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# SAVINGS LEAD GROWTH IN INDIA: AN INVESTIGATION

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**ABSTRACT**

Economic Growth is the common aim of every nation and saving forms an inevitable part of it. Accumulated savings can be considered as a source of capital formation which plays a crucial role in creating investment and employment. Hence, it becomes necessary to study the relationship between Saving, Investment and GDP. The present study is an endeavour to examine the direction of causality between Gross Domestic Savings (GDS), Gross Capital formation (GCF) and Gross Domestic Product (GDP) in India during the period 1950-51 to 2015-16. The period of study has been further classified as pre- reform and post- reform period to have a clearer picture of the relationship among the variables. Vector Error Correction Mechanism (VECM) and Johansen co-integration techniques are used to analyze the relationship among the variables. The Johansen co-integration test indicates that a long run relationship exists among GDS, GCF and GDP. The Granger Causality test suggests that there is no causality running among the variables in the pre- reform period with the exception that GDS granger causes GCF. In the post reform period we find that there is no causal relationship among the variables. The result so obtained for the overall period, reveals that GDP and GCF Granger causes GDS thereby suggesting that there is growth led savings.

**KEYWORDS:** Economic Growth, Savings lead Growth, VECM, Granger Causality Test.

**INTRODUCTION**

Every nation tries to achieve a common goal of economic growth. Hence, Government in each country aims to undertake measures to remove the anomalies that hinder the path of economic growth and implement those policies that target economic growth. Savings and investment acts as a vital tool in the determination of economic growth and the level of national income of any developing country. Domestic savings is an important source of capital formation, which is essential for economic growth. Savings are channelized in the form of investment which necessitates economic growth. Increased savings and thus increased capital formation in the form of investment serves as the strategy behind the economic growth. India happens to be one of the most emerging economies of the globalised era, predominantly since the initiation of liberalisation in 1991. The dual impact of globalisation and liberalisation has had a mixture of response in the form of achievements and disappointments in the Indian economy. One such achievement is the high rate of economic growth of the country which has seen a stark difference from the pre-reform period. As such it becomes very important to study the conditions responsible for the rate of economic growth in the pre and post reform period.

The relationship between saving, investment, and economic growth has been a matter of contemplation among economists for a considerable period of time. Simple Keynesian economics says that in a closed economy, total income is composed of savings and consumption and saving determines the level of investment. If we define both savings and investment as the difference between Gross Domestic Product and Consumption, it may tend to be interpreted in terms of cause and effect relationship.

The literature regarding the relationship between saving, investments and economic growth has seen varied opinions and arguments in theories developed by the economists' overtime. *Lewis'* (1955) traditional theory argues that an increase in saving would accelerate economic growth, while *Harrod-Domar* model credited investment as a major component promoting economic growth. *Japelli* and *Pagano* (1994) claimed that it is savings that contribute to higher investment and higher GDP growth in the short- run, whereas, *Carroll-Weil hypothesis*(1994) argues that economic growth contributes savings, and not vice-versa. *Sinha* (1996) studied the causality between the growth rates of Gross Domestic Savings and Economic growth and concluded that there was no causality running in either direction. *Mühleisen* (1997) observed significant causality running from growth to savings

but not the other way around. Again, *Sinha* and *Sinha* (2008) looked at the relationships among growth rates of Gross Domestic Product, household savings, public savings and corporate savings over the period 1950-2001 and inferred that economic growth produce higher savings in various forms but not vice-versa. *Verma* (2007) used the Auto Regressive Distributed Lag co-integration approach (ARDL) to determine the long run relationship of Gross Domestic Savings, Gross Domestic Investment and Gross domestic Product for the period 1950-51 to 2003-04 and concluded that saving does not cause growth but growth causes savings and supported the Carroll-Weil Hypothesis. *Krieckhaus* (2002) notes that a higher level of national savings led to higher investments and consequently caused higher economic growth. *Anoruo and Ahmad* (2001) studied the direction of causality of savings and economic growth in seven African countries using VEC method. They observed that in four countries, economic growth Granger caused the growth rate of domestic savings. However, there was bi-directional causality in Cote d'Ivoire and South Africa. It was only in Congo that the opposite result did prevail such that the growth rate of domestic savings Granger caused economic growth. *Mavrotas and Kelly* (2001) studied data from India and Sri Lanka to find out the relationships among gross domestic product, gross domestic savings, and private savings using the Toda and Yamamoto method to test for Granger causality. They found that there was no causality between GDP growth and private savings in India. However, bi-directional causality was observed in Sri Lanka. *Ramesh, Mohan* (2006) investigated the relationship between the domestic savings and economic growth for various economies. Granger causality tests were conducted for anuual time-series data. Their objective was to find out whether the direction of causality in these economies differed or not according to their income class: namely Low Income Countries, Low Middle income Countries, Upper Middle income Countries, and High Income Countries. The empirical results reveal that in 13 countries, the economic growth rate Granger causes growth rate of savings. In two countries the opposite results prevailed while, in five countries, a bi-directional causation was observed.

