Research Journal of Finance and Accounting
ISSN 2222-1697 (Paper) ISSN 2222-2847 (Online)
Vol.5, No.6, 2014

Investigating the Relationship between Aggregate Savings and Investment in Namibia: A Causality Analysis

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Abstract
The discussion concerning the link between savings and investment in the literature is quite extensive. Most of the past studies concerning this relationship are cross-sectional in nature. The obvious difficulty with such studies is the homogeneity assumption that is usually made across the countries under investigation. Therefore, country specific studies are necessary to shed light on the savings-investment nexus. For Namibia, such studies are very scarce. In light of this, the study tried to fill this gap in some ways by attempting to investigate the causal relationship between savings and investment in Namibia using relevant econometric techniques. The evidence arising from the study suggests that, savings and investment are not co-integrated. In other words, there is no reason to suspect either a long-run or equilibrium relationship between these two variables. This could also be interpreted to imply the existence of high capital mobility. Furthermore, a unidirectional causal relationship between savings and investment in Namibia running from savings to investment was observed. In light of these results, some policy measures were put forward.
Keywords: Savings, Investment, Co-integration, Causality, Namibia, Time series macroeconomic data.

1. Introduction

This study made a logical attempt to contribute to the literature on savings and investment nexus in Namibia by relying upon econometric methods. Conventional thinking holds that savings is an essential element in promoting investment and therefore, economic growth. Thus, there is plentiful evidence in the literature suggesting that countries that achieved high rates of economic growth also experienced corresponding high savings and investment rates. While raising savings is not a sufficient condition for achieving sustained growth, however, it does appear to be a necessary condition for higher sustained growth. Economic research, both theoretical and applied, cites that the development problem and lack of economic growth has been shown to be conditioned by inadequate savings. Given that these macroeconomic indicators are key requirements for growth and development, by implication lack of investments is common in developing countries like Namibia, although the level of national saving is considered high. Low domestic savings level is a common problem in developing nations, because of poor performance of the economies, poor financial sector development, low wages and salaries and high unemployment levels. Concomitantly, the lack of adequate domestic investment requires the encouragement of foreign savings via unrestricted capital flows. Therefore, appreciating the causal relationship between savings and investment is relevant for policy implications, especially for a country belonging to a common monetary area (CMA). If savings causes investment in Namibia, then promoting domestic savings should be a high priority to boost investment and economic growth cum development. Alternatively, if causation is from investment to savings, savings-promoting policies are likely to be unsuccessful and economically inefficient. If this is the case, then policy emphasis should concentrated on removing the barriers to investment hence, promoting investment. Given these facts, causality issues regarding savings and investment are of great interest for Namibia as a member of the CMA.

At the heart of the savings and investment debate lie the issue of causation; and whether it is domestic savings that causes domestic investment or it is domestic investment that causes domestic savings. In contrast to the theory of natural rate of unemployment, which is a theoretical question for monetary policy, the savings-investment nexus is the decisive question of fiscal policy. The conviction that budget deficits have a negative effect on domestic savings and therefore investment is one of many reasons why countries put much emphasis on budget deficit reductions (and budget deficit targeting). Thus, the economic significance of government deficits is commonly constructed in terms of their negative effects on domestic savings and capital formation. Capital formation improves the productive capacity of the economy in a way that the economy is able to produce more output, employ more people, increase income and greater savings according to (Shiimi and Kadhikwa, 1999). Behind the interpretation of government deficits, is an implicit assumption that domestic savings systematically causes domestic investment. Government deficits represent negative government savings, and this reduces the pool of national savings available for investment, thereby reducing the level of investment. Not only does the savings-investment causation debate raise questions about the level of deficits, it also has implications regarding

how such deficits are to be financed. Thus, if savings causes investment and investment is desired for purposes of raising growth, then the government deficit should be closed by cutting spending rather than raising taxes. This is because raising taxes would tend to lower disposable income, business and household savings, thereby reducing the benefit of lower deficits on domestic savings. Unquestionably, taxes should be cut so as to increase domestic savings. Moreover, to the extent that the propensity to save is positively related to income, upper level income taxes should be cut first. In this case, the deficit target in Namibia would be relevant.

