

The Relationship between National Saving and Economic Growth in Ethiopia: ARDL and Granger causality Approaches

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This is to certify that the project prepared by Abel Mesfin, entitled: the relationship between national saving and economic growth in Ethiopia and submitted in Partial Fulfillment of the Requirements for the Degree of Master of Arts in Applied Economic Modeling and Forecasting (Financial Policy Analysis and Planning) complies with the regulations of the University and meets the accepted standards with respect to originality and quality.

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Abstract

The relationship between national saving and economic growth in Ethiopia: the time series analysis of an ARDL and Granger causality approach.

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Achieving a high and stable economic growth rate is an important issue for every country as economic growth is crucial for economic development. The objective of the paper is to investigate relationship between savings and economic growth in Ethiopia. The study analyzes the long-run causality between national saving and economic growth in Ethiopia's economy. Annual data for the period 1975-2013 is used; an Autoregressive Distributed Lag Model and Granger causality are attributed for the empirical results. The results of the study show that there is a negative and insignificant impact of savings on economic growth. In addition Granger causality test showed that there is a unidirectional causality from gross national product to national savings.

Keywords: Economic Growth, National Saving, Autoregressive Distributed Lag Model, Granger Causality Ethiopia.

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CHAPTER ONE

1. INTRODUCTION

Economic growth is one of the indicators for an economic progress. In this regard countries around the world are working to achieve higher economic growth; as a result economic growth is the common key target for the countries to raise their social welfare. Low saving rates has been identified as one of the big challenge, for growth process, especially in developing countries like Ethiopia (Schmid et al, 1992).

Ethiopia is the second-most populated country in Africa with more than 80 million people. It is among the low-income sub-Sahara African countries and has been a representative of poverty for a number of decades. The country is experiencing a severe resource gap. From 1961-62 to 2008-09, average domestic savings and investment as a percentage of nominal GDP were 12.8 per cent

and 19 per cent, respectively. Between 1961 and 74, average domestic savings were about 22 per cent of GDP, while the investment ratio was slightly lower at 20 per cent (Abay, 2010).

National saving rate is one of macroeconomic variables that relate with economic growth. National savings rate in macroeconomic theory is defined as the combination of public and private saving rates of a nation. It plays very important role in economic growth and development. Low national savings rate is one of the most serious obstacles to achieving higher and more sustainable economic growth. Classical and neoclassical models are seemed to emphasize on higher savings for long run growth. Positive change in saving rate may promote the growth rate. For that reason saving is one of the factors for economic growth, accumulated saving is the source for capital stock which leads to increase investment, output and more employment these would enhance economic growth (Solow, 1956). suggested that savings affected the economic growth because higher savings led to capital accumulation, which in turn led to economic growth, moreover, low rate of savings, are identified as a serious constraint to sustainable economic growth.

Keynesian aggregate demand models assign an important role to final consumption spending in enhancing the current economic growth rate; growth theories having at their base on (Harrod-Domar, 1939). Also (Solow-Swan, 1956) models prove the critical importance of saving in generating future economic growth through investment. Therefore, excessive consumption spending can counter low economic growth in the short-run but in the long-run the growth solution for any country crucially resides in adequate saving.

Saving may be defined as the portion of disposable income not spent on consumption of consumer goods but accumulated or invested directly in capital equipment. It may be referred to or assumed suspend consumption, being income left over for future consumption on capital investment or precautionary and speculative motives (Thomas M., 1997). In short, saving is disposable income less consumption. In Ethiopia, it is known that both public and private savings are the main sources of capital accumulation for investment purposes. As of theoretical viewpoint total savings of households, entrepreneurs, and corporate unit in an economy has positive correlation with per capita income. In most of the time, it is known that saving is the main source of capital investment. Higher level of national saving can leads to higher investment and hence higher growth (Krieckhaus, 2002). This indicates that the level of national saving affects the level of output per capita growth rate which is one of the indicators of macroeconomic situation of the country.

According to (Deaton, 2005) and (Rogg, 2006) serious problem confronting poor countries including Ethiopia is savings and investment gap. Because of this gap, these countries faced challenges to finance investments needed for growth from domestic saving. It is also common to see these countries to finance their investment in the short run partly through domestic government borrowings and foreign loan and grants but this can significantly increase debt burden and cannot be a solution in the long run, (Buffie, 2003).

The level of national saving has important implications for the economy; it provides a source of funds available for domestic investment, which in turn is a key driver of labour productivity and higher future living standards, (GDO, 2001).

This paper deals with the relationship between national saving and economic growth: with a focuses on Ethiopia to examine the causality between saving and economic growth therefore, the

findings of this study are believed to provide a useful contribution to the empirical basis needed for proper understanding of the previous routes as well as to give emphasis for future process of saving issue.

The Solow model shows that higher savings leads to higher growth, but only temporarily, until the economy reaches the new steady- state. Keeping high savings rate in an economy will cause the maintenance of a high level of capital stock and high level of output, but anyway it will not keep forever a high growth rate. By contrast a higher saving is said to have a level effect. Only the level of income per person is influenced by the saving rate in the steady state, not its growth rate. The ARDL method is used to show the relationship between dependent variable and independent variables, it perform well in small samples and it is unbiased and efficient (Narayan, 2006), (Feeny, 2005). Moreover, Ganger causality test will also be used in order to catch the direction of causality between national saving and the level of GDP of Ethiopia to expose whether the growth of national saving has a positive role on the level of GDP or GDP causes saving rate.

1.2 Statement of the problem

Savings naturally plays an important role in the economic growth and development process in Ethiopia. Savings determines the national capacity to invest and thus to produce, which in turn, affect economic growth potential of the country. Low saving rates have been cited as one of the most serious constraints to sustainable economic growth in Ethiopia. Gross domestic saving which was 8.8 percent of GDP in 2010/11 On the other hand, the share of gross domestic investment to GDP was 25.5 percent in 2010/11 and resource gap (trade deficit) was -15 in

Ethiopia at the same year (MoFEC). Growth models developed by (Romer, 1986 and Lucas, 1988) predict that higher saving rates and the related increase in capital accumulation can result in a permanent increase in growth rates. Empirical work by (Barro, 1990) has provided support to the notion that capital accumulation and savings is central for understanding growth differentials across countries. Unfortunately, Low public saving, on the other hand, domestic saving in general and private saving in particular is the developing stage in Ethiopia that affect the economic growth (Abay, 2010)

One major problem facing Ethiopia attempt to accelerate growth and development is lack of capital formation. Inadequate capital formation to undertake the real investment has adversely affected the output level of the economy. Lack of adequate capital formation results from non-availability of credit to adding to existing ones. Therefore, gross domestic savings in Ethiopia is a very critical and reliable factor in capital formation process. Capital formation, whether financed from internal domestic saving or from external sources, requires the mobilization of economic surpluses.

As (Sajid and Sarfraz, 2008), examine of the causal relationship between saving and economic growth is very important because it provides useful information on which economic variable(s) that the government and relevant authorities need to control in order to attained the desired level of the targeted variable or variables. The relationship between domestic savings and economic growth has significant implications on the state of the economy. For example, if the results of causality test indicate that saving precedes and causes economic growth, then government and policy makers can design or employ policies that would promote the mobilization of saving in order to achieve higher economic growth. 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.

Although the relationship between saving and economic growth is an important one, the direction of causality between the variables has continued to generate series debate controversies among scholars. The controversy concerning the temporal precedence between these two variables is one of the most questioned issues in current macroeconomics, as noted by (Schmidt-Hebbel et al. 1996). Nevertheless, the determination of the direction of the causal link between saving and growth is a crucial economic problem as it has important policy implications for developing countries.

This research focus on examining the causal relationship between national savings and economic growth in Ethiopia that is to put light on how national saving affects Economic Growth. Hence based on the context that study will try to assess the following basic research question:

1. Does national saving enhance economic growth in Ethiopia?

1.3 Objectives of the Research

The research has the following general and specific objective.

The general objective of this study is to analyze the relationship of national saving and economic growth in Ethiopia.

1.3.1 Specific objective:

In view of the general objective this paper attempts to achieve the following specific objective:

This study is going to investigate whether the direction of causality runs from savings to economic growth or vice versa.

1.4 Research Hypothesis

1. Ho: National saving has significant impact on economic growth.
H1: National saving has insignificant impact on economic growth.
2. H0: GDP per capita growth does not granger cause to national saving growth
H1: GDP per capita growth does a granger cause to national saving growth

1.5 Significance of the study

Knowledge of the extent to which national saving impacts on economic growth is a principal agenda to both the policy makers and to the academicians. The findings of this study are believed to provide a useful contribution to the empirical basis needed for proper understanding of the previous routes as well as give emphasis for future process on saving issue. The study also adds value to the stock of knowledge by showing the relationship between national saving and economic growth in the Ethiopian economy.

1.6 Scope and limitations of the study

1.6.1 Scope of the Study

The scope of this study was limited in terms of coverage and method. With regard to coverage, it was limited to evaluate Ethiopian economy. In terms of time, it covers the time period 1975-2014 G.C.

1.6.2 Limitation of the study

Every study conducted may have certain shortcomings. When conducting Preliminary search for data there occur some constraints that affected the research work. The major constraint of the problem is data about the actual dates of deregulation of some policy variables in the researcher's preliminary survey was not readily available. Some data was unavailable at certain period of time but, it is hoped that this did not bias the results.

1.7 Structure of the study

This study will be organized in five chapters. The first chapter deals with introduction of the study, research questions, objectives of the research, Hypothesis, significance of the study, scope and limitation of the study, and finally the Structure of the study. The second chapter discusses concepts and theories related to the area of study. The review of the literature includes the theoretical review in its first section which is followed by the review of the previous studies related to the area and conclusion and knowledge gap finally. Third chapter presents the research design and methodology as well as the model specification. The fourth chapter discusses the presentation, analysis and interpretation of the data collected and the last chapter makes summary of main findings, conclusion and recommendations

CHAPTER TWO

2. LITERATURE REVIEW

The first chapter introduced the problem to be investigated in this study along with purpose and research hypothesis. In order to put the study within the context of the existing literature, the subsequent section of this chapter present the review of both theoretical and empirical studies related to national saving and economic growth.

