SUBMISSION

Research Paper Titled

SAVING AND ECONOMIC GROWTH IN INDIA: ESTIMATING LONG-RUN RELATIONSHIP

For The

13th International Workshop on Pensions, Insurance and Savings
University Paris Dauphine, Paris, France
28th & 29th May, 2015

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Saving and Economic Growth in India: Estimating Long-run Relationship

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ABSTRACT

The present study is based on an ongoing research by the author on the direction of causal relationship between saving and economic growth for India.

The behaviour of saving and economic growth in India has been puzzling. Saving rates have been progressively rising and impressive throughout the planned economic period. In contrast, the growth rates have been increasing slowly and unpredictably low. Economic growth has failed to keep pace with the high saving rates in the economy. Upward sailing saving rates are often paralleled with sharp dips in growth rates. Hence, the progress of saving rates does not get reflected in the growth scenario. This phenomenon of 'high saving and low growth' makes it imperative to investigate the nature and direction of causal influence between saving and growth in India. It needs to be empirically explored whether saving causes growth, or growth leads to savings, or if there is a bi-directional causal relationship between saving and growth, or do they really share any relationship at all. An examination of the causality issue between saving and growth would enable policymakers to devise such economic policies as may be fruitful in meeting the planned targets.

This study examines the association between savings and economic growth in India over the planned economic era from 1950-2013 by engaging Granger causality (VECM) estimation technique using the cointegration approach. The empirical results indicate a bi-directional mutual causality between saving and income (both total and non-agricultural income) in the short-run. In the long-run, nominal national income Granger causes gross domestic savings uni-directionally but savings share a two-way causal relationship with nominal non-agricultural income.

1. Introduction

Domestic saving rates could play critical role in the progression of economic growth. It has attracted and sustained the interest of economists both at theoretical and empirical levels. The close relationship between the saving rate of the economy and the growth rate is a stylised fact and has been well documented in the literature on savings, receiving considerable attention in India and many countries around the world. Saving is understood as sacrifice of current consumption to provide for the accumulation of capital, which is necessary for creating additional output. Thus, saving is central for capital formation and economic growth. Also, countries having high saving rates for long periods of time tend to have a higher and sustained economic growth over time. On the other hand, income is the epitome of economic growth, influencing the saving behaviour of households. Economic growth increases savings by raising the marginal propensity to save. Saving and income are thus closely associated and rate of saving tends to be higher in countries with higher per-capita income, and vice-versa [Schmidt-Hebbel et. al, 1996].

Scholars are divergent in their perceptions and empirical findings on the relationship between saving and growth. The directional relationship between saving and economic growth is largely ambiguous and inconclusive. The saving-growth dynamics has often been analyzed as the ‘cause and effect’ relationship. *Is it growth that causes saving or saving that causes growth?* In this search, the present study empirically investigates the nature and direction of relationship between saving and economic growth in India over the planned economic era. The investigation of the causal relationship between saving and economic growth is pertinent as it provides useful information to policymakers for devising targeted policies. If saving matters for economic growth, then government and policy makers need to design and implement policies aimed at promoting the mobilization and canalization of savings into higher economic growth. Conversely, if economic growth leads to higher saving, then economic policies would be directed towards removing obstacles and accelerating economic growth.

The study is spread over seven sections covering the theoretical and empirical aspects respectively. The present *section 1* is the introduction to the study. This is followed by *section 2* that establishes the theoretical base of the relationship between saving and economic growth and also covers the review of literature on the issue of causality between the two. *Section 3* outlines the objectives of the study. *Section 4* reveals the trend and behaviour of savings and economic growth in India over the past six and a half decades. *Section 5* discusses the aspects of econometric analysis related to methodology and data.

Section 6 presents the empirical results followed by conclusion and policy inferences in *section 7.*

2. Theoretical Background and Literature Review

Across countries, economists have since long confirmed that saving rates and growth rates are positively correlated. This positive correlation has generally been interpreted as corroborating to the standard growth models. The early Harrod (1939)-Domar (1946) models have specified investment as the key to promoting economic growth. This gets support from Lewis's (1955) traditional development theory which also states that an increase in saving would accelerate economic growth. The neoclassical Solow (1956) model argues that increase in saving rate boosts steady-state output by more than its direct impact on investment, because the induced rise in income raises saving, leading to a further rise in investment. According to the new growth models of Romer (1986, 1987) and Lucas (1988), higher saving rate leads to a permanently higher rate of output growth as the resulting higher rate of accumulation of physical capital leads to permanently higher rate of progress in the level of technology.

The relationship between saving and income can be viewed in two different ways. One point of view pursues the Keynesian hypothesis that economic growth is the most important determinant of saving. Economic growth increases the saving propensity which leads to increase in aggregate savings. Income growth enhances the volume of savings by affecting the marginal and average propensities to save. In the other view, saving is the most significant factor influencing economic growth. A country's progress depends upon its ability to save and invest in productive enterprises. Savings give rise to capital formation or investment, known to be the engine of growth. Growth in capital formation is directly proportional to that part of additional output which is not immediately consumed but saved for future utilisation. Savings when invested for productive purposes transforms into capital formation via the role of investment multiplier and subsequently into higher economic growth. The greater the investment of savings, the more will be employment and production, resulting into multiple increases in capital accumulation and GDP growth.

As the foundation of a positive connection between saving and economic growth finds support in different hypothesis, the vast literature on saving-growth relationship is conflicting and divided to a great extent. According to the *capital fundamentalist view*, the positive association between saving and growth runs as a causal chain from saving to growth. This notion gets support from pioneer studies by Bacha (1990), Otani and Villanueva (1990), De Gregorio (1992), Levine and Renelt (1992), Japelli and Pagano (1994), Sinha (1999), Bebczuk (2000), Kreickhaus (2002) and Misztal (2011). These studies conclude that a higher saving rate eventually leads to higher growth in the economy. Lean and Song (2008) found household saving to Granger cause economic growth in China in the short-run. A study by Ciftcioglu and Begovic (2010) suggests that domestic saving rate has exerted a statistically significant effect on growth rate of GDP for a sample of central and east European countries. The *Keynesian view* is that saving depends upon the level of output, or that economic growth acts as the driving force behind savings in the country. This hypothesis gets support from studies by Modigliani and Brumberg (1954, 1979), Houthakker (1960, 1965), Fei and Ranis (1964), Marglin (1976), Bosworth (1993), Dekle (1993), Carroll and Weil (1994), Edwards (1995), Blomstrom et al (1996), Gavin et al (1997), Loayza et al (1998), Rodrik (1998), Saltz (1999), Attanasio et al (2000), Carroll et al (2000), Anoruo and Ahmad (2001), Narayan and Narayan (2006) and Abu (2010). Alomar (2013) concluded that for majority of the countries of Cooperation Council for the Arab States of the Gulf, it is economic growth rate that Granger causes growth rate of savings. At large, the empirical evidence from these literatures suggests that high economic growth leads to higher savings, and not the other way around.

Although there is a substantial divergence of outcomes in the empirical literature, theoretically it is generally accepted that economic growth and saving are interdependent. Bayar (2014) establishes that gross domestic savings and economic growth share bi-directional causal relationship in short-run as well as in long-run for emerging Asian economies.

A number of studies examining the causal influence between saving and economic growth arrived at mixed results. Sinha used dynamic models to examine the relationship between saving and economic growth in a number of countries. Sinha (1996), Sinha and Sinha (1998) and Sinha (2000) presented evidence that economic growth Granger causes growth rate of savings in Pakistan, Mexico and Philippines, respectively. For Sri Lanka, Sinha (1999) found that causality ran in the opposite direction from growth rate of gross domestic savings to economic growth rate. Andersson (1999) found the causal linkages to be in different directions for different countries and also for different periods, long-run and short-run. One of the most extensive researches on saving-growth causal relationship was conducted by

Carroll and Weil (1994), with a large cross-section of countries across the globe. They found causality from growth to saving for both fast-growing and slow-growing nations and for the aggregate and household levels. Using the Granger causality test, they arrived at two basic results. One, growth Granger-causes saving with a positive sign. Second, saving does not Granger-cause growth; even the insignificant causation from saving to growth is with a negative sign. There appears to be no clear consensus. In some cases, growth seems to be causing saving; for others either there is mutual causation between growth and saving or no link at all.

Other studies by Plies and Reinhart (1998), Saltz (1999), Anoruo and Ahmad (2001), Mavrotas and Kelly (2001), Baharumshah et al (2003), Mohan (2006), and Sajid and Sarfraz (2008) also arrived at different conclusions to the causal relationship. Greyling, Mwamba and Verhoef (2013) did not find any causal relationship between saving and GDP for Cape Colony. The issue of causal chains is much more complex than this and the dependence between output and saving over time will also depend on country characteristics and what type of dynamics one is studying.

Unlike the global literature, few Indian studies have tried to determine the nature of causal relationship between saving and economic growth. There has been limited research in this area, in the Indian context. Studies by Krishnamurty and Saibaba (1981), Balakrishnan (1996), Muhleisen (1997) and Ray and Bose (1997) support the case for a positive and significant impact from economic growth to savings in India. Muhleisen (1997) and Ray and Bose (1997) examined the growth-saving relationship by conducting Granger causality tests. Joseph (1997) found a two-way causal relationship between saving rate and growth rate in India. There appears to be a virtuous circle in operation of higher economic growth leading to higher saving which in turn, by financing higher investment stokes even higher growth. Another study by Sethi (1999) tried to test causality between aggregated and disaggregated saving and income variables with the help of cross-autocorrelation method. Only in a few cases, causality was found to be running in the usual income to saving direction. In majority cases, this channel of causality was rejected. In such cases, causality was observed either to have run from saving to income; or to be feedback in nature; or to be instantaneous; or to have remained undetected. Studies by Mishra (2006) and Mohan (2006) found that there exists no definite causal relationship between economic growth and saving in India. A recent study by Jangili (2011) found the direction of causality from higher saving and investment to higher economic growth. It failed to observe the reverse causality. Despite the continued attempts of researchers, the nature and direction of causal relationship between saving and economic growth remains unresolved in the Indian case.

The collective evidence from international as well as Indian literature fails to provide conclusive support for either possibilities of causal links between saving and growth. The results are varied, with some supporting a link from growth to saving while others confirming the reverse causality from saving to growth. A number of researchers accept bi-directional or mutual causation between saving and growth whereas some deny any causal link between these two macroeconomic variables. Therefore, the debate on causality between economic growth and saving remains unsettled.

The general acceptance however is for causality running from growth to saving as majority of the studies agree on at least a uni-directional positive causal influence from economic growth to saving. In the Indian case too, the causal chain from growth to saving is more universally accepted. Even if saving causes growth, it is mostly insignificant. Among the India based studies, Sethi (1999) and Jangili (2011) are exceptions lending greater support to causal influence running from saving to growth. Likewise, some of the recent international studies such as Saltz (1999), Sinha (1999), Anoruo and Ahmad (2001) and Baharumshah et al (2003) have also found growth rate of saving to Granger-cause economic growth rate for some countries.

The issue of causality between saving and growth is unsettled because of the wide variation in results among the studies conducted on causality. The direction of causality between saving and growth may vary because of differences in the methodology used. Another reason could be the choice of variable specifications for causality analysis and the definition of the variables used. The causal relationship may also vary from country to country and between periods of time.

3. Objectives of the Study

The objective of the present study is to determine the causal linkages between domestic savings and economic growth for the Indian economy over the planned economic period. The study aims to explore

- *whether Saving Granger causes Economic Growth, or*
- *if Economic Growth Granger causes Saving, or*

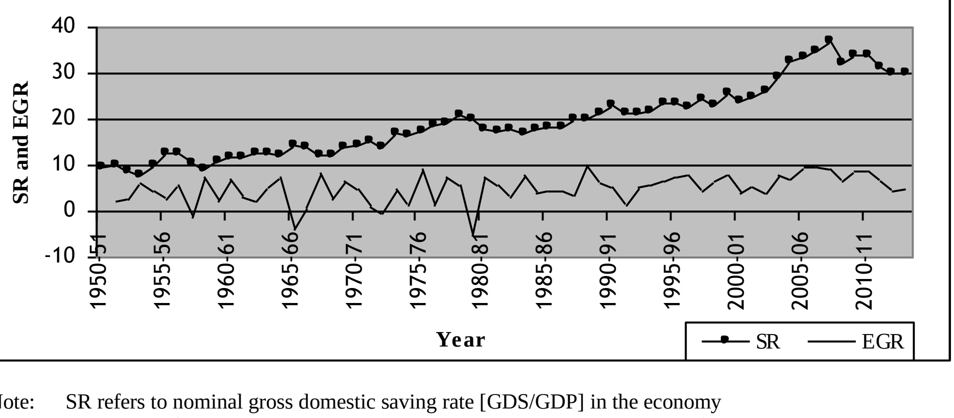
- *does a bi-directional causal relationship exist between Saving and Economic Growth, or*
- *is there no causality between Saving and Economic Growth at all.*

4. Saving - Growth Experience in India

The Indian economy witnesses an overall rising trend in domestic savings and economic growth over the past six and a half decades. There has been an impressive growth in saving rates being most prominent the 1990s onwards. The gross domestic saving rate has risen from a bottom of 8 percent in 1953-54 to as high as 36.8 percent in 2007-08. From the traditional Hindu growth rate of 3.5 percent in the 1950s, the real GDP growth rates have escalated to nearly 10 percent during certain time periods as in 1988-89 and 2006-07. Despite the positive trends, the economic growth rates have failed to match the high rate of savings in the country. The Indian economy is widely known to be characterised by the peculiar feature of 'high savings and low growth'. The sharp dips in growth rates are paralleled with upward sailing saving rates right through the 1960s, 80s and 90s.

The saving-growth behaviour in India has been presented in the graph and table below. Chart 1 reveals that both saving and economic growth rates have witnessed an upward trend with many fluctuations over time. However, the fluctuations are more pronounced and frequent in case of GDP growth rates. The saving rates have been higher than GDP growth rates for most part of the planned economic era with the gap between the two widening over time. Moreover, the saving rates have grown at a faster pace as compared to growth rates.

Chart: 1 Behaviour of Saving Rate and Economic Growth Rate



Note: SR refers to nominal gross domestic saving rate [GDS/GDP] in the economy
EGR stands for economic growth rate [real GDP growth rate measured at factor cost 2004-05 prices].

Table 1 shows the decadal behaviour of saving rates and real GDP growth rates.

Table: 1 Saving and Growth Relationship

Sr. No.	*Time Period*	*Saving Rate*	*Real GDP growth rate*
1.	**1950-51 to 1959-60**	10.2	3.59
2.	**1960-61 to 1969-70**	12.7	3.95
3.	**1970-71 to 1979-80**	17.3	2.95
4.	**1980-81 to 1989-90**	18.6	5.81
5.	**1990-91 to 1999-00**	22.97	5.77
6.	**2000-01 to 2009-10**	30.6	5.8
7.	**2010-11 to 2013-14**	31.4	6.2
8.	**1950-51 to 2013-14**	**19.5**	**5.0**

Note: The gross domestic product is measured at factor cost [2004-05 prices]

Saving rate has consistently increased from an average of 10 percent in the 1950s to over 30 percent in the early 2010s. The decadal growth rates have however witnessed fluctuations. The saving-growth experience of the country reveals that for phases of time when saving rates have shown substantial improvement (1970s, 1990s and 2000s); growth rates have remained either stagnant or declined. On other occasions, when growth rates have risen dramatically, the same does not get reflected in the behaviour of saving rates, as in the 1980s. The saving rate average over the entire analysis period stands at 19.5 percent whereas that of growth rate is merely 5 percent. Thus, raising important issues such as whether saving and growth really share any definite relationship empirically despite the framework of theoretical underpinnings. Is their behaviour independent of each other? This makes it pertinent to search for the nature and direction of relationship between savings and economic growth in India. The same is being explored in the subsequent sections.

5. Econometric Analysis: Methodology and Data

The Engle-Granger (1987) cointegration approach has been employed to estimate the long-run relationship between saving and economic growth for the Indian economy. The cointegration technique has been preferred to usual regression analysis so as to overcome the issues of non-stationary time series data and spurious results that are inherent in the latter. Granger causality test is used to determine the direction of causality between saving and economic growth using Vector Error Correction Model (VECM) so as to understand the short-run as well as long-run dynamics. The study largely follows a three-step methodology for examining the long-term and causal relationship between saving and growth variables in the country: (1) Unit Root Test [for testing stationarity of the variables]; (2) Cointegration Test [for estimating the long-run relationship]; and (3) Granger Causality Test - VECM [for establishing the direction of causality].

This section elaborates upon the methodology and data adopted for empirical analysis. It undertakes a discussion on the following:

5.1. The Model
5.2. Specification of Variables
5.3. Steps involved in Causality Test using Cointegration Approach
5.4. Data Source and Time Period

5.1. The Model

The econometric model to be used has its basis in the Keynesian and the Solow hypotheses. The Keynesian model states that saving ‘S’ is a function of income ‘Y’. Thus,

$$\mathbf{S = \mathit{f}\ [Y]}$$

Solow’s model suggests that higher saving precedes economic growth. As such, the growth model specifies economic growth as a function of saving. Thus,

$$\mathbf{Y = \mathit{f}\ [S]}$$

To assess the nature of causal relationship between saving and economic growth, the following models are subject to Granger causality tests:

$$\mathbf{S_t = \alpha + \sum_{i=1}^{m} \beta_i S_{t-i} + \sum_{j=1}^{n} \gamma_j Y_{t-j} + u_t} \qquad \textit{[Model 1]}$$

$$\mathbf{Y_t = a + \sum_{i=1}^{q} b_i Y_{t-i} + \sum_{j=1}^{r} c_j S_{t-j} + v_t} \qquad \textit{[Model 2]}$$

Where S = Saving; Y = Economic Growth; β, γ, b, c = sensitivity coefficients; u, v = residual component; t = period of analysis; i, j = number of variable delays or lags.

Having specified the saving and growth models, the probable cases of causation may be stated as:

i. Y causes S but S does not cause Y, which represents the case for *Uni-directional causation* from Y to S [Y→ S]

ii. S causes Y but Y does not cause S, representing the case for *Uni-directional causation* from S to Y [S →Y]

iii. Y causes S and S causes Y, implying *Bi-directional causation* between Y and S [Y⇄ S]

iv. Y does not cause S and S does not cause Y, meaning Y and S are independent, or there exists *no causal relationship* between Y and S [Y~~ S].

5.2. Specification of Variables

An important issue in the testing of causation between saving and economic growth is the definition and specification of the variables under study. Saving and growth variables to be used for causality tests need to be carefully established. One may choose to work with the level of income, or rate of growth in income, or first difference of income. Similarly, saving may be specified as saving levels, or saving rate, or change in saving, or even rate of growth in saving. Among the India based studies, an IMF study by Muhleisen (1997) tested for causality between real GDP growth and levels of saving; and also between growth and change or difference in saving. One RBI study conducted by Ray and Bose (1997) ran causality regressions between first difference of income [ΔY] and saving [ΔS] for detecting the causal link between real saving and real GDP. Sethi (1999) tried to test the causal linkage between saving and income, at levels. Jangili (2011) investigated causality using cointegration technique between first difference of nominal GDP and GDS. Recent studies such as Sinha and Sinha (1998), Sinha (1999), Sinha (2000), Anoruo and Ahmad (2001), Baharumshah et al (2003) and Mohan (2006) examined the causal relationship between the growth rate of saving and economic growth rate. Majority studies are using the growth rate of saving vis-à-vis economic growth rate because of the problem of unit roots in other specifications.

In view of these observations, the present study performed the unit root test for the relevant saving and income variables as a navigation tool towards the selection of appropriate variable specifications. The saving variables selected were: (1) Saving at levels [S]; and (2) Growth Rate of Saving [$\Delta S/S$]. The income variables identified for the purpose were: (1) Income at levels [Y]; and (2) Growth Rate of Income or Economic Growth Rate [$\Delta Y/Y$]. Here, Saving

[S] has been defined as Gross Domestic Saving [GDS] at current prices. Income [Y] has been defined as Nominal National Income [or Gross Domestic Product at current market prices]. Income has been alternatively defined as:

Y - Nominal National Income
[Gross Domestic Product at current market prices]

Y_{fc} - Nominal National Income at factor cost
[Gross Domestic Product at factor cost current prices]

YNA_{fc} - Nominal Non-agricultural Income at factor cost
[Non-agricultural Income at factor cost current prices]

Despite being the most dominant sector employing 50 percent of Indian population, the agricultural sector in India contributes only 18 percent to GDP. The share of industry and services in GDP has increased perceptively over the last seven decades, particularly the service sector, with a contribution of over 50 percent in GDP. Agriculture is characterised by paucity of funds. It receives an unfavourably low investment, which leads to low capital formation, low productivity and a low contribution towards GDP growth. At large, savings appear to be directed towards investment and growth in the non-agricultural sector. Therefore, it becomes important to examine the role of non-agricultural income in generating savings and vice-versa.

5.3. Steps in Causality Test using Cointegration Approach

The study applies Granger causality test based on the cointegration approach for examining the direction of causality between saving and economic growth. It involves the following steps:

5.3.1. Unit Root Test
5.3.2. Cointegrating Regression
5.3.3. Cointegration Test
5.3.4. Error Correction Model
5.3.5. Granger Causality Test - VECM

5.3.1. Unit Root Test

Test of stationarity is the first step in the process of examining long-run causal relationship. Time series analysis requires that the variables under consideration be stationary or free from unit roots. The Augmented Dickey-Fuller [ADF] test has been performed on the respective saving and income variables using Ordinary Least Squares method. The ADF test equation has a constant term and number of lag = 1.

The model for ADF test with Saving [S] as the variable to be tested for unit roots is stated as:

$$\Delta \mathbf{S_t} = \boldsymbol{\beta} + \boldsymbol{\delta}\, \mathbf{S_{t-1}} + \boldsymbol{\alpha}\, \Delta \mathbf{S_{t-1}} + \boldsymbol{\varepsilon_t} \qquad \text{Eq.1.}$$

If the relevant test statistics confirm that series S is stationary, S is said to be integrated of the order zero [I(0)]. In case the series is not stationary, the ADF test is repeated for the first differenced saving series [ΔS]. In that case, ΔS becomes the variable to be tested for unit roots. The ADF test equation thus estimated is:

$$\Delta^2 \mathbf{S_t} = \boldsymbol{\beta} + \boldsymbol{\delta}\, \Delta \mathbf{S_{t-1}} + \boldsymbol{\alpha}\, \Delta^2 \mathbf{S_{t-1}} + \boldsymbol{\varepsilon_t} \qquad \text{Eq.2.}$$

If ΔS becomes stationary, S is said to be integrated of the order one [I(1)], or else, same exercise of ADF test is repeated with successive differencing of time series variable till it becomes stationary. All the three income variables [Y, Y_{fc}, and YNA_{fc}] are also tested for unit roots following the same procedure.

If both the saving and income variables are integrated of the same order, say I[d], we proceed with the test for cointegration between them. This condition has to be fulfilled since it is a pre-condition for testing cointegration.

5.3.2. Cointegrating Regression

Once the unit root test has been conducted, the long-run equation is estimated for the non-stationary series of Saving [S] and Income [Y, Y_{fc}, YNA_{fc}] variables. Ordinary Least Squares method is used to estimate the cointegrating regression of the form:

$$\mathbf{S_t} = \boldsymbol{\beta_1} + \boldsymbol{\beta_2}\, \mathbf{Y_t} + \mathbf{u_t} \qquad \text{Eq.3.}$$

The residual series u_t is derived from the above cointegrating regression for the purpose of cointegration test. The cointegrating equation is useful in analyzing the long-run response of variables. This step is though a transitory step in the analysis required mainly for arriving at the residual series. For long-run analysis, this step is succeeded by the actual test of cointegration.

5.3.3. Cointegration Test

Cointegration test requires the residual series obtained in the previous step to be tested for unit roots. If a linear combination of two I[d] time series yields a residual series which is stationary or integrated of an order lower than I[d], then the two I[d] time series are cointegrated.

The Augmented Engle-Granger [AEG] test has been carried out to detect the presence of unit roots in the residual series derived from the cointegrating regression. It is similar to the ADF test for unit roots as stated earlier. A linear combination of S_t and Y_t yields the residual series u_t, stated as:

$$\mathbf{u_t = S_t - \beta_1 - \beta_2 Y_t} \qquad \text{Eq.4.}$$

The model for the ADF regression estimated for examining unit roots in the residual variable may be stated as:

$$\mathbf{\Delta u_t = \delta\, u_{t-1} + \alpha\, \Delta u_{t-1} + v_t} \qquad \text{Eq.5.}$$

The ADF test equation is without a constant and a trend (constant is already included in the cointegrating regression), and the number of lags of the dependent residual variable is equal to one.

If the residual is found to be stationary or free from unit roots at a lower order than that of S_t and Y_t, the latter pair of variables are said to be cointegrated, that is, S_t and Y_t share a long-run equilibrium relationship. Cointegration between a pair of variables implies existence of Granger causality in at least one direction although it does not tell the actual direction of causal influence.

5.3.4. Error Correction Model

Once cointegration is established between S_t and Y_t series, the error correction modelling is undertaken to detect the short-run response of variables. The Error Correction Mechanism [ECM] is modelled for stationary S_t and Y_t variables. Assuming that S_t and Y_t are first difference stationary [I(1)] variables, the ECM can be estimated as:

$$\mathbf{\Delta S_t = \alpha_0 + \alpha_1 \Delta Y_t + \alpha_2 u_{t-1} + \varepsilon_t} \qquad \text{Eq.6.}$$

Where u_{t-1} is the lagged residual term of the cointegrating regression and is also called as the Error Correction Term [ECT]. The ECM has mainly been used to study the short-run dynamics. Also, the sign and significance of the coefficient of the error correction term provides an additional parameter for confirming cointegration between S_t and Y_t. If α_2 is significantly less than zero, cointegration between S_t and Y_t is confirmed.

5.3.5. Granger Causality Test - VECM

The direction of causal relationship between saving and income is examined using the Vector Error Correction Model [VECM]. This model enables the identification of short-run as well as long-run causality. The Error Correction Term [ECT] which is the lag of residual variable is augmented in the standard causality regressions for the VECM. The VECM uses stationary saving and income variables: ΔS and ΔY, in this case. The model for Granger Causality can be presented as:

$$\Delta S_t = \alpha + \sum_{i=1}^{m} \beta_i \Delta S_{t-i} + \sum_{j=1}^{n} \gamma_j \Delta Y_{t-j} + \delta\, ECT_{t-1} + u_t \qquad \text{Eq.7.}$$

$$\Delta Y_t = a + \sum_{i=1}^{q} b_i \Delta Y_{t-i} + \sum_{j=1}^{r} c_j \Delta S_{t-j} + d\, ECT_{t-1} + v_t \qquad \text{Eq.8.}$$

ECT is the error correction term obtained as a residual from the cointegrating regression in Step 2. δ and d denote the speed of adjustment along the long-run equilibrium path.

Interpretation of the above set of equations involves the following:

ΔY Granger causes ΔS, if
H_o: $\gamma_1 = \gamma_2 = \gamma_3 = \ldots\ldots = \gamma_n = 0$ is rejected against $H_{a:}$ at least one $\gamma_j \neq 0$, j = l,…..n; or $\delta \neq 0$.

ΔS Granger causes ΔY, if
H_o: $c_1 = c_2 = c_3 = \ldots\ldots = c_r = 0$ is rejected against $H_{a:}$ at least one $c_j \neq 0$, j = 1, …..r; or $d \neq 0$.

Equation [7] in the causality model determines whether Y_t Granger causes S_t and Equation [8] confirms whether S_t Granger causes Y_t, or not. There are three outcome possibilities of Granger causality test for cointegrated variables:

i. Y_t Granger causes S_t *uni-directionally.*
ii. S_t Granger causes Y_t *uni-directionally.*
iii. Y_t Granger causes S_t and S_t Granger causes Y_t, *bi-directionally.*

5.4. Data Source and Time Period

The study uses annual data for saving and income variables. All the variables are in nominal terms. Data have been sourced from the latest Economic Surveys, Ministry of Finance, Government of India. The data for the period 1950-51 to 2012-13 refer to the earlier base series of 2004-05 but for the most recent year 2013-14, the new base series of 2011-12 has been engaged. The analysis period covers the six and a half decades from the initiation of planning in 1950-51 to 2013-14. This study is the only one to include such a long period of analysis in this area of empirical research for the Indian economy.

6. Empirical Results

To examine the causal relationship between saving and economic growth in India, Granger causality test has been performed using the cointegration approach. Saving is defined as Gross Domestic Saving [GDS] throughout the analysis and income has been used alternatively as Nominal National Income [Y], Nominal National Income at factor cost [Y_{fc}] and Nominal Non-agricultural Income at factor cost [YNA_{fc}]. The initial unit root tests are carried out for saving and income variables both at levels and their growth rates.

Suffice to mention here that the a priori requirement for cointegration test is that both dependent and independent variables should be stationary at the same level. Hence, the saving variables [S and $\Delta S/S$] and income variables [Y, Y_{fc}, YNA_{fc} and $\Delta Y/Y$, $\Delta Y_{fc}/Y_{fc}$, $\Delta YNA_{fc}/YNA_{fc}$] have been subject to unit root test to find out the level of stationarity. Thereafter, these variables have been paired based on the level of stationarity for estimating cointegrating regressions.

In the second step, after finding out the residual series from the cointegrating regression, the existence or absence of the long-run relationship between the saving and income variables have been examined using the Augmented Engle-Granger [AEG] test. And finally, these pairs were tested for causality using Granger causality test.

The empirical results have been presented in the following order:

- 6.1. Unit Root Test
- 6.2. Cointegrating Regression
- 6.3. Cointegration Test
- 6.4. Error Correction Model
- 6.5. Granger Causality Test - VEC Models

6.1. Unit Root Test

The results of the Augmented Dickey-Fuller [ADF] test for unit roots have been specified in Table 2 and 3. Table 2 provides the ADF test results and the order of integration for Saving [S] and Income [Y, Y_{fc} and YNA_{fc}] at levels. Table 3 provides the ADF test results and the order of integration for Growth Rates of Saving [$\Delta S/S$] and Income [$\Delta Y/Y$, $\Delta Y_{fc}/Y_{fc}$ and

$\Delta YNA_{fc}/YNA_{fc}$]. They also present the Mackinnon critical values for rejection of hypothesis of a unit root in the variables tested for stationarity.

- <u>Saving and Income</u>

Table: 2 **Unit Root Test**
[Saving and Income at Levels]

Augmented Dickey-Fuller Test with a Drift Term
Lag = 1
Time Period: 1950-51 to 2013-14

Variables	ADF Test Statistic[@]			Order of Integration
	Level	First Difference	Second Difference	
Saving				
1. S	7.52	-1.08	-13.83[*]	I [2]
Income				
1. Y	3.63	1.79	-6.86[*]	I [2]
2. Y_{fc}	2.26	2.23	-4.83[*]	I [2]
3. YNA_{fc}	-1.46	-0.89	-3.32[**]	I [2]
	Mackinnon Critical Values : 1% = -3.54	5% = -2.91	10% = -2.59	

@ Significance is based on Mackinnon critical values for rejection of hypothesis of a unit root.
* = Significant at 1%, ** = Significant at 5%, *** = Significant at 10%

- <u>Growth Rate of Saving and Growth Rate of Income</u>

Table: 3 **Unit Root Test**
[Growth Rates of Saving and Income]

Augmented Dickey-Fuller Test with a Drift Term
Lag = 1
Time Period: 1950-51 to 2013-14

Variables	ADF Test Statistic[#]		Order of Integration
	Level	First Difference	
Saving			
1. $\Delta S/S$	-7.02[*]	-	I[0]
Income			
1. $\Delta Y/Y$	-4.45[*]	-	I[0]
2. $\Delta Y_{fc}/Y_{fc}$	-4.43[*]	-	I[0]
3. $\Delta YNA_{fc}/YNA_{fc}$	-3.32[**]	-	I[0]
	Mackinnon Critical Values : 1% = -3.54 5% = -2.91 10% = -2.59		

Significance is based on Mackinnon critical values for rejection of hypothesis of a unit root.
* = Significant at 1%, ** = Significant at 5%, *** = Significant at 10%

The following inferences are drawn from the unit root test results:

i. With reference to Table 2, it is observed that both saving and income variables are integrated of the same order [I(2)] and become stationary after second differencing. The following cointegrating regressions can be estimated for the stationary variables:

$$\mathbf{S = \mathit{f}\,[Y]}$$
$$\mathbf{S = \mathit{f}\,[Y_{fc}]}$$
$$\mathbf{S = \mathit{f}\,[YNA_{fc}]}$$

ii. The observation made from Table 3 is that growth rate of saving as well as growth rate of income variables are integrated of the order zero [I(0)] and are therefore stationary at levels. As both of these variables are free from unit roots, the two cannot be subject to cointegration test. Causality between these set of variables may be tested using standard causality tests. For further analysis of cointegration, only those saving and income variables whose order of integration is same and that are not stationary at levels have been retained for empirical analysis.

6.2. Cointegrating Regression

After determining the order of integration for saving and income variables, the next step is the estimation of long-run equations by regressing saving upon the income. The following cointegrating regressions are estimated:

$$\mathbf{S = a + bY} \qquad \text{Eq.1.}$$
$$\mathbf{S = a + bY_{fc}} \qquad \text{Eq.2.}$$
$$\mathbf{S = a + bYNA_{fc}} \qquad \text{Eq.3.}$$

The cointegrating regressions are presented in Table 4.

Table: 4 Cointegrating Regressions

Method: Ordinary Least Squares *Dependent Variable: Nominal Gross Domestic Saving [S]*
Time Period: 1950-51 to 2013-14

Eqn. No.	Coefficient of Independent Variables and [t-values]				R^2	$\bar{R}^2$	D-W
	Intercept	*Y*	Y_{fc}	YNA_{fc}			
1.	-282.03 [2.68]	0.32 [89.16]*	-	-	0.99	0.99	0.50
2.	-266.17 [2.57]	-	0.34 [90.57]*	-	0.99	0.99	0.59
3.	-135.77 [1.47]	-	-	0.43 [100.75]*	0.99	0.99	0.86

* t-values are significant at 1% level

The coefficient value of the explanatory variables represents the long-run marginal propensity to save [MPS]. The non-agricultural sector, exhibits the strongest saving potential in the long-run with a mps of over 40 percent for the sector. The cointegrating regressions are estimated primarily to derive the residual series to be used for further analysis and test for cointegration.

6.3. Cointegration Test

Augmented Engle-Granger [AEG] test or unit root test is applied to the residual variables derived from the cointegrating regressions to determine the level at which they become stationary. The Augmented Engle-Granger [AEG] test results are presented in Table 5.

Table: 5 Test for Cointegration

Time Period: 1950-51 to 2013-14

Eqn. No.	**Variables**		**AEG Test#** *ADF Test Statistic for Residual$*				**Inference**
	Dependent	*Independent*	*Residual*	*Level*	*Order of Integration*	*Cointegration*	
1.	S	Y	ECT 01	-2.59**	I[0]	Yes	Cointegrated : implies Granger causality
2.	S	Y_{fc}	ECT 02	-2.76*	I[0]	Yes	Cointegrated : implies Granger causality
3.	S	YNA_{fc}	ECT 03	-3.47*	I[0]	Yes	Cointegrated : implies Granger causality
			Mackinnon Critical values: 1% = -2.60 5% = -1.94 10% = -1.61				

ADF test equation for unit root test of residual is without a constant and trend. It carries a lag of one-period for the dependent residual variable. $ Significance is based on Mackinnon critical values for rejection of hypothesis of a unit root.
* = Significant at 1%, ** = Significant at 5%, *** = Significant at 10%

The results of the AEG test confirm the absence of unit roots in residuals' series. All the three residual series ECT 01, ECT 02 and ECT 03 are integrated of the order zero [I(0)] which is less than the order of integration of saving and income variables that are integrated of the second order [I(2)]. Therefore, as per Engle and Granger (1987) specifications, the following variable pairs - S and Y, S and Y_{fc}, and S and YNA_{fc} are cointegrated. The test confirms a stable long-run relationship between the three pairs of saving and income variables. This obviously implies the existence of Granger causality in at least one direction between S and Y, S and Y_{fc} and S and YNA_{fc}. The exact direction of causality needs to be explored further by developing Vector Error Correction Model [VECM] for Granger causality test. Prior to this, the results of the Error Correction Model [ECM] examining the short-turn dynamics between saving and income have been presented in the next step.

6.4. Error Correction Model

Once the existence of long-run relationship between saving and income variables is established, the Error Correction Model [ECM] helps to understand the short-run impact between variables. The error correction model has been estimated for each pair of saving and income variables [S - Y, S - Y_{fc} and S - YNA_{fc}], as presented in Table 6. The ECM is estimated for stationary saving and income variables, including a lagged Error Correction Term [ECT] obtained from the cointegrating regression.

Table: 6 Error Correction Mechanism

Method: Ordinary Least Squares — ***Dependent Variable:*** $\Delta^2 S$

Time Period: 1950-51 to 2013-14

Eqn. No.	**Coefficient of Independent Variables and [t-values]**									
	Intercept	$\Delta^2 Y$	$\Delta^2 Y_{fc}$	$\Delta^2 YNA_{fc}$	$ECT\ 01_{-1}$	$ECT\ 02_{-1}$	$ECT\ 03_{-1}$	R^2	$\bar{R}^2$	***D-W***
1.	-53.19 [0.63]	0.66 [5.96]*	-	-	-0.57 [5.00]*	-	-	0.48	0.47	2.74*
2.	-12.14 [0.12]	-	0.50 [2.95]*	-	-	-0.66 [4.87]*	-	0.31	0.29	2.62*
3.	33.94 [0.35]	-	-	0.38 [1.47]**	-	-	-0.88 [5.05]*	0.32	0.29	2.23*

* Significant at 1% level, ** Significant at 15% level

The stationary saving and income variables are:

$\Delta^2 S$ = Second Difference of Nominal Gross Domestic Saving
$\Delta^2 Y$ = Second Difference of Nominal National Income
$\Delta^2 Y_{fc}$ = Second Difference of Nominal National Income at factor cost
$\Delta^2 YNA_{fc}$ = Second Difference of Nominal Non-agricultural Income at factor cost

The following observations can be made from the Error Correction Models [ECM] stated above:

i. The error correction model for each of the saving and income variables are not spurious as the D-W values are higher than the R^2 values. D-W values for all the three models are significant at 1% level indicating no issue of either positive or negative first-order autocorrelation in the residuals.

ii. The R^2 and $\bar{R}^2$ values are poor but t-values of explanatory variables are statistically significant. The short-run marginal propensity to save has turned out to be higher than long-run marginal propensities. For a unit change in Y and Y_{fc}, saving increases by nearly 70 percent and 50 percent respectively, in the short-run. This indicates a stronger marginal relationship in the short-run than in long-run. For non-agricultural sector, the marginal response in savings to changes in income is nearly 40 percent in both short-run and long-run.

iii. The coefficients of all the three error correction terms [ECT 01, ECT 02 and ECT 03] are significantly negative, which reconfirms the existence of cointegration or long-run equilibrium between the respective saving and income variables.

iv. The coefficients of the error correction terms show the speed of adjustment between saving and income variables. The adjustment parameters indicate that 0.57 of the discrepancy between saving and national income; and 0.66 of the discrepancy between saving and national income at factor cost in the previous year is eliminated in the current year. Savings would fall by 0.88 points in the current year to restore long-run equilibrium between saving and non-agricultural income at factor cost.

6.5. Granger Causality Test - VEC Model

Granger causality results provide evidence on the direction of causality between saving and income. Granger tests based on Vector Error Correction Models [VECM] also explain the existence or absence of short-run and long-run causality between the variables and determine the direction of causal link between them, whether uni-directional or bi-directional.

The following tables display the causality results. Tables 7a and 7b present the VECM for saving and national income [S and Y]; Tables 8a and 8b for saving and national income at factor cost [S and Y_{fc}]; and Tables 9a and 9b present the causality results for saving and non-agricultural income at factor cost [S and YNA_{fc}].

The interpretation of the tables mentioned above involves the following. For a certain model,

i. If the coefficients of the independent variables are jointly significant [as a group], or coefficient of at least one independent variable is significantly away from zero, it explains the short-run causality from the independent to the dependent variable.

ii. If the coefficient of the error correction term [ECT] is significantly away from zero, it indicates long-run causality from the independent to the dependent variable.

If the above two conditions are satisfied, it can be deduced that the independent variable Granger causes the dependent variable uni-directionally both in the short-run and long-run.

The same principle is applied for examining the causal influence in the opposite direction. The final conclusion on uni-directional or bi-directional causality between the variables is made on the basis of cumulative results from the two cases.

Table: 7a	**Granger Causality Test [Y to S]**			
Dependent Variable: $\Delta^2 S$ Method: Ordinary Least Squares Time Period: 1950-2013				
Variable	***Coefficient***	***Std. Error***	***t-Statistic***	***Prob.***
C	43.862	62.042	0.707	0.482
$\Delta^2 S_{-1}$	-1.464	0.171	-8.538	0.000
$\Delta^2 S_{-2}$	-1.059	0.256	-4.132	0.000
$\Delta^2 S_{-3}$	0.069	0.191	0.366	0.715
$\Delta^2 Y_{-1}$	1.045	0.149	6.985	0.000
$\Delta^2 Y_{-2}$	-0.459	0.190	-2.416	0.019
$\Delta^2 Y_{-3}$	0.069	0.115	0.607	0.547
ECT 01_{-1}	-0.273	0.092	-2.974	0.004
R-squared :	*0.809*	*F-statistic :*		*30.876*
Adjusted R-squared :	*0.783*	*Prob[F-statistic] :*		*0.000*
D-W statistic :	*2.061*			

Coefficients are significant at 5 percent level

Inference:

The explanatory variables $\Delta^2 Y$ are jointly significant in explaining $\Delta^2 S$. This explains the short-run causality from Y to S. Also, the coefficient of error correction term is significantly away from zero which indicates long-run causality from Y to S. *Therefore, Y Granger causes S uni-directionally both in short-run and long-run.*

Table: 7b	**Granger Causality Test [S to Y]**			
Dependent Variable: $\Delta^2 Y$ Method: Ordinary Least Squares Time Period: 1950-2013				
Variable	***Coefficient***	***Std. Error***	***t-Statistic***	***Prob.***
C	119.239	79.197	1.506	0.138
$\Delta^2 Y_{-1}$	0.813	0.191	4.256	0.000
$\Delta^2 Y_{-2}$	-0.039	0.243	-0.161	0.873
$\Delta^2 Y_{-3}$	0.091	0.146	0.621	0.537
$\Delta^2 S_{-1}$	-0.588	0.219	-2.686	0.009
$\Delta^2 S_{-2}$	-1.087	0.327	-3.321	0.002
$\Delta^2 S_{-3}$	-0.203	0.244	-0.833	0.409
ECT 01_{-1}	0.052	0.117	0.442	0.6605
R-squared :	*0.571*	*F-statistic :*		*9.680*
Adjusted R-squared :	*0.511*	*Prob[F-statistic] :*		*0.000*
Durbin-Watson stat :	*1.927*			

Coefficients are significant at 5 percent level

Inference:

The joint significance of the explanatory variables $\Delta^2 S$ confirms short-run causality from S to Y. However, there is lack of long-run causality from S to Y since the coefficient of the error correction term is not significantly away from zero. *Therefore, S Granger causes Y uni-directionally in short-run but not in long-run.*

Final Conclusion:

Short-run causality is bi-directional between S and Y. However, long-run causality runs uni-directionally from Y to S.

Table: 8a	**Granger Causality Test [Y_{fc} to S]**			
Dependent Variable: Δ^2S Method: Ordinary Least Squares Time Period: 1950-2013				
Variable	***Coefficient***	***Std. Error***	***t-Statistic***	***Prob.***
C	22.265	64.879	0.343	0.733
Δ^2S_{-1}	-1.148	0.144	-7.966	0.000
Δ^2S_{-2}	-1.275	0.193	-6.592	0.000
Δ^2S_{-3}	-0.271	0.177	-1.531	0.132
Δ^2Y_{fc-1}	1.016	0.155	6.535	0.000
Δ^2Y_{fc-2}	-0.176	0.199	-0.883	0.382
Δ^2Y_{fc-3}	0.103	0.135	0.761	0.450
ECT 02_{-1}	-0.348	0.098	-3.557	0.001
R-squared :	*0.798*	*F-statistic :*		*28.846*
Adjusted R-squared :	*0.771*	*Prob[F-statistic] :*		*0.000*
Durbin-Watson stat :	*1.884*			

Coefficients are significant at 5 percent level

Inference:

There exists short-run causality from Y_{fc} to S as at least one independent variable Δ^2Y_{fc-1} is significantly away from zero and explains variations in saving. Coefficient of the error correction term is also significantly away from zero, explaining long-run causality from Y_{fc} to S. *Therefore, Y_{fc} Granger causes S uni-directionally in short-run as well as in long-run.*

Table: 8b	**Granger Causality Test [S to Y_{fc}]**			
Dependent Variable: Δ^2Y_{fc} Method: Ordinary Least Squares Time Period: 1950-2013				
Variable	***Coefficient***	***Std. Error***	***t-Statistic***	***Prob.***
C	81.747	60.453	1.352	0.182
Δ^2Y_{fc-1}	0.355	0.145	2.450	0.018
Δ^2Y_{fc-2}	0.224	0.185	1.209	0.232
Δ^2Y_{fc-3}	0.258	0.126	2.048	0.046
Δ^2S_{-1}	-0.011	0.134	-0.080	0.937
Δ^2S_{-2}	-0.609	0.180	-3.383	0.001
Δ^2S_{-3}	-0.367	0.165	-2.227	0.030
ECT 02_{-1}	0.077	0.091	0.843	0.403
R-squared :	*0.589*	*F-statistic :*		*10.446*
Adjusted R-squared :	*0.533*	*Prob[F-statistic] :*		*0.000*
Durbin-Watson stat :	*1.766*			

Coefficients are significant at 5 percent level

Inference:

The explanatory variable Δ^2S is jointly significant in explaining Δ^2Y_{fc}. This implies the existence of short-run causality from S to Y_{fc}. There is no evidence of long-run causality from S to Y_{fc} as suggested by the coefficient of the error correction term which is insignificant. *Therefore, S Granger causes Y_{fc} uni-directionally only in the short-run.*

Final conclusion:

There exists bi-directional causality between S and Y_{fc} in the short-run whereas long-run causality is found to be running uni-directionally from Y_{fc} to S.

Table: 9a Granger Causality Test [YNA_{fc} to S]

Dependent Variable: Δ^2S
Method: Ordinary Least Squares
Time Period: 1950-2013

Variable	*Coefficient*	*Std. Error*	*t-Statistic*	*Prob.*
C	10.345	57.300	0.181	0.858
Δ^2S_{-1}	-0.856	0.145	-5.914	0.000
Δ^2S_{-2}	-1.121	0.179	-6.242	0.000
Δ^2S_{-3}	-0.139	0.182	-0.767	0.447
Δ^2YNA_{fc-1}	1.435	0.203	7.069	0.000
Δ^2YNA_{fc-2}	-0.816	0.288	-2.834	0.007
Δ^2YNA_{fc-3}	0.472	0.241	1.960	0.055
ECT 03_{-1}	-0.389	0.100	-3.888	0.000
R-squared :	*0.844*	*F-statistic :*		*39.347*
Adjusted R-squared :	*0.822*	*Prob[F-statistic] :*		*0.000*
Durbin-Watson stat :	*1.863*			

Coefficients are significant at 5 percent level

Inference:

The joint significance of the explanatory variables Δ^2YNA_{fc} reveal short-run causality from YNA_{fc} to S. The statistically significant coefficient of the error correction term also indicates long-run causality from YNA_{fc} to S. *Therefore, YNA_{fc} Granger causes S uni-directionally in short-run as well as in long-run.*

Table: 9b Granger Causality Test [S to YNA_{fc}]

Dependent Variable: Δ^2YNA_{fc}
Method: Ordinary Least Squares
Time Period: 1950-2013

Variable	*Coefficient*	*Std. Error*	*t-Statistic*	*Prob.*
C	76.549	47.6355	1.607	0.114
Δ^2YNA_{fc-1}	0.639	0.169	3.789	0.000
Δ^2YNA_{fc-2}	0.110	0.239	0.459	0.648
Δ^2YNA_{fc-3}	-0.289	0.200	-1.444	0.155
Δ^2S_{-1}	0.034	0.120	0.285	0.777
Δ^2S_{-2}	-0.290	0.149	-1.943	0.058*
Δ^2S_{-3}	-0.199	0.150	-1.324	0.192
ECT 03_{-1}	0.198	0.083	2.377	0.021
R-squared :	*0.570*	*F-statistic :*		*9.674*
Adjusted R-squared :	*0.511*	*Prob[F-statistic] :*		*0.000*
Durbin-Watson stat :	*1.941*			

Coefficients are significant at 5 percent level
* Significant at 10 % level

Inference:

At least one explanatory variable Δ^2S_{-2} is significantly explaining Δ^2YNA_{fc}. Therefore, short-run causality runs from S to YNA_{fc}. The coefficient of the error correction term is also statistically significant, indicating long-run causality from S to YNA_{fc}. *Therefore, S Granger causes YNA_{fc} uni-directionally both in short-run and long-run.*

Final Conclusion:

Short-run causality is bi-directional between S and YNA_{fc}. Long-run causality is also bi-directional for S and YNA_{fc}.

➢ Final Summary - VEC Model

Causality Test Results			
Sr. No.	***Variables***	***Short-run Causality***	***Long-run Causality***
1.	S - Y	Y ⇄ S	Y → S
2.	S - Y_{fc}	Y_{fc} ⇄ S	Y_{fc} → S
3.	S - YNA_{fc}	YNA_{fc} ⇄ S	YNA_{fc} ⇄ S

Granger causality test results for the VEC Models establish that in the Indian case,

i. Short-run causality is bi-directional between saving and income at levels - S and Y, S and Y_{fc}, S and YNA_{fc}.

ii. Long-run causality runs uni-directionally from Y to S and Y_{fc} to S. However, for the non-agricultural sector, bi-directional or mutual causation exists between saving and non-agricultural income - S and YNA_{fc}.

7. Conclusion and Policy Inferences

India has experienced very high saving rates over the decades but it does not reflect in the low growth rates. The growth rates have shown an overall increasing trend but failed to match the extraordinary saving performance in the country. The economy is thus characterised by a puzzling feature of ‘high savings and low growth’. In order to understand this strange phenomenon, the study empirically examines the saving-growth relationship in India by applying cointegration procedure to Granger causality testing. The results of Engle-Granger cointegration test indicates that a long-run equilibrium exists between domestic savings and national income. Hence, there is a definite long-run relationship between savings and growth for India. In addition, the Granger causality tests yield different causality outcomes for short-run as compared to the long-run. The study arrives at bi-directional causal relationship between saving and growth in the short-run. Increasing saving levels lead to increase in income levels of nominal national income and nominal non-agricultural income. The same is true for the reverse causality. Higher income encourages higher savings that would be available for investment purposes and eventually fuel higher economic growth. In long-run, the Keynesian hypothesis largely holds true with a significant positive causal impact running from higher national income to higher domestic savings. For the non-agricultural sector, the causation is bi-directional or mutual from nominal non-agricultural income to domestic savings and conversely from saving to non-agricultural income. Savings directed towards the non-agricultural sector leads to higher overall growth in the economy. Thereby, implying that growth in the country is essentially driven by the non-agricultural sector. A larger portion of the saving pie needs to be allocated or diverted towards this sector. As saving is economic growth led in India, there is a need for framing policies that would accelerate economic growth for boosting the country's saving kitty further. The attainment of high and sustained economic growth necessitates the revival of manufacturing competitiveness with focus on labour-intensive manufacturing, which is possible only by promoting investment in infrastructure (Mohan and Kapur, 2015). With a saving capacity of over 50 percent from the total national income and 40 percent from non-agricultural income, the Indians are prolific savers. This huge quantum of saving needs to be appropriately mobilised and canalized for capital accumulation necessary for generating higher economic growth. The issues of significance with respect to saving are efficient allocation and utilisation of savings; focus on providing saving incentives; alternative saving options; variety of financial instruments to save in; and a universally favourable saving environment.

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