Several briefing papers on the historical trends of savings and investment have emerged in Namibia so far, but none of these studies used econometric tools to investigate evidence of causality between savings and investment. Many applied work are cross-country studies, with little work done on country specific studies; thus, empirical findings are mixed and controversial across countries, data and methodologies. Seho and Keho (2010) asserted that, most empirical works are based on panel or cross-country regressions and may be criticised since they impose cross-sectional homogeneity on coefficients that in reality may vary across countries because of differences in institutional, social and economic issues. The overall results obtained from panel or cross-sectional regressions represent only an average relationship, which may or may not apply to individual countries in the sample. To enhance our understanding of the causal relationship between savings and investment it is essential to perform country-specific studies using time series data and apply relevant econometric procedures. This study therefore, is the first step in attempting to provide literature that could be useful to policy makers, captains of industry and academics in Namibia. By examining the relationship between savings and investment, this paper ***a)*** tests for co-integration and causality between savings and investment, ***b)*** propose a guideline to policymakers in-order to help them formulate their policies in terms of boosting domestic savings and/or investment, ***c)*** suggests measures that will help induce domestic savings or investment, as per causality direction evidence.

Accordingly, the paper is organised in the following fashion. Section two reviews the relevant literature. Section three contains data sources and econometric procedures (Unit root, Co-integration, and Granger-causality tests), employed in order to authenticate empirically the direction of causality between savings and investment, while section four looks at empirical findings and results discussions thereof. Finally, section five contains the conclusion, policy implications, recommendations and future direction for further studies regarding the issue under investigation.

2. Relevant Theoretical and Empirical Literatures

Theoretical discussions on the savings and investment nexus resonate around the neo-classicalists and Keynesian schools of thoughts. Consensus on the macroeconomic equilibrium condition is that, saving equals investment. However, Keynesians argued that the two may be equal at a whole range of potential levels of output and income, only one of which is full employment, whereas neo-classicalists argued that the two may only be equal at full employment. According to Keynes and his apostles, saving is a function of disposable income thus, the more income earned the more is available for saving (saving representing unspent income). Similarly, he observed a negative relationship between saving and consumption implying that, in order for saving to increase, consumption needed to be reduced therefore making saving appear as a consequence of expenditure and so of investment. Conferring to the neoclassical school and classists like Adam Smith, saving is what causes investment via changes in interest rate; saving determine interest rate and thus the cost of investment which in turn influences the demand for new capital; Keynesians opposed this view accentuating that investment is not determined by savings through interest rate, but by supply and demand for money in accordance with Keynesian liquidity preference theory. In concluding this part, Keynesians cogitated that investment is what finances savings through changes in income and in neoclassical school savings finances investment through changes in interest rates.

Empirical findings are mixed and controversial thus, we review empirical works that are closest to our study with regards to the question of causality between the variables in question. Causality issues concerning the savings-investment relation are non-existent, if not limited in Namibia. Most empirical investigations on the savings-investment nexus echoes around the revolutionary work of Feldstein and Horioka (1980) henceforth, F-H. F-H (1980) investigated the link between savings and investment using data originating from the Organisation for Economic Co-operation and Development countries (OECD) for the period 1960-74; their results were in favour of a high correlation coefficient between domestic investments and savings hence, capital immobility in the region. F-H (1980) further asserted that, in a country or region were capital is highly mobile, investors care only about the rate of return on their investments and not about which country they invest in, implying that investment and domestic savings need not be related to each other under perfect international capital mobility. Tsoukis and Alyousha (2002) investigated the long-run Granger causality between the gross saving/GDP and the gross investment/GDP ratio in seven developed nations (Australia, Canada, Germany, Japan, Netherlands, the United Kingdom, and the United States) and found savings and investment to be co-integrated only in Australia and the UK, and the test for Granger causality indicated causality running from savings to investment in both

countries. Moreover, they found co-integration between the two variables only for Germany and with evidence of causality running from investment to savings. The presence of co-integration between savings and investment in developed nations is attributed to immobile capital in more developed nations (F-H, 1980). Consistent with the interpretation by F-H, Murphy (1984), Baxter and Crucini (1993) and Mamingi (1994) found that smaller OECD or developing countries exhibit higher capital mobility than larger ones. These findings are attributed to the fact that smaller countries cannot influence world interest rates, and thus their saving-investment relationship is not biased upwards. Georgopoulos and Hejazi (2005) concluded that, F-H results simply reflect the fact that large countries are more reliant on domestic sources of financing. Uanguta, Haiyambo, Kadhikwa and Chimana (2004) studied the structure and nature of savings in Namibia and found contractual savings (consisting mainly of pension fund contributions and life insurance premiums) mobilised in the Namibian economy not to have a causal linkage to domestic investment. Furthermore, they highlighted the lack of investment instruments in the Namibian economy to have hindered the utilisation of savings in the domestic economy, implying that Namibia is a net importer of capital.

