

# Nexus Between Domestic Investment, FDI and Economic Growth: Empirical Evidence from India

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## Abstract

This paper examines the impact of Domestic Investment and Foreign Direct Investment (FDI) on economic growth of India for the period 1980-2013 by employing the Vector Error Correction Model (VECM) methodology. Domestic Investment was broken down into Private investment and Public Investment. The Augmented Dickey Fuller (ADF) test for unit root, Johansen Cointegration test, VECM, Short run Causality and Impulse Response Function (IRF) were the tools of analysis employed by the study. ADF test for unit root result shows all variables to be integrated of order one  $I(1)$ , i.e. they became stationary after taking first difference. Johansen Cointegration Trace and Max-Eigen Value test shows the presence of cointegration (long run relationship) among the variables. Normalised long run estimates showed Private Domestic Investment and FDI to have a positive and significant relationship with economic growth. The relationship between Labour and economic growth was positive, though statistically insignificant, while Public investment was found to have an insignificant negative relationship with economic growth of India. Short run dynamics of the model shows Private Domestic Investment to have a significant positive relationship with Economic Growth, while FDI was found to have a short run negative impact. Other variables were found to be statistically significant in the short run. Short run Causality result confirms the presence of a short run causal relationship between Private Domestic Investment and FDI with economic growth, running from the variables to economic growth. Impulse Response Function (IRF) showed the response of GDP to a unit standard deviation innovation/ shock on Private Domestic Investment, FDI and Labour to be positive, while the response to shock in Public Investment was negative. Policy recommendations of the study to the government include the enhancement of Private Domestic Investment by removal of bottlenecks to private investment such as high interest rates, excessive taxation. The

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government should also encourage more FDI inflows through the creation of enabling and friendly environment to do business in India.

**Keywords:** Investment, FDI, Economic Growth, India.

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## Introduction

The role of investment in enhancing economic growth has continued to be a topic of interest among economists and policy makers. Investment provides the platform for capital formation which is thus channeled into production of goods and services, and by extension, economic growth. Investment in an economy broadly can be classified into domestic investment and foreign investment. As (Irfan et al, 2012) noted, FDI inflows fulfills the rising investment requirement to boost economic growth at a higher pace and helps for macroeconomic stability. Developing nations such as India have continued to attract foreign capital into their economies. In light of this, (Moses et al, 2013) posited that the economic preference foreign capital is based on the underlying assumption that foreign capital helps to augment domestic investment capital-gap, improves productivity and enhance competition as well as managerial and technological spill over to host countries. Domestic investment is also vital in enhancing economic growth; this is evident in the fact that both the neo-classicals and Marxists have placed emphasis on capital accumulation as an engine of growth (Muhammad and Sampath, 1999).

Domestic Investment and FDI inflows in India have been on the increase in the past decade, the extent to which they affect economic growth of India is what the study investigates.

## Objective

The Objective of the study is to examine the impact of Domestic Investment and Foreign Direct Investment on economic growth of India.

## Empirical Literature Review

(Hooi and Bee, 2011) investigated the impact of domestic investment and FDI on economic growth of Malaysia. Findings of the study suggest FDI have a positive long run impact on economic growth, while domestic investment had a negative impact. FDI was also found to crowd-in domestic investment. (Debashis and Jaydeep, 2012) in their study on “Is There Any Relationship between Foreign Direct Investment, Domestic Investment and Economic Growth in India? A Time Series Analysis” found a unidirectional causality from GDP to FDI and from FDI to Domestic Investment. Stable GDP growth rate was seen as a major boost towards sustainable domestic investment. (Leonce and Sher, 2008) examined the linkages between FDI and Domestic Investment in Sub-Saharan Africa. Results shows FDI to crowd in Domestic Investment while also showing that countries gain more from measures aimed at improving investment climate.

