

An Empirical Study of Savings Impetus on Gross Domestic Product of India

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Abstract: India's growth story is increasingly becoming visible in the global context, with the various policy measures taken by the present government and the monetary authorities. The growth in the Indian context is diverse with higher imports, unswerving consumption, and being a developing economy a large government deficit. The policy makers must strike the right chord to steer the economy in such turbulent times. The measures of de-monetization, implementation of GST have their own repercussions. The increase in Foreign direct investment also aids in building the capital, required for growth. The capital formation, prima facie is a product of the savings function of the economy. Various economic theories have worked on the model of domestic savings leading to investment, which translates to higher growth. The study was intended to understand the Growth-Savings nexus in the Indian context. ARDL model was framed using secondary data. The model observed significant influence of FDI, FII and Domestic savings. FDI was observed pivotal in influencing the other dependent variables and the GDP growth.

Keywords: Savings, capital formation, economic growth, ARDL model, Causality JEL Classification: E21, F43, C41

1. INTRODUCTION

The trajectory of a growing economy is significantly influenced by capital flows. The India's growth story has also been influenced by the capital flows, similar to the other Asian peers & the emerging countries. The factors that influence the growth include consumption, government expenditure, exports to name a few. The Indian growth is predominantly led by consumption, and the growth needs large amount of capital. The various forms of capital include domestic savings, foreign investments and government spending. The policy makers have in the recent past strived to increase the foreign holdings in various sectors, so as to enable sufficient capital required for growth. On the other hand, various economic theories stress on domestic savings as a key factor to capital formation that can also aid in higher growth and the study was aimed at determining the key determinants of gross capital formation and at the same time observes the effect of growth in capital formation that translates to gross domestic product.

2. REVIEW OF LITERATURE

The prior studies stress upon the political aspects and legal aspects in aiding growth, and the degree of development varied between the developed and the developing countries (Petraos, Arvanitidis, & Pavleas, 2007). Interaction among the various policy measures, technology, human capital, culture have been studied and the causality among them have been highlighted (Kibritcioglu & Dibooglu, 2001). Some sector specific studies with agriculture in focus highlighted population in rural areas, FDI, life expectancy, inflation rate, Overall Exports and percentage of exports to imports with respect to agricultural products determined the agriculture sector contribution to GDP significant (De Sormeaux & Pemberton, 2011). A Sub-Saharan study stressed capital formation, exports and formation of human capital contributed significantly to economic growth (Ndambiri, Ritho, & Ng'ang'a, 2012). Private investments can be encouraged to advance the economic growth and at the same time external loans was observed to have a negative effect (Amanja & Morrissey, 2005). FDI and FII are key drivers of growth for Indian economy. Various studies proved to have a unidirectional influence from FII towards GDP (Shikha Menani, 2013), she suggested that FDI can be encouraged as it provides a long term framework, whereas in case of FII inflows are of short term in nature. The investments in the Indian market were attributed to institutional investors The stock markets were strongly influenced by FII flows (Anubha Shrivastav, 2013). A bidirectional causality was noted between the FII flows and the money market returns, stock market returns and also with the returns of foreign exchange. The correlation between the FII investments and the Sensex returns & Nifty returns was observed positive. FDI inflow patterns were examined to evaluate the key factors that determine FDI flows (Bhavya Malhotra, 2014), The research observed FDI inflows had a positive impact on the economic growth. The FDI capital flows augments the shortfall of the domestic capital. The causality direction between savings and economic growth was studied to examine the causation effect

(Sachin N. Mehta, 2014). The study observed no causality during the year 1950 to 2011, between Real GDP and Real GDS in India. A co-integration among the factors was observed between savings, foreign aid on India's growth (Murtala Abdu, 2015), the study suggested utilization of aid for productive sectors through policy measures. India sector specific studies observed services sector to contribute significantly to the Economic growth (Jain, Nair, & Jain, 2015). The role of increasing spending on research & development was also highlighted by the literature to increase GDP growth by means of technological advancement (Svetlana et. al, 2016) The economic theories stress the role of capital formation in the GDP estimates, and it was observed that large foreign investment inflows also aid in higher proportion of capital formation (Nagaraj R & T N Srinivasan, 2016) and the prior studies abstracted key variables as FDI, Domestic savings, Investment lead to a higher GDP, but lacks clarity on how the variables adds to the capital formation which intern lead to higher economic growth in the Indian context.