Bassam (2006) investigated the relationship between saving and investment in Middle East North Africa countries (Egypt, Jordan, Morocco and Tunisia); using unit root analysis and vector autoregressive model (VAR-in first difference) under Granger-causality procedures his findings indicated that, savings and investment rates were integrated of order of one. He further used co-integration analysis and found the two variables not co-integrated, therefore implying a no long-run or equilibrium relationship between the variables and the existence of capital mobility. His results revealed a unidirectional causality running from savings to investment in Egypt and Jordan and a unidirectional causality running from investment to savings in Morocco, while no causality (statistically in the Granger sense) evidence was found in Tunisia. Using conventional and time-series econometrics procedures, Afzal (2007) provided additional evidence on the savings and investment relationship in developing countries. He observed no long-run relationship between savings and investment in seven countries of the sample, which implied increased degree of capital mobility and weakening of savings and investment relationship. Blanchard and Giavazzi (2002) argued that, in the absence of co-integration between savings and investment; in-other-words, if savings and investment exhibits a weak long-run relationship; higher financial and trade integration could be implicated. His results further revealed the existence of bidirectional causality between savings and investment in South Africa, while a unidirectional causality from savings to investment was found in Pakistan and Sri Lanka and he found no causality in any direction in India, Philippines, Malaysia and Iran. Concluding on this, he said the divergence might be due to country-specific policies and economic conditions, and the strong correlation between savings and investment does not rule out capital mobility across these countries. In Ethiopia, Gebreyehu (2010) finds no statistically significant causality between savings and investment in either direction. Esso and Keho (2010) have found mixed results on evidence of causality between savings and investment in the WAEMU region. They found investment to be positively related to domestic savings in only three of seven regional countries, namely Benin, Côte d'Ivoire and Niger; with-regards-to the other four countries, investment was found not related to domestic savings. Furthermore, they avowed that, the bulk of investment in these countries was not financed by domestic savings but, by foreign savings. They further cautioned that, the relationship between savings and investment cannot be generalized across countries because the results are country-specific. Seka (2011) investigated the direction of causality between savings and investment using modern techniques on time-series data analysis (co-integration, decomposition of variances and dynamic panels) and WAEMU as a test hub. He concluded that, savings granger-causes investment in the region. In his lively discussion, he epitomised countries with weak financial markets and institutions with savings as a constraint to investment; insinuating that, mobilisation savings is not a condition for investment and economic growth. Onafowara, Huart and Owoye (2011) investigated the savings-investment relationship in eight advanced economies of the European Union and statistically found evidence of co-integration for six countries to be significant.

3. Variables definition, Research procedures and Data sources

Macroeconomic data used in this study are selected based on the nature of the issue under investigation, accessibility and a priori knowledge. All data collected are expressed in millions of Namibia Dollars (in real terms), unless stated otherwise. Annual macroeconomic data running from 1995 to 2011 are utilised. That is sixteen observations in total. Using Namibia's Annual National Accounts, we calculate gross domestic saving by deducting private consumption and government consumption from real gross domestic products. These are domestic resources feeding into the monetary system as sources of funds to finance domestic investment. Furthermore, gross fixed capital formation is calculated by deducting disposals of fixed assets during the accounting period plus certain additions to the value of non-produced assets realized by the productive activity of institutional units, from the total value of a producer's acquisitions. Domestic savings includes household saving and business saving (together known as private savings) and government savings. Gross fixed capital formation (formerly gross domestic fixed investment) includes land improvements, plant, machinery, and

equipment purchases, and the construction of roads, railways, which may include schools, offices, hospitals, private residential dwellings, and commercial and industrial buildings. The data on real gross domestic savings and real gross fixed capital formation were drawn from the 2011 d*evelopment index database* (World Bank, (2011)) and the National Accounts of Namibia.

Econometric literature recommends various techniques for investigating the relationships between two or more time series variables. It is a common practice to test for stationarity; hence, we investigate the time-series properties of the data in order to determine the order of integration of the variables, before proceeding with other relevant procedures, such as, co-integration and Granger-causality tests. In light of this, we used "Eviews 7.1" statistical package to estimate our models. The econometric procedures used in this paper are therefore, co-integration, error correction model (ECM/VAR) and Granger causality tests (Johansen (1991), and Johansen and Juselius (1990)).