2.1 Theoretical Literature Review

Theories of Economic Growth and Savings In this part provides the important relationship between saving and growth based on the well-known Classical economic growth models of Solow-swan.

2.2 The (closed-economy) Solow-swan:

According to (Solow, 1956) model saving rate influence the steady state level of economy and have an impact on growth rate of output temporarily. This model express the increases in the rate of saving affects the level of capital stock and the level of per capital income however it doesn't affect the rate of economic growth. This model is constructed by the two equations which are the production and capital accumulation equation. The production equation expresses how imputes (capital and labor) are combined and provides an output. This production function specified in the form of Cobb-Douglas production function. Matimatically label as

$$Y = f(K, L) = K^{\alpha} L^{(1-\alpha)}$$

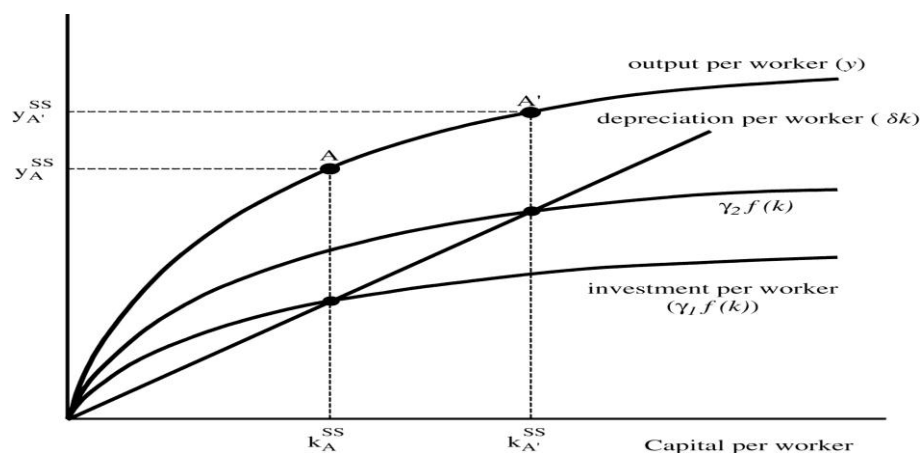
Where Y is output, K is capital and L is labor, the value of the parameter α is between 0 and, small k is the capital labor ratio ($k=K/L$), small y is capital per worker ratio ($y=Y/L$). The marginal product of capital is positive but decreasing i.e. $f'(k) > 0, f''(k) < 0$. Labor force grows at constant rate (g_L).

$$y = k^\alpha$$

The production function graphed in a convex form which characterizes the more capital per worker produces the more output per worker and the diminishing return to capital will take place when for the farther increase in capital accumulation.

While y specifies actual output per capita produced for any capital- output ratio, k , (g_L/s) k specifies the output needed to maintain the corresponding capital labor ratio. An increase in saving will increase the steady state level of capital per capital and output per capital. The diagram below illustrate as follow

The effect of a change in the saving rate



Source: (oxrep.oxfordjournals.org)

Initially, the saving rate is γ_1 at equilibrium e_0 , an increase in saving rate to γ_2 will shift the equilibrium level to e_1 . Following this increment by saving rises the per-capital capital and the per capital output level at the steady state k_A^{ss} to $k_A'^{ss}$ and y_A^{ss} to $y_A'^{ss}$ respectively. The saving rate influence the level of per capital capital and per capital output in which the economy incline in equilibrium but this effect is short run it doesn't affect the growth rate in the long run.

As early mentioned Solow model built by two equations the second part of this equation is the capital accumulation which is presented as follow

$$\dot{K} = \gamma f(k) - \delta k$$

According to (Eric S, 2012) The change in capital stock, $\dot{K}$ is equal to the amount of gross investment, γ_1 less the amount of depreciation that occurs during the production process, δk , $\dot{K}$ shows the change in capital stock with respect to time $\delta k_{t-1} - \delta_t$. The model assumes a closed economy and the only source of investment is domestic saving, households save a fraction of their income which used for investment. However the increase in gross investment will reduce by the amount of depreciation in the capital stock, which is at constant rate every year.

Now from the fundamental dynamic equation of growth, the level of output per person can be calculated as follow:

$$k = K/L$$

Take the logarithm both sides $\ln k = \ln K - \ln L$

$$d \ln k / dt = \ln K / dt - \ln L / dt$$

Now the derivative of this equation with respect to the change in time will provides the growth rate of each variable.

$$\dot{k}/k = \dot{K}/K - \dot{L}/L$$

$y = Y/L$ known as output per labour ratio or per capital output, and

$k = K/L$ capital per labour ratio or capital per capital

$$\dot{K}/K = sY/K - dK/K$$

$$\dot{k}/k = \gamma f(k) - (n + \delta)k$$

The capital stock has subjected to depreciation, if the depreciation rate is more than the level of investment of saving, the capital stock will reduced , at steady state (**e1**) saving per capital $\gamma f(k)$ is equal to the amount of investment per person and this point can also determine the output per capital at y_A^{ss} .

As (Eric S, 2012) justification when the capital labour ratio below the steady state, the level of saving per capital $\gamma f(k)$ is greater than the amount which is necessary to possess capital per worker constant $(n + \delta)k$ and therefore, the saving level will generate more capital which is the per capital capital increases and this process will proceeds until it reaches to the level of steady state k_A^{ss} .

To summarize the Solow-swan model by considering the changes in the three most important variables, that are saving rate, population growth and technological progress or increase in productivity.

When the rise in saving rate causes the level of the initial steady state value k_A^{ss} to increase and come to at a new level which is k_A^{ss} capital per capital, and y_A^{ss} to y_A^{ss} per capital output will rise.

The increase in growth rate of population will rotate the capital stock per capital line $(n + \delta)k$ up and reduce the level of both capital per capital and per capital output and the reverse is true for decreases in population

Finally, *saving rate dose changes the economy's balanced growth path at steady state but it doesn't affect the growth rate of output per labour on the balanced growth path.* Thus, the exogenously given technological change will farther increase the amount of Y/L to the new steady state and which drives the production function upward. Hence produce more output with the same level of input.

2.3 H-D model

The Harrod Domar model depends on two important variables of saving and capital output ratio for an economy, and starts with an assumptions of Full employment of capital and labour besides saving is equal to investment moreover this model assumes that no government intervention, closed economy and no depreciation. as stated by (Richard R, 1966) The model focused on the limited role of government in the economy and the role of savings as the main determinant of investment. Therefore, the rate of growth in GDP will be sustainable if the growth rate of both capital stock and labour are grows as the rate of growth in income. However, this condition may not be true in the real world because the condition of equilibrium growth in both full employments of labour and capital is impossible, which is the basic defect of this model.

$$Y = \text{GDP}, Y \text{ be GDP and } S = sY, (S) \text{ is saving,}$$

(s) Average propensity to consume

$$K = vY, \quad v = K/Y, (v) \text{ is the capital-output ratio}$$

Investment is defined as the change in capital stock, thus

$$I = \Delta K \rightarrow K = vY \rightarrow K/Y = v$$

$$\rightarrow \Delta K / \Delta Y = v \rightarrow \Delta K = v \Delta Y$$

Saving is equal to Investment, ($S = I$)

$$sY = v \Delta Y \text{ Therefore, } s/v = \Delta Y / Y$$

$$g = s/v = \Delta Y / Y$$

g = the equilibrium growth rate of the economy

From the above model the percentage change in GDP or the growth rate of GDP ($\Delta Y / Y$) can be determined by the ratio of average propensity to save (s) and capital-output ratio (v).

Therefore, according to Harrod-Domar (1959) growth model saving has a positive relationship with GDP growth rate and a negative relation with the capital-output ratio since it is the denominator, thus the country with more saving or more investment ($S=I$) will have higher growth rate than those countries with less saving rate.

2.4 Foreign saving

In a small open economy: where capital is mobile, investment is not constrained by domestic saving as firms have access to foreign saving.

In an open economy, the production function is given by

$$Y = f(A_t, K_{dt}, K_{ft}, L_t)$$

Where, as before, A_t is a productivity parameter, two sources of capital are distinguished: K_{dt} denotes domestically sourced capital and K_{ft} is foreign sourced capital, L_t denotes labour.

As said by (Iris C. et al, 2001). Assumes that the economy is small and faces an infinitely elastic supply of capital on the international market at the world interest rate (r_w). For simplicity, we also abstract from a country risk premium. Growth of national income after allowing for payments to foreigners can be written as:

$$dY_n = dY - r_w dK_f$$

$$dY_n = \underbrace{f_A(.)dA + f_{kd}(.)dK_d + f_L(.)dL}_{\text{domestic source}} + \underbrace{(f_{kf}(.) - r_w)dK_f}_{\text{foreign source}}$$

The above equation shows that an increase in foreign investment will enhance national income if the term $(f_{kf}(.) - r_w)dK_f$ is positive. In other words, provided the return on foreign capital (adjusted for depreciation) exceeds the rate of interest paid on foreign borrowing, foreign investment will raise the level of the domestic country's national income. Both national income and output growth in the borrowing country will be higher than it would have been in the absence of the foreign capital flow.

In the absence of open capital markets, the domestic interest rate will exceed the world rate. Thus, opening the economy to international capital movements will result in a lower rate of interest domestically. The domestic interest rate will be equal to the world rate plus an adjustment for a country risk premium.

