CAUSAL RELATIONSHIP BETWEEN DOMESTIC SAVING AND ECONOMIC GROWTH: CASE OF ETHIOPIA.

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A thesis Submitted to the School of Graduate Studies of Adama University in Partial Fulfillment of the Requirements for the Degree of Masters of Science in Economics (Development Economics).

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DECLARATION

I, the undersigned, declare that this thesis is my original work and has not been presented for a degree in any other university, and that all sources of materials used for the thesis have been duly acknowledged.

Declared by:

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Acronyms

ADF Augmented Dickey Fuller

AIC Akaike Information Criterion

FDI Foreign Direct Investment

GDP Gross Domestic Product

GDS Gross Domestic Saving

HIC High Income Countries

I Investment

IFS International Financial Statistics

LIC Lower Income Countries

LMIC Lower Middle Income Countries

MOFED Ministry of Finance and Economic Development

NBE National Bank of Ethiopia

S Saving

UMIC Upper Middle Income Countries

VAR Vector Autoregression

VEC Vector Error Correction

VECM Vector Error Correction Model

Y Output (GDP)

ABSTRACT

The study investigated Causal relationship between domestic saving and economic growth; Case of Ethiopia for the period 1975-2014.Therefore, the main objective of this paper is to find the direction of causality between domestic savings and economic growth in case of Ethiopia using different techniques. To achieve its objective the study use Secondary data. The paper applies Granger Causality and Co-integration techniques to examine the causal relationship between domestic saving and economic growth.

The Johansen co-integration test result revealed that the variables are co-integrated and there exists long run relationship between economic growth and domestic saving. The Granger Causality test result on the other hand revealed unidirectional causality which runs from economic growth to domestic saving. Therefore, the study rejects the Solow's claim that saving precedes economic growth, and accepts the Keynesian theory that it is higher economic growth that leads to higher domestic saving growth in Ethiopia. In this case, the researcher recommends that growth enhancing policy should be implemented in order to increase individual income level so as to create surplus that in turn increases saving. That is, growth should be enhanced to scale up saving.

CHAPTER ONE
INTRODUCTION

1.1. Background of the Study

Economic growth is the common goal of all nations. Everybody lives with more comfortable, better standard of living than ever before and holding a better welfare because of the surge in their economic growth. Government in each country aims to reduce the poverty and increase the level on national income. Therefore, to achieve the main target of economic growth, governments may implement various kinds of policies such as encourage saving, stimulating investment and production in their countries.

Investment contributes to growth in aggregate wealth. But the investment cannot increase without increasing in the amount of saving. Thus, savings perform a major role in providing the national capacity for investment and production, which will affect the potential of economic growth. A serious constraint to sustainable economic growth can cause from the low rate of saving.

Saving in the economic literature is known as a give-up of current consumption to provide for the build-up of capital, where in turn, is very essential for the production of extra output in the future. In this regard, savings of the citizens and their governments' is a fundamental factor in economic growth of any nation. Countries those have high saving rates for long periods of time lean to have a large and sustained economic growth. East Asian, notably the '*Asian Tigers'* are usually cited as an example of mobilizing sufficient domestic savings to support their '*miracle*' economic growth (Seng, 2014).

Since the work of Lewis (1955) was published, many Third World countries have pursued policies aimed at raising the rate of savings in order to increase their rate of growth of real GDP. The theory behind Lewis' work is that higher rates of savings will increase the availability of loanable funds, which in turn, will increase investment. Higher rates of investment will then increase future economic growth. Recent works like Saltz (1999) have thrown light on the fact that increases in savings will facilitate more rapid expansion of the capital stock and, therefore, higher rates of investment that should lead to higher rates of economic growth. In addition, Growth models emphasizing capital accumulation (Solow and AK models), tell us that higher savings rates should foster growth because higher savings imply higher investment.

From another perspective, Keynes (1936), argue that higher growth rates of saving may result from higher rates of growth of real income, that is, real GDP. If incomes are rising more rapidly, households can easily increase their consumption and saving levels.However, the proponents of the Keynesian hypothesis stressed that it is growth of output (or income) that causes growth of saving. The supporters of this theory argue that increase in output lead to increase in income, thus raising the level of saving in the economy. For instance, as Lean and Song (2009) study the work of Carroll and Weil (1994) which suggested that economic growth preceded savings motivated further researches that aim at ascertaining the direction of causality between saving and economic growth. To this end, Gavin et al. (1997), Sinha and Sinha (1998) confirmed that higher economic growth precedes and causes higher saving.