3. STATEMENT OF PROBLEM

Domestic consumption and foreign flows influence the growth of India's GDP. Among the foreign flows, foreign direct investments provides a larger benefit by creating employment, standard of living and also acts as a multiplier to growth, whereas foreign institutional investments by nature is are more volatile. The factors that are key to determine the GDP growth is the capital formation and the various investments that yields a higher capital formation needs to be figured to implement measures to attain a higher and stable growth.

3.1 Objectives

1. To list various investments and their effect on capital formation.
2. To model Gross capital formation and its influence on GDP.
3. To determine the causal relationship among the variables.

3.2 Data & Methodology

Secondary data was used for the study period of 26 years from 1990 to 2016. E-Views version 7.2 was used to analyze the data.

3.2.1 Test for Stationary Series:

A series with mean equal to zero and no auto-co-variances based on time is defined stationary. A combination of trend and drift in the series is checked using the Augmented Dickey Fuller test. The hypothesis is specified as below;

H_0 : Time series is not stationary (the series has a unit root)

H_1 : The Time series is stationary.

3.2.2 Vector Auto Regression

Vector Auto Regression (VAR) aids in analysis of multiple times series to capture their linear interdependencies. The model facilitates more than one evolving variable. VAR provides optimal lag length criteria for the Auto Regressive Distributive Lag model.

3.2.3 Assumption check & Diagnosis

The following checks were performed to ensure that the model satisfies all necessary conditions. Normality Test, Breush-Godfrey Serial Correlation, Heteroskedasticity test, Stability Test (CUSUM TEST) and VAR Granger causality test.

4. DATA ANALYSIS AND INTERPRETATION

The data was collected from the World Bank estimates and the data was differenced to obtain Stationarity. The Gross domestic product was considered as dependent variable, foreign institutional investments, foreign direct investment and gross domestic savings were independent variables.

TABLE 1: ADF test for Stationarity

ADF test for Stationarity	
Constant and trend	
	P-value
LGDP	0.6639
DLGDP	0.0120
FDI	0.0013
FII	0.0001
GCF	0.6437
DGCF	0.0082
GDS	0.5315
DGDS	0.0019

All variables were observed stationary at first difference excluding one variable (FII). All the variables were tested using Augmented Dickey Fuller test and a P-value of less than 5%, rejects the null hypothesis of non-Stationarity.

TABLE 2: Model 1: dlgdp c dfdi fii dgds

Dependent Variable: DLGDP				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.052314	0.010829	4.830952	1E-04
DFDI	9.30E-13	1.43E-12	0.648918	0.523
FII	-8.86E-13	1.22E-12	-0.72519	0.476
DGDS	1.63E-12	2.74E-13	5.927244	0
R-squared	0.765376	F-statistic	22.83502	
Adjusted R-squared	0.731859	Prob(F-statistic)	0.000001	
Durbin-Watson stat	1.998826			

The model is significant, with a prediction of 73% and among the independent variables; GDS is significant whereas FDI and FII are not.