Unit root test

If you regress a non-stationary time series on another non-stationary time series you may get nonsensical results. Among the important attributes of a time series variable is its order of integration. To use the appropriate model to investigate the causal relationship, we need to determine the stochastic properties of the individual time series. Thus, we need to test whether the variables rS_t and rI_t are stationary, i.e., integrated of order of zero, $rS_t \sim I(0)$ and $rI_t \sim I(0)$. We first perform unit root tests in levels and first differences in order to determine the order of integration of the series and we employ the eminent Augmented Dickey-Fuller (ADF) test (Dickey and Fuller, 1979 and 1981); this can be provided as follows[1]:

$$\Delta \boldsymbol{rS_t} = \boldsymbol{\beta_{1o}} + \boldsymbol{\beta_2 t} + \boldsymbol{\delta_1 rS_{t-1}} + \sum_{i=1}^{m} \boldsymbol{\alpha_{1i}} \Delta \boldsymbol{rS_{t-i}} + \boldsymbol{\varepsilon_{1t}}$$

$$\Delta \boldsymbol{rI_t} = \boldsymbol{\gamma_{1o}} + \boldsymbol{\gamma_2 t} + \boldsymbol{\theta_1 rI_{t-1}} + \sum_{j=1}^{m} \boldsymbol{\vartheta_{1j}} \Delta \boldsymbol{rI_{t-j}} + \boldsymbol{\mu_{1t}} \qquad \textbf{(1)}$$

Where Δ is the first difference operator, $\beta_{1o}, \beta_2, \delta_1, \alpha_{1i}, \gamma_{1o}, \gamma_2, \theta_1, and\ \vartheta_{1j}$ are the coefficients, and ε_{1t} and μ_{1t} are stochastic error terms.

The null hypothesis in, *equation (1)* is that rS_t and rI_t are non-stationary series, i.e., having unit roots, (H_0: $\delta_1 = 0\ and\ \theta_1 = 0$). The alternative hypothesis is that rS_t and rI_t are stationary (H_1:$\delta_1 < 0\ and\ \theta_1 < 0$), i.e., integrated of order zero, $rS_t \sim I(0)$ and $rI_t \sim I(0$. If we fail to reject H_0 the series are non-stationary otherwise, stationary if we reject H_0 (*decision-rule)*.

Error Correction Model

Most time-series data emanating from developing nations, like Namibia are usually non-stationary. Use of non-stationary data not only violates the esteemed Gauss Markov assumptions, but also renders unreliable and inefficient policy making from such econometric results. The error correction mechanism (ECM) first used by Sargan and later popularized by Engle and Granger corrects for disequilibrium. An ECM is a neat way of combining long-run co-integrating relationships between the levels variables and the short-run relationship between the first differences of the variables. The ECM has the advantage that all the variables in the estimated equation are stationary; hence there is no problem with spurious correlation. In cases where variables are non-stationary and co-integrated; causality (in Granger sense) between two or more time-series variables is performed under the vector error correction methodology, in order to capture the short-run dynamic properties of the model. Otherwise, in the absence of co-integration, the vector autoregressive model (VAR-in first difference) should be employed. The causal relationship between rS_t and rI_t can be accomplished using Granger-causality test by estimating the vector error correction model (VECM) that is given in *equation (2)* as follows:

$$\Delta \boldsymbol{rS_t} = \boldsymbol{\alpha_{2o}} + \sum_{i=1} \boldsymbol{\beta_2} \Delta \boldsymbol{rS_{t-i}} + \sum_{j=1} \boldsymbol{\alpha_{2j}} \Delta \boldsymbol{rI_{t-j}} + \boldsymbol{\varphi_1 \omega_{t-1}} + \boldsymbol{\varepsilon_{2t}}$$

$$\Delta \boldsymbol{rI_t} = \boldsymbol{\gamma_{2o}} + \sum_{i=1} \boldsymbol{\theta_2} \Delta \boldsymbol{rI_{t-i}} + \sum_{j=1} \boldsymbol{\vartheta_{2j}} \Delta \boldsymbol{rS_{t-j}} + \boldsymbol{\varphi_2 v_{t-1}} + \boldsymbol{\mu_{2t}} \qquad \textbf{(2)}$$

