in the policy towards FDI. Prior to the beginning of liberalization; the FDI inflows were very small, being \$ 113 million in 1990-91. With liberalisation, Portfolio investment comprising Foreign Institutional investors (FIIs) and investment under ADRI, GDR route. India suffering from low levels of savings and capital facing choice between finding foreign debt and to increase FDI inflow.

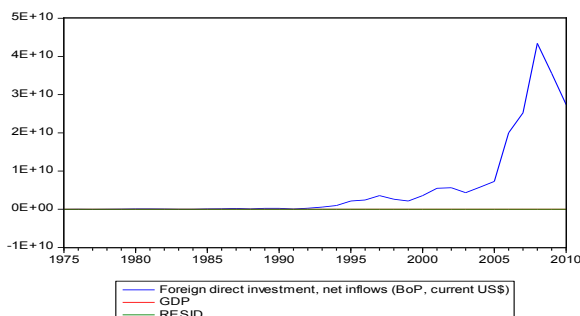


Figure No.1 FDI and GDP Ratio

Review of Literature:

1) Manpreet Kaur, et.al. (2013)

Analyzed A bivariate causality link between foreign direct investment and economic growth: Evidence from India. Found that GDP per capita and FDI are integrated in long run. There also exist a bidirectional between FDI and growth in post liberalization period, i.e. post 1991. There is also evidence of FDI led growth in the pre-liberalization period, i.e. pre 1991.

2) Jena Pabitra Kumar (2012)

Studied that the Robust Direction Between foreign direct investment (FDI) and economic growth for India after globalization. The study explores possible causal and impact relations. FDI to growth to FDI and the bidirectional or no causal link using India's annual time series data for GDP and FDI inflows. Found that there is a positive relationship between FDI and economic growth.

Objectives:

The Main objective of this paper is to study the presence of Relationship between GDP and FDI for India. Government of India has targeted for economic growth and development through foreign direct investment enhances the rate of technology transfer.

Hypothesis:

- 1) is bi-directional causality between GDP growth and FDI
- 2) is unidirectional causality between the two variables

Methodology and Data:

The study analyzes the relationship between GDP and FDI in India. The effect of FDI on economic growth will be estimated in the analysis by using the model below

$$X = \alpha + \beta + \varepsilon \quad \dots\dots\dots 1.$$

$$GDP = \alpha + \beta FDI$$

The data of 1975-2010 periods has used in the empirical analysis. Gross national product symbolizing economic growth and direct foreign investment has been defined in terms of the variables of GDP and FDI.

Unit Root Testing:

Conventional unit root tests such as the ADF, whether the variables include unit-root or not will be tested as in the test of time series analysis. Stationary of data will be analyzed with the help of the equation below

$$\Delta y_t = \beta_1 y_{t-1} + \beta_2 \Delta y_{t-1} + \beta_3 \Delta y_{t-2} + \beta_4 + \beta_5 \varepsilon_t \quad \dots\dots\dots 2.$$

To test for causality between GDP and FDI, we shall estimate

the following regression equations: That Y Granger-causes X. If Y causes X and X does not cause Y, it is said that unidirectional causality exists from Y to X.

$$y_t = \alpha_1 + \sum_{i=1}^n \beta_i x_{t-i} + \sum_{j=1}^m \gamma_j y_{t-j} + \varepsilon_t \dots\dots\dots (3)$$

$$x_t = \alpha_2 + \sum_{i=1}^n \theta_i x_{t-i} + \sum_{j=1}^m \delta_j y_{t-j} + \varepsilon_{t-1} \dots\dots\dots (4)$$

If the F statistic is greater than a certain critical value for an F distribution, then we reject the null hypothesis that Y does not Granger-cause X (equation (1)), which means Y Granger-causes X.

Table No.1

Null hypothesis: FDI has a unit root
Exogenous: Constant
Lags: 6 (Automatic - based on SIC, maxlag=9)

	Statistic	Prob.*
Augmented Dickey-Fuller test statistic	790448	1.0000
Critical values:		
1% level	679322	
5% level	967767	
10% level	622989	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(FDI)
Method: Least Squares
Date: 9/21/14 Time: 22:52
Sample (adjusted): 1982 2010
Included observations: 29 after adjustments

Variable	Coefficient	Std. Error	t-Statistic
FDI(-1)	1.440921	0.516376	2.790448
D(FDI(-1))	-1.114149	0.695019	-1.603049
D(FDI(-2))	-0.517264	0.692424	-0.747033
D(FDI(-3))	-3.658382	0.669352	-5.465555
D(FDI(-4))	-2.630168	0.876917	-2.999333
D(FDI(-5))	-0.632795	1.035375	-0.611175
D(FDI(-6))	-2.765083	1.048422	-2.637375
C	2.27E+08	5.93E+08	0.382658