TABLE 3: dlgdp c dfdi fii dgds dfdi(-1) fii(-1) dgds(-1) dfdi(-2) fii(-2) dgds(-2)

Dependent Variable: DLGDP				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.060849	0.012533	4.855081	0.0003
DFDI	9.78E-13	2.14E-12	0.456308	0.6557
FII	-4.48E-13	1.50E-12	-0.299146	0.7696
DGDS	1.56E-12	3.07E-13	5.098547	0.0002
DFDI(-1)	1.88E-13	2.46E-12	0.076603	0.9401
FII(-1)	-1.19E-12	1.98E-12	-0.601356	0.5579
DGDS(-1)	4.61E-13	2.98E-13	1.54921	0.1453
DFDI(-2)	-1.19E-12	1.73E-12	-0.686159	0.5047
FII(-2)	-2.22E-12	1.68E-12	-1.321967	0.209
DGDS(-2)	4.12E-13	3.18E-13	1.29555	0.2177
R-squared	0.869031	F-statistic	9.584473	
Adjusted R-squared	0.77836	Prob(F-statistic)	0.0002	
Durbin-Watson stat	1.330405			

The model for GDP as dependent variable is significant, with a prediction of 77% considering the lags and among the independent variables, GDS is significant whereas FDI, FII and their lags are not.

TABLE 4: dgcf c dfdi fii dgds dfdi(-1) fii(-1) dgds(-1) dfdi(-2) fii(-2) dgds(-2)

Dependent Variable: DGCF				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-3.88E+09	3.49E+09	-1.111446	0.2865
DFDI	-1.338802	0.596169	-2.245673	0.0427
FII	-1.462869	0.416795	-3.509806	0.0038
DGDS	1.36028	0.085384	15.93124	0
DFDI(-1)	1.022923	0.683483	1.496633	0.1584
FII(-1)	0.221463	0.549782	0.40282	0.6936
DGDS(-1)	0.260665	0.082806	3.147919	0.0077
DFDI(-2)	-1.183348	0.482767	-2.451177	0.0291

FII(-2)	-0.262056	0.466426	-0.561839	0.5838
DGDS(-2)	0.175212	0.088398	1.982075	0.069
R-squared	0.981308	F-statistic	75.83282	
Adjusted R-squared	0.968368	Prob(F-statistic)	0	
Durbin-Watson stat	0.585498			

The model with GDS is significant, with a prediction of 96% considering the lags and among the independent variables, FDI, FII and GDS is significant along with the lags. R-Squared can be compared for the model among the GDP and GDS, and in comparison the model for GDS proves highly significant. The model uses the variables at 1st difference and Level and hence the model of best fit is the ARDL model.

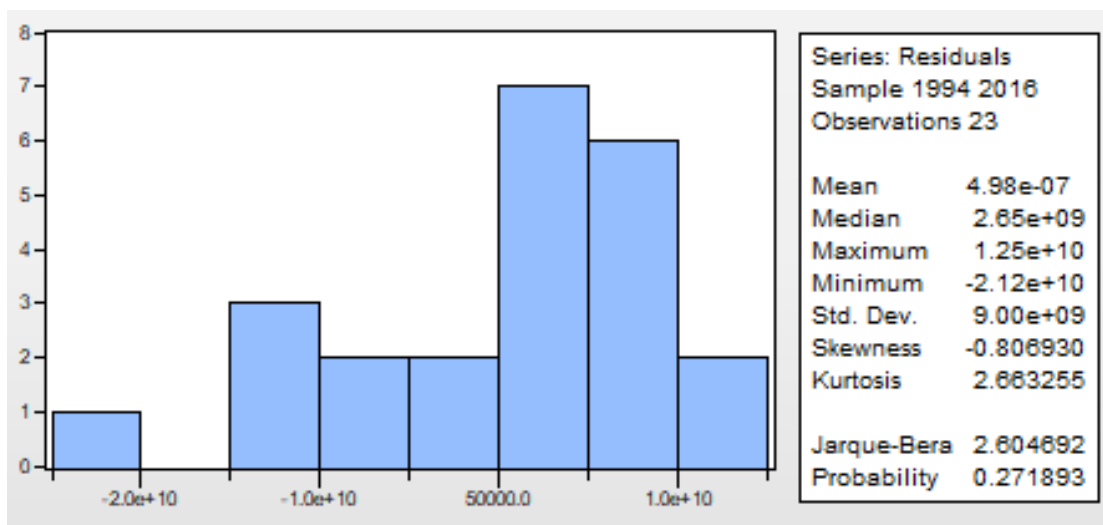
TABLE 5: ARDL Model: dgcf c dfdi dfdi(-2) fii dgds dgds(-1) dgds(-2)