It so appears that there is no significant literature available to identify the relationship between Gross Domestic Savings (GDS) and Gross Capital Formation (GCF) with that of Gross Domestic Product (GDP) in the pre and post reform period. This paper therefore investigates whether there is causality running from savings to growth or from growth to savings by studying the relationship between the aforementioned variables in the pre and post reform period. Johansen method of co-integration is

employed to test the long run relationship between the variables and Granger causality test to identify the direction of causality.

**OBJECTIVE OF THE STUDY**

To examine the causal relationship between Gross Domestic Saving, Gross Capital Formation and Gross Domestic Product for the period 1950-51 to 2015-16

**METHODOLOGY AND DATA BASE**

The study uses annual time series data to determine the causal relationship between Gross Domestic Savings (GDS), Gross Capital formation (GCF) and Gross Domestic Product (GDP) with the economic growth of the Indian Economy. The annual time series data of the aforementioned variables for the period 1950-51 to 2015-16 is collected from the National Accounts Statistics, published by the Ministry of Statistics and Programme Implementation, Government of India and the Handbook of Statistics on Indian Economy published by RBI. The data is further categorised into pre reform and post reform period for the purpose of the study. All data are in terms of domestic currency and at constant prices. Natural logarithm of the variable is taken for the study.

**UNIT ROOT TEST**

The assumption of stationarity of the series plays a very significant role in the interpretation of the statistical inferences. If time series data are non-stationary then the regression results so obtained cannot be based on OLS because in this case the OLS method will yield spurious results. Hence it becomes necessary to test whether the time series is stationary or not. In another sense the order of integration of each time series has to be determined. This objective will be fulfilled by the Unit Root Test of the time series. The Unit Root Test provides information regarding the stationarity of the time series variables. If the time series variables are non-stationary, then the series contains unit root. The presence of unit root generates unreliable results, hence it becomes necessary for the non-stationary time series to be differenced until the time series becomes stationary. One way to test the presence of stationarity and order of integration of the variables using ADF (Augmented Dicky Fuller) test.

$\Delta Y_t = a_0 + a_1 t + a_2 \Delta Y_{t-i} + \sum_{i=1}^{k} b_i \Delta Y_{t-i} + \in$

T= time, $\Delta$ = First difference operator, k= lag length

If $a_2$ is significantly negative and higher than the MacKinnan critical value then the null hypothesis that Y has a unit root, gets rejected and we conclude that the time series is stationary.

In order to determine the order of integration of the series we perform the unit root test at

levels and first difference. To test the order of integration, we use the Augmented Dickey Fuller (ADF) test (*Dickey and Fuller, 1979 and 1981*). ADF test takes the null hypothesis to be non- stationary and test against its Stationary alternative.

**CO-INTEGRATION TEST**

Cointegration has become a significant property in contemporary time series analysis. If two or more series are individually integrated but some linear combination of them has a lower order of integration, then the series are said to be cointegrated. I(1) series are cointegrated if there exists at least one linear combination of the variables that is stationary. If the variables under consideration, say X and Y are of the same order of integration though they are individually non stationary, the estimation of the regression equation of Y on X or X on Y in level form by OLS method is referred to as cointegration regression. In simple words, $X_t$ and $Y_t$ are said to be cointegrated if there exists a parameter 'α' such that

$$ut = Y_t - \alpha X_t$$

Is a stationary process . There are various methods of testing co-integration such as the

- Engel- Granger Test
- Johansen Co-integration Test.

