Determinants of National Savings: A Short and Long Run Investigation in Ghana

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Abstract

The study investigated the determinants of national savings by employing the Johansen cointegration technique and error correction model to examine the short run and long run dynamics of the system using time-series data for Ghana over the 1975-2008 period. The study found all the variables to be integrated of order one and the existence of co integration indicated a valid long run economic relationship among the determinants of national saving in Ghana. The empirical results established that in the long run, income and terms of trade have a positive and significant impact on savings while dependency ratio, political instability and the real interest rate have a negative impact on savings. In the short run however, only terms of trade positively affects savings. The other variables namely dependency ratio, political instability, financial deepening, income and interest rate have an insignificant impact on savings. The error correction term has a coefficient of -0.830376 which shows that there will be about 83.04 percent speed of adjustment toward long run equilibrium when there is any imbalance in the short run.

***Keywords*:** National Savings, Co-integration; Life Cycle Hypothesis, Error Correction Model; Ghana

INTRODUCTION

Economic theory suggests that national savings is an important component of growth in every economy. In developing countries like Pakistan, China, Turkey, India and other Asian countries that are performing well in terms of growth, one cannot rule out the fact that savings has got a role to play. China and some South East Asian countries, for instance, have their savings rates in the range of 30 to 40 percent (Agrawal, Sahoo and Dash, 2007). The same cannot be said of Ghana, a nation touted to be the first African country to achieve the millennium development goal of reducing poverty by half. Dovi (2008) informs that Sub Saharan Africa countries, including Ghana, have the lowest saving rate amongst developing countries. Quartey and Blankson (2008) also reveal that savings as a percentage of GDP in Ghana has been low

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compared to many African countries; between 1980 and 2001, it averaged 6.4 percent in Ghana, 37.4 percent in Botswana, 21.4 percent in Cameroon, 21.6 percent in Nigeria, 13.9 percent in Kenya and 7.3 percent in Malawi.

Policy makers in Ghana have reckoned the importance of savings and as a result, a number of policies have been implemented to overcome the low level of savings. Nevertheless, the country has not achieved a lot in this regard (Quartey and Blankson, 2008). This therefore calls for the need to research into the variables that affect savings in the Ghanaian contest to inform policy makers in order to come up with better policy options. This paper thus seeks to look at the short and long run determinants of savings in the country using data from 1975-2008. The importance of the research is that studies on savings for groups of countries and regions are abundant, relative to those focused on a particular country. Moreover, studies on savings behavior in Ghana compared to other developing countries like Pakistan and India have been under researched with limited empirical works. The relatively few works on determinants of savings in Ghana include that of Zorklu and Barbie (2003), Quartey and Blankson (2008) and Issahaku (2011). This study will thus contribute to the literature on savings and the dearth of studies on determinants of savings in Ghana.

LITERATURE REVIEW

Examining the determinants of savings has its root from the life cycle model of consumption developed by Modiglinai and Brumberg (1954), Ando and Modigliani (1963) and Modiglinai and Brumberg, (1990) which assert that individuals work and save in the first period of their lives, then retire and dissave during the second period (Athukorala and Sen, 2004; Husain, 1995). From this model, a number of factors that have been identified to affect savings include dependency ratio, real interest rate, inflation, financial deepening and terms of trade. Others are fiscal stance, income and political stability.

An important variable that influences the saving behavior especially in less developed countries is the population structure that is, the dependency ratio. The argument is that a high dependency ratio will lead to low disposable income (due to high expenditure level) hence low savings and vice versa. Leff (1969) in his study found a significant inverse relationship between dependency rates and saving rates in less developed countries. Meanwhile subsequent studies by Fry (1991), Gupta (1975), Kelly (1973, 1976, 1988) and Lahiri (1989) as cited in Ahmad et al, (2006) have also found a negative relationship between dependency rates and saving rates.

Husain (1995) using the cointegration method found that demographics did not influence the long-run saving rate in Pakistan for the period 1975 -1993. The author attributes this to the limited variability and change in the working age population ratio together with limited savings in the sampled period. However, Ahmad et al. (2006) found that both the young and old dependency ratios have a significant and negative effect on the household savings in Pakistan in the short run and long run periods. The authors employed the Johansen-Juselius cointegration technique and error correction model using time-series data over the period 1972-2003.

