

Determinants of National Saving in Four West African Countries

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Abstract

Saving is one of the preeminent integral of economic growth. The desideratum of this study is to investigate the determinants of national saving in four West African countries, namely, Ghana, Togo, Burkina Faso, and Cote d'Ivoire. The study uses annual data from the World Bank database for the period 1997-2016. The Augmented Dickey-Fuller (ADF) test, Cumulative sum of residuals (CUSUM) test, and autoregressive distributed lag (ARDL) bounds test were used to examine the stationarity, stability, and cointegration of the variables respectively. ARDL model analysis was carried out to determine the short run and long run determinants of national saving in the studied countries. The long run results reveal that gross domestic product, per capita income and real interest rate has a statistically and significant positive effect on gross savings, while age dependency ratio has a statistical, and insignificant negative relationship with gross saving. The short run results suggest that gross domestic product and per capita income possesses positive statistical significant effects on gross national savings.

It is recommended that, in order to promote saving, growth and development, pragmatic and realistic economic policies should be formulated to strengthen all monetary and financial institutions in the respective countries.

Keywords: national saving, Autoregressive distributed lag (ARDL), stationarity, cointegration, West Africa

1. Introduction

Macroeconomics theory delineates national saving to be one of the underpinnings of every economic progress and development. Recent economic advancement by developing countries in Asia such as China, India, Turkey etc, is possible due to the role savings played. For instance, China and some South East Asian countries have their saving rates in the range of 30 to 40 percent (Agrawal, Sahoo, & Dash, 2007). Dovi (2008) noted that some Sub Saharan Africa countries have the lowest saving rate amongst developing countries. West African countries are facing many economic problems like unemployment, rapid growth of population, slow economic growth, and low rates of national saving which is undesirable for the sustainable economic development. Lucas (1988) reported that high savings rates and growth in the creation of wealth and capital formation can affect economic growth of the country very positively. The savings rates in most West African countries have been weakened, while according to economic concepts for financial development, the required savings rate is 22-25%.

Every economic agent; individuals, companies and government save for future investment and expenditures. The saving of companies is basically the undistributed corporate profit; and the one of government is basically tax revenue minus public expenditure. These savings have different denominations; personal saving for individuals or household, business saving for companies or business sector and public saving for government or public administration. The sum of these three savings constitutes the national saving. It can also be simply considered as the sum of Private and public saving.

$$NS = S_{pvt} + S_{pub} \quad (1)$$

National saving is very important in an economy and has a huge role to play in its development. Most of the time, whenever we look at economic data of different countries, our focus is on variables like unemployment rate, GDP growth, Inflation rate, Interest rate, Money supply growth, trade deficit and so on. National saving is often not one of our focuses but it has a lot to do in the shaping of these variables. Abdul-Malik and Baharumshah (2007) reported that countries having higher savings rates are also enjoying the higher growth rate and per capita income. Having a high rate of saving helps a country to face many huge development projects without having to borrow out of the country. The effects on economics aggregates are then positive. However, savings can be

influenced by different factors. The public administration often run public deficit, Business save only when they didn't distribute all their profits and household can have difficulties to save sometimes depending on their financial health.

Most of the empirical works on the determinants of national savings in African have focused their studies relatively on separate and distinct countries. This paper thus solicits to look at the short and long run determinants of national savings in four West African countries namely, Ghana, Togo, Burkina Faso and Cote d'Ivoire using secondary data from World Bank website from 1997-2016. The relevance of the research is that, studies on national savings for separate and distinct countries are copious, relative to those focused on group of countries. This study does seek to contribute to the limited empirical works on the determinants of national savings in West African countries.

2. Literature Review

Saving is one of the fundamental basis for capital formation, investment and growth of every country.

Ahmad and Mahmood (2013) explained the determinants of national savings in the process of economic development, in the realm of Pakistani experience. They used Autoregressive Distributed Lag Model (ARDL) bound testing approach for co-integration techniques to check the vigorousness for long run relationship and Error Correction Mechanism (ECM) for short run characteristic during the 1974-2010. They concluded that the per capita income varies inversely with national saving rate, both in long and short run significantly. The exchange rate and inflation rate have a negative effect on national saving but lagged exchange rate has significantly impact. Trade liberalization (openness) is positively associated with national savings in Pakistan because trade openness cause surge in the income and welfare of the society in through market economy. Money supply is also positively linked with national saving due to seignior age effect. The growth of the income level has negative relationship with national savings. They conclude that, Keynesian and permanent income hypothesis of income and savings is not valid for Pakistan because per capita income and income growth is an inverse function of savings in the country.

Epaphra (2014) examined the determinants of savings in Tanzania for the 1970-2010 periods. The life-cycle/permanent income hypothesis was adopted as the framework for the study. Augmented Dickey Fuller and Phillips-Perron test are used to test stationarity of all-time series. Johansen test was applied to test long-run relationship of the variables. The outcome reveals that disposable income, real GDP growth, population growth and life expectancy have a positive impact on savings in Tanzania, while inflation has a negative impact on national savings in the country. In addition, the research portrays the direction of a strong relationship between national savings and economic growth. The results on this causal relationship indicates that real GDP growth affect national savings positively and not otherwise. This implies that policies geared towards real GDP growth rate should be given first priority if the national savings trend is to be enhanced over time. From a policy point of view the precautionary motive for saving is not supported by the findings as inflation which captures the degree of macroeconomic volatility has a negative impact on savings in Tanzania.

Odhambo (2007) examined the core determinants of domestic savings in South Africa, using the cointegration based error correction model. The current low and declining saving rate in South Africa motivated his study. Their empirical findings of the study for the period 1968-2004, outlined that savings in South Africa are largely influenced by the growth rate of real GDP, real deposit rate, terms of trade foreign savings and government expenditure. In accordance with the life-cycle hypothesis, the study concludes gross domestic savings to be positively related to the growth rate of real GDP. The study also finds that higher government expenditure is associated with lower domestic savings in South Africa. An improvement in the terms of trade tends to increase the saving rate in South Africa, while foreign savings seem to supplement rather than substitute domestic savings. An increase in real deposit rate also tends to encourage households to increase their savings in South Africa

Baharumshah and Thanoon (2003) extend in their paper, the empirical knowledge on the determinants of gross saving ratio in Malaysia utilizing the Johansen-Juselius (1990) co-integration and error-correction model to deal with the non-stationarity properties of time series of the variables involved. The results suggest that saving ratio is determined by dependency ratio, economic growth, interest rate and foreign direct investment (FDI) in the long run. The short-run error-correction model shows that apart from the variables considered, saving ratio is also influence by tax policies and growth in exports. The major findings of the study are; (1) economic growth exhibited a core role in explaining the high saving proportions observed in the past periods. (2) dependency ratio marshals saving ratio: some phenomena associated with the life cycle theory, (3) foreign capital inflows, as a proxy of FDI, temporary affects saving ratios. (4) the effect of tax and trade expansion policies on domestic saving has a positive effect but quite temporary.

Kwakwa (2013), his study analyzed the determinants of national savings by using the Johansen co-integration formula, as well as error correction model to show the short run and long run flexibility of the system using time-series data for Ghana for the 1975-2008 period. The factual results established that, in the long run, income and terms of trade possesses positive and significant impact on savings whiles political instability, dependency ratio, and the real interest rate shows negative impact on savings. In the short run however, only terms of trade positively affect savings. The dependency ratio, political instability, financial deepening, income and interest rate however, has an insignificant impact on savings.

Kudaisi (2013) noted that the dependency ratio, and interest rate on domestic savings has a negative and insignificant, the government budget surplus, inflation rate and growth of GDP were indicated to be statistically significant. The development of West Africa financial market has a positive effect on savings, and finally, the real interest rate, and terms of trade have insignificant impact on the level of saving in West Africa.

Esmail (2014), analyzed macroeconomic determinants of savings in Egypt using Ordinary multiple regression. The results indicate that national savings rate is positively related with real GDP growth rate. This indicates that saving is a positive function of income. The evidence suggests that national savings rate is negatively related with federal debt growth and inflation. Finally, negative association between savings rate and inflation implies that the consumer is rational and makes decisions based on his perceptions when it comes to allocating the lifetime resources over the period of his life. Increase in inflation dampens the incentive to save and people respond rationally which is made evident by the negative sign on inflation coefficient in the model.

2.1 Theoretical Framework

In order to understand the savings behavior of economic agents, it is fundamental to look at the various theories of savings. There are four widely recognized theories that explain these phenomena. These are Absolute Income Hypothesis (AIH) by Keynes (1936), Relative Income Hypothesis by Duesenberry (1949), Permanent Income Hypothesis by Friedman (1957) and Life-Cycle Hypothesis by Modigliani (1963).

2.1.1 Absolute Income Hypothesis (AIH)

Early Research on consumption and saving function is said to have begun with Keynes's General Theory, though we need not disregard excellent earlier work of Ramsey (1928) and Fischer (1930). Since then consumption and savings has been the subject of countless theoretical and empirical studies (Santos Alimi, 2013). According to Keynes, consumption and savings is an increasing function of disposable income. Consumption is however, a stable but not necessarily linear, function of disposable income,

$$C_t = \lambda + \beta Y_t^d \quad (2)$$

Where C denotes real values of total consumption expenditure, Y_t^d is real values of disposal income, t denotes the time period, β is marginal propensity to consume (MPC) and λ is the autonomous consumption. In the short run average propensity to consume (APC) is greater than marginal propensity to consume MPC; $APC > MPC$, where $APC = C/Y$; $MPC = \partial C / \partial Y$ this is because in the short run autonomous consumption do not change with income but over the long period horizon, as wealth and income increase, consumption also rises; the marginal propensity to consume out of the long run income is closer to the average propensity to consume.

The Keynesian saving function takes a form of linear function with constant marginal propensity to save (MPS);

$$S_t = \alpha + \beta Y_t^d \quad (3)$$

Where t time, S is gross saving, Y_t^d is disposable income, β is marginal propensity to save which lies $0 < \beta < 1$ and $\beta = \partial S / \partial Y$. α which is generally taken to be negative, signifying that at low levels of income savings will be negative. Under this formulation savings ratios should be expected to rise over time in all countries where income is growing.

2.1.2 Relative Income Hypothesis (RIH)

In the field of economics, relative income hypothesis is attributed to James Duesenberry (1949), who investigated the implications of this idea for consumption behavior in his book titled *Income, Saving and the Theory of Consumer Behavior*. It states that, the utility an individual derives from a given bundle consumption, depends on its relative magnitude in the society rather than its absolute level. Duesenberry argue that consumption depends on the current income of economic agents and for any given income function, the percentage of income saved by these economic agents tend to be unique, invariant, and increasing function of its percentile position in the income distribution. From Duesenberry relative income hypothesis, two conclusions can be drawn; firstly, aggregate saving rate is independent of aggregate income, which is consistent with the time

series evidence; and second, the propensity to save of an individual is an increasing function of his or her percentile position in the income distribution, which is consistent with the cross-sectional evidence (Santos Alimi, 2013).

2.1.3 Life Cycle Hypothesis (LCH)

Modigliani (1963) postulates a lifecycle hypothesis of consumption of an individual in a specified period of time. This theory suggests that in the early years of a persons' life, they are net borrowers. In the middle years they save to repay debts and provide for retirement (Epaphra, 2014: s.226, cited by Dilek, 2016). Alimi (2013) note that, in the life cycle hypothesis, the average propensity to consume is larger in the old households and among young people, this is because the old people run their lives on their life savings while the young people are more into borrowing. The middle-aged people, on the other hand, incline to have higher incomes with lower consumption and higher saving.

The Life Cycle Hypothesis can be explained by the equation;

$$C = (W + RY)/T \quad (4)$$

Where W, initial endowed wealth, R, is number of years earning labor income, Y, is Labor income, and T, is number of years of the individual's lifespan. If every individual plans their consumption in such way, then, aggregate consumption function of a wholistic economy, will take the form;

$$C = \beta W + \delta Y \quad (5)$$

where parameter β is the marginal propensity to consume out of accumulated wealth and δ is the marginal propensity to consume out of income.

2.1.4 Permanent Income Hypothesis (PIH)

Milton Friedman (1957) is the pioneer of the permanent income hypothesis (PIH) which maintains that households spend a fixed fraction of their permanent income on consumption. According to Friedman hypothesis, the saving function at time t in its simplest form given the transitory and permanent income can be expressed as (Epaphra, 2014, s. 226):

$$S_t = \alpha + \beta Y_t^p + \beta Y_t^t \quad (6)$$

Where $Y = Y^p + Y^t$, β is the marginal propensity to save given permanent income, Y^p , β is the marginal propensity to save given transitory income Y^t . Friedman hypothesizes that, individuals consume virtually no transitory income implying that spending, $\beta=1$, this means that past behavior of consumers determines their consumption expenditure. However, Changes of transitory income brings about changes in saving, in other words, the higher the transitory income, the higher the saving (Epaphra, 2014, s. 226).

3. Methodology and Data Source

The study uses secondary data (data series) from the World Bank indicators for the period 1997 to 2016. The savings function can be empirically express as follows;

$$S = (DPR, MS, RT, PERC, GDP) \quad (7)$$

where GS, is gross domestic savings (current US\$), DPR is the dependency ratio, MS is broad money supply (annual %), RT is real interest rate (annual %), PERC is per capita income (current international \$), GDP is gross domestic income (US\$)

Taking the natural log of both sides of equation (7) arrives at;

$$\ln GS_t = k + \beta_1 DPR_t + \beta_2 MS_t + \beta_3 RT_t + \beta_4 PERC_t + \beta_5 GDP_t + \varepsilon_t \quad (8)$$

Where k is a constant, $\beta_1 \dots \beta_5$ are parameters to be estimated, t is the time subscript and ε is the "noise" term.

3.1 Autoregressive Distributed lag (ARDL) Model

Autoregressive distributed lag (ARDL), or bound testing model is used to analyze the role of various determinants of saving in the four West African countries. it is a type of a Regression model that have been in use for decades, but in more recent times, it has been shown to provide a very valuable vehicle for testing for the presence of long-run relationships between economic time-series, empirically it can be used to test for cointegration, and estimate long-run and short-run dynamics, even when the variables are a mixture of stationary and non-stationary time-series. In its basic form, an ARDL regression model looks like this:

$$Y_t = \beta_0 + \beta_1 Y_{t-1} + \dots + \beta_p Y_{t-p} + \alpha_0 x_t + \alpha_1 x_{t-1} + \alpha_2 x_{t-2} + \dots + \alpha_q x_{t-q} + \varepsilon_t \quad (9)$$

Where p, q are optimal lag orders, $\beta_1 \dots \beta_p$ and $\alpha_1 \dots \alpha_q$ are unknown regressors (Prof. Dave Giles blog post,

2013).

Augmented Dickey-Fuller (ADF) test is employed to check the stationarity of each variable, and it is applied for order of integration of each variable. ADF unit root test is based on the following equations;

$$\delta X_t = \lambda X_{t-1} \sum_{i=1}^p \beta_i \delta X_{t-i} + \varepsilon_t \quad (10)$$

Where; δ indicates first difference operator, p shows lag operator, t represents time period. Augmented Dickey-Fuller (ADF) test assumes the following three possible properties; (a) without intercept and trend, (b) with intercept and (c) with intercept and trend. ARDL model has a reparameterization approach to cointegration of nonstationary variables and error-correction (EC) processes.

3.2 Empirical Model

We adopt Equation (9) to express the empirical ARDL model for the study as follows;

$$\Delta \ln GS = \alpha_0 + \sum_{i=1}^p \beta_i \Delta \ln GS_{t-i} + \sum_{i=1}^p \delta_i \Delta \ln DPR_{t-i} + \sum_{i=1}^p \theta_i \Delta \ln MS_{t-i} + \sum_{i=1}^p \varnothing_i \Delta \ln RT_{t-i} + \sum_{i=1}^p \Omega_i \Delta \ln PERC_{t-i} + \sum_{i=1}^p \varrho_i \Delta \ln GDP_{t-i} + \lambda_1 \ln GS_{t-1} + \lambda_2 \ln DPR_{t-1} + \lambda_3 \ln MS_{t-1} + \lambda_4 \ln RT_{t-1} + \lambda_5 \ln PERC_{t-1} + \lambda_6 \ln GDP_{t-1} + \varepsilon_t \quad (11)$$

Where β , δ , \varnothing , θ , Ω , ϱ , indicates short run dynamics of the model and the λ s portrays the long run dynamics. F-statistics is adopted to check the existence of cointegration. The F-statistics is compared with a computed F-critical value by Pesaran et al. (2001) technique. If the computed F-statistics is less than the lower bound value, the null is not rejected, otherwise it confirms the existence of long run relationship among the studied variables considered. Lastly if the F-statistics (computed) is in the lower bound and upper bound range, then, long run consortium between the variables becomes inconclusive (Dilek, 2016).

The H_0 (null hypothesis); there is no co-integration

$$\lambda_1 = \lambda_2 = \lambda_3 = \lambda_4 = \lambda_5 = \lambda_6 = 0$$

The H_A (alternative hypothesis);

$$\lambda_1 \neq \lambda_2 \neq \lambda_3 \neq \lambda_4 \neq \lambda_5 \neq \lambda_6 \neq 0$$

4. Empirical Results and Discussion

4.1 Stationarity of Studied Variables

Table 1. Unit root test (ADF)

Variables	Level		1 st Difference	
	Intercept	Intercept and Trend	Intercept	Intercept and Trend
Savings	-0.0333 (-0.7228)	-0.0447 (-0.9541)	-0.09175*** (-8.0397)	-0.9337*** (-8.1276)
Gross domestic product	0.1511 (4.6796)	0.1962 (3.5877)	-1.0313*** (-8.9553)	-1.0331*** (-8.9525)
Real interest rate	-0.5745*** (-3.7210)	-0.6421** (-3.9970)	-1.4314*** (-13.7779)	-1.4317*** (-13.6939)
Age Dependency ratio	-0.0954 (-1.9672)	-0.1218 (-2.1007)	-1.0449*** (-9.1204)	-1.0468*** (-9.0802)
Per capita income	-0.0685 (-1.4606)	-0.0747 (-1.5802)	-0.9859*** (-8.5858)	-0.9934*** (-8.6018)
Money supply (broad)	-0.6351*** (-6.1477)	-0.0775*** (-7.0176)	-3.7642*** (-7.6650)	-3.8440*** (-7.8002)

***, ** donates significance at 1% and 5% respectively.

Table 1 shows the unit root test (ADF) of the variables considered. The results portray that real interest rate and broad money supply of series are both stationary at level and first difference, were as savings, gross domestic product, dependency ratio and per capita income are stationary at first difference only.

Table 2. ARDF bound test for cointegration

Variables	F-statistic	Cointegration
f(S/GDP, RT, DPR, PERC, MS)	9.3846***	Cointegration
Critical Value Bounds (significance)	Lower Bound (I0)	Upper Bound (I1)
10%	2.26	3.35
5%	2.62	3.79
2.5%	2.96	4.18
1%	3.41	4.68

*** donates 1% significance.

The results in Table 2 shows that the calculated F-statistics has a higher value (9.3846) than the upper bound critical value, 4.68 (at 1% significance level) hence we have sufficient reasons to reject the null hypothesis of no long-run relationship at 1% significance level and perhaps the existence of cointegration among the studied variables.

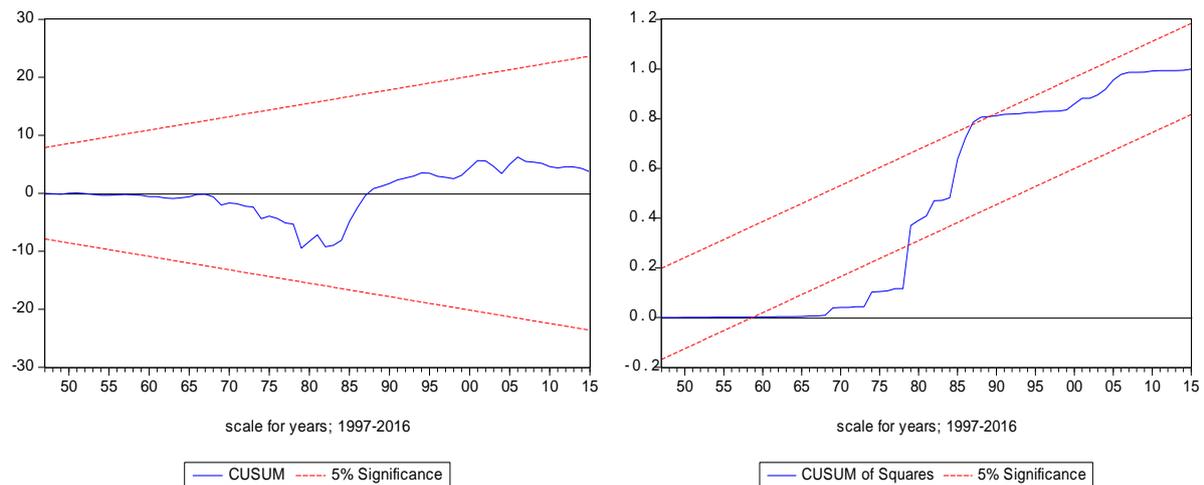


Figure 1. CUSUM tests of stability of variables

The CUSUM tests of stability indicate that, the variables are not volatile because they do not exceed the 5% significance line. However, there is some structural breaks in CUSUM of squares line from the word go, and becomes somewhat stable at higher period, hence all the variables are not quite stable during the period investigated.

Table 3. Long run coefficients

Dependable variable; Gross Savings

Variables	Coefficients	Standard Error	Prob.
Gross Domestic product (GDP)	0.625791	0.215202	0.0049***
Age Dependency Ratio (DPR)	-20.246482	5.493514	0.0005***
Money Supply (broad) (MS)	0.768533	0.577853	0.1879
Per Capita Income (PERC)	0.591863	0.108955	0.0000***
Real Interest Rate (RT)	0.135624	0.578643	0.0154**
Constant	87.309141	22.091286	0.0002***

***, ** significant at 1% and 5% respectively.

Table 3 shows the long run coefficients results of the studied variables. It should be noted that, all variables are in logarithmic transformations and perhaps interpretations are based on long run elasticity relationships. The results indicate that there is a statistically positive relationship between gross domestic product (in terms of income) and gross saving. This implies that an increase in gross domestic product by 1 percent leads to 0.63 percent increase in gross saving in the long run, and this is significant at 1% significance level. Age dependency

ratio has negative effect on gross saving and insignificant relationship with gross saving. This portrays that a 1% increase in age dependency ratio will leads to 20.25% decrease in gross saving. The results also show that per capita income has positive effect on gross saving and statistically significant at 1% level. The implication is that, a percentage increased in the per capita income will lead to 0.59% increase in gross saving in the long run. In the long run, real interest rate also has positive effect on gross saving. The Results show that 1 percent increase in real interest rate leads to 0.02 percent increase in gross saving.

Table 4 shows the Short Run coefficients results of the studied variables. The empirical results suggest that, there is a statistically positive relationship between gross domestic product (in terms of income) and gross saving. This indicates that an increase in gross domestic product by 1 percent leads to 0.5 percent increase in gross saving in the short run, and this is significant at 1% significance level. Age dependency ratio also displays negative effect on gross saving and insignificant relationship with gross saving. This portrays that a 1% increase in age dependency ratio leads to 16.35% decrease in gross saving. In the short run, real interest rate also has positive effect on gross saving. The Results depicts that, 1 percent increase in real interest rate leads to 0.02 percent increase in gross saving in the respective countries.

Table 4. Short run coefficients

Dependent variable; Gross Savings (lnGS)

Variables	Coefficients	Standard Error	Prob.
Gross Domestic product D(lnGDP)	0.505211	0.187706	0.0089***
Age Dependency Ratio D(lnDPR)	-16.345313	4.898804	0.0014***
Money Supply (broad) D(lnMS)	-0.402260	0.288825	0.1682
Per Capita Income D(lnPERC)	0.477821	0.103407	0.0000***
Real Interest Rate D(lnRT)	0.109491	0.468044	0.8157
ECM(-1)	-0.807316	0.111298	0.0000***

*** Significant at 1%.

5. Conclusion and Recommendation

Saving is one of the preeminent components of economic growth. The desideratum of this study is to investigate the determinants of national saving in four West African countries. Namely, Ghana, Togo, Burkina Faso, and Cote d' Ivoire, the study uses annual data from the World Bank database for the period 1997-2016. The ADF and CUSUM test were used to examine the stationarity and stability of the variables respectively. The ADF test shows that all series are not stationary at level; CUSUM test also reveals that the variables were not stable at initial periods. The ARDL bounds testing approach found that gross saving and its determinants were cointegration.

The long run results reveal that gross domestic product, per capita income and real interest rate has a statistically and significant positive effect on gross savings, were as age dependency ratio has a statistical and insignificant negative relationship with gross saving. Short run results show that gross domestic product and per capita income possesses positive statistical significant effects on gross savings.

The positive impact of gross domestic product (GDP) and per capita income, on national savings in both the short and long run confirms to the theoretical explanations offered by most intermediate macroeconomics literatures, as well as some empirical research. These findings are also in line with Ahmad, K & Mahmood, H (2013) and Epaphra, M. (2014) studies. In pragmatic terms, countries with higher GDP enjoys higher per capita incomes and perhaps these countries should pay much attention to GDP growth indicators.

Interest rate is a volatile variable in terms of savings and investment and plays a critical role in economic stability. This study however, concludes that interest rate is a positive determinant of national savings in the long run of these economies, hence, for economic growth and advancement, these countries should save more in the long run since positive interest rates accumulates national savings.

Majority of West African countries have high age dependency ratio, and this is confirmed by the findings of the study. The negative inverse relationship of age dependency ratio with national savings explains the exact reality in these countries. High age dependency ratio is a retirement on national savings and economic progress.

It is recommended that the public sector, private sector and nongovernmental organizations (NGOs) should pursue realistic and factual policies geared towards employment creation in their respective countries. The more

citizens are engaged in income earning activities the less the dependency ratio and perhaps stimulating economic growth and national saving. It is also recommended that in order to promote saving, growth and development, pragmatic and realistic economic policies should be formulated to strengthen all monetary and financial institutions in the respective countries.

Future researchers interested in investigating the factors of national savings should focus on a more volatile but opened key variables of national savings such as: inflation rate, trade liberalization, political stability, tax revenue, net acquisition of financial assets amongst others.

For clarity and understanding of what really determines national savings in each of the countries considered, future research prospects should holistically study the distinct dynamics of national savings in each of the respective countries in the African continent.

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