

An Empirical Test of the Relationship between Private Savings and Economic Growth: A Case Study of Kenya

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Abstract

The study aims at investigating the long run and short run relationships between private savings and economic growth in Bahrain. The study covers the period (1990-2013). The study methodology is based on the econometrics analytical approach to estimate the parameters' value and the trends of the economic relations between the study variables by using the co-integration and Granger causality techniques. Johansen co-integration test indicates that a positive long run relationship between the study variables, while Granger causality test reveals that significant bilateral causality between the private savings and the economic growth, this means that the economic growth Granger causes the private saving, and also the private savings Granger cause the economic growth. These results indicate that the economic growth could stimulate the private saving, and the private savings could accelerate the economic growth in the long run. The study recommends that government and policy makers in the kingdom of Bahrain should employ policies that would attract more private savings in order to accelerate economic growth which would lead to raise GDP per capita and Bahraini standard of living.

Keyword: Private Savings, Economic growth, Econometrics, Kingdom of Bahrain.

1. Introduction

Economic growth defined as a sustained expansion of potential output as measured by the increase in Real Gross Domestic Product over certain period of time. Maintained rapid of economic growth over a number of years, could transform the impoverished country to a rich country. While the slow economic growth or the absence of growth could turn the country into a state facing the specter of poverty. Private savings play a dominant role in the economic growth and stability of any country. Economic growth requires investment and it can be financed through private savings or from abroad foreign capital inflows. However, in the long run a nation has to rely on private savings. Economic revival primarily depends on investment through private savings and capital accumulation.

There have been extensive theoretical and empirical researches examine the relationship between private saving and economic growth both in the context of developed and developing countries. Although the relationship between private saving and economic growth is an important one, the direction of causality between the two variables has continued to generate series debate among scholars. Some theories and empirical studies point to savings led growth such as : (Harrod1939, Solow1956, McKinnon1973, Romer1986, Sinha and Sinha1998, Olajido2009), while others show evidence for growth driven savings such as: (Keyns1936, Modigliani1970, Dekle1993, Saltz1999, Agarwal2001, Nurudeen2010, Pinchawe 2011), and some suggest there is bilateral causality between the two variables such as: (Jappelli and Padula1994, Sajid and Sarfraz2008, Abu Al-Foul 2010), while few studies found ambiguous or no relationship between the two variables such as: (Sinha1996, Andersson1999, Mohan2006).

Private savings in Bahrain economy represent an integral part of national savings, and it is the most important source of funds to finance capital investment in the real sector, because foreign capital is mostly invested in production of natural resources like oil and gas. Currently the ratio of private savings to GDP in Bahrain equals to 39%, which is considered one of the highest saving/GDP ratios in emerging economies, compared with 20% and 18.6 % in year 2000, and 1990, respectively. There are many reasons led to raise private savings in Bahrain during the study period such as: the growth of real GDP per Capita by 9% per annum. Financial incentives that is offered by Bahrain commercial initiations that give high returns for different savings options, with no or low

risk, this led to raise private deposits by 70.5% . Applying tax incentives for different forms of savings (Deposits, Bonds, stocks...etc.). In addition to confidence in Bahrain's economy and development plans that carried out by the government of the Kingdom. (CBB, statistical Bulletin).

The examination of the causal relationship between private savings and economic growth in Bahrain is very important because it will provide useful information on which economic variable that the Bahrain government and relevant policy makers need to control in order to attain the desired level of the targeted variable. For example, if the results of causality test indicate that private savings precedes and causes economic growth, then Bahrain government and policy makers can design or employ policies that would promote the mobilization of savings in order to achieve higher economic growth in Bahrain. On the other hand, if econometric investigation reveals the reverse, then, efforts would be made to remove the obstacles to and accelerate economic growth in order to raise the level of saving. Therefore, the purpose of this study is to investigate whether the direction of causality runs from private savings to economic growth or vice versa during the study period. The study employs two econometric models that are most frequently used by empirical studies of examining relation between savings and economic growth in both developed and developing countries. The first econometric model examines the short run and long run relationship between real GDP and household savings by applying Johansen co-integration test and the associated Vector Error Correction Model (VECM), and the second is the application of the Granger causality test to determine the direction of causality between the two variables.

The remaining of this paper is organized as follows: Following this introduction, Section two reviews the relevant literature. Section three shows the study hypotheses and mythology. Section four illustrates data and empirical results. And finally, section five contains conclusion and policy recommendations.