(Moses et al, 2013) examined the impact of domestic investment on FDI inflows in Nigeria for the period 1970-2009. Results shows that private and public domestic investment as well as human capital and market size to be negatively related with FDI, while trade openness and natural resources are positively linked to FDI. (Irfan et al, 2014) studied the interaction between domestic investment, FDI and economic growth of Pakistan for the period 1976-2010. Empirical findings of the study show a bidirectional causality between FDI and domestic investment, and domestic investment has a unidirectional causal relationship with GDP, while no causality was found between FDI and GDP. (Yilmaz, 2014) investigated the effects of FDI inflows and Domestic Investment on economic growth in Turkey using the ARDL methodology. Findings demonstrate FDI inflows as having both short run and long run negative effect on economic growth, while domestic investment affected economic growth positively in the short run and long run. (Olusanya, 2013) employed the Granger Causality approach to examine the impact of FDI on economic growth in Nigeria. Results of the study showed a unidirectional causal relationship running from GDP to FDI in the pre-deregulation period, but in the post deregulated period, bi-directional causal relationship was established.

(Anis and Bassem, 2013) examined the nexus among foreign investment, domestic capital and economic growth in 13 MENA countries using GMM framework. Findings of the study show a bi-directional causal relationship between foreign investment and economic growth as well as domestic capital and economic growth. A unidirectional causal relationship from foreign investment to domestic capital was found. (Micheal, 2009) investigated the effect of domestic investment, economic growth and human development on FDI in China by using data from 1977 to 2007. Findings of the study indicate that as investment and economic growth increase, FDI is attracted to the country.

## **Methodology**

The study adopted the Vector Error Correction Model (VECM) methodology to examine the relationship among the variables. The Augmented Dickey Fuller (ADF) test for unit root was applied to test stationarity of the series and when they were found to be integrated of order one, the Johansen Cointegration test was employed to examine the long run association among the variables, and when cointegration was established, the VECM was employed to identify the long run and short run relationship among the variables. Short run causality as well as Impulse Response Function was also used for analysis.

### *Model Specification*

In order to examine the relationship between the variables, the model is specified as:

$$\text{GDP} = f(\text{DINV}, \text{FDI}, \text{LAB}) \quad (1)$$

For a more robust investigation, domestic investment is divided into public domestic investment and private domestic investment. In order to cater for the problem of outliers and hetroskedasticity, the series are taken in their log form. Hence, the model can be mathematically specified as:

$$LNGDP = \alpha_0 + \beta_1 LNPRINV + \beta_2 LNPUINV + \beta_3 LNFDI + \beta_4 LNLAB + \varepsilon_t \quad (2)$$

Where: GDP = Gross Domestic Product, proxy for economic growth.

PRINV = Private Investment (Gross Domestic Capital Formation).

PUINV = Public Investment (Public Capital Expenditure).

FDI = Foreign Direct Investment Inflows.

LAB = Total Labour Force.

Data on the variables were sourced from the Handbook of Statistics on Indian Economy 2014 and World Bank Indicators. Data are in annual series and were collected for the period 1981 - 2013.

The VAR Specification of the Model is given as:

$$Y_t = C + \Pi_1 Y_{t-1} + \Pi_2 Y_{t-2} + \dots + \Pi_p Y_{t-p} + \varepsilon_t \quad (3)$$

Where:  $Y_t$  is a vector of endogenous variables =

$C$  is a vector of intercept term.

$$\begin{pmatrix} GDP \\ PRINV \\ PUINV \\ FDI \\ LAB \end{pmatrix}$$

$\Pi_i$  is an (n x n) coefficient matrix.

$\varepsilon_t$  is a vector of error term.

The long run cointegrating equation is specified as:

$$U_t = GDP - \alpha_0 - \beta_1 PRINV - \beta_2 PUINV - \beta_3 FDI - \beta_4 LAB \quad (4)$$

The Vector Error Correction Model (VECM) is specified as:

$$\Delta Y_t = C + \sum_{i=1}^k \Gamma \Delta Y_{t-i} + \gamma(U_{t-1}) + \varepsilon_t \quad (5)$$

Where:  $\Gamma$  = Short run coefficient matrices.