The effect of access to foreign capital and lower domestic interest rates on saving is theoretically ambiguous. As (Iris C. et al, 2001) stressed that lower interest rates make current consumption less expensive in relation to future consumption, and hence consumption would be expected to

rise and domestic saving to fall. However, at the same time, lower interest rates reduce household income from interest payments and will encourage greater saving. Which of these two effects dominates can only be determined empirically. Much of the evidence is uncertain. Generally, the interest rate sensitivity of domestic saving is found to be small. This suggests that domestic saving may be little affected by the presence of foreign saving.

(Robert A., 2010). Access to foreign capital makes the borrowing country unambiguously better off. Savings decisions are determined by agents. Rate of time preference and inter-temporal trade-offs. International capital movements allow a country to consume more in future while maintaining current consumption. Increasing domestic saving would lower interest paid to foreigners for the use of their capital, but not necessarily increase welfare. This is because higher savings imply lower consumption. However, it is clear that the reduced interest payments to foreigners would increase national income in future.

Theoretical models (R. Solow, 1956) of growth predict that higher saving and investment will result in a higher level of per capita income and temporarily faster growth. But once the new level of income is reached, the growth rate will resume its initial rate. There is little empirical evidence for models that predict that increased saving has a long-run effect on economic growth.

In a closed economy, investment is constrained by domestic saving. In an open economy, where capital is mobile, domestic saving and investment can diverge without necessarily impeding growth. When a country's trade balance is in deficit, imports exceed exports and gross domestic investment exceeds gross domestic saving.

2.5 Empirical Literature Review

The role of saving for economic growth has been widely discussed in various literatures. I begin by observing the empirical relationship between growth rates and saving rates in countries with different income group data.

Based on neoclassical growth model (R. Solow, 1956) suggested that savings affected the economic growth since higher savings led to capital accumulation, which in turn led to economic growth. saving has no influence on the long run growth of total and per capital output since capital deepening increase capital labor ratio and also increase the share of output to replace and keep the existing capital but it still positively affects the living standards permanently by increasing the steady state amount of stock of capital per worker which, in turn, allows an increase in output per worker in the long run. Thus, depreciation of capital may exceed net investments. A growing labor force may accelerate this condition because more workers need to be equipped with capital.

In recent times, many empirical studies highlighted in varied role of private and public investments in growth process. As sighted in (Dritsakis, 2002), (Khan and Kumar, 1997) argued that the effects of private and public investments on economic growth differ significantly, through private investment to be more productive than public one. (Nelson and Singh, 1994) confirmed that public investments on infrastructure have an important positive effect on economic growth over the period 1980-1990. Easterly and (Rebelo, 1993) assessed that public investments on transportation and communications are positively correlated to economic growth, while there were negative effects of public investments of state-owned businesses on economic growth.

The causal relationship between savings and investment has been widely discussed in the empirical literatures according to (Mason, 1988), based on a cross country comparison the study found that the positive (0.7) relation between domestic saving and gross domestic investment means that on average a one percent increase in domestic saving cause a 0.7 percent increase in investment. Recently (Jagadeesh, 2015) explored the relationship between savings and economic growth in his empirical study the data were stationary and co- integrated and showed that there is a significant relationship between savings and economic growth in Botswana. The results supported that saving rate positively or directly related to the GDP in this country.

(Ciftcioglu and Begovic, 2010) used Hausman and LM tests to study the relationship between savings and investment in the sample of advanced economies of the Europe and found statistically significant evidence of saving and GDP growth. Which, reveals that the optimal econometric model, the panel estimation of the relationship between domestic saving rate and the growth rate of GDP for their sample of Central and East European countries .The study recommended that the economic growth and domestic saving rate are positively correlated for the sample of Central and East European countries over the sample period. Based on their study domestic savings have continued to be an important source of domestic investment which is ultimately the parameter that links savings to output growth. Domestic saving rate is positive and statistically significant at 5% level.

(Sajid and Sarfaraz, 2008) analyzed the effect of savings on economic growth by using seasonal data for 1973 to 2003 in Pakistan. The authors assessed the causality relation between savings and economic growth by using co-integration techniques and a Vector Error Correction Model (VECM). Their results show that there is a one-way causal relationship from savings to

economic growth. The long run results of this study show the importance of savings in investment creation for Pakistan. The short run results also indicate that there is a relation between domestic savings and GDP. The causality relation only runs from national savings to GDP in the short run. The short and long run results of this study confirmed the Keynesian view that saving is a function of income levels.

(Aghion and Comin, 2009) used a cross-country panel regression, and estimates lagged saving on growth are significantly larger for poor than for rich countries. The average estimate of the effect of saving on growth for the sample of rich countries is zero. (Verma and Wilson, 2007) there is a unique equilibrium relationship between the level of saving and output. Indicates a one percent increase in saving is consistent with a 0.55 percent increase in output in long run equilibrium. This estimate is significant at the one percent level. This shows the close relationship between output and saving.

(Sajid and Sarfraz, 2008) used vector error correlation model and showed that in the long run savings causes Economic growth in the same study there is mutual short run causality between domestic Savings and GDP. (Cáceres, 1995) was found that in sample of four countries domestic savings apply a much larger impact on economic growth than external savings. These results indicate that mobilization of domestic Resources of financial, real, and human where lies the key for countries development.

(Mohan, 2006) investigated the causality relationship between savings and economic growth in 13 countries with different income levels during 1960- 2001. The countries were divided into

four different income levels: low income, less than the average, more than the average and high income. He used a Granger Causality Test and showed that the causality relation and direction differs among countries depending on income levels. In general, the Keynesian theory of savings as a function of growth was confirmed in countries with low and less than average incomes while the Solow hypothesis that savings is a determinant of economic growth was confirmed in countries with high and more than average incomes.

(Anoruo and Ahmad, 2001) analyzed the relationship between saving rate and economic growth for Congo, Cote d'Ivoire, Ghana, Kenya, South Africa, and Zambia by using VECM model and co integration test. In their study, except for Nigeria, in all countries, it was recognized that there was a positive relation between saving rate and economic growth. The results of causality test showed that economic growth was Granger cause of saving rates for Ghana, Kenya, Nigeria, and Zambia, in return to this, for Congo, that saving rate was Granger cause of economic growth. Finally, in Cote d'Ivoire and South Africa, there is a two directional causality between two variables.

(Ekinici and Gül, 2007) analyzed the relationship between domestic savings and economic growth for Turkey by means of VECM model and co-integration test, using the data belonging to the period of 1960 -2004. According to the result of the analysis, there is a long term relationship between saving rate and economic growth. But, the results of Granger causality analysis, in contrast to the traditional view, it shows that there is one-directional causality in Turkey from economic growth to the domestic saving rates.

(Thornton, 2009) conducted a study on Consumer expenditure and the study confirmed that Consumer expenditure is a large component of aggregate demand that even a small decline in consumption could have a noticeable effect, and the more saving means less consumption. They look data on the U.S. personal saving rate and GDP growth since 1948 for some insight into how likely it is that increased personal saving will slow economic growth.

(Brueckner, et al. 2014) the study confirmed that changes in national income may increase or decrease the aggregate savings rate depending on the level of national income and the increases in borrowing constraints have a positive effect on the aggregate savings rate. The study suggests that in poor countries growth in incomes per capita will lead to increases in aggregate savings rates while, the opposite situation takes place after certain limit in the level of economic development.

The acceleration of saving becomes particularly essential, as a main proportion of investment is financed by domestic saving. The heavy dependence of investment on domestic saving strengthens the Lucas Puzzle ‘why doesn’t capital flow from rich to poor countries’ (Lucas, 1990) on the lack of capital flows from the developed countries to the developing countries. Saving is a provision for future consumption for the individual households and a source of capital accumulation for the economy at large.

(Singh, 2009) conducted a study in India based on time serious data and found the significant impact of saving on income, these saving contributed for domestic investment to grow and accelerates capital accumulation which leads to the economy to grow .based on this study most

of these saving comes from the surplus domestic household saving sector which finance the deficit private and public sector and fills the resource gap.

(Abu, 2010) studied the relationship between savings and economic growth in Nigeria using Granger Causality techniques and Co-Integration for the period 1970 to 2007. His results indicate that the variables are co-integrated in such a manner that one can conclude there is a long-run equilibrium relationship between them and that causality is from economic growth to savings.

(Narayan, 2006) conducted a study based on autoregressive distributed lag modeling approach for Japan over the period 1960–1999. Finally, the study confirmed that there is a cointegrated result between investment and saving they used bootstrap approach to find out the direction causation that shows investment causes saving for the Japan.

An economies faced the crowding out effect of the private sector investment through decline in savings rate as a result of government's indebtedness, the evidence suggests by (Esmail, 2014) reveals that national savings rate is negatively related with federal debt growth and inflation. The study conducted by using Ordinary multiple regressions in Egypt.

(Amusa and Busani, 1998) analyze the relationship between domestic saving in case of Botswana. Based on this study the country has relatively high saving to GDP ratio and they used Bound testing approach for cointegration analysis and establish the relationship between domestic savings and economic growth in Botswana. Their result indicate that domestic savings is significantly positively related to growth in Botswana.

(Tinaromm, 2005) studied the relationship between savings and economic growth in North Africa using a Vector Error Correction Model for 1946-1992. He concluded that private saving

has both direct and indirect effects on economic growth. In his view, the direct effect of savings is through private investment. He also showed that economic growth has a positive effect on the private savings rate.

(Singh, 2010) studied the causal relationship between domestic savings and economic growth in India. He analyzed the short and long run relation between these variables using an Autoregressive Distributed Lag model for the period 1950 to 2002. The results indicate that there is a two-way relationship between savings and economic growth. His results also showed that an increase in savings and capital accumulation will lead to higher income and economic growth.

(Jilani, 2013) examine the determinant of national saving in Pakistan and their findings show that GDP, inflation, and fiscal deficit play significant role in determining the national savings of the studied country also coefficient analysis showed that growth rate and increased Government consumption give positive impact in increasing national savings while inflation possessing negative relation with national savings of the country.

