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THE CAUSAL NEXUS BETWEEN SAVING AND INVESTMENT IN ETHIOPIA

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Abstract

This paper explores the causal nexus between saving and investment in Ethiopia. This study employed Augmented dickey fuller, Johansen test for cointegration and Granger causality test following the vector autoregressive (VAR) model. The result drawn from the study confirmed that all series are stationary after first difference. The Johansen cointegration test exposed the absence of a long-run relationship between saving and investment. The causality result indicated unidirectional causality running from investment to saving which in turn recommends an investment promoting policies to achieve better national economic performance.

Keywords: Saving, investment, Ethiopia, Co-integration, Granger causality test

INTRODUCTION

Saving and investment are the two indispensable pillars for the economic growth and development of one country. Today many countries around the globe are focusing on saving and investment to achieve the sustainable economic growth. However, achieving the required level of saving and widening the sphere of investment is among the great obstacles for developing countries like Ethiopia. Esso (2010) mentioned some of the major reasons like high level of unemployment, low wages, involvement of large part of the labor force in informal sectors and poor performance of the economy have been considered as the causes for low level of saving in developing countries. Inversely, Ramakrishna G. and Rao S. (2012) stated that investment and saving are the two core macro-economic determinants that play a great role

in attaining price stability, encouraging employment opportunities, increasing income level of the employment there by contribute to the better and sustainable economic performance of the country.

One of the most stable consistencies observed in the data is the fact that national saving rates are highly correlated with national investment rates, both in time-series analyses of individual countries and in cross sections in which each country is treated as a single data point. This indicates the existence of High saving-investment correlations in both countries with small and large economies. However, the correlations tend to be lower for smaller economies (Baxter and Crucini,1993). The issue of relationship between investment and saving has perplexed economists ever since economics has been considered as an independent scientific discipline. Whether investment causes saving or saving causes investment has been also a long run theoretical as well as an empirical debate among the economists and policy makers. The root of the debate was raised from the question posed as such: does domestic saving acceleration is certainly the surest and fastest way of improving domestic investment?".

The debate related to the relationship among domestic saving and investment was initially introduced by Feldstein and Horoika (1980). They observed high correlation coefficient between domestic saving and investment. Based on that result, they claimed that if capital is perfectly mobile across country border, investors only search for investment with high rate of return irrespective of the country in which they are investing. This infers the equality of domestic saving with domestic investment under the unbounded international capital mobility. Feldstein and Horoika (1980) Regressed domestic investment ratio on domestic saving ratio for 16 organization for economic cooperation and development (OECD) countries over the period 1960-1974, they examined that the "saving-retention coefficients", were all close to one, demonstrating that most of the incremental saving retained by the initial country.

Additionally, Linda L. Tesar (1991) has conducted research on cross- sectional saving-investment correlations for the sample of 24 OECD countries using Feldstein-Horioka regressions. Her study revealed that for data averaged over 25 years (1960-1984) the coefficient on the savings ratio was 0.93. moreover, The presence of strong bond between saving and investment has been confirmed by Feldstein (1983), Summers (1988), Baxter and Crucini (1993), Dooley, Frankel, and Math-ieson (1987), Caprio and Howard (1984), Feldstein and Bacchetta (1989), Miller (1988), and Tesar (1991). opposite to the result of, Linda L. Tesar (1991) and other scholars mentioned above, Robert G. Murphy (1984) followed the same Feldstein- Horioka methodology and examined that the average coefficient on the savings ratio is only 0.59 for the ten smallest countries.

Surprisingly, a bundle of researchers including Murphy (1984), Obstfeld (1986), Finn (1990), Stockman and Tesar (1991), and Barkoulas, Filizetkin, and Murphy (1996) have confronted the existence of high correlation between saving and investment. All These writers have stand side by side with the idea of capital mobility internationally. Under this hypothesis, foreign capital flows to countries with higher real interest rates. Perfect capital mobility, therefore has important policy implications especially for small open economies. In the case where the capital was internationally perfectly mobile, an increment in domestic saving do not necessarily interpreted as the availability of higher domestic investment since foreign savings are not restricted and has to flow to countries with higher real interest rates. The existence of such inconformity in the result more sharpen the debate regarding the relationship between saving and investment.

Miller (1988) suggested that if there is a cointegration between savings and investment, this implies to some extent the immobility of the capital internationally, while the lack of cointegration suggests perfect capital mobility. Consequently, the importance of studying and Understanding the causal relationship between savings and investment for policy implications is posed itself, if causality runs from saving to investment, then encouraging domestic savings should be considered as the quickest way to enhance investment. This impose pressure on the policy maker to concentrate on saving and pay attention to providing opportunities for saving.

On the other hand, if investment causes saving, then, the policies that promote saving are probably to be ineffective and may lead to poor economic performance. huge amount of studies has been conducted regarding investment nexus saving cross sectionally across countries. However, it is worth noticing that analyzing saving investment relationship specifically at national level using up to recent time data to further elaborate causal relationship between saving and investment. Such studies are indispensable for the policy makers as they may push them to reinvestigate their existing national policy to investment. Therefore, the aim this paper is to fill this lacuna through examining the causal associations between savings and investment in Ethiopia using recent data.

Theoretical aspects of saving -investment relationship

The theoretical history of links between saving and investment was traced back to the era of mercantilists and Adam smith, accumulation of wealth, which is today so-called saving. According to Adam Smith's theory, growth is positively linked to the rate of investment. The rate of investment which is an important determining factor of Economic growth is explained by the rate of savings in an economy (Smith, 1937). Later on, how this accumulated wealth (saving) can effortlessly convert itself to investment was describes by Solow (1956) and Romer (1986).

In the traditional Keynesian theory, the association between the saving and the level of income implies that saving rate increases with the level of economic development. The ideal connection between domestic saving and the investment is originated from the hypothesis that capital does not freely move from one country to the other due to various inadequacies. Economic agents and savers tend to invest their resources in domestic investment outlets and require rewards that compensate the risk involved in making investment in other countries. This is commonly the situation that make domestic investments opportunities are attractive, and enable the resources are to be allocated efficiently for their most productive use

Neoclassical economic advocators argue that investment is positively linked to real rental cost of capital. This increase in the rental cost would diminish the capital stock and thereby increase marginal product of capital. As a result there would be the flow of capital from high income country to low income country to secure high rate of return on the investment (Henrick son, K. and Herzog, R., 2015) In classical theory, as the amount of savings rise the rate of interest decrease this will encourage investors demand more from the available funds and thereby increase investment. In a nutshell, at theoretical level, for both classical and neoclassical economists, it is saving and investment that control the interest of the capital market and it is the interest rate equilibrates saving and investment.

Opposite to the classical theory, Keynes argues that an increase in the investment leads to an increase in the output and income in so doing savings will increase. As for Keynesian Economics, savings is defined as the amount left over after the consumer's expenditure is deducted from the amount of disposable income that consumer gain within a given period of time. Savings is also part of disposable income left from the consumption expenditure and accumulated or invested directly. An investment is the acquisition of goods that are not consumed today but are opted to be used in the future to create wealth. in macroeconomic theory domestic saving is the blend of public and personal saving rates of a given country. In a country’s economic development, saving is considered as the basis for capital stock which in turn leads to boost investment (Taye, 2017).

EMPIRICAL ASSOCIATION BETWEEN SAVING AND INVESTMENT

Following the pioneering work of Feldstein and Horioka (1980) who stimulated a large body of empirical works where more of such works have concentrated on the developed economy and only few conducted on developing nations. Kollias, et.al. (2008) analyzed the saving-investment correlation for 15 European Union member countries, using the ARDL approach and panel regressions. Their study confirmed the Feldstein-Horioka interpretation of the saving-investment correlation, nevertheless, the conclusion drawn from the ARDL approach failed to locate to any

particular direction regarding to country size, or level of development, or economic and capital market structure.