$\gamma$  = Error correction term/ speed of adjustment.

$\Delta$  = Short run operator.

$U_{t-1}$  = One lag of long run cointegrating equation.

$\varepsilon_t$  = Vector of error term.

## Findings and Discussion

### Stationarity Test

As a first step in time series analysis, the variables have to be checked to see at whether they are stationary or not, and at what level. To do this, the Augmented Dickey Fuller (ADF) test for unit root was employed. The result of the test is presented in Table 1.0.

Table 1 Stationarity Test Result

Variables	Level		First Diff.		Order
	Intercept	Int & Trend	Intercept	Int & Trend	
GDP	1.97	-1.31	-4.86**	-5.35**	I(1)
PBINV	1.24	-0.33	-8.11**	-5.87**	I(1)
PRINV	0.88	-2.59	-6.80**	-6.91**	I(1)
FDI	-0.67	-3.58	-4.21**	-4.17**	I(1)
LAB	-1.51	-0.81	-4.68**	-4.79**	I(1)

H<sub>0</sub>: Series is non- stationary. \* and \*\* indicates rejection of H<sub>0</sub> at 5% and 1% sig level

From the stationarity test result in Table 1.0, all our variables became stationary only after taking their first difference. A variable is said to be stationary if the ADF test statistic is greater than the critical ADF value. We could thus say that all our variables are integrated of order one I(1) because they were not stationary at level, but rather at first difference.

### Cointegration Test

Based on our stationarity test result, all our variables were found to be integrated of order one. Therefore, the next step is to examine whether the variables have long run relationship or not, to do this, we apply the Johansen Cointegration test. The test result is presented in Table 2.0.

Table 2 Cointegration Test Result

Hypothesized No. of CE(s)	Trace Test		Max Eigen Value Test	
	Trace Statistic	0.05 Critical Value	Max-Eigen Statistic	0.05 Critical Value
None	96.32559*	69.81889	46.62512*	33.87687
At most 1	49.70047*	47.85613	24.66502	27.58434
At most 2	25.03545	29.79707	16.04843	21.13162
At most 3	8.987018	15.49471	7.697974	14.26460
At most 4	1.289044	3.841466	1.289044	3.841466

\* denotes rejection of the hypothesis at the 0.05 level

From the cointegration test result presented in Table 2.0, the null hypotheses are rejected if the test statistic is greater than the 5 percent critical value statistic. The Trace test statistic indicates the presence of two cointegrating relationship among the variables,

while the maximum eigen value test indicates the presence of one cointegrating relationship among the variables. We could thus infer from the above that there exists the presence of long run association among our variables.

### *Long Run Relationship*

Having established the presence of long run association (cointegration) among the variables, the next step in the analysis is to examine the long run relationship among the variables. The normalized long run relationship among the variables is given as:

$$GDP = 7.86 + 0.44PRINV^* + 0.08PUINV + 0.09FDI^* - 0.36LAB.$$

From the long run estimation above, private investment is found to have a significant long run impact on GDP, a percentage change in private investment leads to a 0.44 percentage increase in GDP. FDI was also found to have a significant relationship with GDP, a percentage change in FDI leads to a 0.08 percent increase in GDP. Public Investment was found to have an insignificant positive relationship with GDP, while Labour was found to have an insignificant negative relationship with GDP in the long run.

### *Vector Error Correction Model (Vecm)*

In order to examine the short run dynamics of the model and error correction coefficient, the VECM is applied. The result is presented in Table 3.0.

Table 3 Short Run Estimation.

Variables	Coefficients	T-Statistic
ECT	-0.41**	-3.60
D(PRINV(-1))	-0.05	-0.52
D(PRINV(-2))	0.18*	2.58
D(PUINV(-1))	-0.02	-0.71
D(PUINV(-2))	-0.03	-1.01
D(FDI(-1))	-0.02*	-2.18
D(FDI(-2))	-0.02**	-3.26
D(LAB(-1))	0.60	1.59
D(LAB(-2))	0.63	1.71
R Squared	0.53	

\*\* and \* indicates statistical significance at 1% and 5%.