As from consumers' perception when prices of commodities increase people have to spend more on buying which decreases the rate of domestic savings. So it can be argued that there exists a negative and significant relation between inflation and domestic savings which, in turn, directly influences the national savings (Kazmi, 1993).

(Hemmi et al. 2007) studied the relationship between precautionary savings and economic growth. They used an Autoregressive Conditional Heteroskedastic (ARCH) model with annual data from 1955 to 1990. They concluded that increased savings can have a favorable impact on

sustainable growth. They also found that stronger shocks on precautionary savings result in the higher levels of savings as a whole.

As from producers' perspective according to Vittorio (1991) when prices rise, producer earns more profit by charging higher prices and ultimately the phenomenon influences the national savings positively. So from producer perspective there exist positive and significant relationship between national savings and inflation rate. There is another study carried out by (Loayza et.al, 2000) in which inflation was taken as one of the explanatory variables of private savings rate and they concluded that there exists a positive and significant relation between savings and inflation rate.

(Schultz, 2004) discusses demographic determinants of savings: estimating and interpreting the aggregate association in Asia. He collects the data from 16 countries during the period 1952-1992 and used different econometric techniques to find out the statistical results. The dependent variable is saving and explanatory variable is age composition of population. The results shows that the association between the saving rates and age composition is depend on time trends of each country and as well as different priorities of families according to their needs and life style. Results conclude that healthier and stronger life will raise the level of aggregate saving.

(Narayan and Siyabi, 2005), discuss an empirical investigation of determinants of Oman's national savings, during the period 1977-2003 using bound testing approach and ARDL model. The dependent variable is aggregate saving and independent variables are per capita income, urban population rate, domestic credit, current account surplus and money supply. The results

indicate that domestic credit, current account deficit and urbanization rate have positive impact on aggregate saving while per capita income and urban population rate and money supply M2 inversely impacted the Oman's aggregate savings.

(Carroll, 1994) found a positive one directional granger causality of growth to saving ,based on the households survey high income household saves more than low income households, the study argued that what the determinant of consumption pattern is depend on habit formation model rather than permanent income model

(Dipendra, 2009) studied the relation between savings and economic growth in India. The goal of this study was to check the long-run relationship between GDP and savings. An Engel-Granger Co-Integrated method was used and the results showed that gross savings of the private sector have a bigger impact on GDP than gross domestic savings. Moreover, gross domestic savings and gross private savings were shown to be co-integrated with GDP. Yet the causality analysis between these variables showed that there is no causality in any direction among them.

(Chaudhry et al. 2010) studied the monetary and fiscal determinants of national saving by using ARDL and co-integration approach. And their result show that deposit rate and government expenditures have a positive relationship with national saving in both long run and short run. M2 is negatively related with national saving in long run but highly significant. Inflation rate is presenting a positive relationship with national saving in short run.

(Remolina, Munoz & Martinez, 1990) they found that Savings rate significantly influences the level income at 5% and 10% confidence interval. In the same study the regression for the middle & low income groups is quite different from the regression with the only high income countries.

The variables P value including saving rate shows statistically significant with the level of economic growth.

(Odhiambo, 2008) investigated the relationship between savings and economic growth in Kenya. He studied the causality relation between savings, economic growth and the fiscal deficit using panel data from 1991 to 2005. His emphasis was on two way causality tests which differentiates his work from other studies. The results show that there is Granger causality between savings and economic growth, and that savings are an important driver for development of the financial sector.

(Odhiambo, 2009) also studied the relationship between savings and economic growth in South Africa. He used a multi-variable causality test with data from 1950 to 2005 which showed that there is one-way causality from the savings rate to foreign capital inflows. His results also show that economic growth Granger causes foreign capital inflows. Therefore, he concludes that policies should be directed toward increasing savings and economic growth in the short run.

(Aghion and et al., 2006) show that savings is significantly associated with higher levels of FDI inflows and equipment imports and the effect on growth is significantly larger for poor countries than rich

(Anoruo and Ahmad, 2001) used VECM and VAR model and investigated that there is a long-run equilibrium relationship between saving and growth time series and the existence of causality in at least one direction, For the sample of 7 African countries that the study examined, there is also causality runs from economic growth to growth rate of domestic savings.

(Masih and Peters, 2010) studied the mutual relation between savings and economic growth in Mexico using a Vector Auto-Regressive (VAR) method and annual data from 1960 to 1996. They concluded that savings have a positive effect on economic growth.

Similar result are observed by (Sheggu, 2009) that the relationship between savings and economic growth in Ethiopia from 1960-2003 in a vector autoregressive model (VAR). Sheggu finds that faster growth rates in the gross domestic savings caused higher growth rates in real GDP in Ethiopia. But another study by (Ramakrishna and Rao, 2012) studied the causal link between savings and investment in Ethiopia through cointegration method from the period 1981-2009 and examined that there is no causality between savings and investment in both direction for Ethiopia.

(Yohannes, 2014) studied the macroeconomic determinants of gross national saving in Ethiopia using time series annual data form 1970-2011 by using ARDL approach. He analyzed as that financial development and Current account deficit are significant determinants of gross national saving, but gross national disposable income, dependency ratio, budget deficit and inflation found to be statistically insignificant determinants of gross national saving in Ethiopia in the long run. And he Conclude as (H. Ademe (2013) that in the short run, gross national disposable income, financial development, current account deficit and budget deficit found to have significant.

(Haile, 2013) analyzed the macroeconomic determinants of gross national saving in Ethiopia using time series annual data form 1971-2011, and conduct the study by ARDL bounds testing approach and ECM both are used to analyze short run and long run relationship. He found that financial development and Current account deficit are significant determinants of gross national

saving in Ethiopia in the long run. Nevertheless gross national disposable income, dependency ratio, budget deficit and inflation, statistically insignificant determinants of gross national saving in Ethiopia in the long run. However, in the short run, except consumer price index and dependency ratio the rest of the explanatory variables such as gross national disposable income, financial development, current account deficit and budget deficit found to have statistically significant.

In Summary, the evidence from the above theoretical and empirical literature review show that the link between, national saving and economic growth rate is mixed. Some studies found that national saving insignificant impact on economic growth, contrary to this result; others found that national saving significant impact on national saving rate, the causality between the two variables is different for different studies. The different findings between of variables hold true for Ethiopia and other developing countries.

This is practically there is difference between countries in policy issues, political stabilities, and growth or development levels. These situations cause difference in time series information of the variables. The other problem that caused mixed result is the kind of data used, methodology and procedural errors. The problem with methodology used is that some used ARDL, VECM and others used co-integration. But the use of this methodology depends up on unit root tests. If the variables are integrated of different orders, is employed.

My study differs from these studies in that it analysis the short run and long run link between national saving, and economic growth (RGDP), by using ARLD integrated of $I(0)$ and $I(1)$ approach and Granger(1987) causality Method in time series data of the variables in Ethiopia.

CHAPTER THREE

3. METHODOLOGY

3.1 Nature and source of Data

In this section the nature and sources of the data used in the analysis are discussed. Regarding the nature of the data, all the time series are annual observations of the variables for period 1975 to 2013. Different measures of savings and level of output are used. For savings, I used national savings (NS) which is the sum of public and private savings. Private savings consists of savings made by the household and the business organization, public saving is the saving made by the government sectors which are based on the budgetary condition of the government and it has negative relationship with the budget deficit. *Real Gross Domestic Product = RGDP*, *Government Capital formation = GCF* are taken from national planning commission of Ethiopia and *External Debt = ED*, *Foreign Aid (Ai)* are from MoFEC. Moreover *National Saving = NS* and *Export = EXP* data obtained from national bank of Ethiopia (NBE). Regarding the source of the annual data of *Inflation = INF rate* taken from the Central Statistical Agency (CSA) used. To avoid fluctuations in the data natural logarithms of all the variables are used. LGDP denotes logarithm of GDP and so on and all variables used in terms of local currency (in Millions of Birr) except *INF*.

3.2 Description of Variables

Real GDP (RGDP): *Dependent variable* is the market value of the goods and services produced by an economy over time. It is conventionally measured as the percent rate of increase in real Gross Domestic Product. Since most economists argue that economic growth can be measured as growth in real GDP, it includes in the model as main dependent variable in order to measure economic growth.

National Saving Rate (independent variable): In economics, a country's national savings is the sum of private and public savings. It is generally equal to a nation's income minus consumption and government purchases.

Inflation Rate (INF): It is measured as an annual percentage increase or inflation is a sustained increase in the general price level of goods and services in an economy over a period of time. The data of inflation rate have taken from MoFEC on Ethiopian economy from 1974 to 2013. Inflation rate have negative relationship with aggregate saving according to Hussain and Brookin (2001)

Export (EXP) is defined as the total exports of goods and service to the rest of the world. It is believed that export of a country's is one of the macroeconomic determinants of economic growth.

External Debt (ED) is defined as net incurrence of government liabilities.

Foreign Aid (Ai) is defined as aid or grant inflows from external assistances.

3.3 Unit Root Test

In this step the stationary properties of the variables are checked. A variable is said to be stationary if it's mean, variance and auto-covariance remains the same no matter at what point

measure them. The null hypothesis of non-stationarity is tested against alternative hypothesis of stationarity.

A number of tests are available in the literature to check the existence of the unit root problem both in the level of the variables as well as in their first difference, *i.e.* to determine the order of integration. The Dickey Fuller (DF) test is applicable if error terms are uncorrelated. If the error terms are correlated, DF test is useless. Augmented Dickey Fuller (ADF) test takes care of this problem by “augmenting” the equation(s) of DF test by adding the lagged values of the dependent variable(s). To test the unit root property of the variables, we employed Augmented Dickey Fuller test (ADF). The equation for ADF test is as follows:

In this study the method of vector autoregressive model (ARDL) is adopted to estimate the effects of national saving on economic growth. This methodology used to recognize the dynamic response between national saving, economic growth and the other variables .The following methodology is applied to investigate the causal relationship between savings and economic growth.