, where ω (= *rS - a - βrI*) and v (= $rI - a' - \beta' rS$) defined as error correction terms that measure deviations from the long-run equilibrium relation between rS_t and rI_t (Engle and Granger, 1987). In testing the causal relationship between rS_t and rI_t using the *VECM* in *equation (2)*, the independent variables "Granger-causes" the dependent variable if the error correction terms in *equation (2)* are statistically significant. For example, using the savings equation in *equation (2)*, the increase in real investment "Granger-causes" the increase in real savings if either the sum of ϑ_{2j}'s or φ_1 is statistically significant, (i.e. not equal to zero). Similarly, using the investment equation in *equation (2)*, the growth in real savings "Granger-causes" the growth in real investment if either the sum of α_{2j}'s or φ_2 is statistically significant, (i.e. not equal to zero). In addition, another source of causation of rI_t by rS_t (or, rS_t by rI_t), can be through the lagged terms of ΔrS_t (or, ΔrI_t) if all the ϑ_{2j} or $\alpha_{2j}$are not equal to zero, statistically.

The Granger-causality model

The Granger causality test assumes that the information relevant to the prediction of the respective variables,

[1] According to Gujarati (2003), the Augmented Dickey-Fuller test ensures that the errors are uncorrelated

savings and investment is contained solely in the time series data of these variables. The test involves estimating the following pair of equations:

$$rS_t = \sum_{i=1}^{p} \alpha_i rI_{t-i} + \sum_{j-1}^{q} \beta_j rS_{t-j} + \varepsilon_{1t} \quad (i) \qquad (3)$$

$$rI_t = \sum_{i=1}^{p} \delta_i rI_{t-i} + \sum_{j-1}^{q} \vartheta_j rS_{t-j} + \varepsilon_{2t} \quad (ii)$$

rS_t = real gross domestic savings
rI_t = real gross fixed capital formation
p and *q* are the optimal number of lags of savings and investment, respectively.
, subscript *t* is the time period; *i* and *j* are the i^{th} and j^{th} year respectively, and the disturbances ε_{1t} and ε_{2t} are assumed uncorrelated. *Equation 3(i)* proposes that current real savings is related to past values of itself as well as that of real investment, and *equation 3(ii)* postulates a similar behaviour for investment. The test involves the construction of the joint null hypothesis that coefficients of the rI_t terms in *equation 3(i)* and those of rS_t in *equation 3(ii)* are all simultaneously 0, statistically.
Hereunder, are three cases prior to expectations:

i. *Unidirectional causality from* rI_t *to* rS_t is indicated if the estimated coefficients on the lagged rI_t in *equation 3(i)* are statistically different from zero as a group (i.e. $\sum\alpha_i \neq 0$) and the set of estimated coefficients on the lagged rS_t in *equation 3(ii)* is not statistically different from zero (i.e., $\sum\vartheta_j = 0$).
Conversely, *unidirectional causality from* rS_t *to* rI_t exists if the set of lagged rI_t coefficients in *equation 3(i)* is not statistically different from zero (i.e., $\sum\alpha_i = 0$) and the set of the lagged rS_t coefficients in *equation 2(ii)* is statistically different from zero (i.e. $\sum\vartheta_j = 0$).
ii. *Bidirectional causality,* is suggested when the sets of rI_t and rS_t coefficients are statistically and significantly different from zero in both regressions.
iii. Finally, *independence* or *no-causality* is suggested when the sets of rI_t and rS_t coefficients are not statistically significant in both the regressions. Mundanely, the future cannot predict the past, if variable rI_t (Granger) causes variable rS_t, then changes in rI_t should *precede* changes in rS_t. Therefore, in a regression of rS_t on other variables (including its own past values) if we include past or lagged values of rI_t and it significantly improves the prediction of rS_t, then we can say that rI_t (Granger) causes rS_t. A similar interpretation applies if rS_t (Granger) causes rI_t.

The following section aims to provide concrete evidence on the variables in question, and thus oversees the concept of stationarity, co-integration and Granger-causality respectively, based on statistical evidence projected by the data.

4. Empirical findings

Unit root test

In order to avoid misleading results, econometric theory requires that variables be stationary before the application of further econometric methods. In performing the stationarity test, we use a maximum lag of 3 in accordance with the Bayesian information criterion (BIC) also known as the Schwarz information criteria (SIC). The results of the stationarity test are presented below.