Panel regressions showed a saving-investment coefficient in the range of 0.148-0.157. Sanjib and Joice (2012) examined the relationship between savings and investment in three diverse economies, namely, US, UK and China and compared it with that of India. The result they got revealed existence of a cointegrated relationship between savings and investment in these countries. In the cross-sectional framework, the conclusions of Penati and Dooley (1984) and Dooley et al (1987) suggest a significant connection between domestic saving and investment rates. Obstfeld (1986) carried out investigation on seven OECD countries found that saving-investment correlation differed significantly from the result gotten by Frankel et al (1986) using a sample of 64 countries of which fourteen were from developed and fifty from developing countries in a study conducted on savings-investment relationship where they found high correlation coefficient between the two variables except that of a few less developed countries.

Arginon and Roldan (1994) studied the existence of correlation between domestic savings and investment in European countries using annual data for the period 1960–1988 and advocate that the causality flow from savings to investment without any feedback effect. Pelagidis and Mastroyiannis (2003) examined the relationship between savings and investment using annual data, in Greece and found that the estimated impact of saving on investment is considerably small. Contrary to the result of Pelagiids and Mastroyiannis (2003), Christopoulous (2007) re-examines the saving and investment correlation and confirmed the hypothesis of perfect capital mobility is valid in Greece. Sinha (2002) suggested that the rate of Savings and Investment are cointegrated for Myanmar and Thailand demonstrating the growth of savings rate causes the growth of investment rate. Fascinatingly, reverse causality between savings rate and investment rate has been detected for Hong Kong, Malaysia, Myanmar and Singapore.

Mamingi (1997) assessed the relationship between saving and investment for 58 developing countries by measuring the degree of capital mobility in the Feldstein -Horioka sense for these developing countries. They observed that the relationship between savings and investment in case of low-income countries tend to be higher than those that of middle-income countries. Apergis and Tsoumas (2009), presents a literature survey on F-H puzzle and conclude that majority of studies support strong correlation between savings and investment.

Sinha and Sinha (2004) deployed a large sample of 123 countries to examine the short run and long-run relationship between savings and investment rates using an error correction framework. The revealed Results advocate capital should be more mobile for the countries with high percapita income. They also found that the mobility of capital for 16 countries most characterized with a low per-capita income. Seshaiah S. and Sriyval V. (2005) investigate the

relationship between savings and investment using cointegration approach. The results discovered that there is unidirectional causality from savings to investment. Fouquaul et al (2009) tested the validity of F-H hypothesis for 24 OCED countries for the period 1960-2000. their study consists of additional variables such as trade openness and size of the country and they got an estimate of coefficient varied from 0.5-0.7.

The same result was also revealed by Bahmani-Oskooee and Chakrabarti (2005) who observed the savings-investment correlation for 106 countries. They got an estimate of β between 0.5-0.7. Cavallo E. and Pedemonte M. (2016) examined the correlation between national saving and investment Using panel cointegration techniques and a comprehensive data set covering the period 1980–2013, they found a positive and significant correlation between national saving and domestic investment rates in Latin America and the Caribbean. The estimated correlation is approximately 0.39. Mishra. S et.al. (2010) examined the dynamics of the relation between savings and investment in India for the period 1950-51 to 2008-09. Using annual data, they found that there is a cointegration between savings and investment and suggests the existence of feedback causality between them.