3.4 Auto Regressive Distributed Lag Model (ARDL)

The study uses the Auto Regressive Distributed Lag Model (ARDL) The ARDL approach was used by, among others, Narayan (2006), argued that the ARDL method proposed by Pesaran et al. (2001) can perform well in small samples and irrespective of whether the variables are I(0), I(1), or mutually cointegrated, and it is unbiased and efficient. The ARDL approach uses two steps to estimate the long run relationship.

3.5 Model Specifications

RGDP growth and National Saving

$$RGDP = f(NS, GCF, ED, AI, EXP, INF)$$

$$LRGDP = \alpha_0 + \alpha_1 LNS + \alpha_2 LGCF + \alpha_3 INF + \alpha_4 LEXP + \alpha_5 LED + \alpha_6 LAi + \varepsilon_i$$

Where, *Real Gross Domestic Product* = *RGDP*, *Export* = *EXP*, *Government Capital formation* = *GCF*, *National Saving* = *NS*, *Inflation* = *INF*, *External Debt* = *ED*, *Foreign Aid* (*Ai*)

3.6 Test for causality (Granger Causality)

To consider the objective question in previous state: Is it economic growth that —causes the national saving ($GDP \rightarrow NS$) or is it national saving that causes economic growth ($NS \rightarrow GDP$). Granger (1985) suggests that if there is a co-integration relation between two variables, then Granger causality will exist in at least one direction. However, although a co-integration test can determine the existence of Granger causality between variables it cannot determine the direction of this relation. Engle and Granger (1987) indicate that if two variables are co-integrated then a relationship will exist that can be measured by Granger causality test.

The following equation used to illustrate the effect of savings on economic growth:

$$LGDP_t = \alpha_t + \sum_{i=1}^n \beta_i LGDP_{t-i} + \sum_{i=1}^n \theta_i LS_{t-i} + \mu_t$$

➤ Where: *LGDP* is natural logarithm differential of *GDP* and

LS are natural logarithm of gross national saving. The saving coefficients show the impact of savings on economic growth.

In the next equation shows the causal relationship from savings to economic growth can detect:

$$\Delta LGDP_t = \alpha_t + \sum_{i=1}^n \beta_i \Delta LGDP_{t-i} + \sum_{i=1}^n \theta_i \Delta LS_{t-i} + \mu_t$$

The effect of economic growth on gross domestic savings is obtained with the following equation; the coefficient on economic growth shows the level that savings depend on economic growth.

$$LS_t = \alpha_t + \sum_{i=1}^n \delta_t LS_{t-i} + \sum_{i=1}^n \phi_t LGDP_{t-i} + \varepsilon_t$$

The coefficients (ϕ_t) on economic growth in this shows the level that savings depend on economic growth. Where, real GDP and S real saving

To study the causality relationship from economic growth to savings in the succeeding equation:

$$\Delta LS_t = \alpha_t + \sum_{i=1}^n \delta_t \Delta LS_{t-i} + \sum_{i=1}^n \phi_t \Delta LGDP_{t-i} + \varepsilon_t$$

If the coefficients δ_t , ϕ_t are non-zero, then, Economic growth causes savings in the long run

CHAPTER FOUR

4. RESULTS AND DISCUSSION

This chapter presents and discusses the results of empirical analysis based on the econometric framework given in chapter three. Preliminary tests that should be undertaken before estimating the ARDL approach to cointegration and Granger Causality Test.

4.1 The Unit Root Test Analysis

In this study econometrical methods of data analysis are employed. To analyze the macroeconomic performance of Ethiopia during the study period, the study used tables and graphs. On the other hand standard econometrical technique would apply to analyze the relationship between economic growth and national saving under the study period. Lastly, Eview 9.0 versions have been used as statistical software package for the entire analyze running this study.

With the aim of determine the degree of integration, a unit root test is carried out by the standard Augmented Dickey-Fuller (ADF) *test*. Moreover applied ARDL model all the variables come into the regression should not be integrated of order *two*. To check these conditions, unit root test is conducted before any sort of action taken. Even though the ARDL framework does not require per-testing variables to be done, the unit root test could convenience us whether or not the ARDL model should be used. The result in Table (4.1) shows that there is a mixture of I [0] and I [1] but not any order two.

Table (4.1): unit root test (Augmented Dickey-Fuller test)

<i>Augmented Dickey-Fuller test statistic (ADF Test)</i>						
Variable	With Intercept			Trend and Intercept		
	<i>At Level</i>	<i>At First Difference</i>	<i>Order of []</i>	<i>At Level</i>	<i>At First Difference</i>	<i>Order of []</i>
LRGDP	4.370	1.909	<i>I[0] at 1%</i>	1.098	-6.513	<i>I[1] at 1%</i>
LNS	8.416	1.141	<i>I[0] at 1%</i>	5.350	-0.329	<i>I[0] at 1%</i>
LGCF	1.318	-7.789	<i>I[1] at 1%</i>	-1.980	-8.213	<i>I[1] at 1%</i>
LEXP	0.731	-5.234	<i>I[1] at 1%</i>	-1.603	-5.493	<i>I[1] at 1%</i>
LAi	-1.075	-5.999	<i>I[1] at 1%</i>	-3.653	-5.999	<i>I[0] at 5%</i>
LED	0.939	-5.092	<i>I[1] at 1%</i>	-2.185	-5.021	<i>I[1] at 1%</i>
INF	-1.691	-8.781	<i>I[1] at 1%</i>	-4.149	-8.792	<i>I[0] at 5%</i>

<i>MacKinnon (1996) with constant, no trend</i>		<i>with constant and trend</i>	
<i>Test critical values: 1%</i>		<i>Test critical values:</i>	
5%	-3.621	1% level	-4.227
10%	-2.943	5% level	-3.537
	-2.610	10% level	-3.200

Source: Eview 9.0 results

According to the result from the above table, GDP which is expressed by LRGDP and national saving-LNS are stationary at level I [0], [with intercept] yet, capital formation-LGCF, export-LEXP and external debt-LED are stationary at integrated of order One I [1] then foreign aid-LAi and inflation-INF are integrated of order zero I [0] with trend. That is aid, inflation and national saving are stationary in level where as GDP, capital formation, and export and external debt are stationary in first difference [with trend and intercept]. But, with Intercept, except GDP and national saving all the variables are stationary in first difference.

4.2 Model Stability and Diagnostic Test

Table (4.2): Serial Correlation LM Test

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.863644	Prob. F(1,21)	0.1867
Obs*R-squared	3.015915	Prob. Chi-Square(1)	0.0825

The null hypothesis of no serial correlation (Brush Cod fray LM test) is failed to reject for the reason that that the p-values associated with test statistic is greater than the standard significant level [*I.e.* $0.18 > 0.05$]. Brush's LM test used for testing serial correlation is applied since unlike

the traditional Durbin Watson test statistic which is totally inapplicable when the lagged dependent variable appear as a regressors, LM test avoid such limitation of DW test.

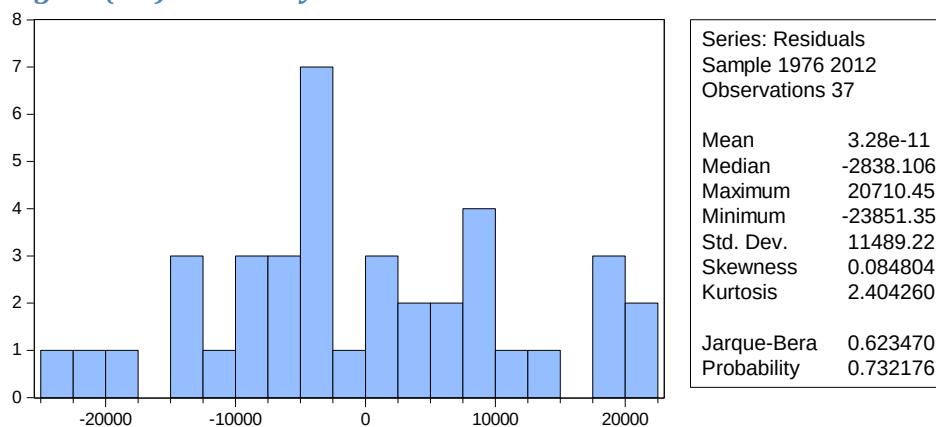
Table (4.3): Heteroscedasticity Test: ARCH

Heteroscedasticity Test: ARCH

F-statistic	0.067120	Prob. F(1,34)	0.7971
Obs*R-squared	0.070929	Prob. Chi-Square(1)	0.7900

The diagnostic test for Heteroscedasticity from the result in the above table, we can reject at 5% significant level due to its p-value associated with the test statistics are greater than the standard significance level [*i.e.* $0.79 > 0.05$].

Figure (4.1): Normality Test



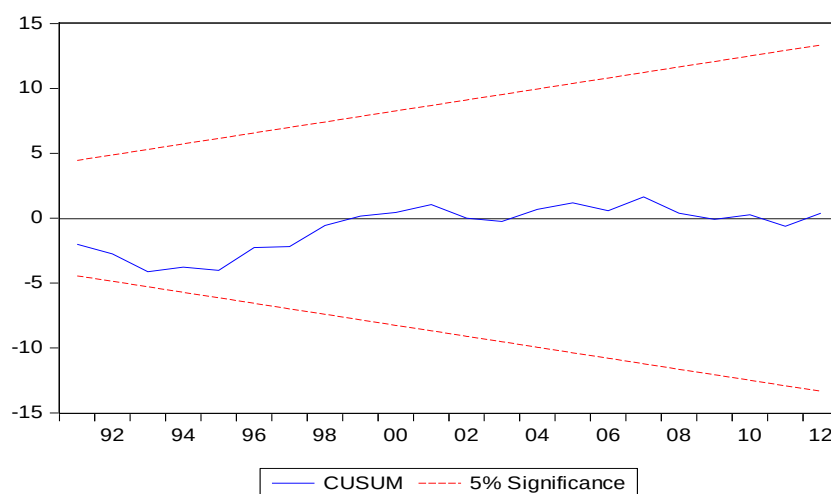
The other diagnostic test is about the residual test. As the result indicates that we could not reject the null hypothesis which says that the residuals are normally distributed, as a result, that the p-

value associated with the **Jarque-Berra** normality test is larger than the standard significance level [I.e. $0.62 > 0.05$].