***Table 1*: Unit root test (Augmented Dickey-Fuller test)**

Variable	At Level$_\mu$		At level$_\lambda$		At level$_\gamma$		At first difference$_\lambda$		Conclusion
	Maximum lag	ADF test statistic	Maximum lag	ADF test statistic	Maximum lag	ADF test statistic	Maximum lag	ADF test statistic	
rS_t=(rGDS)	3	-1.4183 (0.5407)	3	-4.9717** (0.0076)	3	0.3349 (0.7667)	3	-5.0025** (0.0084)	I(1)
rI_t=(rGFCF)	3	-0.3417 (0.8979)	3	-2.1870 (0.4644)	3	1.8298 (0.9784)	3	-4.0588* (0.0384)	I(1)

Note: * and ** indicate statistical significance at 1% and 5% levels, respectively. The subscripts μ, λ and γ indicate the models that allow for a an intercept, deterministic trend and intercept, and none, respectively. Numbers in parenthesis represent the Mackinnon (1996) one-sided p-values.
It is evident from the above table 1, that real gross domestic saving and real gross fixed capital formation are non-stationary series and thus, become only stationary at first difference. Alternatively, these time-series attributes (e.g. mean, variance and covariance) are time variant; that is they change overtime. Empirics suggest other important tests to investigate the presence of stationarity in variables [Sargan-Barghava Durbin Watson Statistics (SBDW) and Phillips-Peron (PP) tests] however; these tests give greater bias in terms of finite samples. Hence, the unit root test results under the ADF method are treated as concrete and reliable, therefore it is logical to proceed with the test for co-integration on the basis that all the variable are *I(1)*.

Johansen test for co-integration

Engle and Granger (1987) contend that in order to test for co-integration, the variables in the system ought to be integrated of the same order *(1)*. In this study we adopted the Johansen (1988) co-integration test; which uses

two likelihood-ratio tests, the trace and the maximum eigenvalue *(λ-max)* statistics in order to determine the number of co-integrating vectors. Econometric literature advises that, if two variables are *I(1)* and co-integrated then causality between them may exist in at least one direction. It may be noted here that we are interested in checking the presence of a co-integrating relationship between *rGDS* and *rGFCF* however; the number of co-integrating vectors is not of our concern. Accordingly, in the table below we present only the results of the null hypothesis that there is no co-integration against the alternative that co-integration exists.

***Table 2*: Johansen test for co-integration results**

H_0: No co-integration exist

Variables in the system	Trace statistic	Maximum Eigen value statistic	Conclusion
rGDS and rGFCF	12.3724	11.9679	Not Co-integrated

Note: * indicate statistical significance at 5%levels.The critical values of Trace test and Maximum Eigen value test at the 5% significance levels are 15.4947 and 14.2646, respectively.

Starting with the null hypothesis of no co-integration *(r=0)*, the trace statistic is well below the 95 percent critical value for the series. Hence, it fails to reject the null hypothesis of no co-integration. Turning to the maximum Eigen value test, the null hypothesis that there is no co-integration is not rejected at 5 percent level of significance. Thus, both the trace and maximum Eigen value test statistics suggest the non-existence of a co-integrating relationship between *rGDS* and *rGFCF*; indicating a no tendency or co-movement or equilibrium relationship between the variables. Co-integration results should be interpreted with caution; as the model employed does not cater for regime shifts or (rather policy changes) that could have taken place between the period under review or external shocks that could have led to regime changes

Pairwise Granger-causality test

Given that the variables in question are not co-integrated and integrated of order one, we cannot perform Granger-causality under the VECM methodology. Instead we adopt Granger-causality under the VAR technique. The results of the standard Pairwise Granger-causality framework are shown in the table below.

***Table 3*: Pairwise Granger causality tests**

Null Hypothesis	Obs	F-Statistic	Probability	Result
rGFCF does not Granger cause rGDS	15	1.4242	0.2856	Do not Reject
rGDS does not Granger cause rGFCF		4.3137	0.0446*	Reject

* (**) indicates significance at 5% and (10%) level of significance

As shown by the results above, real gross fixed capital formation does not Granger cause real gross domestic saving, statistically at 5 percent level of significance. However, statistically at 5 percent level of significance, there is evidence of a unidirectional causality running from real gross domestic saving to real gross fixed capital formation. Alternatively, savings "Granger" causes investment and therefore changes in savings *precede* changes in investment. The Granger methodology is very sensitive to the lag length used in the model. Therefore, the results should be interpreted with caution. Additionally, the power of unit root and co-integration tests may suffer in small samples.