From the estimated short run result in Table 3.0, the error correction term (ECT) shows the speed of adjustment towards long run equilibrium following a shock in the economy. The coefficient -0.41 indicates that about 41 percent correction towards long run equilibrium is completed in a year. The findings suggest that second period lag of private investment has a positive short run relationship with GDP, while FDI has a negative short run relationship with GDP. Other variables were found to be statistically insignificant. R squared shows that about 53 percent variation in the dependent variable is explained by the independent variables.

### Residual Diagnostics

Portmanteau Tests for Autocorrelations shows the absence of autocorrelation in the model (see appendix one). VEC Heteroskedasticity test shows residual to be homoscedastic (see appendix two). Jarque –Bera Normality test shows residuals to be normally distributed (see appendix three).

### Short Run Causality

Causality examine whether or not the past values of a series is useful in forecasting another series. The short run causality among the variables is examined using the Wald Restriction test.

Table 4.0 Short Run Causality Result

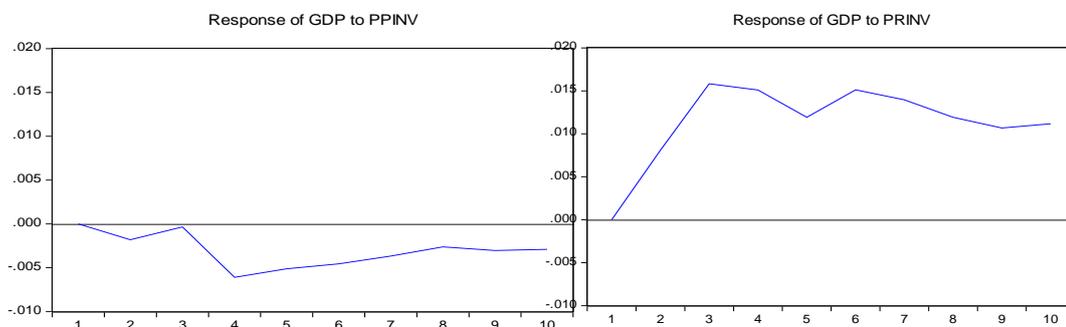
Variables	F Statistic	Prob.
PUINV → GDP	0.63	0.55
PRINV → GDP	3.45*	0.05
FDI → GDP	5.45**	0.01
LAB → GDP	2.51	0.11

\*\* and \* indicates statistical significance at 1% and 5%.

From the short run causality test result in Table 4.0, Private investment and FDI are found to have a unidirectional causal relation with GDP, running from the variables to GDP. We could thus say that past values of FDI and Private investment are useful in forecasting GDP.

### Impulse Response Function (IRF)

The IRF shows the response of a variable to a unit standard deviation innovation/ shock to itself and other variables in the model. It shows how a variable respond into time horizon to shocks (a sudden unexpected change) in the variable and other variables in the model.



From the IRF graphs above, Fig 1 shows the response of GDP to a shock in Private Investment. It can be seen that the response is negative for all the period under study, it started with by having a mild negative response during the second period; it later rose to zero in the third period and afterwards bottomed out at the fourth period. In Fig.2, the

response of GDP to shock in Private investment was a sharp positive response; it reached its peak in the third period and continued to fluctuate, though positively all through the period. We could thus say that Public investment has a negative impact on GDP, while Private investment is positive impact.