4.3 Diagnostic test for the long run ARDL

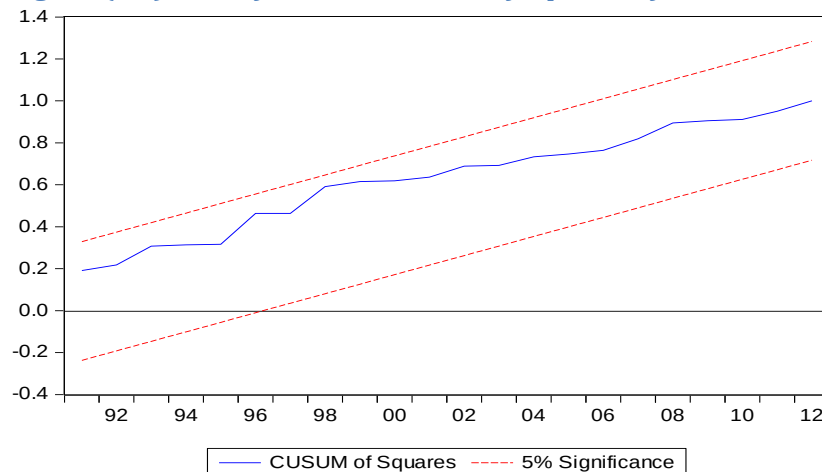
The stability of the model for long run and short run relationship is detected by using the cumulative sum of recursive residuals (CUSUM) and the cumulative sum of squares of recursive residuals (CUSUMSQ) tests, Pesaran and Shin (1997) suggested that structural stability of the long-run and short-run relationships for the entire period is better examined by the cumulative sum (CUMSUM) and the cumulative sum of squares(CUMSUMSQ) of the recursive residual test as proposed by (Brown et al, 1975) to assess the given parameter consistency. The null hypothesis of these tests is that the regression equation is correctly specified. if the cumulative sum goes outside the area (never returns back) between the two critical lines.

*Testing parameter stability using CUSUM and CUSUMSQ test
Figure (4.2): Plot of Cumulative Sum of Recursive Residuals*



The straight lines represent critical bounds at 5% significance level

Figure (4.3): Plot of Cumulative Sum of Squares of Recursive Residuals



The straight lines represent critical bounds at 5% significance level

The above two graphs we have the tests presented in figure [4.2] and figure [4.3]. The pair of two straight lines in the above two graphs which are parallel indicate the 5 percent significant level and if the plotted CUMSUM and CUMSUMSQ graphs remain inside the straight lines the null hypothesis of correct specification of the model can be accepted. Otherwise, the null hypothesis is rejected at 5 percent level of significance and it can be concluded that the regression equation is miss-specified.

The two plots disclose that the plots of CUMSUM and CUMSUMSQ stay within the lines, and, therefore, this confirms the equation is correctly specified and the model is stable. Furthermore, the results reveal that there is no structural instability in the model during the sample period. The selected model adopted in study seem to be good and robust in estimating the short run and long run relationship between national saving and economic growth (RGDP).

In conclusion, the model stability test using cumulative sum (CUMSUM) and (CUMSUMSQ) control chart also confirmed that the null hypothesis of parameter stability cannot be rejected at the 5% critical bound. Thus, the parameters of the estimated saving model do not suffer from any structural instability over the period of study.

Table (4.4): Model Stability

R-squared	0.999295	Mean dependent var	215804.4
Adjusted R-squared	0.998847	S.D. dependent var	134490.0
S.E. of regression	4567.145	Akaike info criterion	19.98210
Sum squared resid	4.59E+08	Schwarz criterion	20.63517
Log likelihood	-354.6688	Hannan-Quinn criter.	20.21234
F-statistic	2228.223	Durbin-Watson stat	2.323286
Prob(F-statistic)	0.000000		

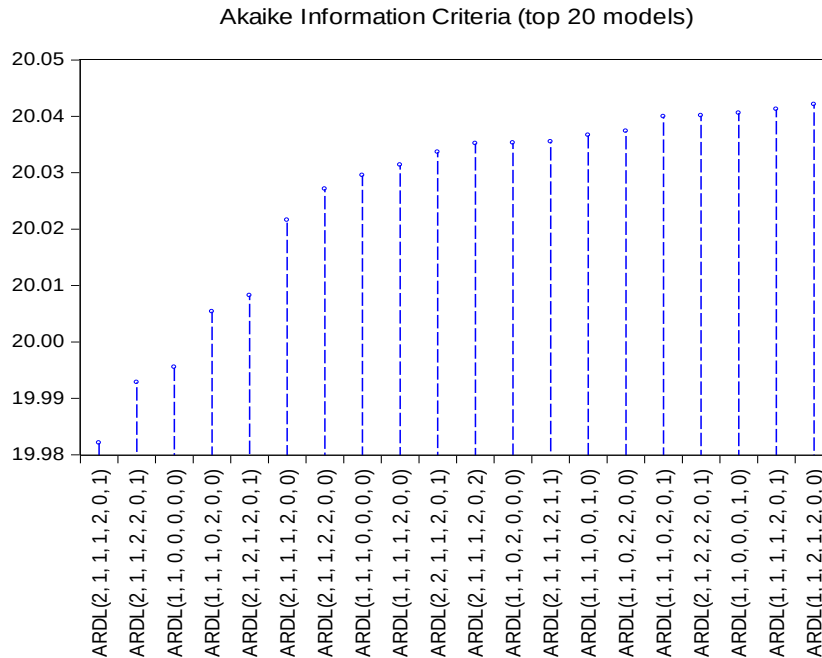
*Note: p-values and any subsequent tests do not account for model selection.

In addition to the model stability **99.8** percent of the model has been explained by the regressor. Hence the results of the estimated model are reliable and efficient.

4.4 Long Run ARDL Model Estimation

According to Pesaran and Shine (1999), as cited in Narayan (2004) for the annual data are recommended to choose a maximum of two lag lengths. From this, a lag length that minimize AIC is 2. Hence , AIC is used to determine the optimal lag because it is a better choice for smaller sample size data as this study. Moreover, AIC found to produce the least probability of under estimation among all criteria available (Liew *et al.*, 2004) as cited in Tsadkan (2013).The model that minimize the AIC was chosen automatically by Eview 9 as displayed in figure [4.3] below.

Figure (4.4): Akaike information criteria model selection



Once the existence of long-run co-integration relationship among the variables are confirming, the subsequent step is running the proper ARDL model to realize coefficients in the long run.

Testing for the existence of long run relationship among the variables in the equation using the bounds test approach. The test for the long run relationship is done using the F-statistic. It is advised that the optimal lag length for the ARDL model is maximum two lags. Furthermore, the study used AIC to determine the optimal lag because of the sample size is small. If the F-statistic is greater than the upper bound we can conclude that there is long run relationship among the variables, if the F-statistic is less than the upper bound test we can conclude that there is no relationship among the variables under consideration.

Table (4.5) ARDL Bounds Test

ARDL Bounds Test

Null Hypothesis: No long-run relationships exist

Test Statistic	Value	k
F-statistic	9.445608	6

Critical Value Bounds

Significance	I0 Bound	I1 Bound
10%	2.12	3.23
5%	2.45	3.61
1%	3.15	4.43

Source: Eviews 9 own calculation

As it is showed in Table [4.5] above, the calculated F statistics [9.44] is higher than upper bound critical values at 1% level of significance. This implies that the null hypothesis of no long-run relationship is rejected; rather accept the alternative hypothesis [there is long-run relationship].

4.5 Long Run ARDL Model Estimation

Table (4.6) Long Run Estimation

Long Run Coefficients				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
NS	-1.397320	0.750184	-1.862636	0.0759
GROSS_CAPITAL_FORMATION	9.271948	3.254665	2.848818	0.0093
INFLATION	-0.0018	0.002501	-0.708601	0.4860
EXTERNAL_DEBT	-2.242641	1.146128	-1.956712	0.0632
EXPORT	-0.908175	1.921920	-0.472535	0.6412
AID	2.124739	0.925822	2.294976	0.0316
Constant	10.776254	77.279296	-1.394456	0.1771

Negative national saving coefficient for Ethiopia might interpret as the high capital outflow. Ethiopia depends heavily on foreign aid and borrowing to meet its investment requirements. There is less saving and the economy depends on external resources to meet the investment requirements. The current account deficits are common in Ethiopia, and this usually balanced by foreign aid and, or borrowing, (Gebreyehu, 2010) finds no statistically significant causality between savings and investment in either direction, (Cyrille, 2010), studying causality for 15 Sub Saharan African countries, and the study analyzed that no effect of saving to investment relation

in these countries. (Cooray and Sinha, 2005) also find that, out of twenty SSA countries they have studied including Ethiopia, investment and saving are not correlated.

Capital formation which is proxied by gross investment has a positive impact on Ethiopian economic growth and statistically significant at 1 percent significance level. This study's result is consistent with study of (Biswas and Saha, 2014) in India and (Tasdesse, 2011) in Ethiopia.

The coefficient of gross capital formation (GCF) is 9.272. This indicates that, in the long run, holding other things constant, a one percent change in gross capital formation about 9.272 percent change in real GDP during the study period.

Export has insignificant impact on Ethiopian economic growth. This insignificant result might be associated with primary agricultural product that suffered from international price shock. This result also confirmed by MoFED during 2011/12 and 2012/13 despite it was expected to play an important role in accelerating the economic growth during the GTP period.