Dependent Variable: DGCF				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-4.16E+09	3.27E+09	-1.269573	0.2224
DFDI	-1.127413	0.421604	-2.674102	0.0166
DFDI(-2)	-0.934357	0.332939	-2.80639	0.0127
FII	-1.528573	0.348331	-4.388277	0.0005
DGDS	1.403656	0.078253	17.93736	0
DGDS(-1)	0.243697	0.054836	4.44414	0.0004
DGDS(-2)	0.214493	0.051516	4.163608	0.0007
R-squared	0.97635	F-statistic	110.0886	
Adjusted R-squared	0.967481	Prob(F-statistic)	0	
Durbin-Watson stat	0.919135			

The model using the lags of dependent variables proves 96% predictability and significant. The model has auto-correlation problem depicted by the Durbin-Watson statistic. Including the lag of the dependent variable the model is corrected for the auto-correlation problem.

TABLE 6: Test for Normality

The results of the normality test are given below.



The value of Jarque-Bera statistics is 2.60. The P-value evidences that the data is normally distributed. The Null hypothesis being that the distribution of data is normal, which cannot be rejected according to the P-Value.

If the current variable value depends on it own past value, serial correlation is said to exist. And the below table suggests no serial correlation as inferred by the p-value of more than 5%.

Serial Correlation test:

TABLE 7: Serial Correlation test

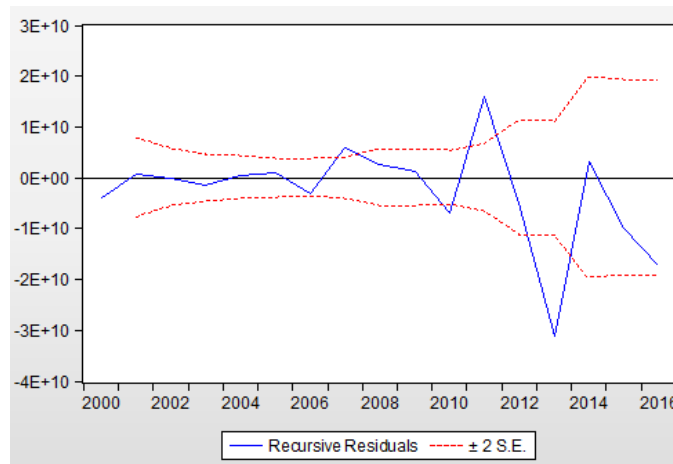
Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	1.578684	Prob. F(2,15)	0.2387
Obs*R-squared	3.999448	Prob. Chi-Square(2)	0.1354

Test for Heteroskedasticity:

The errors are homoscedastic, if the variance is constant. The p-value suggests (Chi-Square) that there is no Heteroskedasticity.

TABLE 8: Heteroskedasticity Test: Breusch-Pagan-Godfrey

Heteroskedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	2.865347	Prob. F(5,17)	0.0470
Obs*R-squared	10.51865	Prob. Chi-Square(5)	0.0618
Scaled explained SS	4.778935	Prob. Chi-Square(5)	0.4435



