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INVESTIGATING THE CAUSAL LINKAGE BETWEEN SAVINGS AND INVESTMENT IN INDIA: A GRANGER CAUSALITY APPROACH

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ABSTRACT

The present research paper tries to explore the causal relationship between savings and investment in India using a time series dataset spanning the years 1960 to 2021. The entire dataset is divided into two distinct sub-periods: the pre-liberalization (1960–1990) and the post-liberalization (1991–2021). The empirical analysis is done through correlation matrix, unit root analysis, cointegration analysis, VAR Granger causality, and pairwise Granger causality. The correlation matrix indicates that the association between GDS and GDI is positive throughout the duration and sub-periods. Further, the unit root test outcomes exhibit that the variables are stationary at their first differences. The results from the cointegration analysis establish the existence of a long-term relationship between variables, VAR Granger causality test brings to light a one-way connection from GDS to GDI, whereas, the pairwise Granger causality test validates the findings obtained from the VAR Granger causality approach. Overall, the study concluded that the classical notion of planned savings always being equal to planned investment is not valid even after the liberalization of the Indian economy.

KEYWORDS: Savings; Investment; Correlation; Granger cointegration; Granger Causality.

1. INTRODUCTION

Savings and investment have been pointed out as two important macroeconomic determinants with microeconomic roots that contribute to long-term economic development by ensuring price stability and increasing employment (Thilwal, 1979; Jain and Baliyan, 2014). However, the relationship between savings and investment remains one of the most debatable subjects among economists, because at the core of the discussion is the subject of causation, that is, whether savings cause investment or investment create savings. The issue of causation becomes more important because it has significant consequences for the country's fiscal policymaking (Issahaku, 2011). If savings lead to increased investment, it becomes imperative to prioritize the promotion of domestic savings to stimulate both investment and economic growth. Conversely, if the causal relationship is reversed, where investment drives savings, then policies aimed at encouraging savings are likely to prove ineffective and may even result in economic inefficiencies. In such a scenario, the focus should shift away from promoting savings and instead concentrate on eliminating barriers to investment (Erden, 2005; Ezzo and Keho, 2010; Mishra and Jain, 2012). Although there is a lot of literature exploring the link between these two variables, most previous research on the relationship between savings and investment has primarily focused on cross-sectional and cross-country analyses. Moreover, the examination of macroeconomic theories reveals divergent perspectives from one another. In accordance with Classical economic theory, an increase in savings will lead to a decrease in interest rates. This, in turn, encourages investors to seek greater capital from the pool of available funds, consequently leading to an upswing in investment (Caminati, 1981). Contrarily, Keynes argues that an increase in the investment leads to an increase in the output and income which, in turn, will increase savings (Keynes, 1936). Therefore, they have conflicting views regarding the causality and this leaves room for ambiguity regarding the direction of causality. Further, insufficient savings and investment are a prevalent problem in developing nations like India, which has a dense population and a long-standing emphasis on savings management. Further, an area of nearly 40 million hectares that is prone to floods. Each year, approximately 8 million hectares of land in the country are affected by floods (Ray et al., 2019). Therefore, savings became uncertain in this industry. Further, the unorganized sector has dominated the organized sector, and people in agriculture have been exploited by higher interest rates; as a result, money has migrated from the urban to the rural sector. Despite the significance of the savings and investment interrelationship, the absence of recent empirical investigations into their causal nexus is particularly pronounced within the Indian context. As a result, this paper aims to address this gap by splitting the complete sample of the study into two segments, namely the pre- and post-liberalisation periods. This division will be subject to causality tests, facilitating an in-depth exploration of the relationship.

2. LITERATURE REVIEW

Long-standing beliefs about the macroeconomic dynamics of the growth process claimed that increasing savings, when turned into productive investment, would help in economic "take-off" Harrod (1939); Domar (1946); Lewis (1954) and Solow (1956). Endogenous growth theorists like Romer (1986); Lucas (1988) and Barro (1991) supported the idea that investments in physical capital are the main source of sustainable economic growth. Jansen (1998); Leachman (1991); Taylor (1996) and Moreno (1997) stated that the short-term connection between savings and investment is governed by country-specific economic cycles, whereas the long-term correlation is dictated by restricted capital movements, government current account management, and budget constraints. Athukorala (1998) investigate the pattern of savings interest rate and investment patterns in India between 1955 and 1995. He came to the conclusion that a rise in interest rate encourages saving and investment. De Vita and Abott (2001) analyzed a significant association between savings and investment in the United States through ARDL bound test. They concluded that the correlation between saving and investment diminished during the period of more liberalized floating exchange rate. Sinha and Sinha (2004) used the ECM to examine the short-run and long-run relationship between financial reserves (saving) and capital expenditures (investment) for 123 countries. Their findings indicated that countries with a high per capita income have more capital mobility. Ang, J (2009) studied the dynamic relationship between saving and investment in India from 1950 to 2005. His study concluded that more financial liberalization makes it possible for more domestic resources to be directed into investment activities. Mohanty (2019) used time series data from 1975 to 2016 to study the relationship between saving and economic growth in Ethiopia. His results revealed a bidirectional causal link between the growth rate of GDS and the growth rate of GDP in both the short and long term. Oyewole et al. (2023) examined the efficiency of Nigeria's industrial sector using interest rate and savings. They concluded that saving has significant positive impact whereas interest rate and inflation rate had a favorable but insignificant impact on Nigerian industrial sector.

3. METHODOLOGY

For the purpose of investigating the causal connection between savings and investment in the pre- and post-liberalisation periods in India, the whole sample period has been split into two parts: pre-liberalization (1960–1990) and post-liberalisation (1991–2021). The data on GDS and GDI has been taken from the World Development Indicator, provided by the World Bank, and expressed as a percentage. The strength and direction of linear correlation between GDS and GDI are evaluated through the correlation matrix, while the stationarity test is done by using the Dickey-Fuller (1979) test with the help of the following expression:

$$\Delta Y_t = \alpha + \beta Y_{t-1} + \sum_{i=1}^k \varphi_i \Delta Y_{t-1} + \varepsilon_t$$

1

Based on the ADF findings, the study moved to the next phase, which included cointegration. The cointegration between GDS and GDI has been done through Granger cointegration, whereas causality tests have been performed through VAR Granger causality and pairwise Granger causality methods.

4. EMPIRICAL ANALYSIS

Savings serve as the basis for investment, implying that increased savings result in greater investment and economic growth. However, this is based upon a favorable macroeconomic environment and a stable financial system (Garcia et al., 1999).

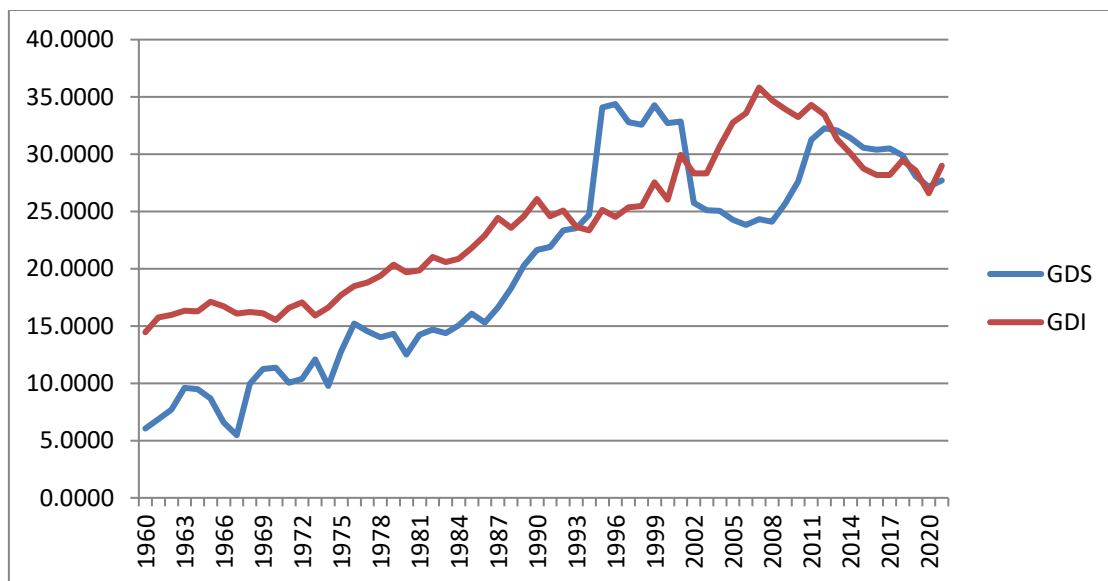


Figure: India's GDS and GDI from 1960 to 2021

In India, domestic savings are widely recognized as an essential component of capital formation. Throughout the history of economic planning, planners have consistently tried to achieve self-reliant and self-sustaining economic development. One of the key strategies employed to achieve this goal has been to encourage a significant rise in the saving and investment rate (Francis et al., 2020). The Gross Domestic Savings (GDS) rate has witnessed significant growth over the years. It commenced at a modest 6% in 1960 and steadily climbed to reach 27.7% in 2021, with minor fluctuations. Until 1991, India operated under a closed capital account system, marked by regulatory barriers and explicit constraints on capital movement within the country. However, in 1996, the GDS surged to 34.4%,

possibly attributable to the positive impact of the New Economic Policy implemented in 1991. Subsequently, there was a noticeable decline in GDS after 2001, persisting until 2007. The resurgence in GDS thereafter could be attributed to the introduction of the FRBM Act of 2003. Simultaneously, investment rates exhibited consistent growth, reaching a peak of 29% in 2021, a remarkable increase from the 17.9% recorded in 1960, with minor exceptions in 1993, 1996, and 2016, as illustrated in Figure. Moreover, since 1991, the gap between GDS and Gross Domestic Investment (GDI) has narrowed. This development holds promise for the Indian economy, emphasizing the pivotal role of savings in capital formation, which, in turn, propels economic growth, output, and employment. According to Mishra et al. (2010), it is crucial for genuine economic advancement to not only have a high saves rate, but also a robust positive relationship between savings and investment rates.

Table: 1 Correlation Matrix

Pre-Liberalization Period (1960-1990)		
Variables	GDS	GDI
GDS	1.00	0.78
GDI	0.78	1.00
Post-Liberalization Period (1991-2021)		
GDS	1.00	0.89
GDI	0.89	1.00
Whole-Period (1960-2021)		
GDS	1.00	0.90
GDI	0.90	1.00

Source: Author`s Calculations

The outcomes drawn from the correlation matrix show a positive correlation between GDS and GDI. Notably, the connection between these two variables exhibited greater strength during post-liberalized periods (89 percent) in comparison to the pre-liberalized era (78 percent). Importantly, when considered jointly, the association between these variables became stronger (90 percent), as shown in Table 1.

Table: 2 Summary Statistics for Equation 1

Pre-Liberalization Period (1960-1990)				
	Levels		First Differences	
Variables	t-Statistics	Prob.	t-Statistics	Prob.
GDS	-1.468401	0.5355	-5.338498	0.0001
GDI	0.178745	0.9661	-7.821168	0.0000
Post-Liberalization Period (1991-2021)				
GDS	-1.558135	0.4906	-3.521179	0.0145
GDI	-1.997132	0.2864	-8.513963	0.0000
Whole-Period (1960-2021)				
GDS	-2.003737	0.2846	-7.512163	0.0000
GDI	-1.258495	0.6431	-8.364757	0.0000

Source: Author`s Calculations

The results of the unit root test are shown in Table 2, which shows that neither the whole period nor the pre- and post-liberalisation periods are stationary at levels, but they are stationary at their first differences. Therefore, both variables are integrated in order I (1). In this scenario, the relationships between the variables generally settle into a state of equilibrium in the long run (Engle and Granger, 1987). As a result, residual-based Granger cointegration tests were employed in Table 3 to determine any possible long-term equilibrium relationship between these two variables.

Table: 3 Cointegration Results

Pre-Liberalization Period (1960-1990)			
Level			
Null Hypothesis	t-Statistics	Probability	Decision
Residual has a unit root	-3.762130	0.0080	Reject the Null Hypothesis
Post-Liberalization Period (1991-2021)			
Residual has a unit root	-3.942529	0.0051	Reject the Null Hypothesis
Whole-Period (1960-2021)			

Residual has a unit root	-4.427274	0.0007	Reject the Null Hypothesis
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Source: Author`s Calculations

Table 3 shows the results of the residuals-based Granger cointegration test. The findings indicate that the residuals have no unit root at this level. This conclusion is drawn from the observation that the probability values for all the residuals (the entire period as well as the pre- and post-liberalisation periods) are below 0.05. Based on this evidence, the study concluded that the variables are cointegrated, thus exhibiting a long-run relationship between GDS and GDI.

Table: 4 VAR Granger Causality

Pre-Liberalization Period (1960-1990)			
Dependent Variables: GDS			
Excluded	Chi-Square	degree of freedom	Prob.
GDI	1.5187	1	0.2178
ALL	1.5187	1	0.2178
Dependent Variables: GDI			
GDS	8.7920	1	0.0030
ALL	8.7920	1	0.0030
Post-Liberalization Period (1991-2021)			
Dependent Variables: GDS			
GDI	1.4101	1	0.2350
ALL	1.4101	1	0.2350
Dependent Variables: GDI			
GDS	4.5586	1	0.0328
ALL	4.5586	1	0.0328
Whole Period (1960-2021)			
Dependent Variables: GDS			
GDI	1.7252	1	0.1890
ALL	1.7252	1	0.1890
Dependent Variables: GDI			
GDS	12.3113	1	0.0005
ALL	12.3112	1	0.0005

Source: Author`s Calculations

The outcomes of the VAR Granger Causality Test are presented in Table 4. The test results indicate that the GDI does not have an influence on the GDS pre- and post-tests, as well as throughout the

entire study duration. This conclusion is supported by their respective p-values. However, the findings also indicate that when GDI is taken as a dependent variable, the corresponding probability values are below 0.05. This means that any changes made to the GDS will directly impact the behaviour of GDI. This pattern is observed across all three instances. Furthermore, this outcome implies unidirectional causation from the GDS to the GDI.

Table: 5 Pairwise Granger Causality Results

Pre-Liberalization Period (1960-1990)				
Null Hypothesis	Obs.	F- Statistics	Probability	Decision
GDI does not Granger cause GDS	30	1.51870	0.2284	No Causality
GDS does not Granger cause GDI		8.79206	0.0063	Causality
Post-Liberalization Period (1991-2021)				
GDI does not Granger cause GDS	30	1.41013	0.2454	No Causality
GDS does not Granger cause GDI		4.55870	0.0420	Causality
Whole Period (1960-2021)				
GDI does not Granger cause GDS	61	1.72521	0.1942	No Causality
GDS does not Granger cause GDI		12.3113	0.0009	Causality

Source: Author`s Calculations

Table 5 presents the outcomes obtained from the pairwise Granger causality test. The results of the causal analysis reveal a one-way causality pattern. This pattern suggests that savings influence investment, while the reverse scenario of investment influencing savings is not observed in all three periods. Additionally, these results provide further support for the conclusions derived from the VAR Granger causality.

5. CONCLUSION

This research paper examined the causal link between savings and investment in India from 1960 to 2021. The empirical investigation encompassed four distinct aspects: firstly, an identification of correlation; secondly, an order of integration of the variables; thirdly, a Granger cointegration analysis; fourthly, a VAR Granger causality test; and lastly, a pairwise Granger causality test. The outcomes drawn from the correlation matrix show a strong and positive correlation between GDS and GDI. Notably, the connection between these two variables exhibited greater strength during post-liberalized periods in comparison to the pre-liberalized era. Importantly, when considered jointly, the association

between these variables became stronger. The orders of integration for these variables were determined using the augmented Dickey-Fuller test, revealing that both variables attain stationarity at their first difference. To assess the presence of a long-term relationship, a Granger cointegration analysis was conducted. The results indicate that the variables are cointegrated, indicating a long-run relationship over the entire sample period as well as during both sub-periods (pre and post-liberalization). The VAR Granger causality test reveals the presence of a unidirectional causal relationship from GDS to GDI throughout the whole sample period as well as in both sub-periods. It is important to note that the causal connection from GDI to GDS is not observed in all cases, whereas pairwise Granger causality results validate the findings obtained from the VAR Granger causality approach. The absence of a causal relationship between GDI and GDS can be attributed to the prevailing fiscal deficit in India. Furthermore, the country encountered limitations in securing external finance. The nation's export revenues were insufficient, proving inadequate to meet its short-term external borrowing obligations. However, the results are contingent upon the established findings of previous studies conducted by Sessaiah and Sriyval (2005), Verma (2007), Bacha (1990), and Jappelli and Pagano (1994). These studies have posited that savings have a significant impact on promoting higher levels of investment and subsequent economic growth as measured by GDP. Based on empirical results, the study concluded that the classical notion of planned saving always being equal to planned investment is not valid, even after the liberalisation of the Indian economy. However, these findings support the neoclassical thesis posited by Solow (1970) that an increase in the savings rate has a greater influence on steady-state production than its direct effect on investment. This is due to the induced increase in income, which subsequently leads to higher savings and further enhances investment. Nevertheless, this study does not propose that Indian planners and policymakers ought to diminish the importance of investment. Instead, it argues that equal consideration should be given to the approach that regards savings and investment as outcomes of increased economic growth rather than as the fundamental drivers.

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