Since the unit root tests test the null-hypothesis of a unit root, most cointegration tests test the Null of no cointegration. If the value of probability is less than .05 then we reject the null hypothesis and conclude that there exists a long run relationship among the tested variables.

Having determined that all the examined variables are of the same order, we proceed further to test for the presence of co-integration among the variables. We use the conventional Johansen co-integration test.

**GRANGER-CAUSALITY TEST**

Given the results of the co-integration tests, the paper proceeds further to estimate the (Vector Error Correction Method) VECM/VAR (Vector Auto Regressive) to determine the direction of causality running between income, saving and investment. If co-integration exists, the Granger-Causality test is performed under the vector error correction methodology. Otherwise the standard Granger-Causality test is performed under VAR framework. Different equations have been estimated:

$$GDP_{t} = \sum_{i=1}^{n} \alpha_i GDS_{t-i} + \sum_{j=1}^{n} \beta_j GDP_{t-j} + \sum_{k=1}^{n} \gamma_k GCF_{t-k} + u_1t$$

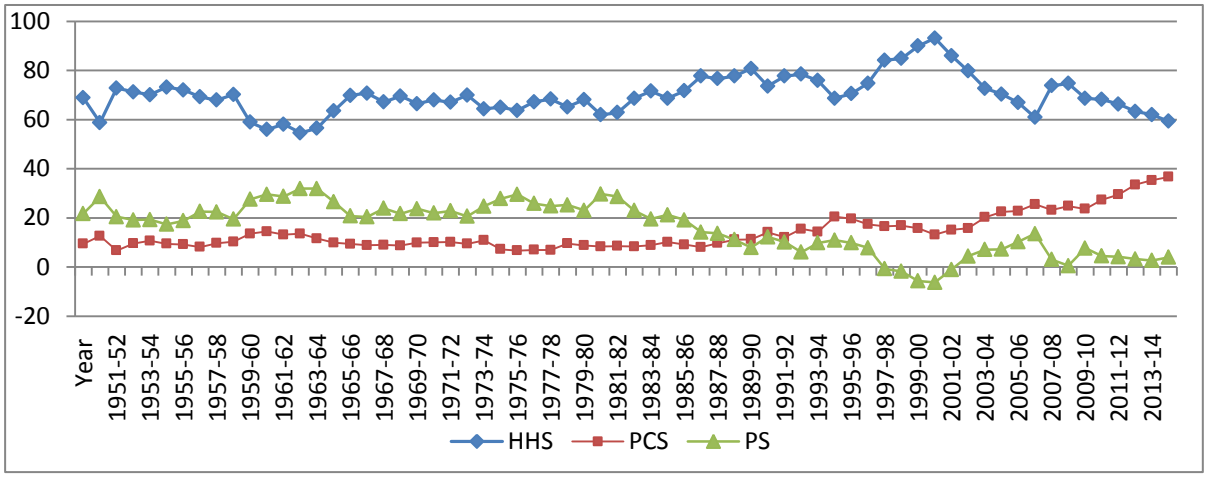
$$GDS_{t} = \sum_{i=1}^{n} \lambda_i GDS_{t-i} + \sum_{j=1}^{n} \rho_j GDP_{t-j} + \sum_{k=1}^{n} \theta_k GCF_{t-k} + u_2t$$

$$GCF_{t} = \sum_{i=1}^{n} a_i GDS_{t-i} + b_j GDP_{t-j} + \sum_{k=1}^{n} c_k GCF_{t-k} + u_3t$$

**OVERVIEW OF THE SAVINGS PERFORMANCE IN INDIA**

Saving is the excess of income over consumption. It is composed of household sector savings (HHS), private corporate sector savings (PCS) and public sector savings (PS). In India, household savings accounted for nearly three-fourth of the Gross Domestic Savings during the period 1980-81 to 2011-12. The pattern and magnitude of domestic savings have undergone significant changes over the years.

**FIGURE 1: COMPOSITION OF DOMESTIC SAVING (AS % OF GDS)**




The figure depicts that household savings has always been the major component of the total Gross Domestic Savings with its share being the highest. However, the other components have had major changes. It can be seen that the share of public savings have fallen overtime from 20.98% in 1950s to 3.29 % in early 2000s. On the contrary, the share of private corporate savings have increased overtime from 9.55% in 1950s to around 19.86% in the early 2000s to around 30%in 2015-16. The literature also tells us that there exists an inverse relationship between household savings and public savings, which is clear from the adjoining figure which shows that during the period when household savings have fallen public savings have risen and vice-versa.