2. Literature Review

There are large number of related literatures that have been done to determine the relationship between private savings and economic growth. Some studies focused on theoretical discussion while the others applied empirical analysis using various tests. The results and conclusions are differing from each other in different countries.

In 1988 Mason raised the difficulty to get an accurate conclusion about the relationship between savings and economic growth, because the process involved are complex and the circumstances varies widely from country to country. For example, some countries like Korea had managed high rates of economic growth despite low national savings rates in the 1960s. However, Mason (1988) got a general result that higher national savings rate contributes to rapid economic growth for many developing countries.

Bacha (1990), Otani and Villanueva (1990), DeGregorio (1992), Jappelli and Pagano (1994) analyzed the relationship between economic growth and savings using the ordinary least squares method (OLS). Their research proved that the higher savings rate (share of domestic savings in GDP), the higher the economic growth rate.

Dekle (1993) presented comparable Granger causality regressions for a group of fast growing countries and he found that growth positively Granger causes savings in every country in his sample. The same conclusion found by Carroll and Weil (1994), and Edwards (1995), where Carroll and Weil used the data of five-year average rates of economic growth in OECD member states and employed Granger causality test, and Edwards used data from a panel of 36 countries over the period (1970-1992) Using lagged population growth, openness, political instability, and other lagged variables as instruments.

Carroll et al.; (2000), found that increases in economic growth tended to be followed by increases in savings for the East Asian countries, and the habit formation could lead to a positive short run response of savings to a favorable shock, even when there is no long run effect of such a shock on saving.

Using cross section data between 1960 and 1997 and Granger causality methodology, Anoruo and Ahmadi (2001) observed the causal relationships between the growth rate of domestic savings and economic growth for 7 African countries (Congo, Cote d'Ivoire, Ghana, Kenya, Nigeria, South Africa and Zambia). They found that savings are co-integrated in all of the countries except for Nigeria and that economic growth Granger causes the growth rate of domestic savings for all the countries considered except Congo.

Alguacil et al.; (2002), investigated the saving-growth nexus by taking into account the impact of foreign capital in complementing savings and the beneficial effects of FDI on domestic investment and income. The Granger non-causality test revealed that higher savings preceded economic growth. Also researches carried out by

Kriekhaus (2002) in 32 countries indicated that higher level of savings led to higher investment levels and thus contributed to higher rate of economic growth in analyzed countries.

Kazakhstan Katircioglu and Naraliyeva (2006), analyzed the relationships between private saving, foreign direct investment and economic growth during the period (1993-2002) using the Granger causality test and co-integration methods. They found that in the long run there is one-way, positive relation between private savings and economic growth.

Waithima (2008) used the Hendry Model with a two-step method to model a savings function for Kenya. He observed that a 1% increase in GDP growth rate causes a 0.5% increase in private savings. Moreover, the causality tests revealed a unidirectional causality that runs from per capita GDP to private savings. While in Pakistan Sajid and Sarfraz (2008) employed both co-integration and the vector error correction techniques and discovered that unidirectional short and long runs causality from output (GNP and GDP) to household savings. They concluded that overall short run results favor Keynesian point of view that savings depend upon level of output.

In Nigeria, Olajido (2009) employed the Toda and Yamamoto (1995) and Dolado and Lutkepohl (1996) TYDL methodology to examine the direction of causal relationship between savings and economic growth between 1970 and 2006. The empirical results proposed that savings and economic growth were positively co-integrated indicating a steady long run equilibrium relationship. Further, the findings revealed a unidirectional causality between savings and economic growth and the corresponding role of FDI in growth. The same results found by Nurudeen (2010) when he employed the Granger-causality and Johansen co-integration test to analyze the relationship between savings and economic growth in Nigeria during the period 1970- 2007. He found out that causality run from economic growth to saving, implying that economic growth proceeded and Granger causes saving. He recommended that government and policy makers should employ policies that would accelerate economic growth so as to increase saving. On the contrary, the study of Adebisi (2005) was a surprise, when he employed quarterly data spanning between (1970- 1998) to examine savings and growth relationships in Nigeria using Granger causality tests and impulse response analysis. He concluded that growth, using per capital income, is sensitive to, and has an inverse effect on private savings.

Piotr (2010), analyzed the cause and effect relationship between economic growth and savings in advanced economies and in emerging and developing countries. In his work he used co-integration models and Granger's causality test. The results confirmed the existence of one way casual relationship from domestic savings to GDP in the case of developed countries as well as in developing and transition countries. The same results found by Ramesh (2011), when he investigated the relationship between savings, investment and economic growth for India over the period 1950-51 to 2007-08. He found that the co-integration analysis suggested that there was a long-run equilibrium relationship. The results of Granger causality test showed that higher savings and investment led to higher economic growth, but the reciprocal causality is not observed. Further, it was empirically evident that savings and investment led growth is coming from the household sector. Also, Aswini and Mohit (2012), found the same results when they studied the pattern between savings, investment and economic growth and the policies which led to such changes and estimating and forecasting the policy implications which would affect these variables in India for the period(1950-2011). They found that the direction of causality was from savings and investment to economic growth collectively as well as individually and there was no causality from economic growth to savings and/or investment.

In addition to the previous studies, there were several studies found the results differ across the countries such as: Saltz (1999), found Granger causality between savings and economic growth in 17 developing countries. He found that 4 countries have causal relationship from savings to the real GDP while 10 countries have the reverse causal relationship from economic growth to savings growth. Also, Andersson (1999), found that the results of the Granger non causality test indicated that the direction of causal relationship between savings and output differ across the countries, when he analyzed the relationship between savings and GDP for a group of countries that include Sweden, UK, and USA.

According to Sinha's (1996, 1998, 1999, 2000 and 2007) series of empirical researches about the relationship between savings growth and economic growth in different developing countries, two types of results were found. The most common result is the economic growth Granger causes the savings growth. This result can be found in Sinha (1996) on Pakistan, Sinha and Sinha (1998) on Mexico, Sinha (2000) on Philippines and Sinha and Sinha (2007) on India. The other result is Sinha (1999) on Sri Lanka where the savings growth Granger causes the economic growth.

Mohan (2006), addressed the relationship between domestic savings and economic growth for various economies with different income levels. He divided the countries into low-income (LIC), low-middle income

(LMC), upper-middle income (UMC) and high-income (HIC) in order to test whether the income level played an important role in influencing the direction of causality. The results suggested that the economic growth Granger causes growth rate of savings in 13 countries and the income class of a country plays an important role in determining the direction of causality. In LICs the direction were mixed. In most of LMCs, the causality is from economic growth to savings growth. In all HICs except Singapore, the causality is from economic growth to growth of saving. However, it appeared that in UMCs, bi-directional causality is more prevalent. And finally, Abu Al-Foul (2010) employed an econometric technique to investigate the long run relationship between GDP and domestic savings for Morocco and Tunisia during the period (1965-2007) and (1961-2007), respectively. The regression exercise revealed interesting results. For instance, it was shown that whereas a long run relationship existed between GDP and domestic savings in Morocco, there was no such evidence for Tunisia. Secondly, the Granger causality test indicated the existence of a two way causal relationship between GDP growth and domestic savings growth in Morocco. Lastly, he observed a unidirectional Granger causality between GDP and domestic savings as causality runs from domestic savings growth to GDP growth in Tunisia.

From previous discussion, we argue that, there are different conclusions about the relationship between the private savings and economic growth in empirical analysis. Different countries also have different effect of saving. In most developing countries, the economic growth Granger causes the private saving, whereas in most developed countries the private savings leads to economic growth. On the other hand, the negative economic effect of high savings rate cannot be excluded from the discussion too.

3.0 Study hypotheses and mythology

3.1 Study hypotheses

The purpose of this study is to investigate whether the direction of causality runs from private savings to economic growth or vice versa during the study period. Thus the study tests the following hypotheses:

- H_0 : GDP growth does not Granger cause private savings in Bahrain
- H_1 : GDP growth does Granger cause private savings in Bahrain

And

- H_0 : private savings does not Granger cause GDP growth in Bahrain
- H_1 : private savings does Granger cause GDP growth in Bahrain

Accordingly, if both null hypotheses are rejected, it indicates that bilateral causality exists between GDP growth and private savings. If the first null hypothesis is rejected and the second null hypothesis is accepted, it means that there is unidirectional causality from GDP growth to private saving. On the contrary, if the second null hypothesis is rejected and the first null hypothesis is accepted, it shows a unidirectional causality from private savings to GDP growth. Finally, if both null hypotheses are accepted, then independence is suggested and means no causality between the two variables.

3.2 Study methodology

State of the art econometric tools of analysis are employed:

- Unit root test.
- Co-integration analysis.
- Granger Causality tests.