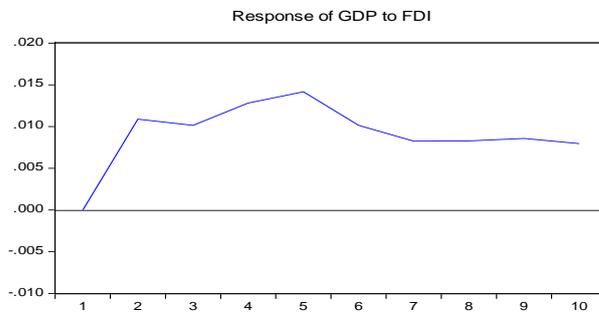


Figure. 3 Response of GDP to FDI

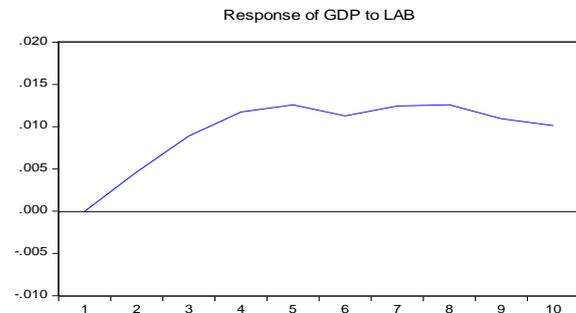


Figure. 4 Response of GDP to LAB

Fig. 3 shows the response of GDP to shocks in FDI to be progressively positive through the first period to fifth period, but afterwards declined marginally, though still positive. In Fig.4, the response of GDP to a unit innovation in labour was found to be positive all through the periods. We could infer from the above that both FDI and Labour exert a positive impact on GDP.

## Conclusion

The study investigated the impact of domestic and FDI on economic growth of India by segregating domestic investment into private and public investment. Findings of the study suggest that Private investment and FDI has a significant positive impact on economic growth in the long run, while Public investment is seen to have an insignificant positive impact. From the findings, it can be inferred that the insignificant positive impact of public investment on economic growth can partly be due the inefficiency of the public sector where a lot of leakages exist and corruption looms so much so that funds appropriated for public spending are not judiciously used for the purpose it was earmarked for and in some cases, the said funds are siphoned and as a result, public investment might not translate into meaningful impact on economic growth of India. As a policy recommendation, the government should consider checkmating the excesses of its officials and ensuring that public investment appropriation are effectively implemented and all loopholes blocked. In the same vein, the government should put in place measures that will enhance private investment such as reduction in interest rate and provision of incentives that will enhance private investment in India. Also, the government should also promote FDI inflows by providing the conducive atmosphere to do business in India by provision of incentives such as reduction in taxation of tax holidays, ensuring security of foreign investment and also revision of bureaucratic practices and laws that may inhibit FDI, this when done will no doubt lead to the economic growth of India.

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## Appendix One

VEC Residual Portmanteau Tests for Autocorrelations

Null Hypothesis: no residual autocorrelations up to lag h

Date: 11/03/15 Time: 18:13

Sample: 1 34

Included observations: 31

Lags	Q-Stat	Prob.	Adj Q-Stat	Prob.	Df
1	12.09104	NA*	12.49407	NA*	NA*
2	27.15040	NA*	28.59201	NA*	NA*
3	49.96883	0.2825	53.85528	0.1717	45
4	73.78893	0.3554	81.20427	0.1695	70
5	105.5842	0.2151	119.1140	0.0477	95
6	130.6711	0.2382	150.2217	0.0322	120
7	146.4332	0.4510	170.5811	0.0721	145
8	165.4630	0.5840	196.2300	0.0821	170
9	186.7633	0.6514	226.2441	0.0620	195
10	198.8892	0.8434	244.1442	0.1265	220
11	212.8060	0.9323	265.7153	0.1735	245
12	226.3509	0.9751	287.8148	0.2180	270

\*The test is valid only for lags larger than the VAR lag order.  
 df is degrees of freedom for (approximate) chi-square distribution

## Appendix Two

VEC Residual Heteroskedasticity Tests: No Cross Terms (only levels and squares)

Date: 11/03/15 Time: 18:14

Sample: 1 34

Included observations: 31

Joint test:		
Chi-sq	df	Prob.
334.4697	330	0.4211

### Appendix Three

Component	Jarque-Bera	Df	Prob.
1	4.229943	2	0.1206
2	0.795489	2	0.6718
3	1.935037	2	0.3800
4	0.450220	2	0.7984
5	0.115607	2	0.9438
Joint	7.526296	10	0.6750