Alexiou. C (2004) conducted the empirical investigation that was carried out for five EU countries using Granger causality test. The result suggests the availability of a relationship, on the basis of which, investment leads saving. Payne (2005) employed Engle-Granger and error correction model (ECM) to examine the association between saving and investment in Mexico over the period 1960-2002. The results located that savings and investment are cointegrated, thereby indicating low capital mobility in accordance with F-H hypothesis. However, the coefficient of error correction model is positive and statistically significant with a binding intertemporal budget constraint and an adjustment parameter of 0.242. Chakrabarti (2006) revisited the relationship between saving and investment by applying Multivariate Heterogeneous panel cointegration for the panel of 126 countries spanning 1960-2000. The author found a significant positive association between the ratio of gross domestic investment to GDP and the ratio of gross domestic saving to GDP ranging from 0.58 to 0.81. The evidence of cointegration and a significant positive correlation. Tang and Lean (2008) applied Rolling Windows Bounds test to empirically investigate the relationship between savings and investment over the period 1960-2007 for Malaysia. The study depicted that savings and investment are not cointegrated suggesting that capital is internationally mobile over the same period.

Afzal. M (2007) investigated the linkage between Savings and investment in developing countries using Granger causality test. The result of investigation portrayed the absence of long-run relationship between savings and investment in seven countries of the sample, which infers

increased degree of capital mobility and weakening of savings and investment relationship since early 1970s. Furthermore, he found that there is bidirectional causality between savings and investment in South Africa, while there is unidirectional causality from savings to investment in Pakistan and Sri Lanka. There is no causality in India, Philippines, Malaysia, and Iran.

Recent study researched by Singh (2008) examined the long run relationship between saving and investment to estimate the degree of capital mobility using Two-step Residual-based test, Autoregressive Distributed Lag (ARDL) Model and Granger causality test from the period 1950-51 to 2001-02. The results revealed long run relationship between saving and investment in India, supporting the Feldstein- Horioka hypothesis. The Granger causality test revealed unidirectional causality running from saving to investment. Wahid, Salahuddin and Noman (2010), studied the savings and investment nexus in South Asia and finds that savings and investment are co-integrated. They concluded F-H hypothesis does not hold true in South Asia region.

The study conducted by Narayan and Narayan (2010) employed Gregory and Hansen Residual-Based structural break test to test the existence cointegration for G7 countries over the period 1971-2002. The results revealed that capital is highly mobile in these countries since no evidence of cointegration exists between savings and investment. Cyrille (2010), conducted causality study for fifteen Sub Saharan African countries, concluded that the coefficient of saving and investment relation is low and there is insignificant correlation between inflows and outflows of capital and have no effect on saving- investment relation in these countries. Ramakrishna. G et.al (2012) studied The Long run Relationship between Savings and Investment in Ethiopia using a Cointegration and ECM Approach. The evidence suggests that there is no causation between savings and investment in either direction in Ethiopia.

Nasiru et. al (2013) analyzed the relationship between domestic savings and investment in Nigeria during the period 1980-2011. employing Autoregressive Distributed Lag (ARDL) Bounds testing approach to test for long run relationship. The results of the Bounds test suggest that there is a long run relationship between savings and investment. This result is consistent with a number of earlier studies reviewed in the literature that found saving and investment to be cointegrated in the long run and the result validated the Feldstein-Horioka (1980) hypothesis that postulates low capital mobility internationally. Tehranchian A. and Behravesh M. (2011) studied the relationship between savings and investment in Iran's economy employing ARDL method. the results of the study indicated that there is a long-run equilibrium relationship between savings and gross domestic investment, and direct significant effect of savings on investment in the long run is stronger than that in the short run.

Ogbokor C. and Musilika O. (2014) Investigated the Relationship between Aggregate Savings and Investment in Namibia employing test for co-integration and direction of causality between savings and investment for the period running from 1995 to 2011. The evidence arising from the study suggests that, savings and investment are not co-integrated implying the absence of a long-run relationship and co- movement. Recently Ahmed S. (2017) examined the long run relationship between investment and saving using ARDL bound testing cointegration approach for developing South Asian economies. The result of study indicates that long run relationship between saving and investment exists in India, Saudi Arabia, Pakistan, and Bangladesh, while the relation could not be established for Sri Lanka.