Kibet et al (2009) have also examined the determinants of household savings in rural areas in Kenya. The authors ran an Ordinary Least Square (OLS) estimation and found that an increase in the dependency ratio has a negative effect on the level of saving by the individual household. When the data was disaggregated into smallholder farmers, entrepreneurs and teachers the result did not change. In Ghana, Issahaku (2011) did a study on the determinants of savings and investment in deprived districts and found a negative and significant impact of dependency ratio on savings. The estimation was that a unit increase in the dependency ratio would reduce saving by GH¢ 0.508.

Another factor, which influences savings, is inflation; although one cannot a priori determine the effect of inflation on savings. This is because in an era where inflation creates uncertainty about future asset values and future real incomes, savings would be encouraged (Ahmad et al., 2006). Also, inflation can lower savings when income is negatively affected. Another reason why inflation's impact on savings cannot be determined a priori is its reduction effect on real interest rate (Agrawal et al 2007). Some empirical studies confirm the argument that the effect of inflation cannot be determined a priori. For instance in Ghana, Zorklu and Barbie (2003) as cited in Quartey and Blankson (2008) found that inflation led to a reduction in savings. Athukorala and Sen (2004) in their study of the determinants of private savings in India found a positive effect of inflation on savings confirming the argument that individuals save more in the face of increased uncertainty in the economic environment. The period of the study was 1954 – 1998 and the error correction model estimation technique was utilized.

Nwachukwu and Egwaikhide (2007) employed the error correction model to estimate the determinants of savings in Nigeria for the period 1970-2005. The authors used annual data and found that the inflation rate has a strong positive effect on the private saving rate. Chaudhry, Faridi, Abbas, and Bashir (2010) investigated the determinants of national savings of Pakistan in

the long run as well as in the short run using time series annual data from 1972 to 2008. Relying on Johansen cointegration and the Vector Error Correction Model, it was observed that inflation has a positive and significant impact on national savings in Pakistan in the long run.

The stance of the government toward public savings may also have a very large impact on household savings and aggregate savings. From the neoclassical version of the life cycle model, a decline in government savings will tend to raise consumption and discourage savings by shifting the tax burden from present to future generations. The implication is a decline in government savings which will cause a decline in national savings. The Ricardian theory however argues that an increase in government savings would have no effect on national savings, as it would be met by an equal decline in private savings (Ozcan, Gunay, and Ertac, 2003). In Turkey, Ozcan et al (2003) indicated that the government savings do not tend to crowd out private savings and the Ricardian equivalence does not hold strictly. Also, Athukorala and Sen (2004) found that an increase in public savings by 1 percent is associated with 0.64 percentage point decline in the private savings rate at steady state in India. In Nigeria, public savings have been found to be a complement rather than a substitute for private savings (Nwachukwu and Odigie, 2009).

From the life cycle hypothesis, an individual is assumed to maximize the present value of lifetime utility subject to a budget constraint. According to Modigliani (1986) as cited in Husain (1995), the budget constraint is equal to the current net worth plus the present value of expected labor income over the remaining working life of the agent. The model under the assumptions of perfect capital markets and perfect foresight of the agent about the ‘‘true’’ income-generation process predicts that consumption in a particular period depends on expectations about lifetime income. There is therefore a positive relationship between income and the level of savings (Ahmad et al, 2006).

Athukorala and Sen, (2004) found a positive and significant effect of income on savings in India. An empirical study in five South Asian countries by Agrawal et al. (2007) employed an error correction model and Dynamic OLS for the 1960-2005 period. It was realised from the study that income (real per capita income) has a positive impact on savings for all countries - India, Pakistan, Sri Lanka, Nepal and Bangladesh. In this same study, the authors did a granger causality test and found that there is uni-directional causality from income to saving. In Nigeria, Nwachukwu and Egwaikhide (2007) also found that the level of income is very crucial factor in

determining savings. Evidence from Turkey by Ozcan et al. (2003) also confirms the positive impact of income on savings. Waithima (2008) also found positive relationship between income and savings in Kenya.