The inflation rate, as showed in the above table 5.6 has negative impact on Ethiopian economic growth, even though statistically insignificant. In the Ethiopian history, inflation remained at a reasonable low level rate until 2002/03. But after 2004, the inflation rate increased and reached 36.4 percent in 2009 (NBE, 2013/14), which was caused primarily by food inflation and affect the wellbeing of the society than harming the macroeconomic performance.

Foreign aid (grant) has positive impact on Ethiopian economic growth. And it is statistically significant during the study period. The study by (Morrissey et al., 2007) the results differed for the two types of aid: grants were associated with increased spending and that government spending had a positive effect on growth. The other study by (Mosley et al., 1987) shows that the

rate of return of aid on capital is higher and the share of aid inflows allocated to the development budget are, on average, higher growth.

As the result showed that a one percent increase in the external debt will result in 2.24 percent decline in real GDP during the study periods. This result was consistent with the finding of (IMF, 2002) working paper for 93 developing countries. Negative impact of external debt on economic growth might be linked with the low domestic saving rate in the country. External debt creates a burden on the economy the study by (Mulugeta F., 2014) showed that External debt influenced negatively by the past stock of external debt and debt servicing and, positively by the current external debt inflows for Ethiopia economy. The panel study of 61 developing countries by (Catherine P., (2004) revealed that high-debt countries, doubling debt will reduce output growth by about 1 percentage point and reduce both per capita physical capital and total factor productivity growth by somewhat less than that.

Inflation has a positive impact on economic growth in Ethiopia, also statistically significant, evidence showed that inflation rate has a positive impact on Economic growth that supported Philip's curve which proved that a creeping inflation about 2% per annum stimulate economic growth. From the econometric result we can understand that, inflation does not harm the economic growth significantly for the study period. The long run estimated model presented as follow with figures in the parenthesis indicates calculated t-value

$$\begin{aligned}
 LRGDP = & 10.78 - 1.41 LNS + 9.27 LGCF - 0.002INF - 0.91 LEXP - 2.13 LED + 2.12LAI \\
 & + \varepsilon_i \\
 & (0.177) \quad (0.075) \quad (0.009) \quad (0.71) \quad (0.641) \quad (0.063) \quad (0.032)
 \end{aligned}$$

4.5 Short Run ARDL Model Estimation

According to the estimation of the error correction representation of long run relationship [ECM] shows the short run dynamics of the model which is consistent with the long run equilibrium of the model.

Table (4.5) ARDL Estimated results of the Short Run Model

Cointegrating Form				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(REAL_GDP(-1))	-0.320176	0.197150	-1.624020	0.1186
D(NS)	-0.638814	0.152761	-4.181778	0.0004
D(GROSS_CAPITAL_FORMATION)	1.297892	0.244523	5.307851	0.0000
D(INFLATION)	0.001003	0.000802	1.325901	0.1960
D(EXTERNAL_DEBT)	-0.166489	0.138834	-1.199197	0.2432
D(EXTERNAL_DEBT(-1))	0.385531	0.180339	2.137817	0.0439
D(EXPORT)	-0.199419	0.418695	-0.476288	0.6386
D(AID)	0.067722	0.203414	0.332928	0.7423
ECM	-0.219583	0.082221	-2.670652	0.0140

Source: Eviews 9 own calculation

The results of the ECM [-0.22] or 22%, which measures the adjustment to restore equilibrium in the dynamic model, appear with negative sign and is statistically significant at 5% level of significance level, ensuring the long run equilibrium can be attained. Therefore, the speed of adjustment is -0.22, which implies that around 22% deviations from long-term equilibrium are adjusted every year.

The long run result of national saving have negative impact on Ethiopian economic growth and statistically significant at 1 and 5 percent significance level, respectively in the short term. As a result a one percent increases in national saving will result in 0.63 percent decline in real GDP in the short run.

Similar to the long run result, capital formation have positive impact on Ethiopian economic growth and statistically significant at 1 and 5 percent significance level, respectively in the short

term. As a result a one percent increases in capital formation will result in 1.29 percent increase in real GDP in the short run.

Inflation is not significantly affect Ethiopian economic growth during the study period, despite their relationship is positive in short run. From this we can understand that under the study period, whether in the long run or in the short run, general inflation rate, does not have significant (both negative and positive) impact on the Ethiopian economic growth.

Then again, exports of goods and service are still insignificant like the long run, with negative coefficient, which indicates the negative relationship between export and Ethiopian economic growth.

The causality result between growth of RGDP and growth national saving can be shown as below.

Table (4.6): Pairwise Granger Causality Tests

Sample: 1975 2013

Lags: 1

Null Hypothesis:	Obs	F-Statistic	Prob.
GNS does not Granger Cause R_GDP	38	0.33218	0.5681
R_GDP does not Granger Cause GNS		9.65135	0.0037

The above result implies the F statistics of the first equation proved the causality between real GDP and national saving is unidirectional indicating the economic growth as the cause for national saving during the study period. The study is consistent with the finding of (Mohan, 2006). These results suggest that the direction of causality is from real GDP growth to national saving growth since the estimated F is significant at the 5 % level of significant; Reject the null hypothesis that R_GDP does not Granger Cause to National Saving. On the other hand, there is

no —reverse causation| from national saving to RGDP growth, because the F value is statistically insignificant.

Table (4.7): At difference Pairwise Granger Causality Tests
difference logged Pairwise Granger Causality Tests

Sample: 1975 2013

Lags: 1

Null Hypothesis:	Obs	F-Statistic	Prob.
R_GDPDD does not Granger Cause GNS	38	9.65135	0.0037
GNS does not Granger Cause R_GDPDD		0.33218	0.5681

To answer the objective of determining whether the direction of causality in Ethiopian economy is from national savings lead to economic growth or vice versa. The empirical result above suggests that the direction is only come from economic growth does play an important role to national saving growth.

The absence of any relationship from national saving to economic growth appears to be at odd with the popular perception that higher saving cause economic growth and raised an important issue regarding the appropriateness of using national saving as a target variable for economic progress. Nevertheless, this piece of evidence is consistent with that found in the study of Nurudeen (2010) stressed that the causality run from economic growth to saving, implying that economic growth proceeded and Granger causes to national saving for the case of Nigeria.

CHAPTER FIVE

5. CONCLUSION

The objective of this study is to analyze the relationship between economic growth and national saving in Ethiopia during the specified study period. To determine the long run and short run relationship among the variables, Autoregressive Distributed Lag (ARDL) model was applied. Before applying the ARDL model, all the variables are tested for their time series properties (stationarity properties) using the ADF. Moreover pairwise Granger causality test also applied in order to find out the directional causation between national saving and economic growth. Real GDP and national saving variable is stationary [no unit root problem] at level, whereas, capital formation, export, aid, external debt and inflation are stationary at first difference with intercept. In addition, national saving, aid and inflation are [stationary in level]; all the other variables are stationary in first difference with trend.

The study carry out the model stability tests and the result shown that no evidence of serial correlation, no functional form problem (the model is correctly specified), the residual is normally distributed and no evidence of Heteroscedasticity problem. Additionally, the study revealed that the causality between real GDP and national saving is unidirectional indicating that economic growth as the cause for national saving during the study period. The study is also consistent with the finding of (Mohan, 2006)

While many theoretical and empirical studies confirm the positive impact of saving on economic growth, results of the present study show that there is not enough evidence to confirm that saving Granger causes the growth of GDP in Ethiopia. The study also does find an evidence of reverse causality. For the case of Ethiopia, saving does not seem to play a major role in contributing to economic growth; it may be due to some other reasons that cause saving to be unproductive to

growth or there may be some other factors that contribute to economic growth in this country instead of saving. This implies that the conventional wisdom that higher level of saving leads to economic growth is not likely to hold in Ethiopia.

The empirical result showed that gross capital investment is found to have positive impact on Ethiopian economic growth during the study period and statistically significant.

Negative national saving coefficient for Ethiopia might interpret as the high capital outflow. Ethiopia depends heavily on foreign aid and borrowing to meet its investment requirements. A one percent increase in capital formation (gross investment) results in 9.272 percent and 1.298 percent increase in real GDP in long run and short run, respectively. The external debt also has negative impact in economic growth during the study period in both long run and short run. A one percent increase in external debt will result in 2.243 percent decline in real GDP in long run however, a 0.386 present increase in RGDP in the short run one possible reason for this might be due to resource gap for investment that the country faces which financed by external sources. So, it causes RGDP to grow in the short run. On the other hand, the study found out that export of goods and service and foreign aid have statistically insignificant impact on economic growth with positive sign in the long run.

Future research and policy direction

Finally as the findings of this study shows that Ethiopia faces challenge with wide saving and investment gap in recent years which have been financed by external sources. And the risk associated with external sources of financing suggests the motivation to depend on national saving to finance the domestic investment sustained economic growth.

This study only considered the relationship between national saving and economic growth. Due to time constraint and data limitations issues concerning structural brake need further study. And Ethiopia is challenged with a persistent and wide saving gap in recent years which have been financed by external sources. And the risk associated with external sources of financing offers the motivation of relying on national saving to finance the investment; this gives an additional incentive to the government to increase gross national saving. Furthermore, the following areas are therefore recommended for further research.

1. The Capital outflow of a country should well-thought-out by the government
2. Establishing a stable macroeconomic environment with low level of inflation is among the main policy tools to increase the saving level in Ethiopia.
3. Government should maintain various initiatives to increase saving ratio.