METHODOLOGY

Description of Data and Econometric Model

Over the past decades, examining long-run relations of macroeconomic variables via econometric analysis has been attracted the attention of economic researchers. In doing so, it indispensable to notice the dynamic features of most time series data and understand the features of macroeconomic variables, how they interact and integrate over time. Opposite to conventional asymptotic theory for ordinary least squares that hold the assumption of stationarity (the feature of converging to their mean over time), most of the long run relationship between macroeconomic variables postulated by economic theories reflect the feature of non-stationarity. Nelson and Plosser (1982) have revealed that most macroeconomic time series data are nonstationary in their levels but stationary when differenced. Thus, conducting the classical regression of variables with the feature of non-stationarity mostly may lead to non-sensical regression or spurious regression which in turn yield the results that cannot be interpreted with conventional testing procedures. Therefore, it is mandatory to describe and perform diagnostics of data we have in hand as much as we are working within the framework of time series analysis.

As to the description of the data, the study uses the annual data on selected variables (gross capital formation and gross domestic saving) for the sample period. Twenty observations of annual macroeconomic data running from 2000 to 2019 are employed. The study was confined to twenty observations due to the absence of long run reliable sources of data of the two mentioned variables together. The relevant annual data on gross domestic savings and gross domestic investment for the sample period have been collected from the national bank of Ethiopia annual report of 2018**/**19 and world development indicators (world bank 2020). The variables of the study are gross domestic savings and gross domestic capital formation in Ethiopia.

Testing for Stationarity

For macroeconomic modelling techniques to be applied in time series analysis, the issue testing stationarity of the data prominently came first. It is all about assuring if the value of time series data tends to revert to its long run average value and features of the data series are not influenced by the change in time. This implies that the means, variance and covariance of the data constant or not changed over time. If not, the time series is known as non-stationary and virtually said to have a unit root. There are several methods of testing unit roots. Viz. Durbin-Watson (DW) test, Dickey-Fuller test (1979) (DF), Augmented Dickey-Fuller (1981) (ADF) test and Philip-Perron (1988) (PP) test. Nonetheless, the most prevalent approach for testing the stationarity property of a single time series encompasses using the Dickey Fuller or Augmented Dickey Fuller test respectively. In this paper we prefer Augmented Dickey fuller (ADF)test as it adjusts the DF test to take care of possible autocorrelation in the error terms (Ut), via adding the lagged difference term of the dependent variable. The typical equation for Augmented Dickey fuller (ADF) model test can be given below:

$\Delta I_t = \gamma + \alpha I_{t-1} + \sum^{k} \beta \Delta I_{t-i} + \varepsilon_t$ where $\alpha=\theta - 1\theta$ = coefficient of I_{t-1}

ΔI_t = first difference of I_t this means $I_t - I_{t-1}$

I = investment now we can test hypothesis as follows*:*

H_0: $\alpha = 0$

H_1: < 0 .

Finally, we examine ADF value. If the ADF value which is α in our case less than its critical value, the test shows that the underlying series is non-stationary. Contrarily, if the ADF value is greater than its critical value the result shows that the underlying series is stationary. We will repeat similar procedures to test the stationarity of gross domestic saving.

$\Delta S_t = \mu + \rho S_{t-1} + \sum \omega \Delta S_{t-i} + \varepsilon_t$

where ρ = coefficient of S_{t-1}

ΔS_t = first difference of $S_t (S_t - S_{t-1})$ S= Saving H_O: ρ=0 and H_1: ρ<0

Cointegration Test

The term cointegration was first coined by the Granger to express the possible conditions in which the nonstationary processes can have linear combinations that are stationary. In other word, the term cointegration come to existence to test the presence of long run equilibrium relationship between variables that are nonstationary individually or integrated of degree one.

There are two common approaches of testing the presence of cointegration between macro variables are Engle-granger and Johansen approach. we go for Johansen approach to test for cointegration between saving and investment using maximum Eigen value and Trace

statistics. Because, Johansen's procedure is currently the most reliable and powerful test for cointegration, imposes no prior restrictions on the cointegration space and has better small sample properties that better match with the data we have in hand. If the cointegration does not exist, it means the linear combination is not stationary and the variable does not have a mean to which it returns.

Inversely, the presence of cointegration implies that a stationary long-run relationship between saving and investment is present. Therefore, we use the maximum-likelihood test procedure established and expanded by Johansen and Juselius (1990) and Johansen (1991). Specifically, if It is a vector of n stochastic variables, then there exists a L-lag vector auto regression with Gaussian errors given by:

$It{=}q$ + Γ1Δ$It{-}1$ + ⋯ + Γ$l{-}1\Delta It{-}l{+}1$ + $\pi It{-}1$ + ut

Where $\Gamma_1 \ldots . \Gamma_{l-1}$ are coefficient of matrices, ut is vector of white noise and q consists all deterministic elements. Accordingly, we determine the rank of matrix whether it is full (the variables in It are cointegrated), zero (series are not cointegrated). In the case where a cointegration revealed, which is, a long-run association between variables, we employ vector error correction model to capture short run dynamic properties of the model and incorporate a term for the deviation from the long run association that determine how much of the disequilibrium will dissipate in the next forecasting period between saving and investment. The causal relationship between saving and investment can be conducted using Granger-causality test by estimating the vector error correction model (VECM) is written as follow:

$\Delta I_t = \alpha_{11}(l)\Delta I_{t-1} + \alpha_{12}(l)\Delta S_{t-1} + \varphi_I ECT_{t-1} + \epsilon_{1t}$

$\Delta = \alpha_{21}(l)\Delta S_{t-1} + \alpha_{22}(l)\Delta I_{t-1} + \varphi_s ECT_{t-1} + \varepsilon_{2t}$

φ implies the deviation of the dependent variable form the long run equilibrium (Engle and Granger, 1987). while ∆, (I) and ECT indicate difference operator, polynomials in the lag operator "L" and the coefficient of the lagged error correction term. In this case, if the absence of co-integration, prevail, we better apply the vector autoregressive model (VAR-in first difference). It is worth noticing that, in the process of specifying of VAR models and cointegration analysis, selecting optimum lag length that best fit for the model. Since specification of accurate lag order is very basic critical for all inferences to be drown from the model. Hence information criterion (AIC), Schwarz Bayesian information criterion (SBIC) and Hannan-Quin information criterion (HQIC) will be used in this paper to determine the optimal lag order for the VAR model. Furthermore, the optimal lag length for the model will be the lag with a minimum criterion value.

Granger Causality

Cointegration may show the presence or absence of Granger-causality and it does not determine the direction of causality between the variables. Granger (1969) proposed a time-series databased approach to determine causality, a time series databased procedure developed by Granger (1969) should be employed. In the Granger-sense, it can be said saving is granger- caused investment if and only if saving is able to increase the accuracy of the prediction of investment with respect to a forecast, only based on past values of saving. After performing early mentioned diagnostic test (both of the series are integrated of the same order one, i.e. I(1)) we can test for causality in Granger sense by specifying the following vector autoregressive (VAR) model:

$S_t = \alpha_0 + \sum_{i=1}^{k} \alpha_i S_{t-1} + \sum_{i=1}^{k} \beta_i I_{t-1} + \varepsilon_{1t}$ and $I_t = \mu_0 + \sum_{i=1}^{k} \mu_i I_{t-1} + \sum_{i=1}^{k} \gamma_i S_{t-1} + \varepsilon_{1t}$

where $\varepsilon_{1t}$and $\varepsilon_{2t}$are assumed to be uncorrelated white noise with zero mean. Hence, one can formulate four hypotheses related to the association between saving and investment.

A, Unidirectional Granger-causality from saving to investment. In this case Saving increase the prediction of the investment but not vice versa. Therefore, $\sum_{i=1}^{k} \beta_i = 0$ and $\sum_{i=1}^{k} \gamma_i \neq 0$

B, Unidirectional Granger-causality from Investment to saving. In this case the investment is useful in the prediction of the saving but not vice versa. This means, $\sum_{i=1}^{k} \beta_i \neq 0$ and $\sum_{i=1}^{k} \gamma_i = 0$

C, Bidirectional causality. In this case the Investment increases the prediction of the Saving and vice versa. here, $\sum_{i=1}^{k} \beta_i \neq 0$ and $\sum_{i=1}^{k} \gamma_i \neq 0$

D, Independence between Investment and Saving. In this case there is no Granger causality in any direction, thus, both, $\sum_{i=1}^{k} \beta_i = 0$ and $\sum_{i=1}^{k} \gamma_i = 0$

Statistical Software

In this study, STATA 16 was used for the analysis of data.

RESULTS AND DISCUSSION

Unit Root Test Result

For the result to be accurate, unbiased and consistent, econometrician requires the time series variables to be stationary before applying further econometric methods. That is, those macro variables have to be checked for the existence of unit root(s) and accompanying with their order of integration of each series. In this study, the Augmented Dickey Fuller (ADF) unit roots test was used to examine for the time series properties of model variables using STATA16. The null hypothesis for the ADF test was revealed that the data series under investigation (saving and investment) are nonstationary (has a unit roots) while the alternative hypothesis claim they are

stationary. The decision rule is rejecting the null hypothesis if the ADF test statistic value exceeds (in absolute value) the critical value at a 5% level of significance.

Table 1 Unit Roots Test Results [At levels]

Variables	Augmented dickey fuller (ADF)					
	With trend	5% critical v	Decision	Without trend	5% critical	Decision
GDI	2.017(0.592)	3.60	nonstationary	1.19(0.674)	3.00	nonstationary
GDS	0.874(0.394)	3.00	nonstationary	0.866(0.798)	3.00	nonstationary

The values in Brackets are MacKinnon p-values

As it can be seen clear from the table above, the results drown from the unit root tests (ADF) indicated that all the variables are nonstationary at levels. Because, their test statistic values are less than the critical values at 5% and the p-values in bracket are greater than 0.05. Therefore, we failed to reject the null hypothesis of a unit root for all the series. A further test for the unit root was made to present the unit root test result for all series at their first difference. The following table presented the result as follows:

Table 2 Unit Roots Test Results [At their first difference]

Variables	Augmented dickey fuller (ADF) at their first difference					
	With trend	5% critical v	Decision	Without trend	5% critical	Decision
GDI	3.6(0.013)	3.0	stationary	3.00(0.017)	1.09	stationary
GDS	5.24(0.000)	3.60	stationary	5.85(0.000)	3.00	stationary

---The values in Brackets are MacKinnon p-values

Based on the decision rule established earlier, the null hypothesis of a unit root is rejected as the result of test statistic is greater than the 5% critical values, as well as the p-values in bracket are less than 0.05. Consequently, the report from the table ensured that all variables in the model that were non-stationary at levels were now made stationary at their first difference. Now, since all series are integrated of order one, I (1), the prerequisite to carry out the co-integration test analysis i.e., all series are integrated of the same order, is fulfilled.

Cointegration Test Result

Given the precondition to perform co-integration test was met, it is worthy conducting the Johansen (1988) co-integration test; that employ two likelihood-ratio tests, namely, the trace

and the maximum eigenvalue (λ-max) statistics so as to examine the magnitude of co-integrating vectors. Econometric scholars advocate that, if two series are I (1) and co-integrated then causality between those variables may exist at least in one direction. Therefore, we performed the Johansen (1988) co-integration test so as to check the presence of a co-integrating relationship between saving and investment and presented the result in of both trace statistics and max statistic with their corresponding critical values at 5% significance level.

Table 3 Johansen cointegration Test Results

Max rank	Johansen tests for cointegration					
	Trace statistics	5% CV	Decision	Max statistics	5% CV	Decision
0	14	32	No cointegrated	15.74	33.9	No cointegrated
1	1.29	3.74	No cointegrated	1.65	3.94	No cointegrated

The results presented in the above table suggested that there bis no existence of cointegration association between saving and investment, no co-movement because, their test statistic values are greater than the critical values at 5%. Therefore, we failed to reject the null hypothesis of a no co-integration between saving and investment.

Granger Causality Test Result

Since the result obtained from Johansen tests for cointegration confirmed that the variables under consideration are integrated of order one and not co-integrated which means that there is long run relationship between saving and investment, we are limited to perform Granger-causality within the framework of the VECM methodology. Instead we are obliged to employ the Granger-causality under the VAR technique. Accordingly, the results of the Granger-causality framework are displayed in the table below:

Table 4 Granger causality tests

Equation	Excluded	chi2	df	Prob > chi2
Sav	Inv	9.3617	2	0.009
Sav	ALL	9.3617	2	0.009
Inv	sav	1.2492	2	0.535
inv	ALL	1.2492	2	0.535

As it is presented in the results above, gross domestic investment does Granger cause gross domestic saving, statistically at 5 percent level of significance. This implies that, at 5 percent level of significance, there is evidence of a unidirectional causality running from real gross domestic investment to gross domestic saving. Put it in a nutshell, investment “Granger” causes saving and therefore changes in investment precede changes in saving. Since the Granger method is very sensitive to the sample size and the length of the lag used in the model, it is highly recommended to conscious while interpreting the results.

CONCLUSION AND RECOMMENDATIONS

The relationship between saving and investment has been a very contestable issue in the past decades. In this study, we investigated the causal nexus between saving and investment in Ethiopia during the period of 2000 to 2019. Since the variables under investigation are macroeconomic variables which are in most cases nonstationary in nature and regressing such nonstationary variables leads to spurious or nonsensical results, we begin with detecting such impediments and addressing them.

The paper ensued to test the assumption stationarity or unit root test. To do so, we adopted augmented dickey fuller unit root test. Certainly, the ADF results confirmed that savings and investment were a non-stationary series at levels, stationary at their first difference and thereby integrated of order one. We then proceed to test the variables for cointegration by employing the Johansen (1988) co-integration test. The clear presented results in the Table 4.3 depicted that the Johansen cointegration test (max statistics and trace statistics) results failed to reject the null hypothesis of no cointegration (H0: r = 0). This in turn inferred that savings and investment are not cointegrated, i.e., do not have long-run relationship or there is no tendency of convergence between savings and investment.

For F-H (1980) and Miller (1988) lack of co-integration between variables has an implication for a high degree of capital mobility which is probably reflected by many researchers as the behaviour of least developed countries. This indicates the presence of perfect capital inflow and out flow in Ethiopia. Based on the result obtained from Johansen tests for cointegration, we employ the Granger-causality under the VAR technique to determine the causal relationship between saving and investment.

The results suggested that there is Unidirectional causality running from gross domestic investment to gross domestic saving implying that changes in investment precede changes in saving and the role of gross domestic savings in developing capital formation in Ethiopian economy is restricted. Therefore, from these results one can recommend that the country should follow and support investment- promoting policies so as to attain price stability,

encourage employment opportunities, increasing income level of the employment. These entails revising an existing investment-promotion strategy, introducing novel investment promotion components in addition to giving due attention in stabilizing the consolidated influences of political and macroeconomic unsteadiness, creating favourable environment and policies that are conducive to foreign investors and improving problems of frail infrastructure and weak governance, there by better contribute to the efficient and sustainable Ethiopian economic performance.

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