5. Concluding comments and Policy implications

Using Namibia as a laboratory test ground, this research article attempted to test for co-integration and further investigated the direction of causality between savings and investment for the period running from 1995 to 2011. Indeed, savings and investment were found to be a non-stationary series and thus, integrated of order one. Johansen's (1988) test for co-integration, revealed the absence of co-integration between the variables in question; implying the absence of a long-run relationship, co-movement or a tendency of convergence between savings and investment. According to F-H (1980) and Miller (1988) lack of co-integration suggests a high degree of capital mobility; a situation likely to prevail in least developed nations. Capital mobility is the ability of private funds to move across national boundaries in pursuit of higher returns. This mobility depends on the absence of currency restriction on the inflows and outflows of capital. Congruent with the F-H findings is Esso and Keho (2010), in their study on the relationship between savings and investment using WAEMU region as a test hub, they concluded that, the non-existence of co-integration between savings and investment in a country belonging to a monetary area implies high capital mobility, indicating that all increases in domestic savings will tend to flow out of the country to other countries, and will not induce an increase in domestic investment. Interestingly, Ground-level studies evidently proved that Namibia experiences high capital outflow, to a certain degree. Given the absence of co-integration hence, high capital mobility and capital outflow, we are inclined to conclude that, the bulk of domestic investment is financed by foreign savings rather than domestic savings; which may intensify the significance of capital outflow reduction and investment-promoting policies. In light of this we may conclude that gross domestic savings play an inactive role in financing capital formation in Namibia and the country is reliant on foreign sources of finance to fund domestic investment. Lack of co-integration could also be an indication of high domestic consumption which leads to low domestic savings. Hence, domestic investment has to be funded by international capital inflows. One of the major reasons that could also be

implicated for the absence of co-integration is the current account deficit on the balance of payments (BoP). The continuous and unsustainable current account deficits which are closely related to the decline in domestic savings particularly in the recent period is the major reason for the absence of long-run or co-movement between savings and investment. The gap between domestic savings and investment in Namibia will further broaden Namibia's current account deficits leading to an increase in the foreign debt and debt financing. Empirical studies have shown that, Namibia is heavily dependent on international trade, especially imports; with that said, it will pose serious challenges to weaken the current account deficit.

Furthermore, empirical results reported a unidirectional causality from savings to investment. Given these findings, the policy implications are clear; investment-promoting policies are likely to be unsuccessful and economically inefficient. Resources should be focused rather more on savings-promoting initiatives.

5.1 Policy recommendations

- Given the results of our study, it is logical to control the deficit on the current account of the balance of payments (BoP) by cutting government spending, instead of raising tax burdens. This is a prudent policy to adopt, because increasing taxes lowers disposable income and private savings, which may have a negative impact on lowering the current account deficit and have an adverse impact on aggregate saving. Capital tax cuts should also be considered in order to encourage private savings and hence, induce investments.
- A combined fiscal and monetary policy initiatives are needed to ensure the equilibrium between domestic resources and financing in the economy. Government budget targeting would minimize the resource gap and this will further bring equality between gross domestic savings and capital formation in the current account.
- Pumping resources in financial sector reform will help increase the level of savings by widening the range of available savings instruments. This would in turn increase the expected return through higher real interest rates and reduced risks, as deeper markets make financial assets more liquid.

Given that, causality is from savings to investment, the following will further help induce domestic savings with its concomitant positive impact on economic growth cum development:

- Financial inclusion should be given a more practical expression
- Reduction in income (and capital) taxes should be explored
- Maintaining economic and political stability should be a top priority for the government
- Place more emphasis in value addition activities to help create employment
- Address the highly debatable issue of high capital outflow into the South African capital and money markets
- Review post-independence policies and amend to suit current and expected macroeconomic circumstances

5.2 Direction for future research

Given the rather mixed findings and somehow controversial nature of our results, it is advisable for future research concerning the issue under investigation to direct their attention to the following: Firstly, future studies should attempt to investigate the effectiveness of foreign direct investment (FDI), in relation to domestic savings and foreign savings. Secondly, future studies should investigate the determinants of financial development. A well-functioning financial sector with abundant alternative investment instruments is central to controlling capital outflow to more sophisticated regions for diversification purposes. Additionally, enthusiastic researchers should investigate the extent to which domestic investment in Namibia is financed by foreign savings. Given that Namibia is simultaneously opened to inflow and outflow of capital due to limited currency restrictions' procedures, researchers should in fact attempt to investigate whether Namibia is indeed, an importer of savings, which are in turn used to finance domestic investment.