The household savings has had a fluctuating decadal trend with the average fluctuating from 69.4% (as percentage of GDS) in the 1950s to 62.49% in the 1960s to 76.07% in 1990s, then again falling back to the range of the 60s. Similarly, the rate of public savings has also fallen overtime from 20.98% in the 1950s to around 3.29% in the 2000s, registering even negative growth rates in the late 1990s

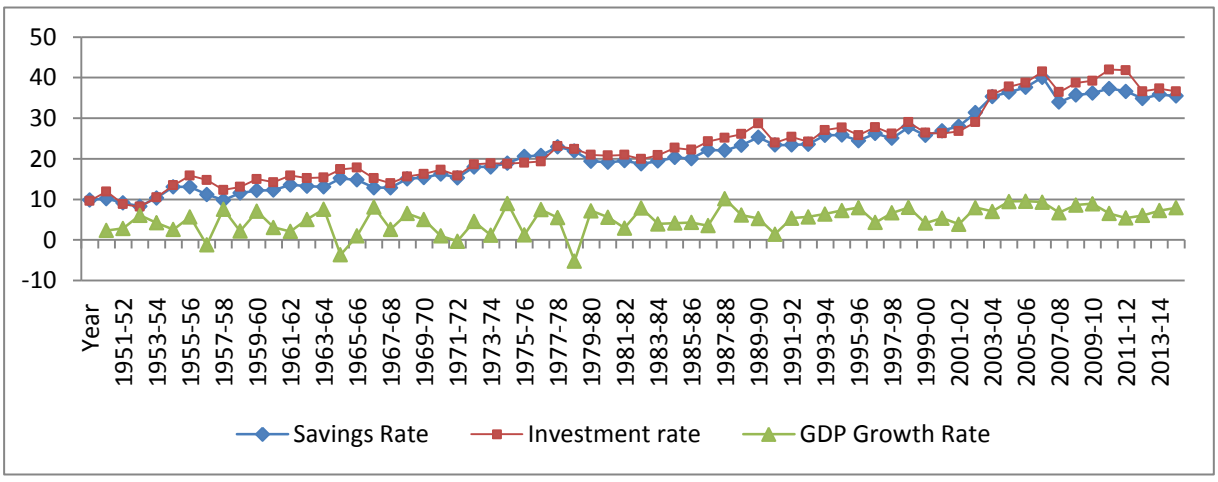
and early 2000s. However, the share of private corporate savings has consistently risen from 9.55% in 1950s to 11.21% in 1960s to 15.82% in 1990s to 19.86% in 2000s and reaches a peak of 30% in 2015-16. There has been a consistent rise in the rate of domestic savings in India since Independence and especially after post reforms, though marked by fluctuations from year to year. The table also shows that the share of private corporate savings have risen since 1990s.

Evidences suggest that the rise in the rate of savings has mainly being contributed by the rise in domestic savings, other components of savings such as the private corporate savings or the public savings have contributed meagrely. However since 1990s and more evidently after 2000s the share of the other counterparts of savings have also shown significant contribution, which may be accorded to the implementation of the FRMB act in 2003.

**SAVING, INVESTMENT AND GROWTH RATE: THE INDIAN EXPERIENCE**

Savings and investment act as the engine of economic growth. It has been evidenced that the countries that were able to cater to high economic growth have achieved it on the basis of higher savings and thus higher investment. The literature confirms the importance of these variables through the number of studies that have been undertaken to look at various dimensions.

**Figure 2: Saving, Investment and Growth rate**




The figure above clearly depicts the relationship among GDS, GCF and GDP. It can be seen that the trend of the GCF follows the trend of GDS and so does the trend of GDP. The level of investment as represented by the gross capital formation increases as savings increase which satisfies the conventional criteria that investment is positively related to savings. It is also seen that GDP has registered stark growth after 1990s i.e., in the post reform period. GDP has constantly risen in the 2000s except for a few fluctuations and the dearth that came around 2008-09, where it can be seen

that along with growth rate, the rate of savings and consequently investment has also fallen.

The data regarding the investment as presented by the gross capital formation reveals that the level of investment has also increased over time. This increase in the rate of investment has been as a result of the increase in the rate of savings overtime. The average rate of growth of investment has increased overtime from 11.84% in the 1950s to 18.95% in 1970s to 33.73% in 2000s and to 36.59% in 2015-16.

**EMPIRICAL RESULTS AND DISCUSSION**

**UNIT ROOT TEST RESULT**

**Table 1: Unit Root Test using Augmented Dickey Fuller Test**

| Variables | Series in level | | | | | Series in First Difference | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Trend | Intercept | None | Lag Length | Result | Trend | Intercept | None | Lag Length | Result |
| GDP | 1.0000(**) | 0.9923(**) | 1.0000(**) | 1 | Non stationary | 0.0000 | 0.0000 | 0.3549(**) | 1 | Stationary I(1) |
| GDS | 0.988(**) | 0.3569(*) | 1.0000(**) | 1 | Non stationary | 0.0000 | 0.0000 | 0.0002 | 1 | Stationary I(1) |
| GFC | 0.9985(**) | 0.2661(**) | 1.0000(**) | 1 | Non stationary | 0.0000 | 0.0000 | 0.0000 | 1 | Stationary I(1) |

Trend, Intercept and None denote the ADF test applied to a regression with intercept, intercept and trend an no deterministic parameters respectively.
(**), (*) denote rejection of the null hypothesis at the 0.01 and 0.05 significance levels respectively.

The result above reveals the results of the Unit Root test. Unit Root Test is performed to test the stationarity of the variables. If the variables are non-stationary then the results so obtained may be spurious. Thus, if the variables are non-stationary then it should be made stationary. If the variables are stationary then it does not contain any unit root. The basic contention is to test the order of integration. The paper uses Augmented Dickey Fuller (ADF) Test to determine the order of Integration. The ADF test reveals that the variables are non-stationary at levels. However, the statistics for all the variables are stationary at their first difference. Hence it can be concluded that variables are I(1)

**CO- INTEGRATION TEST RESULT**

**Table2: co-integration between GDS, GCF and GD**

Series: GCF GDP GDS
Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

| Hypothesized No. of CE(s) | Eigenvalue | Trace Statistic | 0.05 Critical Value | Prob.** |
|---|---|---|---|---|
| None * | 0.263746 | 36.39190 | 29.79707 | 0.0075 |
| At most 1 * | 0.155692 | 16.79634 | 15.49471 | 0.0317 |
| At most 2 * | 0.088993 | 5.965135 | 3.841466 | 0.0146 |

Trace test indicates 3 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Co-integration test is performed to test whether there exists any long run relationship among the variables or not. The paper uses Johansen method of co integration to test for the co integration. The test so performed takes the null hypothesis that there does not exist co-integration among the variables. The p- value so obtained is 0.0075, thus the null hypothesis is rejected .hence, the result for co integration reveals that the variables are co-integrated which means that the variables exhibit long run relationship.

**GRANGER CAUSALITY TEST RESULT**

**Table3: Granger causality test (Pre-reform)**

VEC Granger Causality/Block Exogeneity Wald Tests

Included observations: 39

Dependent variable: D(GCF)

| Excluded | Chi-sq | df | Prob. |
|---|---|---|---|
| D(GDP) | 0.458682 | 1 | 0.4982 |
| D(GDS) | 9.071820 | 1 | 0.0026 |
| All | 10.05902 | 2 | 0.0065 |

Dependent variable: D(GDP)

| Excluded | Chi-sq | df | Prob. |
|---|---|---|---|
| D(GCF) | 1.241748 | 1 | 0.2651 |
| D(GDS) | 0.401014 | 1 | 0.5266 |
| All | 1.491152 | 2 | 0.4745 |

Dependent variable: D(GDS)

| Excluded | Chi-sq | df | Prob. |
|---|---|---|---|
| D(GCF) | 0.699517 | 1 | 0.4029 |
| D(GDP) | 0.010406 | 1 | 0.9187 |
| All | 0.856366 | 2 | 0.6517 |