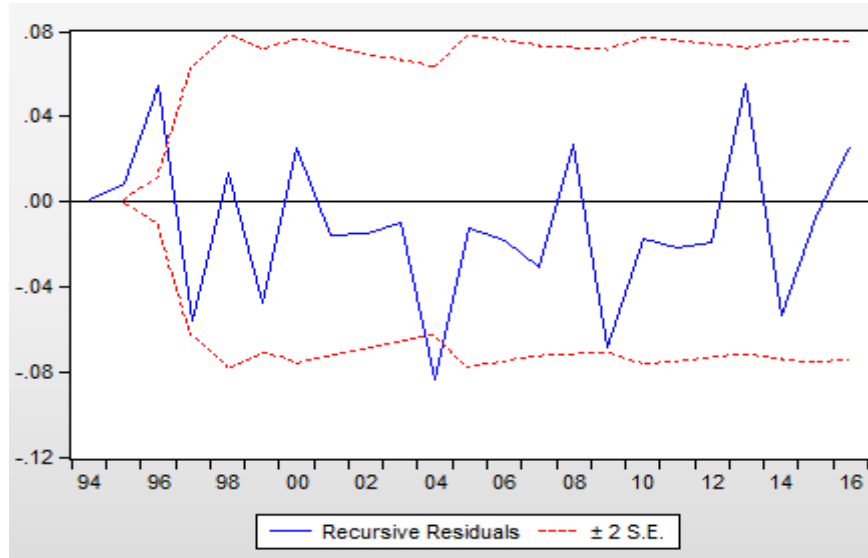
Graph 1: Stability test:

From the above graph, the blue line indicates the stability of the model with the 5% significance.

TABLE 9: Model DLGDP and DGCF

Dependent Variable: DLGDP				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.054659	0.008267	6.611703	0
DGCF	1.24E-12	1.48E-13	8.360541	0
R-squared	0.752418	F-statistic	69.89864	
Adjusted R-squared	0.741654	Prob(F-statistic)	0	
Durbin-Watson stat	2.325279			

The Dependent variable GCF proved highly significant with R-squared of 74% and the Residual diagnostics of the model was found free of autocorrelation, homoskedastic and normally distributed. The Stability of the model is as shown below.



Graph 2: Stability test:

TABLE 10: Lag order Selection

VAR Lag Order Selection Criteria						
Endogenous variables: DLGDP DGDS DFDI FII						
Lag	LogL	LR	FPE	AIC	SC	HQ
0	-1652.793	NA*	4.35e+57	144.0690	144.2665*	144.1186*
1	-1636.331	25.76710	4.30e+57*	144.0288*	145.0162	144.2771
2	-1627.146	11.18124	9.01e+57	144.6214	146.3987	145.0684

TABLE 11: Granger Causality

Pairwise Granger Causality Tests			
Null Hypothesis:	Obs	F-Statistic	Prob.
DGDS does not Granger Cause DLGDP	24	0.40270	0.5325
DLGDP does not Granger Cause DGDS		0.27628	0.6047
DFDI does not Granger Cause DLGDP	24	0.09440	0.7617
DLGDP does not Granger Cause DFDI		6.55779	0.0182
FII does not Granger Cause DLGDP	24	0.00801	0.9296
DLGDP does not Granger Cause FII		1.04043	0.3193
DFDI does not Granger Cause DGDS	24	0.14950	0.7029
DGDS does not Granger Cause DFDI		10.0841	0.0046
FII does not Granger Cause DGDS	24	0.07712	0.7840
DGDS does not Granger Cause FII		1.90148	0.1824
FII does not Granger Cause DFDI	24	18.3083	0.0003
DFDI does not Granger Cause FII		0.37978	0.5443

The cause and effect relation was checked using the Granger causality test and a unidirectional relationship was observed between FDI and FII, FDI and GDS and FDI and GDP. FDI proved to cause an effect on the other variables. The influence of FDI was significant and matched prior studies Anita R(2012) and Malla Reddy M(2014).

5. IMPLICATIONS & SUGGESTIONS

The econometric model of Gross capital formation was highly significant compared to the model GDP. The independent factors GDS, FDI and FII showed highly significant in determining the Capital formation. The model using GDP as dependent on capital formation was superior than the independent factors directly taken upon GDP. The causality suggests that FDI as the key factor in aiding the GDP growth and the other factors. The policy makers are suggested to attract more FDI such that it stimulates the other factors to aid in capital growth and intern increase the GDP growth.