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Appendices

Appendix: A

Dependent Variable: REAL_GDP

Method: ARDL

Date: 05/26/08 Time: 12:48

Sample (adjusted): 1976 2012

Included observations: 37 after adjustments

Maximum dependent lags: 2 (Automatic selection)

Model selection method: Akaike info criterion (AIC)

Dynamic regressors (2 lags, automatic): NS GROSS_CAPITAL_FORMA
TION GENERAL_INFLATION EXTERNAL_DEBT EXPORT AID

Fixed regressors: C

Number of models evaluated: 1458

Selected Model: ARDL(2, 1, 1, 1, 2, 0, 1)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
REAL_GDP(-1)	0.460241	0.202978	2.267447	0.0335
REAL_GDP(-2)	0.320176	0.197150	1.624020	0.1186
NS	-0.638814	0.152761	-4.181778	0.0004
NS(-1)	0.331986	0.130895	2.536278	0.0188
GROSS_CAPITAL_FORMATION	1.297892	0.244523	5.307851	0.0000
GROSS_CAPITAL_FORMATION(-1)	0.738067	0.301482	2.448132	0.0228
GENERAL_INFLATION	820.7104	159.7769	5.136602	0.0000
GENERAL_INFLATION(-1)	366.5260	184.4144	1.987512	0.0595
EXTERNAL_DEBT	-0.166489	0.138834	-1.199197	0.2432
EXTERNAL_DEBT(-1)	0.059575	0.189092	0.315058	0.7557
EXTERNAL_DEBT(-2)	-0.385531	0.180339	-2.137817	0.0439
EXPORT	-0.199419	0.418695	-0.476288	0.6386
AID	0.067722	0.203414	0.332928	0.7423
AID(-1)	0.398834	0.271523	1.468874	0.1560
C	-23662.79	10409.13	-2.273272	0.0331
R-squared	0.999295	Mean dependent var	215804.4	
Adjusted R-squared	0.998847	S.D. dependent var	134490.0	
S.E. of regression	4567.145	Akaike info criterion	19.98210	
Sum squared resid	4.59E+08	Schwarz criterion	20.63517	
Log likelihood	-354.6688	Hannan-Quinn criter.	20.21234	
F-statistic	2228.223	Durbin-Watson stat	2.323286	
Prob(F-statistic)	0.000000			

*Note: p-values and any subsequent tests do not account for model selection.

Appendix: B

ARDL Bounds Test

Date: 05/30/08 Time: 05:42

Sample: 1976 2012

Included observations: 37

Null Hypothesis: No long-run relationships exist

Test Statistic	Value	k
F-statistic	9.445608	6

Critical Value Bounds

Significance	I0 Bound	I1 Bound
10%	2.12	3.23
5%	2.45	3.61
2.5%	2.75	3.99
1%	3.15	4.43

Appendix: C

ARDL Cointegrating And Long Run Form

Dependent Variable: REAL_GDP

Selected Model: ARDL(2, 1, 1, 1, 2, 0, 1)

Date: 05/25/08 Time: 15:26

Sample: 1974 2013

Included observations: 37

Cointegrating Form				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(REAL_GDP(-1))	-0.320176	0.197150	-1.624020	0.1186
D(NS)	-0.638814	0.152761	-4.181778	0.0004
D(GROSS_CAPITAL_F ORMATION)	1.297892	0.244523	5.307851	0.0000
D(GENERAL_INFLATIO N)	820.710432	159.776917	5.136602	0.0000
D(EXTERNAL_DEBT)	-0.166489	0.138834	-1.199197	0.2432
D(EXTERNAL_DEBT(- 1))	0.385531	0.180339	2.137817	0.0439
D(EXPORT)	-0.199419	0.418695	-0.476288	0.6386
D(AID)	0.067722	0.203414	0.332928	0.7423
CointEq(-1)	-0.219583	0.082221	-2.670652	0.0140

Cointeq = REAL_GDP - (-1.3973*NS + 9.2719*GROSS_CAPITAL_FOR
MATION + 5406.7859*GENERAL_INFLATION -2.2426

$$*EXTERNAL_DEBT -0.9082*EXPORT + 2.1247*AID -107762.5453)$$

Appendix: D

Long Run Coefficients				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
NS	-1.397320	0.750184	-1.862636	0.0759
GROSS_CAPITAL_FOR MATION	9.271948 5406.78587	3.254665	2.848818	0.0093
GENERAL_INFLATION	5 2245.301765	2.408044	0.0249	
EXTERNAL_DEBT	-2.242641	1.146128	-1.956712	0.0632
EXPORT	-0.908175	1.921920	-0.472535	0.6412
AID	2.124739	0.925822	2.294976	0.0316
	107762.545 77279.29620			
C	275	8	-1.394456	0.1771

Appendix: E

Heteroscedasticity Test: ARCH

F-statistic	0.067120	Prob. F(1,34)	0.7971
Obs*R-squared	0.070929	Prob. Chi-Square(1)	0.7900

Test Equation:

Dependent Variable: RESID^2

Method: Least Squares

Date: 05/25/08 Time: 15:25

Sample (adjusted): 1977 2012

Included observations: 36 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	12169070	5004491.	2.431630	0.0205
RESID^2(-1)	0.044394	0.171355	0.259076	0.7971
R-squared	0.001970	Mean dependent var	12734792	
Adjusted R-squared	-0.027384	S.D. dependent var	26655340	
S.E. of regression	27017834	Akaike info criterion	37.11585	
Sum squared resid	2.48E+16	Schwarz criterion	37.20382	
Log likelihood	-666.0852	Hannan-Quinn criter.	37.14655	
F-statistic	0.067120	Durbin-Watson stat	1.938838	
Prob(F-statistic)	0.797139			

Appendix: F

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.863644	Prob. F(1,21)	0.1867
Obs*R-squared	3.015915	Prob. Chi-Square(1)	0.0825

Appendix: G

Test Equation:

Dependent Variable: RESID

Method: ARDL

Date: 05/25/08 Time: 15:23

Sample: 1976 2012

Included observations: 37

Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
REAL_GDP(-1)	0.350319	0.324800	1.078568	0.2930
REAL_GDP(-2)	-0.308021	0.297169	-1.036518	0.3117
NS	-0.001689	0.149853	-0.011274	0.9911
NS(-1)	0.072604	0.138978	0.522412	0.6069
GROSS_CAPITAL_FORMATION	-0.038544	0.241516	-0.159591	0.8747
GROSS_CAPITAL_FORMATION(-1)	-0.276207	0.358321	-0.770837	0.4494
GENERAL_INFLATION	32.76645	158.5574	0.206654	0.8383
GENERAL_INFLATION(-1)	-211.1420	238.0030	-0.887140	0.3851
EXTERNAL_DEBT	0.020506	0.137012	0.149665	0.8825
EXTERNAL_DEBT(-1)	0.082354	0.195049	0.422220	0.6772
EXTERNAL_DEBT(-2)	0.016271	0.177301	0.091769	0.9278
EXPORT	-0.186863	0.432920	-0.431633	0.6704
AID	0.124240	0.219310	0.566505	0.5771
AID(-1)	-0.153951	0.289236	-0.532267	0.6001
C	3696.414	10563.56	0.349921	0.7299
RESID(-1)	-0.502302	0.367945	-1.365153	0.1867
R-squared	0.081511	Mean dependent var	-3.66E-11	
Adjusted R-squared	-0.574552	S.D. dependent var	3570.301	
S.E. of regression	4480.055	Akaike info criterion	19.95113	
Sum squared resid	4.21E+08	Schwarz criterion	20.64774	
Log likelihood	-353.0959	Hannan-Quinn criter.	20.19672	
F-statistic	0.124243	Durbin-Watson stat	2.108603	
Prob(F-statistic)	0.999925			

Appendix: E Unit root tests for National Saving

Intercept

Null Hypothesis: NS has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=9)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	8.416230	1.0000
Test critical values: 1% level	-3.615588	
5% level	-2.941145	
10% level	-2.609066	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: NS has a unit root

Exogenous: Constant, **Linear Trend**

Lag Length: 0 (Automatic - based on SIC, maxlag=9)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	5.350066	1.0000
Test critical values: 1% level	-4.219126	
5% level	-3.533083	
10% level	-3.198312	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: **D(NS) has a unit root**

Exogenous: Constant, **Linear Trend**

Lag Length: 2 (Automatic - based on SIC, maxlag=9)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-0.328584	0.9865
Test critical values: 1% level	-4.243644	
5% level	-3.544284	
10% level	-3.204699	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: **D(NS) has a unit root**

Exogenous: **Constant**

Lag Length: 2 (Automatic - based on SIC, maxlag=9)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	1.140562	0.9971
Test critical values: 1% level	-3.632900	
5% level	-2.948404	
10% level	-2.612874	

*MacKinnon (1996) one-sided p-values.

Intercept

Null Hypothesis: NS has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=9)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	8.416230	1.0000
Test critical values: 1% level	-3.615588	
5% level	-2.941145	
10% level	-2.609066	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: NS has a unit root

Exogenous: Constant, **Linear Trend**

Lag Length: 0 (Automatic - based on SIC, maxlag=9)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	5.350066	1.0000
Test critical values: 1% level	-4.219126	
5% level	-3.533083	
10% level	-3.198312	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: **D(NS) has a unit root**

Exogenous: Constant, **Linear Trend**

Lag Length: 2 (Automatic - based on SIC, maxlag=9)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-0.328584	0.9865
Test critical values: 1% level	-4.243644	
5% level	-3.544284	
10% level	-3.204699	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: **D(NS) has a unit root**

Exogenous: **Constant**

Lag Length: 2 (Automatic - based on SIC, maxlag=9)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	1.140562	0.9971
Test critical values: 1% level	-3.632900	
5% level	-2.948404	
10% level	-2.612874	

*MacKinnon (1996) one-sided p-values.

Declaration

I, the undersigned, declare that this project paper is my ordinal work and has not been presented for Master's degree in any other university, and that all sources of material used for the project have been duly acknowledged.

Declared by:

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Signature:

Date:

Confirmed by (advisor)

Name: Tadele Ferede (PhD)

Signature:

Date:

Place and date of submission:

