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Connection between Saving, Investment and Economic Growth of India

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Abstract
This paper scrutinizes the relationship between gross domestic saving, gross capital formation and economic growth in India during a period from 1992 to 2018. The results of cointegration analysis reveal that there is a long-run relationship between selected variables; however, the observations from the results of the Granger causality test indicate a positive relationship between saving, investment and economic growth in India. The findings explicate that saving and investment directed growth is coming from the private sector.

Keywords: Economic Growth, Investment, Saving, Casualty, Cointegration, Vector Error Correction, Vector Auto Regression (VAR)

JEL Codes: C02, C22, E20, E21

Introduction

Economic growth, the major end for developing and developed countries define as an increase in the country's production and per capita income. Due to the anomaly and volatility of the growth process, the country may experience various shifts in growth regimes that can involve growth take-off and booms, stagnation and or growth collapses over a period of several decades. In this context investment and savings become important determining factors and dynamics as they affect positively the rate of economic growth (Hundie, 2016). Promoting economic growth through savings and investment has received considerable attention in many countries around the world (Verma, 2007) due to the fact that high investment and saving rates are crucial because of their strong positive correlation with the GDP growth rates as suggested by endogenous growth theory (Agrawal, 2000).

The relationship between saving, investment and economic growth has puzzled economists ever since economics became a scientific discipline. In general, a fraction of income is saved and put into the investment. An exogenous increase in the desire to save leads to an unchanged level of saving but at a lower level of income. If we define both saving and investment as the difference between gross domestic product (GDP) and consumption, it may tend to be interpreted in terms of the cause-and-effect relationship (Jangili, 2011). The role of domestic saving and domestic investment in stimulating economic growth has received considerable attention in India and also in many countries around the world and hence proved by various theories and empirical data. The traditional theory is given by Lewis (1955) states that saving and economic growth are positively associated; it means an increase in saving boosts economic growth.

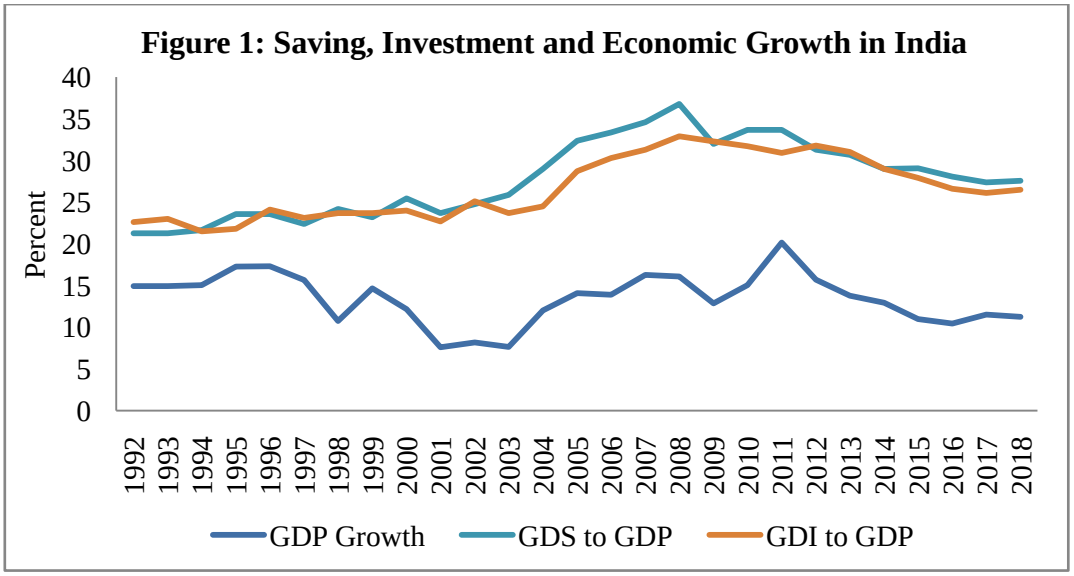
The Harrod-Domar models, on the other hand, specify investment as the key to promote economic growth. Further, the neoclassical model (Solow, 1956) argues that the increase in the saving rate boost steady-state output by more than its direct impact on investment, because the induced rise in income raises saving, leading to a further rise in investment. Jappelli and Pagano (1994) claimed that saving contributes to higher investment and higher GDP growth in the short-run, whereas, Carroll-Weil hypothesis (Carroll and Weil, 1994) states that it is economic growth that contributes to saving, not saving to growth (Jangili, 2011).

The role of saving and investment in promoting economic growth is also proved through empirical studies. Some of the studies support the classical growth theory, some with the Carroll-Weil hypothesis and some studies do not support either of these. To exemplify, Yadav et. al (2018) examined the long-run equilibrium relationship between real domestic saving, investment and growth in India by using cointegration to tests the null hypothesis of non-causality between these variables during a period from 1951 to 2015. The study confirmed the existence of a long-run equilibrium relationship between domestic savings, investment and growth. On the basis of the results of the causality test it confirmed the absence of a causal relationship between growth and investment, and between growth and saving. Seth (2011) employed Engel Granger Cointegration to test the long-run relationship between gross domestic saving and gross domestic investment as well as corporate sector saving and corporate sector investment in India over a period from 1980 to 2008. The results showed the long-run relationship between domestic saving and domestic investment on the one hand and corporate saving and investment on the other hand.

Sinha (1996) looked at the causality between the growth rates of gross domestic saving and economic growth and found no causality running in either direction. Muhleisen (1997), in a study, found significant causality running from growth to saving but not from saving to growth for all forms of saving. Sinha and Sinha (2008) studied the relationships among growth rates of the GDP, household saving, public saving and corporate saving during 1950 to 2001 and found that economic growth produced higher saving in various forms and never the other way around. Verma (2007) employed the ARDL cointegration approach to determine the long-run relationship of GDS, GDI and GDP during a period from 1950-51 to 2003-04 and supported the Carroll-Weil hypothesis that saving does not cause growth, but growth causes saving.

The Indian Scenario

Saving and investment play a pertinent role in growth and development. The theoretical and empirical works conducted in the Indian context also reveal a connexion between saving, investment and economic growth. The macroeconomic performance indicators (table 1) show that India's GDP (at current market prices) has changed erratically during a period from 1991-92 to 2017-18. In the initial years after liberalisation, it increased from 14.95 percent in 1991-92 to 17.32 percent in 1995-96; it was lowest (7.63 percent) in 2000-01 and highest (20.17 percent) in 2010-11. The gross domestic saving(GDS) as a percent of GDP, however, has increased progressively over time from an extremely low base of 21.3 percent in 1991-92 to the highest peak of 36.8 percent in 2007-08 and 27.6percent in 2017-18. The gross domestic investment (GDS) also has increased from 22.6 percent in 1992-91 to the highest level of 32.9 percent in 2007-08and 26.5 percent in 2017-18. Due to the global economic crises of 2008, GDS to GDP ratio fell suddenly from 36.8 percent in 2007-08 to 32.0 percent in 2008-09. The GDI to GDP ratio also registered a decrease from 32.9 percent in 2007-08 to 32.9 percent in 2008-09. All this indicates a robust relationship with GDP, GDS and GDI, but there seems a need to examine the significance of the relationship among the variables.



Source: Statistical Appendix, Economic Survey (2019-20)

The review of theories and literature on the problem under study explicates that there is no inclusive study on the analysis of the interdependence between saving and investment of the household, private corporate and public sector and the economic growth in the Indian context. This paper is an attempt to investigate the possibility of saving-investment managed growth and growth driven saving-investment by using the Granger causality test between the logarithms of Gross domestic saving, Gross capital formation and GDP in India.

Material and Methods

To examine the causal relationship between gross domestic saving, gross domestic investment and economic growth of India, the study considers annual data series of gross domestic saving (GDS), gross domestic capital formation (GDI) of the household sector, private corporate sector and public sector, and gross domestic product (GDP) collected from statistical tables of Economic Survey 2019-2020 over a period from 1992 to 2018. In order to ascertain the nature and order of integration among selected time series variables Augmented Dickey-Fuller (ADF) unit root test (Dickey and Fuller, 1979 and 1981) is used; and to test the presence or absence of cointegration relationship among selected variables the study used Johansen cointegration test.

The cointegration results envisage VECM / VAR methodology to define the direction of causality among variables under consideration. If there exists a cointegration relationship among the variables, the Granger causality test is performed under Vector Error Correction Model (VECM) environment; and if there does not exist cointegration among the variables, the Granger causality test is applied by using Vector Auto Regression (VAR) methodology. This paper used both the VECM and VAR framework to examine the direction of causality.

Result and Discussion

The results of the Augmented Dickey-Fuller (ADF) test used to examine the null hypothesis of a unit root against stationary alternatives are presented in table 1. The results show that the calculated 't' value of all the selected variables, is more than the critical value at the first difference (with probability value less than 0.05) at a 5 percent level of significance. Thus, the variables under study are not found stationary at level.

Table 1: Results of Augmented Dickey Fuller Unit Root Test				
S. No	Variables (Integrated at 1st difference)	't' Value	Critical Value	P value
1.	LNGDP	6.66*	2.986	0.0000
2.	LNGDI	5.55*	2.986	0.0001
3.	LNGDS	4.78*	2.986	0.0008
4.	LNHHI	6.84*	2.986	0.0000
5.	LNHHS	4.45*	3.600	0.0084
6.	LNPCI	4.53*	2.986	0.0015
7.	LNPCS	5.14*	2.986	0.0003
8.	LNPI	3.80*	2.986	0.0084
9.	LNPS	5.72*	2.986	0.0001
Note:* level at first difference Here, HHI is Household Investment, HHS is Household Saving, PCI is Private Corporate Sector Investment, PCS is Private Corporate Sector Saving, PI is Public Sector Investment, and PS indicates Public Sector Saving **Source:** Author's calculation				

Since all the variables under study are integrated on the first difference, these are considered for further analysis. To test the presence of cointegration among the variables under consideration Johansen cointegration test is used. The null hypothesis is that there does not exist cointegration among variables; and the test results are presented in Table 2.

On the basis of the results of the cointegration test contained in table 2 the null hypothesis of no cointegration among variables, except household investment (HHI), is rejected, meaning that there exists a long-run relationship among all the variables except HHI. Turning to the maximum Eigen and trace stats, the null hypothesis that there is no cointegration is rejected at a 5 percent significance level in favour of the alternative hypothesis that there is at least one cointegrating vector for all the series except HHI.

Table 2: Results of Johansen Cointegration Test				
S. No.	Variables	Trace Statistics	Eigen Statistics	Conclusion
1.	LNGDP and LNGDI	22.02	15.49	Cointegrated
2.	LNGDP and LNGDS	18.95	16.05	Cointegrated
3.	LNGDP, LNGDI and LNGDS	32.02	16.87	Cointegrated
4.	LNGDP and LNHHI	12.19	13.12	Not Cointegrated
5.	LNGDP and LNHHS	17.38	16.78	Cointegrated
6.	LNGDP, HHI and HHS	24.93	16.64	Cointegrated
7.	LNGDP and LNPCI	16.23	15.79	Cointegrated
8.	LNGDP and LNPCS	16.01	14.98	Cointegrated
9.	LNGDP, LNPCI and LNPCS	34.87	20.82	Cointegrated
10.	LNGDP and LNPI	18.09	14.39	Cointegrated
11.	LNGDP and PS	18.25	18.18	Cointegrated
12.	LNGDP, LNPS and LNPI	33.17	20.39	Cointegrated
Note :* The critical value of trace test and maximum eigen value at 5% level of significance is 15.4947 and 14.2646 respectively. **Source:** Author's calculation				

The results show that GDP is cointegrated with GDS and GDI individually as well as collectively, hence, it can be deduced that there is a long-run equilibrium relationship between the two variables; and there exists causality in at least one direction. The results also indicate that there exists long-run cointegration between GDP and private corporate sector saving (PCS) and investment (PCI); and also

between GDP and public sector saving (PS) and investment (PI), but no cointegrating relationship is observed between GDP and household investment (HHI) individually. However, collectively both HHI and HHS are cointegrated with GDP as shown in table 2. This infers that there exists a cointegration relationship between GDP and saving and investment of private as well as a public sector rather than the household sector.

To test causality among selected variables, the researchers applied the Vector Error Correction Mechanism (VECM) on all the cointegrating variables and Vector Auto Regression (VAR) on non-cointegrating variables. The test results are presented in Table 3.

Table 3: Results of the Granger Causality Test		
Null Hypothesis	P Value (Sign. 0.05)	Conclusion
Granger Causality in VECM Framework		
Economic Growth		
LNGDP does not granger cause LNGDI	0.2869	Do not Reject
LNGDP does not granger cause LNGDS	0.0725	Do not Reject
LNGDP does not granger cause LNPCI	0.0049	Reject
LNGDP does not granger cause LNPCS	0.0062	Reject
LNGDP does not granger cause LNPI	0.0897	Do not Reject
LNGDP does not granger cause LNPS	0.0148	Reject
Saving and Investment		
LNGDI does not granger cause LNGDP	0.0101	Reject
LNGDI does not granger cause LNGDS	0.4018	Do not Reject
LNGDS does not granger cause LNGDP	0.0363	Reject
LNGDS does not granger cause LNGDI	0.1922	Do not Reject
Private Corporate Sector		
LNPCI does not granger cause LNGDP	0.0057	Reject
LNPCI does not granger cause LNPCS	0.6317	Do not Reject
LNPCS does not granger cause LNGDP	0.0058	Reject
LNPCS does not granger cause LNPCI	0.3512	Do not Reject
Public Sector		
LNPI does not granger cause LNGDP	0.0199	Reject
LNPI does not granger cause LNPS	0.4285	Do not Reject
LNPS does not granger cause LNGDP	0.0790	Do not Reject
LNPS does not granger cause LNPI	0.1964	Do not Reject
Granger Causality in VAR Framework		
Household Sector		
LNGDP does not granger cause LNHHI	0.0168	Reject
LNGDP does not granger cause LNHHS	0.0127	Reject
LNHHI does not granger cause LNGDP	0.3585	Do not Reject
LNHHI does not granger cause LNHHS	0.5760	Do not Reject
LNHHS does not granger cause LNGDP	0.0278	Reject
LNHHS does not granger cause LNHHI	0.0209	Reject
Source: Author's calculation		

The results of the bivariate Granger causality test performed under the VECM framework among selected cointegrated variables depict unidirectional causality running from GDI to GDP and GDS to GDP. One can infer that saving (GDS) and investment (GDI) lead to economic growth (GDP); but,

economic growth does not foster investment and saving, which is against the Carrol and Weil (1994) hypothesis. The results also indicate bidirectional causality running between private corporate saving and investment (PCS and PCI) and economic growth. It means GDP affects PCS and PCI and also gets affected by PCS and PCI. Further, the unidirectional causality from public sector investment (PI) to economic growth indicates that the PI gets affected by the GDP of the country.

The test results of bivariate Granger causality in VAR environment applied for household saving (HHS), household investment (HHI) and GDP indicate bidirectional causality between GDP and HHS, and unidirectional causality from GDP to HHS, meaning that GDP affects both the HHI and HHS, but it gets affected by HHS only. The results also indicate that household savings affect household investments.

Conclusion

The study examined the direction of the relationship between domestic saving, domestic investment and economic growth in India at both the aggregate level and sector level during a time span of 1992-2018 by using the Granger causality test. The empirical results confirm that the direction of causality is from saving and investment to economic growth and not vice versa. So, the government should make such modifications in its policies which may induce gross domestic savings and investment, ultimately resulting in increased economic growth.

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