Adjusted R-squared: 0.798363
Mean dependent var: 494.8110
S.D. dependent var: 210.3427
Akaike info criterion: 12.26338
Schwarz criterion: 12.35135
Hannan-Quinn criter.: 12.29408
Durbin-Watson stat: 0.517047
Prob(F-statistic): 0.000000

Variable	Coefficient	Std. Error	Prob.
C	401.3067	20.39223	0.0000
FDI	1.69E-08	1.70E-09	0.0000
Mean dependent var	0.742001		494.8110
S.D. dependent var	0.734444		210.3427
Akaike info criterion	108.3940		12.26338
Schwarz criterion	109.4751		12.35135
Hannan-Quinn criter.	-218.7408		12.29408
Durbin-Watson stat	97.79892		0.517047
Prob(F-statistic)	0.000000		

Unit Root Test: FDI Table No.2

Unit Root Test: GDP: Table No.3

Null Hypothesis: GDP has a unit root		
Exogenous: Constant		
Lag Length: 0 (Automatic - based on SIC, maxlag=9)		
		t-Statistic Prob.*

Augmented Dickey-Fuller test statistic			8.375847	1.0000
T e s t c r i t i c a l v a l u e s:	1% level		-3.632900	
	5% level		-2.948404	
	10% level		-2.612874	
*MacKinnon (1996) one-sided p-values.				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(GDP)				
Method: Least Squares				
Date: 09/21/14 Time: 22:54				
Sample (adjusted): 1976 2010				
Included observations: 35 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDP(-1)	0.094419	0.011273	8.375847	0.0000
C	-23.75165	5.809084	-4.088708	0.0003
R-squared	0.680092	Mean dependent var		21.51643
Adjusted R-squared	0.670398	S.D. dependent var		21.94652
S.E. of regression	12.59970	Akaike info criterion		7.960669
Sum of squared resid	5238.833	Schwarz criterion		8.049546
Log likelihood	-137.3117	Hannan-Quinn criter.		7.991349
F-statistic	70.15481	Durbin-Watson stat		2.073090
Prob (F-statistic)	0.000000			

FDI Test of a unit root with differentiation. The Differentiated series has unit root. P-value is 1.000, which is less than 5%, which leads to Accepted of null hypothesis about the existence of the unit root. In terms of GDP test of a unit root the Differentiated series has no unit root

The table no 1 has indicated Change of FDI of 1% in period t-1 would affect the GDP for 9.889335% in period t.

Pairwise Granger Causality Tests			
Date: 09/21/14 Time: 22:45			
Sample: 1975 2010			
Lags: 1			
Null Hypothesis:	Obs	F-Statistic	Prob.
GDP does not Granger Cause FDI	35	8.36038	0.0068
FDI does not Granger Cause GDP		0.35996	0.5528

Granger Causality Test: Table No.4

The joint F-statistic value in equation 1 is 8.36038 with the probability value 0.0068. From this we can reject the null hypothesis of GDP does not granger cause FDI. Were $F 8.36038 > P 0.0068$. Also the joint F-value on FDI from equation 2 is 0.35996 with the probability value 0.5528. So we can accept the alternative hypothesis at 5% level of significance. That is FDI Granger causes GDP. The results of Pairwise Granger Causality between economic growth (GDP) and foreign direct investment (FDI) are first equation contained in Table no.4. The results reveal the existence of a uni-directional causality which runs from economic growth (GDP) to investment in foreign direct investment.

Pairwise Granger Causality Tests			Table No.5
Date: 09/21/14 Time: 22:44			
Sample: 1975 2010			
Lags: 2			
Null Hypothesis:	Obs	F-Statistic	Prob.
GDP does not Granger Cause FDI	34	10.8868	0.0003
FDI does not Granger Cause GDP		0.51368	0.6036

The results of the Table no.5 Granger causality tests of the model are shown in above table The table also shows the tests used to choose the lag 2 lengths. The joint F-statistic value in equation 1 is 10.8868 with the probability value 0.0003. From this we can reject the null hypothesis of GDP does not granger cause FDI. Were $F_{10.8868} > P_{0.0003}$. Also the joint F-value on FDI from equation 2 is 0.51368 with the probability value 0.6036. So we can accept the alternative hypothesis at 5% level of significance. That means lag order 2 also FDI Granger causes GDP.

Conclusion

This paper empirically examine Causality relationship between FDI and GDP The test results show that foreign direct investment the findings Indicated that the strong and positive relationship between the GDP and FDI inflows. In terms of Granger causality test indicates that there is a uni-directional causality on the FDI-GDP relationship for one and two year lags that imply, strongly indicating that FDI Granger-causes GDP in india.

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