The unit root test is used to detect the stationarity of the two macroeconomic variables under study. The test is undertaken for two reasons. First, avoid the spurious regression problem. Second, a basic assumption underlying the application of causality test is that the time series in question should be stationary. Hence, in order to detect the stationarity of the two variables, we employ the ADF test (Dickey and Fuller, 1981) and the (PP) test (Phillips and Perron, 1988) with intercept and trend. Individual economic time series may not be stationary, but there may be cases of linear combination among them. This means that nonstationary economic time series may produce stationary relationships if they are co-integrated. This is a reason why we subjected the two macroeconomic variables series individually to unit root analysis. If both time series are integrated of the same order, $I(d)$ for $d=0,1,2,\dots$, then the two series are said to be co-integrated and the regression on the same levels of the two variables is meaningful, in addition to the possibility to proceed with the estimation of the following co-integration regression:

$$LGDP_{gt} = \alpha + \beta LPS_{gt} + \epsilon_t \quad (1)$$

$$LPS_{gt} = \alpha + \beta LGDP_{gt} + \mu_t \quad (2)$$

Where $LGDP_{gt}$: economic growth rate, LPS_{gt} : private savings rate at time t , and ϵ_t and μ_t are random error terms (residuals). Residuals ϵ_t and μ_t measure the extent to which $LGDP_{gt}$ and LPS_{gt} are out of equilibrium.

If the residuals of the two variables do not contain unit roots, the econometric relationship among the variables could be co-integrating. The Johansen (1988) co-integration test is used for analyzing the long run relationship between the two variables in Bahrain. The Granger causality test is also used to determine the direction of Granger causality. If the private savings helps to forecast its economic growth, then we say that the private savings Granger cause the economic growth. Furthermore, if economic growth also Granger causes the private savings, there is bilateral causality between private savings and economic growth. However, if both variables do not cause each other, it means that these two variables are statistically independent. On the other hand, if the private savings cause the economic growth but the economic growth does not cause the private saving, then a unidirectional causality from private savings to economic growth exists. If there is no co-integration among the variables, the VAR procedure will be used. However, if a unique co-integrating vector for the variables used in the co-integration analysis, the Granger causality procedure based on VECM is used. This procedure is particularly favorable compared to the standard VAR as it permits temporary causality to emerge from the sum of the lagged coefficients of the explanatory differenced variables and the coefficient of the error correction term (ECT). Besides indicating the direction of causality among variables, the VECM framework could also distinguish between short run and long run causality. The significance of the F-test and Wald χ^2 test helps to indicate any short run causality between the independent variable and dependent variable. The long run causality is indicated through the error correction term where a significant t-statistic shows the existence of long run causality running from the independent variable to the dependent variable.

4. Data and empirical results

4.1 Data

The current study used annual data from 1990 to 2013. All data came from the Central Bank of Bahrain statistical Bulletin (various issues). Some of the missing observations were updated with comparable data from the World Bank International Financial Statistics database. Variables used in this study and the definitions are LPS (log of Gross Private Savings), and LGDP (log of Gross Domestic Product). Gross private savings rate is calculated residually by subtracting the gross public sector savings rate from the gross national savings rate. GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. All the data used are in BD millions and are measured in real terms (2005=100)

4.2 Empirical results

4.2.1 Stationarity tests (Unit Root Tests)

The tests for unit roots are closely related to the investigation of stationarity in a time series. Augmented Dickey-Fuller (ADF) and Phillips and Perron (PP) are employed to detect the stationarity of the two variables. The two tests are applied to both the original and to the first differences. Table (1) shows that at the level, all variables are non stationary but all the variables become stationary at the first difference. Thus, all variables are integrated of the same order of one I(1), which means that the co-integration test could be applied.

Table (1) ADF and PP tests for unit root

Variables	Level		1st differences	
	ADF	PP	ADF	PP
LGDP	-2.88 (1)	-2.79(3)	-3.06(0)	-3.12(3)
	-2.54 (4)	-1.63 (3)	-4.31(1)	-5.62(3)

Source: Researcher's estimation using SPSS

* ADF critical values at level are: -4.071 at 1%, -3.464 at 5% and -3.158 at 10%. While ADF critical values at first differences are: -2.727 at 1%, -1.964 at 5% and -1.627 at 10%

** The numbers in parentheses are the lag length, which are augmented up to a maximum of 4 lags , The optimal lag length is determined based on Schwarz Information Criterion (SIC).

4.2.2 Co-integration test

Having established that two variables are integrated of same order, we proceed to test for presence of co-integration between the two variables. We employ Johansen co-integration test. It may be noted here that we are interested to check for the presence of co-integrating relationship between the variables, however, number of co-integrating vectors is not of our interest. Table (2) presents the results of the null hypothesis that there is no co-integration against the alternative that there exists co-integration. Starting with the null hypothesis that co-integration does not exist among the two variables; the trace statistic value is shown to be greater than the critical values at both 5% and 1% levels. Hence, we reject the null hypothesis of no co-integration in favor of existence of co-integration for all the series at both 5% and 1% levels. However, the maximum Eigen statistic value indicates that 2 co-integration equation at 5% level of significance, while it shows no co-integration at 1% level. Thus, both the trace and maximum Eigen value test statistics indicate that there is a long run equilibrium relationship between private savings and economic growth in Bahrain.

Hence, we can analyze the long run co-integration equation of GDP with their independent variable of private savings with VECM. The equation can be written as follow where the numbers in () are t-statistics.

$$LGDP = 3.0856 + 0.6437 LPS \quad (3)$$

$$(1.9403) \quad (2.6485)$$

Form the above equation, we argue that private savings is significantly positive related to the economic growth in Bahrain during the study period.

4.2.3 Granger causality test

The existence of co-integrating relationship between private savings and economic growth for Bahrain suggests that there must be long run Granger causality in at least one direction. The Granger causality test based on VECM is applied to variables after first differencing, with the purpose of testing whether the private savings causes the economic growth or vice versa. The results are presented in Table (3).

From Table (3), the result is different for the short-run and long-run. First, in the short-run, there is a unidirectional causality exists from the economic growth to the private saving. This means that the economic growth Granger causes the private savings. This result indicates that the economic growth could stimulate the private savings in the short run. Second, in the long run there is bilateral causality between the private savings growth and the economic growth, this means that the economic growth Granger causes the private saving, and also the private savings Granger cause the economic growth. This result indicates that the economic growth could stimulate the private saving, and also the private savings could accelerate the economic growth in the long run.

Table (2) Johansen Panel Co-integration (Trace and Maximum Eigen Value Test)

Hypothesized No. of CE(s)	Eigen value	Trace Statistic	5% critical value	1% critical value
None	0.667396	23.156	15.197	10.310
At most one	0.132376	13.189	3.962	6.936

Hypothesized No. of CE(s)	Eigen value	Trace Statistic	5% critical value	1% critical value
None	0.667396	16.254	14.036	17.936
At most one	0.132376	13.189	3.962	6.936

Source: Researcher's Estimation Using SPSS

*The critical values in the table are copied from Walter Enders, Applied Economic Time Series, Wiley Series in Probability and Statistics, 1995, page 420.

Table (3) Result of Granger causality tests

Null hypothesis	Obs	F-statistic	Short-run Results	ECT(-1) t-statistic	Long-run Results
- LPS does not cause LGDP - LGDP does not cause LPS	24	LPS: 0.8160 LGDP: 3.9144**	LPS ← LGDP	LPS: 0.0201* LGDP: -0.2504***	LPS ← LGDP

Source: Researcher's estimation using SPSS

***, ** and * indicates significance at 1%, 5% and 10% respectively.

The number in parentheses is the lag length. The optimal lag length is determined based on Schwarz Information Criterion (SIC).

“ ” indicates the direction of Granger causality

5. Conclusion and policy recommendations

The study aims at investigating the relationship between private savings and economic growth for Bahrain economy. Using time series annual data from 1990 to 2013, the co-integration method was applied to discover the nature of two variables. The main finding is that there is a positive long run relationship between the two variables, which leads to test the hypotheses whether the direction of causality runs from private savings to economic growth or the opposite. The results suggest that the economic growth Granger causes private savings and also the private savings Granger cause the economic growth in the long run. Based on the results, the study favors to reject both null hypotheses, which indicates that bilateral causality exists between the two variables. Accordingly, it can be pointed out that that Bahrain economy tends to have higher level of income (GDP) first in order to generate higher rate of private savings in the short run, which causes to rapid economic growth in the long run. Therefore, it would be important to Bahrain economy to mobilize the private savings into the economy. It is recommended that government and policy makers should focus on improving the economic growth that could increase high saving rate. While if the government only focuses on increasing the private saving rather than improving real output growth; the domestic capital may transfer to other faster economic growth countries. Furthermore, high saving rate could mean less consumption which causing over supply in the market.

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