Also mentioned in the literature is the effect of the real interest rate on savings. There is no certainty about the relationship between interest rates and savings under the life cycle model. This is because an increase in the rate of interest has two effects - income effect and substitution effect. There is income effect when an increase in the interest rate increases lifetime income which leads to an increase in consumption and hence a reduction in savings. The substitution effect explains that a higher interest rate increases the current price of consumption vis-à-vis the future price, thus leading to an increase in savings. Thus the total effect of a rise in interest rate is dependent on which effect outweighs the other. When income effect exceeds substitution effect, then savings will fall but when substitution effect exceeds income effect, savings will rise following an increase in interest rate.

McKinnon (1973) and Shaw (1973) as cited in Athukorala and Sen (2004), and Nwachukwu and Egwaikhide (2007) have argued that the relationship between the real interest rate and the savings rate is positive for a developing economy. Examining the household savings behavior in Australia, Ouliaris (1981) as cited in Muradoglu and Taskin (1996) indicated that real interest rates exert a negative influence on the savings ratio. However, Athukorala and Sen (2004) found contrary results in India. They found that the real rate of return on bank deposits has a statistically significant positive effect on saving behavior in India. In fact, the actual Error Correction Model estimation suggests that a 1 percent increase in the rate of return on deposits is associated with a 0.20 percentage point increase in the private saving rate.

Ahmad et al. (2006) found the impact of the real interest rate to be significantly positive on household saving in Pakistan but Nwachukwu and Egwaikhide (2007) found a negative relationship between the interest rate and savings in Nigeria. Also, Agrawal et al (2007) found mixed results in their study. They found that the real interest rate has a negative and significant coefficient for India and Pakistan; insignificant coefficient for Sri Lanka and positive and significant coefficients for Bangladesh and Nepal. Chaudhry et al (2010) found positive and significant impact of interest rate on savings in Pakistan.

A deep financial system, as measured by the degree of monetization of the economy, has the chance of increasing the level of savings. A developed financial system can also lead to

interest rate liberalization, the elimination of credit ceilings, easing of entry for foreign financial institutions, enhanced prudential guidelines and supervision, the development of capital markets (Nwachukwu and Egwaikhide 2007), and a reduction in the population per bank. As the number of banks increases, there will be a reduction in population per bank, improvement in bank accessibility, reduction of transaction costs and encouragement of savings (Athukorala and Sen, 2004). Husain (1995) argues that through liberalization, development in the financial sector can raise the real rate of return on financial assets, which can boost the savings rate. The author found a positive effect of financial depth on savings in Pakistan. The estimation suggests that financial development resulted in an increase in the long-run rate of private saving by 3 percentage points for the period of 1975 to 1993.

Onwioduokit (1998) as cited in Nwachukwu and Odigie (2009), employed an Error Correction Model to examine the effects of financial development on savings mobilization in Nigeria. The results reveal that there is no long-run equilibrium relationship between financial depth and domestic resource mobilization. Athukorala and Sen, (2003) also found in India that a reduction in population per bank by 10 percent would increase the private savings rate by 0.4 percentage point. Agrawal et al (2007) found positive and significant for all the five countries they studied except Nepal, for which the coefficient is insignificant.

Another variable of interest is the terms of trade. The Harberger-Laursen-Metzler hypothesis has become the start off point in studying the relationship between the terms of trade and private savings. Based on the assumption of myopic expectations on the part of consumers, the hypothesis suggests that deterioration in the terms of trade reduces real income and thus savings. Others have also argued that a change in terms of trade has an ambiguous effect on savings. This is based on the fact that the Harberger-Laursen-Metzler hypothesis would hold only when there is an anticipated change in the terms of trade (Nwachukwu and Egwaikhide 2007).

Athukorala and Sen, (2004) found a strong and negative relationship between the terms of trade change and the private saving rate in India. Nwachukwu and Egwaikhide (2007) unlike Athukorala and Sen (2004) found a strong positive relationship between terms of trade and the private savings rate in Nigeria suggesting that private agents reduce savings when faced with lower future real incomes as a result of terms of trade deterioration.

In some cases, political instability may affect savings as it may create fear in an economy and this would negatively affect the level of savings.

METHODOLOGY

Data source, Description and model

Following the discussion on the determinants of savings, and using annual time series data from World Development Indicators (WDI) 2011 version and the Bank of Ghana, the empirical savings function can take the form as follows:

$$S = f(Y, TOT, IR, DR, FD, DUM) \qquad (1)$$

Where *S*, the dependent variable, is the gross domestic savings rate; *Y* is the income variable expected to have positive effect on savings. Income in this study is defined as the growth rate of GDP per capita; *TOT* refers to the terms of trade. *TOT*, which is calculated as the difference between total exports as a percentage of GDP and imports as a percentage of GDP is more likely to positively affect savings here though its effect on savings is indeterminate; *IR* is the interest rate variable which also has an indeterminate effect on savings and thus its effect is not predicted in this study.

DR is the dependency ratio. This is the ratio of the number of dependents over the working age group. The dependency ratio (expected to reduce savings) is measured as the sum of population under 15 years (as a percentage of total population) and those above 64 years (as a percentage of total population); *FD* stands for financial development (measured by money supply) is expected to increase savings; and *DUM* is a dummy variable for political instability in Ghana represented by the number of Coup d'états. It takes on the value of 0 if there has been no Coup d'état and 1 if there has been a Coup. The expectation is a negative relationship between savings and political instability. Eviews was used in carrying out the analysis.

Estimation technique

The start off point in our estimation is to ensure that all the variables are stationary. This was done by carrying out a unit root or stationary test. The essence of this test was to avoid spurious regression if the variables are non-stationary. In this study, we used the Augmented Dickey Fuller (ADF) test to examine whether the variables are stationary or not. If the results show that a variable is not stationary at all levels, it is then differenced until we attain stationarity.

Next we proceeded to conduct the cointegration test. The argument is that even though the variables may not be stationary at all levels; there may be long run relationships among them. Thus, cointegration would help to determine whether there exists a long-term relationship among the variables. The Johansen cointegration technique was employed in this study. The presence of cointegration is a sufficient condition to invoke the error correction model (ECM) which for any two variables by following Merza (2007) is given as:

$$\Delta Y_t = \beta_0 + \beta_1 \Delta X_t - \beta_2 [Y_{t-1} - \gamma_1 - \gamma_2 X_{t-1}] + U_t \qquad (2)$$

where β_0 is a constant term. β_1 is the short run elasticity which is a measure of the impact of the changes in X_t on Y_t . $\beta_1 \Delta X_t$ is the first difference term of the ECM that shows the effect of the short run disturbances on the explanatory variable. A zero coefficient of ΔX_t implies that ΔY_t is not responding to a deviation from the long run equilibrium in the previous period. The ECM coefficient β_2, demonstrates the short run adjustment of the variables toward the long run equilibrium whiles $[Y_{t-1} - \gamma_1 - \gamma_2 X_{t-1}]$ is the disequilibrium error in the previous period, that shows the adjustment toward the long run equilibrium. U_t is the error term.

Once cointegration is detected, the long run equilibrium tends to be re-established after a disequilibrium shock, and any deviation from equilibrium in a period will be partially corrected in the following period. The main estimation technique of the model moves from the general to specific model minimizing the possibility of spurious relations while retaining long-run information (Waithima, 2008).

RESULTS AND ANALYSIS

To establish the short run and long run determinants of savings in Ghana, we used the Johansen cointegration method and error correction model technique. The beginning of the estimation started with the Stationarity or unit toot test.

TABLE 1
Unit root Test results

Variable	t-statistic	Critical Value	Order of integration
S	-9.659169	-2.659169	*I*(1)**
Y	-3.116816	-3.711457	*I*(1)*
TOT	-2.597491	-2.64712	*I*(1)**
DR	0.0573	-2.64712	*I*(1)*
FD	-6.061085	-2.63921	*I*(I)*
IR	-6.843774	-4.273277	*I*(1)**

**Significant at 1% level of significance
* Significant at 5% level of significance

The results of the unit root test reported in Table 1 indicate that all the variables are integrated of the order one that is they are all *I*(1) variables. This means that at all levels, none of the variables was stationary until they were differenced once. The first difference of Savings *(S)*, terms of trade *(TOT)* and interest rate *(IR)* are stationary at a significant level of 1 percent while the first difference of income *(Y)*, dependency ratio *(DR)* and financial deepening *(FD)* are 5 percent significant stationary. The next stage after conducting the unit root test was to conduct the cointegration test. The result from the Johansen conitegration test is reported in Table 2 below.

TABLE 2
Co-integration Test Results

Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.983392	487.379	150.5585	0.0000
At most 1 *	0.972523	360.3459	117.7082	0.0000
At most 2 *	0.959526	248.9196	88.8038	0.0000
At most 3 *	0.890951	149.4997	63.8761	0.0000
At most 4 *	0.699094	80.80493	42.91525	0.0000
At most 5 *	0.54591	43.57526	25.87211	0.0001
At most 6 *	0.460004	19.10203	12.51798	0.0035

*denotes rejection of the hypothesis at 0.05 level
**Maxkinon-Haug-Michelis (1999) p-values

From Table 2, the trace test of cointegration indicates that there are 7 cointegrating equations at 5 percent level of significance meaning that there is a long run relationship among

the variables. The next step in the estimation was to examine the long run relationship among the variables, through the application of the Johansen cointegration test. The estimation of the long run determinants of savings is reported in Table 3. The estimates of the coefficients are given in Column 2, while Standard errors and t – ratios are interpreted in Column 3 and 4 respectively.

TABLE 3
Long run determinants of savings

Variable	Coefficient	Standard error	T ratio
Y	8.0010**	2.3547	3.3979
TOT	0.9298**	0.0443	20.9887
IR	-0.3715**	0.0132	-28.1439
FD	-0.0121	0.0525	-0.2305
DR	-3.5174**	0.3581	-9.8224
DUM	-3.9551**	0.6502	-6.0820

**Significant at 1% level Log likelihood -6.434890

From the results reported in Table 3 above, income has the expected sign of positively influencing savings at 1 percent level of significance. An increase in income by 1 percent is likely to lead to an approximately 8 percent increase in savings. The finding is consistent with the life cycle model and studies by Athukorala and Sen (2004) for India, Nwachukwu and Egwaikhide (2007) for Nigeria, Issahaku (2011) for Ghana and Waithima (2008) for Kenya. The coefficient of terms of trade *(TOT)* is positive and highly significant. A one percent change in the terms of trade will lead to about 0.93 percentage change in savings. That is an improved terms of trade positively affects savings in Ghana. Thus it can be said that the Harberger-Laursen-Metzller hypothesis holds for Ghana in the long run.

The result for real interest rate *(IR)* points to the fact that changes in the interest rate have a negative and significant effect on savings. At a significant level of 1 percent, a one percentage increase in interest rate would lead to about 0.371 percentage fall in savings. In this case it is clear that the income effect in Ghana outweighs the substitution effect. Authors like Ouliaris (1981) and Nwachukwu and Egwaikhide (2007) found similar results in their studies, while Athukorala and Sen, (2003) and Chaudhry et al (2010) had a contrary outcome. The effect of financial deepening on savings though negative is not significant.

It is also seen that the dependency ratio *(DR)* has the expected sign of negatively affecting savings significantly. A 1 percent increase in the number of dependents to the working

population is expected to reduce savings by 3.517 percent at a significant level of one percent in Ghana. The reason could be that the expenditure level of an individual increases with the number of dependents and this is likely to reduce disposable income and ultimately savings. This confirms a similar study by Issahaku (2011) in the country.

Political stability is also found to be a significant determinant for savings in Ghana. This is seen from the negative and significant coefficient of the dummy which took a value of 1 for periods of Coup d'états in Ghana and 0 for civilian rule. In Ghana, the military take over created uncomfortable feelings in the lives of many citizens, as a result any Coup d'état would discourage a number of people from putting their monies at the bank. The presence of civilian rule however breathes comfort in the lives of the citizen and many would feel free to save in the banks.

We now turn to the results of the short run relationship between savings and the variables of interest. The outcome of the parsimonious error correction model is reported in table 4 below.

TABLE 4
Parsimonious Error Correction Model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DIR	0.0491	0.0469	1.0469	0.3063
DTOT	0.5056	0.1084	4.6642	0.0001
DFD	0.2366	0.1937	1.2216	0.2354
DDR	-4.6980	2.9063	-1.6165	0.1209
DDUM	0.2583	1.4470	0.1785	0.8600
C	-3.5815	2.1777	-1.6446	0.1149
ECM(-1)	-0.8304	0.2008	-4.1355	0.0005
DIR(-1)	0.0491	0.0428	1.1472	0.2635
DFD(-2)	0.1111	0.1756	0.6327	0.5338
DY(-1)	1.2536	14.5382	0.0862	0.9321

R^2 = 0.69; Adj. R^2 = 0.56; F; Stat = 5.194161; Log Likelihood = -63.9431

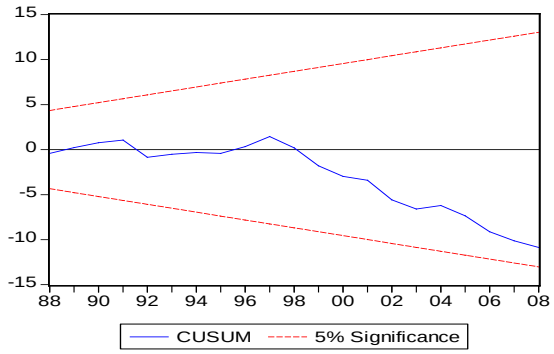
From the above, it is observed from the value of the R^2 that about 69 percent changes in savings is caused by changes in the explanatory variables. However, apart from the terms of trade (*DTOT*), which has a significant and positive effect on savings in the short run just like its long run effect, the rest of the variables are insignificant. Thus the impact of interest rate (*DIR*), financial deepening *(DFD),* dependency ratio *(DDR),* dummy for political instability *(DDUM)* and income *(DY)* in the short run though positive on savings are not statistically significant at a

reasonable level. Also, there is an insignificant negative relationship between savings and dependency ratio in the short run.

The speed of the adjustment given by the lagged error correction term, *ECM (-1)* is correctly signed and significant at 1 percent. A coefficient of -0.830376 shows that there will be about 83.04 percent speed of adjustment toward long run equilibrium when there is any imbalance in the short run.

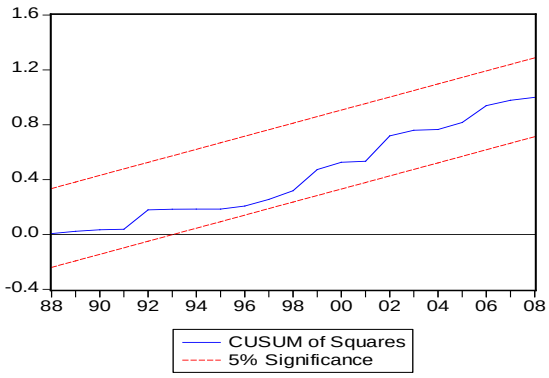
To test for parameter stability, the cumulative sum of residuals (CUSUM) and CUSUM of squares tests were taken into account.

Figure 1
CUSUM stability test



As can be seen in Figure 1 above, the 5 percent significance lines are not exceeded by the CUSUM line and from figure 2 below, the CUSUM of squares line do not cross the 5 percent significance lines. This indicates that the equation is stable and hence it can be safely argued that there is no structural break during the period investigated.

Figure 2
CUSUM of Squares stability test



CONCLUSION AND RECOMMENDATION

The study has sought to investigate the determinants of national savings in Ghana. To achieve this, Johansen cointegration and an error correction model were used to ascertain the long run and short run dynamics of the determinants of savings. In the long run, income and terms of trade positively influence savings; political instability, dependency ratio and the interest rate on savings have negative effect on savings and financial deepening has no significant impact on savings. In the short run while financial deepening, political instability, interest rate, dependency ratio and income have no significant influence on savings, the terms of trade was found to positively affect savings. The speed of the adjustment given by the lagged error correction term has the correct sign at 1 percent level of significance. The error correction term's coefficient of -0.8304 shows that there will be about 83.04 percent speed of adjustment toward the long run equilibrium when there is any imbalance in the short run. Following the above discussion and findings, it is recommended that:

a. Measures are put in place to improve the terms of trade.
b. The nation continues to ensure that civilian rule and democracy gains a firm ground.
c. Dependency ratio when minimized may help improve savings

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