Finally, if for nothing else, we believe that, this study in many ways will serve as food for thought to our professional colleagues in terms of the relationship between savings and investment. We shall be satisfied, if they are challenged and provoked into carrying out more studies on the topic under discussion.

6. References

Afzal, M. (2007)." Savings and Investment in Developing Countries: Granger Causality test," *Philippine Review of Economics*, 44, No.2.

Bassam, A. (2006). The relationship between savings and investment in MENA countries. *International Journal of Economics*.

Baxter, M. and Crucini, M. J. (1993). Explaining Saving-Investment Correlations. *American Economic Review,* 88, 416-436.

Blanchard, O., and Giavazzi F. (2002), "Current Account Deficits in the Euro Area. The End of the Feldstein-Horioka Puzzle?" *MIT Department of Economics Working Paper*, No. 03-05.

Dickey, D. A. and Fuller, W. A. (1979). Distribution of the Estimators for Autoregressive Time Series with a Unit Root. *Journal of the American Statistical Association*, 74, 427-431.

Dickey, D.A. and Fuller, W.A. (1981). ''Likelihood Ratio Statistics for Autoregressive Time Series with Unit Root'', *Econometrica*, Vol. 89, No. 4, 1052-1072.

Esso, L. J., and Keho, Y. (2010). The Saving-Investment Relationship: Cointegration and Causality Evidence from UEMOA Countries. *International Journal of Economics and finance Vol.2,* No.1 , 174-181.
Feldstein, M. and Horioka, C. (1980), "Domestic Saving and International Capital Flows," *Economic Journal,* 90(358), 314-329.
Gebreyehu, W. (2010), "Causal Links among Saving, Investment and Growth and Determinants of saving in Sub Saharan Africa: Evidence from Ethiopia," *Ethiopian Journal of Economics*, 19, no.2.
Georgopoulos, G. J. and Hejazi, W. (2005). Feldstein-Horioka meets a time trend. *Economics Letters,* 86, 353-357.
Granger, Clive W. J. (1969). "Investigating Causal Relations by Econometric Models and Cross-Spectral Methods," *Econometrica,* 37, 424-438.
Gujarati, D. (2003). *Basic Econometrics. (Fourth Edition)*. New York: McGraw-hill Companies.
J. D. Sargan and A. S. Bhargava (1983), "Testing Residuals from Least-Squares Regression for being Generated by the Gaussian Random Walk," *Econometrica,* vol. 51, pp. 153–174.
Johansen, S. (1988), "Statistical Analysis of Cointegrating Vectors," *Journal of Economic Dynamics and Control,* 12, 231-254.
Johansen, S. (1991). "Estimation and Hypothesis Testing of Cointegrating Vectors in Gaussian Vector Autoregressive Models," *Econometrica,* 59, 1551-1580.
Johansen, S. and Juselius, K. (1990), "Maximum Likelihood Estimation and Inference on Cointegration: with Applications to the Demand for Money", *Oxford Bulletin of Economics and Statistics,* 52, 169-210.
Mamingi, N. (1994). Savings-Investment Correlations and Capital Mobility in Developing Countries. *The World Bank Policy Research Working Paper*, 1211.
Miller, S (1988). "Are Saving and Investment Cointegrated?" *Economic Letters,* 27, 31-34.
Murphy, R.G. (1984). Capital Mobility and the Relationship between Saving and Investment Rates. *Journal of International Money and Finance 3*, 327-342.
Onafowara, O., Owoye, O., and Huart, F. (2011). The Temporal Relationship between Saving and Investment: Evindence from advanced EU Countries. *International Journal of Business and Social Science. Vol.2,* No.2, 1-12.
Uanguta, E., Haiyambo, E., Kadhikwa, G., and Chimana, S. (2004). The Structure and Nature of Savings in Namibia. *BoN Occassional Paper 8/4/1OP-1/2004* , 1-27.
Seka, P. (2011). Is Saving Really Prior to Investment? Time Series and Panel Evidence in the WAEMU. *African Journal of Economic and Management Studies* , 123-142.
Shiimi, I., and Kadhikwa, G. (1999, April). Savings and Investment in Namibia. *BoN Occasional Papers* No.2 , 1-29.
Tsoukis, C. and Alyousha, A. (2002), "The Feldstein-Horioka Puzzle, Saving-Investment Causality and International Financial Market Integration," *Journal of Economic Integration* 16 (2), 262-277.
World Bank (2011), 2011 *World Development Indicators*, World Bank, Washington, D. C.