**Table4: Granger causality test (Post-reform)**

VEC Granger Causality/Block Exogeneity Wald Tests

Included observations: 23

Dependent variable: D(GCF)

| Excluded | Chi-sq | df | Prob. |
|---|---|---|---|
| D(GDP) | 1.697363 | 1 | 0.1926 |
| D(GDS) | 1.426070 | 1 | 0.2324 |
| All | 2.510501 | 2 | 0.2850 |

Dependent variable: D(GDP)

| Excluded | Chi-sq | df | Prob. |
|---|---|---|---|
| D(GCF) | 2.924077 | 1 | 0.0873 |
| D(GDS) | 2.631918 | 1 | 0.1047 |
| All | 2.936205 | 2 | 0.2304 |

Dependent variable: D(GDS)

| Excluded | Chi-sq | df | Prob. |
|---|---|---|---|
| D(GCF) | 0.813695 | 1 | 0.3670 |
| D(GDP) | 0.482447 | 1 | 0.4873 |
| All | 1.190572 | 2 | 0.5514 |

**Table5: Granger causality test (overall period)**

VEC Granger Causality/Block Exogeneity Wald Tests

Included observations: 64

Dependent variable: D(GCF)

| Excluded | Chi-sq | df | Prob. |
|---|---|---|---|
| D(GDP) | 2.164257 | 1 | 0.1413 |
| D(GDS) | 12.81143 | 1 | 0.0003 |
| All | 16.79078 | 2 | 0.0002 |

Dependent variable: D(GDP)

| Excluded | Chi-sq | df | Prob. |
|---|---|---|---|
| D(GCF) | 4.804480 | 1 | 0.0284 |
| D(GDS) | 1.669161 | 1 | 0.1964 |
| All | 5.840429 | 2 | 0.0539 |

Dependent variable: D(GDS)

| Excluded | Chi-sq | df | Prob. |
|---|---|---|---|
| D(GCF) | 8.090445 | 1 | 0.0044 |
| D(GDP) | 7.299217 | 1 | 0.0069 |
| All | 15.33819 | 2 | 0.0005 |

Granger causality test is performed to determine the causal relationship among the variables. It helps understand whether the dependent variables are affected by the independent variables or not. In other words whether independent variable causes dependent variable or not. If co-integration exists, the Granger-Causality test is performed under the vector error correction methodology. Otherwise the standard Granger-Causality test is performed under VAR framework. Since above results reveal that the given variables are co-integrated so the Granger- Causality test is performed under VECM (Vector Error Correction Mechanism). The test takes the null hypothesis that the independent variable does not Granger causes the dependent variable. To have a clear understanding of the question that whether it is growth led savings or savings led growth, the paper is divided into pre-reform and post reform period. In pre-reform period the result of the Granger Causality reveals that there is no sign of causal relationship among the variables under study with the exception that GDS causes GCF which states that savings affect the amount of investment. In the post reform period we observe that there is no cause and effect relationship among the variables. The result so obtained for the overall period, reveals that GDS does not Ganger causes GDP but GCF granger causes GDP. However, GDS Granger causes GCF which shows that as the per capita savings of the country increases the level of investment shall also increase and as the level of saving increases investment also gets boosted. Also GCF causes GDS which shows that there is bi-directional relationship between them. Finally the data also reveals that GDP and GCF Granger causes GDS thereby answering to the question of whether there is growth led savings or savings led growth. The data so revealed confirms that it is growth led savings and the inception of the other way around is not true.

This result is in conformity with *Sinha and Sinha* (2008) who also concluded that higher saving is the consequence of higher economic growth and not the cause. Also *S.Budhedeo* (2015) in her study indicates that in the long run nominal income granger causes GDS uni-directionally.

**CONCLUSION**

The study examines the causal relationship between savings, investment and GDP for the period 1950-51 to 2015-16 using the Granger Causality test. The ADF unit root test show that GDP, GDS and GCF become stationary when first difference are considered. The empirical result reveals that there exists a long run relationship between GDP, GDS and GCF in India. We found that in the pre-reform period there was no sign of causality running in either direction with the exception that GDS causes GCF. In the post reform period also we do not observe any evidence of causality running in either

direction. On the contrary, for the overall period we observe that there is unidirectional causality running from GDP to GDS thereby conforming the existence of Growth led Savings.

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