6. CONCLUSION

The study demonstrates that Gross capital formation is the key to India's GDP growth, and the key factors that determine the capital formation are the FDI, FII and the domestic savings. The significance of capital formation was noted by (Qaiser Abbas et. al., 2011) in a study of SAARC Countries. It is observed from the ARDL linear estimates (Table 5). The relationship using Granger causality was found unidirectional influenced predominantly by FDI. The various tests for normality, serial correlation & Heteroskedasticity proved residuals to be free from all the criteria's. The ARDL model fit estimates a 96% accuracy (R^2 value) with a significant model. The study suggests a higher growth of GDP can be achieved by increasing the capital formation through domestic savings, FDI and FII.

7. LIMITATIONS AND SCOPE FOR FURTHER RESEARCH

The data collected was limited to 5 variables- GDP, GDS, GCF, FII & FDI. The other forms of investment such as portfolio investments can also be considered to give a clear picture. FII proved stationary at level leading to the ARDL model. The other theoretical models of savings can as well be tested to obtain reliable estimates. The model can be extended to a higher time period; the study was performed using 26

years data i.e. from 1990 to 2016. GDP data used for the analysis was at current prices, other substitutes can yield a different dimension to the model.

REFERENCES

- [1] Amanja, D. M., & Morrissey, O. (2005). Foreign Aid , Investment , and Economic Growth in Kenya : A Time Series Approach by. *Growth (Lakeland)*, (06).
- [2] De Sormeaux, A., & Pemberton, C. (2011). Factors Influencing Agriculture's Contribution to GDP: Latin America and the Caribbean, (Lewis 1954).
- [3] Jain, D., Nair, K. S., & Jain, V. (2015). Factors Affecting GDP (Manufacturing , Services , Industry): An Indian Perspective. *Annual Research Journal of Symbiosis Centre for Management Studies*, 3(April 2015), 38–56.
- [4] Kibritcioglu, A., & Dibooglu, S. (2001). Long – Run Economic Growth : An Interdisciplinary Approach. 2001.
- [5] Ndambiri, H. k, Ritho, C., & Ng'ang'a, S. I. (2012). Determinants of Economic Growth in Sub-Saharan Africa : A Panel Data Approach. *International Journal of Economics and Management Sciences*, 2(2), 18–24. Retrieved from <https://www.omicsonline.org/open-access/determinants-of-economic-growth-in-subaharan-africa-a-panel-data-approach-2162-6359-2-121.pdf>
- [6] Petrakos, G., Arvanitidis, P., & Pavleas, S. (2007). Determinants of economic growth: the experts' view. *2nd Workshop of DYNREG in ...*, 13(October 2007), 245–276. Retrieved from http://www.ifw-kiel.de/konfer/2007/agks/paper/petrakos_arvanitidis_pavleas.pdf
- [7] Sachin N. Mehta and Gaurang D. Rami (2014), *Causal relationship between savings and economic growth in India*, Retrieved from https://www.academia.edu/5903697/CAUSAL_RELATIONSHIP_BETWEEN_SAVINGS_AND_ECONOMIC_GROWTH_IN_INDIA?auto=download
- [8] Shikha Menani (2013), *FDI and FII as drivers of growth for Indian economy: A Comparison*, retrieved from www.ijird.com/index.php/ijird/article/viewFile/44248/35762
- [9] Svetlana Sokolov-Mladenović, Slobodan Cvetanović & Igor Mladenović (2016) R&D expenditure and economic growth: EU28 evidence for the period 2002–2012, *Economic Research-Ekonomska Istraživanja*, 29:1, 1005-1020, DOI: 10.1080/1331677X.2016.1211948
- [10] Qaiser Abbas, Salman Akbar, Ali Shan Nasir , Hafiz Aman Ullah, M. A. N. (2011). Impact of Foreign Direct Investment on Gross Domestic Product. *Global Journal of Management and Business Research*, 11(8).
- [11] World Bank estimates retrieved from <https://data.worldbank.org>