Indeed, the empirical evidence to date has shown that there is a relationship between saving rates and rates of economic growth. During 1984-1994, thirty-one countries had average annual real per capita GDP growth rate of 2.5% or higher. In these successful countries the median saving rate was 24%. By contrast, the median saving rate stood at 16% in the fifty-nine countries in which per capita income grew at less than 1% a year. While there appears to be a correlation between economic growth and savings, the question is which way the direction of association runs. Theory and evidence have shown that the direction of association can run both ways (Adebiyi, 2006). The motivation for this study is to find out whether causality exist between gross domestic savings and economic growth for Ethiopia and if so the direction of causality between them.

1.2. Statement of the Problem

Though the relationship between saving and economic growth is a vital issue, the direction of causality between the two variables has continued to be debatable among macro economists and researchers. The main controversy was instigated by Robert Solow in 1950s when he emerged with the premises that higher saving promotes economic growth contradicting the Keynesian conventional wisdom that growth of output proceeds and causes saving to boost. These causality debates have initiated many scholars/researchers to empirically investigate the issue in various countries/sub-regions. For instance, Abiodun et.al (2014) carried out a Panel Co-integration and Granger Causality Test in Sub-Saharan African during 1980-2010 and found that it is saving that granger causes economic growth in the region. On the contrary, Anoruo and Ahmad (2001) applied VEC model on seven African countries and found granger causality running from growth to saving in five countries while the case of two of the countries namely South Africa and Cote d'Ivoire revealed bidirectional causality evidence.

Despite these debates among economists and empirical findings regarding the nexus between saving and economic growth, there are no sufficient empirical investigation concerning the subject in the Ethiopian case.

Perhaps, due to the fact that government, policy-makers and other stakeholders in the Ethiopian economy are aware of the positive relationship between gross domestic saving rates and economic growth rates on the basis of economic theory but unaware of the angle of causality between them. Therefore the direction of policies and programmes over the years to improve the rate of growth of the two variables has been misplaced. While there appears to exist a correlation between growth and domestic savings, the question is the way the direction of association runs for Ethiopia. Since the direction of causality is not known, it is difficult to decide the direction of policies and programmes to pursue to achieve increased growth and domestic savings. It is the quest to answer this question of direction that provides the motivation for this study.

Therefore, the study of the causal relationship between saving and economic growth is very important because it gives very significant information on which economic variable that the government need to accentuate so as to realize the desired level of the targeted variable or variables (Abu, 2010).

1.3 Research Questions

The study critically investigates the following research questions regarding the causal relationship between saving and economic growth in Ethiopia.

1. Does domestic saving cause economic growth?
2. Does economic growth propel domestic saving?
3. Is there any long run relationship between domestic savings and economic growth?

1.4 Objectives of the Study

The major objective of the study is to determine the relationship between domestic saving and economic growth in the context of the Ethiopian economy.

The Specific objectives of this work are:

- To examine whether there is a long run relationship between domestic savings and economic growth
- to assess the direction of causality between domestic savings and economic growth

1.5 Significance of the Study

The study believed to provide relevant information for policymakers to know whether there is a long run relationship between domestic savings and economic growth of the country. Also, the study enables policy-makers and other stakeholders to know whether or not there is a causal relationship between domestic savings and economic growth of the country. Once a causal relationship is established, the study also enables policymakers to know the angle of causality between gross domestic savings and economic growth in Ethiopia. In addition it might also create a center of attention for further investigation by interested researchers with different approaches given the area is under researched in the Ethiopian perspective.

1.6 Scope of the Study

The study covers the issue of causal relationship between domestic savings and economic growth in the context of Ethiopia ranging from 1975 to 2014 (forty years of coverage) annual data. This period is chosen due to the availability of relevant data and yet considered reasonably long enough to provide adequate answers to the research questions to be addressed in this study.

1.7 Limitations of the Study

In Ethiopia, evaluating the quality of data, there is no adequate, consistent data in domestic sources. For example, there is a discrepancy of GDP data reported by IFS yearbook and the current Ministry of Finance and Economic Development. In addition to this, different sources of data use different calendar year. Some sources of data use Gregorian calendar others use Ethiopian fiscal calendar. The differences in data present a problem of choice of appropriate data to use for the study.

1.8 Organization of the Study

The rest of the paper is organized as follows. Chapter two reviews the theoretical and empirical literature regarding the relationship between domestic saving and economic growth. Chapter three shows Overview of Ethiopian economy with a focus on economic growth and GDS. Chapter four gives insight on the model specification and methodology employed. Chapter five presents' empirical results and its interpretation and finally chapter six provides summary, conclusion and recommendation based on the findings.

CHAPTER TWO
LITERATURE REVIEW

2.1. Theoretical Literature

2.1.1. Definition of Saving

In a narrow sense, saving generally means putting money aside, for example, by investing in a pension plan or putting money at the bank. In a broader sense, saving is typically used to refer to economizing, cutting costs, rescuing someone or something. Savings, on the other hand, may be defined as accumulated money put aside by saving (Mensah, 2004).

In economics, savings may be categorized into three: personal saving, business savings and government savings. Personal savings has been defined as personal disposal income minus personal consumption expenditure. In other words, income that is not consumed by immediately buying goods and services is saved (Keynes, 1936). Business savings is the corporate retained earnings (profits minus tax payments and dividend). Businesses save when they do not distribute all their profits: these sums, however, are usually quite tiny on a macroeconomic scale. Government savings is the budget surplus. The government often runs public deficits, so that they rather dis-save. National savings is thus, the sum of personal, business, and government savings. Domestic savings (DS) is obtained by subtracting net factor income form the national savings. However, the size of business and government savings lead to the conclusion that personal savings are the largest and the most important part of national savings.

In a primitive agricultural economy, savings might take the form of holding back the best of corn harvest as seed corn for the next planting season. If the whole crop were consumed, the economy would deteriorate to hunting and gathering the next season.

2.1.2. Definition of Economic Growth

“Economic growth refers to a rise in national or per-capita income and product. If the production of goods and services in a nation rises, by whatever means, one can speak of that rise as economic growth” (Gillis et al, 1987).

Todaro (2003) defines economic growth as “a long-term rise in capacity to supply increasing diverse economic goods to its population, this growing capacity based on advancing technology and the institutional and ideological adjustments that it demands.” According to him, there are three principal components that are inherent in the definition:

- The sustained rise in the national output is a manifestation of economic growth, and the ability to provide a wide range of goods is a sign of economic maturity;
- Advancing technology provides the basis or preconditions for continuous economic growth; and
- The realization of the potential for growth inherent in new technology, institutional and attitudinal adjustment that must be made- technological innovation without concomitant social innovation is like a bulb without electricity, the potential exists but without the complementary inputs, nothing will happen.

Economists draw a distinction between short-term economic stabilization and long-term economic growth. The topic of economic growth is primarily concerned with the long run. The short-run variation of economic growth is termed the business cycle.

The long-run path of economic growth is one of the central questions of economics; in spite of the problems of measurement, an increase in real GDP of a country is generally taken as an increase in the standard of living of its inhabitants.

2.1.3. The Relationship between Gross Domestic Savings and Economic Growth

There have been numerous studies on the relationship between savings at the domestic level and economic growth. The conclusions arising out of these studies depend on the data collected from various income classes of the economy such as low-income group, low- middle income group, upper -middle income group and high- income group.

One of such conclusions is that with economic growth, an economy can invariably experience a growth in the personal income and per capita consumption expenditure. The impact of economic growth on a particular country can be very well felt in the increase in the disposable income of an individual. According to the concept of marginal propensity to save (MPS), savings increases with additional increase in income. Hence, it can be easily understood that with an increase in

economic growth, the amount of savings also increases, other things being equal (Bassam and AbuAl-foul; 2010).

The other conclusion from the studies is that governments of some countries offer a number of saving and investment schemes that are tax exempt in order to promote the practice of saving in the country. By investing in such saving schemes, individuals can save a considerable amount of money. Governments borrow and invest such money in various development projects that help build a better economy (Ibid).

2.1.4. Theoretical review on Economic growth model

2.1.4.1. Classical economic growth model

This theory consists of concepts from Adam Smith, David Ricardo and Thomas Robert Malthus. They emphasized about productive investment and capital accumulation as the principal of the growth model. They also focused on the effects of technological progress, the concept of division of labor and the changes in production methods.

Adam Smith stated about supply-side driven growth model. The production functions and output growth function as follows:

Y = f (L, K, T)

Where

Y: output

L: labor

K: capital

T: land

Economic growth in Smith's view

There are relationship's series.

Growth of output/living standards = f (Accumulate capital)

- Accumulate capital. = f (Investment)
- Investment = f (Savings)
- Savings = f (Profits)
- Profits = f (Productivity)
- Productivity = f (division of labor)

Division of labor is the same thing as specialization

- Division of labor = f (extent of the market)
- Extent of market = f (Division of labor)

“It is Causality relationship”

Smith also emphasized about "division of labor which come from two sources, first the saving and capital accumulation, and second the extent of the market. The saving in capitalists system, savings creates investment and hence economic growth. It is useless for division of labor if the market is very small. The economy tries to use cost saving technology and division of labor in the case where the market is large. Division of labor is limited by the size of market, and trade limits the size of market. Free trade can be both domestically and internationally.

2.1.4.2. Harrod - Domar growth model

Harrod – Domar (1956) growth model was named after two well-known economists, Sir Roy Harrod of England and Professor Evesey Domar from the US. It is a conventional empirical that helps people to understand the economic growth rate derive from the productivity of capital and the savings level. This model states that aggregate savings are arranged from any funds with the purposes of investment. According to the Harrod - Domar growth model, the growth rate of an economy is depended on two important factors - the savings level and capital-output ratio of the economy.

Economic growth of Harrod – Domar model is under three conditions as follow

- Investment is equal to saving
- Using full of capital stock
- Full employment

Therefore, the rate of growth in GDP will be sustainable if the capital stock and labor have the same rate of growth as income growth rate (warranted rate of growth). However, this theory has some weakness point because the condition above might not be true.

Harrod - Domar model define a close economy, assuming no government, no depreciation, and the investment is equal to saving.

Assume

: Capital-output ratio is (k)

: The level of national saving is (s) which is a proportion of the national income.

: Since close economy the investment (i) is determined by the amount of savings.

Therefore

Savings (S) is a proportion of average propensity to save (APS) times national income (GDP). Define APS = s, Define GDP =Y

$$\mathbf{S = s\ (Y)}$$

Investment (I) in Harrod Domar is defined as the change in capital stock (K)

$$\mathbf{I = \Delta K}$$

The capital stock (K) is a proportion of national income (Y) times the capital-output ratio (k)

$$\mathbf{K = kY}$$

$$\mathbf{K/Y = k}$$

$$\mathbf{\Delta K/\Delta Y = k}$$

$$\mathbf{\Delta K = k\ (\Delta Y)}$$

Since investment equal to saving

$$\mathbf{S = I}$$

From previous formula

$$\mathbf{S = s\ (Y)}$$

$$\mathbf{I = \Delta K}$$

$$\mathbf{\Delta K = k\ (\Delta Y)}$$

Therefore

$$\mathbf{s\ (Y) = k\ (\Delta Y)}$$

$$\mathbf{s/k = \Delta Y/Y}$$

From the model above, it is obvious that ΔY/Y is the rate of growth of GDP. (ΔY/Y) can define as the percentage change of GDP, therefore the Harrod - Domar growth model can be explained as: The GDP growth rate (ΔY/Y) is determined by average propensity to save (s), and the national capital-output ratio (k).

In conclusion

- The GDP growth rate has a positive correlation to the average propensity to save (s).
- The more saving or investment in an economy, the greater will be of the rate of national income (GDP)

However, the GDP growth rate has a negative relationship to the national capital-output ratio. The higher of national capital-output ratio, the lower will be the rate of national income (GDP). If we would like to make economy growth, the country should save and invest in a certain portion of its national income.

In summary the Harrod-Domar economic growth rate model is defined by the formula below:

$$\mathbf{s/k = \Delta Y/Y}$$

$$\mathbf{\Delta Y/Y = g}$$

Therefore

$$\mathbf{g = s/k}$$

And with depreciation

$$\mathbf{g = s/k - d}$$

Where

g: Rate of Economic Growth (ΔY/Y)

s: average propensity to save

k: capital-output ratio

d : Capital depreciation

2.1.4.3. The Solow-Swan Model

The Solow-Swan (1956) model presents the case in which a rise in the saving rate affects the stock of capital and the level of per-capita income, but does not affect the *rate* of economic growth. An increase in the saving rate increases per capita output and per capita capital stock in steady- state. A higher savings rate will generate more investment per unit of output than it did before- which in turn will lead to an expansion of capital per worker. The process, however, comes to a halt since for a given growth rate of labour, an increasing proportion of investment will be devoted to maintaining this higher capital-labour ratio. The saving rate thus influences the level of per capita capital stock and thus per capita output towards which the economy gravitates in equilibrium, rather than the rate at which either magnitude changes. In sum, the Solow-Swan model says a change in the saving rate changes the economy's balanced growth path and hence per capita output in steady state, but it does not affect the growth *rate* of output per worker on the balanced growth path. Only an exogenous technological change will result in a further increase in output per worker in steady state.

2.1.4.4. The Romer Model

By contrast, in the Romer (1986) growth model in which technology is endogenized, an increase in the saving rate not only increases per capita output in steady state but also increases the growth rate of per capita output. Thus, since the growth rate of the capital-labour ratio is not declining, it follows that the growth rate of per capita output is not declining in the capital-labour ratio either. Thus an increase in the saving rate, not only increases the growth rate of the capital-labour ratio, and per capita output, but also the increase in the growth rate would persist indefinitely.

The difference between the Solow-Swan model and the Romer model relates to the nature of the capital stock. Since, in the Romer model, the social returns to scale in capital are constant, the marginal product of capital is also constant. Unlike in the Solow-Swan model, there is no incentive in the Romer model to discontinue investing in capital as the capital-labour ratio increases. Thus, there is no incentive for the economy to stop expanding. The above discussion illustrates how an increase in the saving rate can indeed lead to growth and more so, when technological change is seen as being endogenous, the increase in the growth rate will persist indefinitely. Thus, while the Solow-Swan model shows the saving rate to have a temporary effect on the growth rate, the Romer model shows the effect to be permanent.

2.1.4.5 The New Growth Theory

The causal links between saving rates (i.e. financial development) and economic growth has been treated extensively in the new growth theory. This theory yields two competing predictions that boil down to the supply-leading and demand-following controversy. Following Pagano (1993), the supply-leading hypothesis is explained as follows.

Aggregate output (Y) is taken to be a linear function of the aggregate capital stock (X). Thus:

$$Y_t = \alpha X_t \quad \text{..... (2.1)}$$

In an open economy with external economies it is assumed that firms and households are identical so that per firm and per capita values coincide. Thus, the firm's output is given by:

$$y_t = Bx_t^n \quad \text{..... (2.2)}$$

Where y_t is firm-specific output, x_t is firm-specific capital stock and B is a parameter that responds to the average capital stock according to $B = \alpha x_t^{1-n}$. Assuming P is identical firms, aggregate output in equation (2.2) will be a summation of individual firm output:

$$Y_t = Py_t \quad (2.3)$$

It is assumed that X_t is a composite of physical and human capital (J_x and H_x respectively) and that J_x and H_x are reproducible with identical technologies (Lucas (1988), thus:

$$X = J_x + H_x \quad (2.4)$$

By further assuming a stationary population with one good being produced, which is either consumed or invested and depreciated at the rate π per period, the gross investment (I) can be stated as:

$$I_t = X_{t-1} - (1-\pi) X_t \quad (2.5)$$

If a closed economy with no government is assumed, capital market equilibrium requires that gross savings (S) equal gross investment (I). However, a proportion of savings ($1-\Phi$) leaks from the process of financial intermediation; hence capital market equilibrium is given by:

$$\Phi S_t = I_t \quad (2.6)$$

from equation (2.5) the growth rate at time t+1 is given by:

$$g_{t+1} = (Y_{t+1}/Y_t) - 1 = (X_{t+1}/X_t) - 1 \quad (2.7)$$

If we re-arrange equation (2.5), it yields $X_{t+1} = I_t + (1-\pi)X_t$ and substituting into the above yields:

$$g_{t+1} = (I_t + X_t - \pi X_t) / X_t = I_t / X_t - \pi \quad (2.8)$$

If we re-arrange equation (2.1), it yields $X_t = Y_t/\alpha$ and then by substituting into the above, we obtain:

$$g_{t+1} = \alpha(I_t/Y_t) - \pi \quad (2.9)$$

If we substitute capital market equilibrium in equation (2.6) into equation (2.9), we obtain:

$$g_{t+1} = \alpha\varphi(S_t / Y_t) - \pi \text{ .....(2.10)}$$

From equations (2.9) and (2.10), we can sum up the steady state solution as follows:

$$g_{t+1} = \alpha(I_t/Y_t) – \pi = \alpha\varphi\tau - \pi\text{..... .(2.11)}$$

where $\tau = S_t / Y_t$. In the context of this study, equation 2.11 predicts that financial development affects growth by raising the coefficient of savings (increasing the social productivity of capital (α), or influencing the saving rate (τ).

2.1.4.6. The Life-Cycle Theory of Consumption and Saving

This model developed by Japelli & Pagano (1994), supports the notion of the direction of association running from growth to saving. The life-cycle saving model has income-earning households saving to finance consumption when they become old - non-earning households. The theory assumes individuals live for three periods and this provides an incentive for intergenerational borrowing. Individuals borrow to finance current consumption when they are young and repay the loan and save for retirement in their middle age. They consume the assets accumulated in the second period of their life when they grow old. Thus, the volume of their savings depends on how much they earn during the middle age.

2.1.4.7. The Absolute Income Hypothesis (AIH)

This was developed by Keynes (1936) in his book titled *The General Theory of Employment, Interest and Money*. According to him, many factors such as wealth, interest rate, income, expectations, demography (household sizes) etc. may influence consumption but the basic determinant of consumption is current income or current disposable income. This is based on introspection and causal observation. As income increases, consumption, on the average increases, but the increase in consumption is less than the increase in income. This means that the marginal propensity to consume (MPC) – the amount consumed out of an additional unit of income - is between zero and one. This, he referred to, as the “Fundamental Psychological Law”. The "fundamental psychological law of any modern community is that, when its real income is increased, it will not increase its consumption by an equal absolute amount," and stated that "as a rule, a greater proportion of income is saved as real income increases."

Keynes (1936) posits that the ratio of consumption to income, called the average propensity to consume (APC) falls as income rises. This is interpreted to imply that at any point in time, he expected the rich to save a higher proportion of their income than the poor; or that at a very low level of income, people will dis-save. This implies that MPC < APC. The acceptance of the theory that MPC < APC and that as income increases APC falls, led to the formulation of the stagnation thesis in 1940. According to this theory if APC falls and private investment is constant, government spending should increase faster than the increase in income otherwise the economy will decline or stagnate. Keynes admitted that interest rate could influence consumption as a matter of theory. But his main conclusion was that the influence of interest rate on individual spending out of a given income is secondary and unimportant. This view contrasts with the classical notion that a higher interest rate encourages saving and thus discourages consumption. Thus, according to Keynes, it is the increased growth, measured in income that leads to increased savings. Increased savings is impossible without increased growth of the economy.

2.1.4.8. The Permanent Income Hypothesis (PIH)

Friedman (1957) develops the Permanent Income Hypothesis. According to him, current income (Y) should be viewed as the sum of two components: permanent income (Y^P) and transitory income (Y^T) that is:

$$Y = Y^P + Y^T \quad \text{.....} \quad (2.12)$$

Permanent income is that part of income that people expect to persist into the future. On the other hand, transitory income is that part of income that people do not expect to persist. For example, a good education provides a permanently higher income whereas a good weather provides only transitory higher income. Friedman assumes that consumption is planned on the basis of permanent income and that the relationship between the two variables is proportional:

$$C = k\,Y^P$$

Where: k is the coefficient of proportionality, which Friedman assumed, depends on factors like household preferences, rate of interest, demographic factors, human wealth etc... For example, if a person received a permanent pay rise of two hundred USA dollars, his consumption would rise by as much. However, if the person won a lottery of the same amount, he would not consume all

in one year. He is likely to spread the extra consumption over the rest of his life. It is out of income that people save.

2.1.4.9. The Relative Income Hypothesis (RIH)

The relative income hypothesis was proposed by Duesenberry (1949). Relative income hypothesis states that an individual's attitude to consumption and savings is guided by an abstract standard of living. "Keeping up with the joneses" may be a more powerful incentive than the pursuit of wealth for its own sake.

Duesenberry's analysis is based on two premises. The first premise is with respect to the consumption behavior of an individual. It states that the consumption behavior of individuals is interdependent. An individual is not so much concerned with his absolute level of consumption as he is with his consumption relative to the rest of the population, thus, the percentage of income consumed by an individual depends on his percentile position in the income distribution.

The second premise states that the present consumption is not influenced merely by present levels of absolute and relative income, but also by levels of consumption attained in previous periods. He argues that consumption relations are irreversible over time. It is difficult for a family to reduce the level of consumption once attained. The aggregate ratio of consumption to income is assumed to depend on the level of present income relative to past peak income. Duesenberry's approach says that people are not just concerned about absolute levels of possession. They are concerned about their possessions relative to others, "keeping up with the joneses." People are not necessarily happier if they have more money. They do however report higher happiness if they have more relative to others.

He argues further that people are more reluctant to reduce their spending in relation to a fall in income than to increase spending in relation to increases in income. The reason is that we do not want to alter our standard of living downward. When the World War II ended, a significant number of economists believed that there would be a consumption decline and a drop in aggregate demand, but that did not occur. This provided supporting evidence to Duesenberry's argument that people do not want to alter their standard of living downwards. This approach therefore, assumes that savings in out of income. It is that part of income not consumed that is saved.

2.2 Empirical Literature

The relationship between savings and economic growth is studied using correlation and dynamic models. However, many recent studies focused on the dynamic relationship of savings and economic growth using the concept of Granger causality. Lean and Song (2008) have examined the short-run and long-run relationship between savings and economic growth in China using Granger causality test via time series annual data from 1955-2004. They found bi-directional causality between gross domestic savings and economic growth in the short-run. In the long-run, a unidirectional causality exists running from the gross domestic savings to economic growth.

The study by Bassam and AbuAl-foul (2010) employed an econometric technique to investigate the long-run relationship between real gross domestic product and real gross domestic saving for Morocco and Tunisia during the period 1965-2007 and 1961-2007, respectively. The regression reveals interesting results. For instance, it was shown that a long-run relationship exists between gross domestic product and gross domestic saving in Morocco, there was no such evidence for Tunisia. Secondly, the Granger causality test indicates the existence of a two-way causal relationship between gross domestic product growth and gross domestic saving growth in Morocco. Lastly, the author observed a unidirectional Granger causality between real gross domestic product and real gross domestic saving as causality runs from gross domestic saving to gross domestic product growth in Tunisia.

Sinha and Sinha (1998) employed econometric techniques to validate or invalidate the claim that higher saving rate leads to high growth rate. The empirical results did not support the view that higher saving rate causes higher economic growth. The authors concluded that causality runs from economic growth to saving. Further Sinha (1999) examined the relationship between the growth rate of savings and economic growth in Sri Lanka. In this study, the causality was from growth rates of gross domestic savings to economic growth rate. However, Sinha (2000) did similar studies in the Philippines and found causality from economic growth rate to growth rate of domestic savings. Finally, Sinha and Sinha (2007) examined the relationship between per capita saving and per capita GDP for India during the 1950-2004 periods. The authors employed the Toda and Yamamoto tests of Granger causality and discovered that there is no causal relationship between per capita GDP and per capita household saving/per capita corporate saving. On the contrary, the results show the existence of a bi-directional causal relationship between per capita household saving and per capita corporate saving.

Carrol and Weil (1993) examine the causal relationship between income growth rate and growth rate of savings using both cross-country and household data in OECD countries (Japan, Hong Kong, South Korea, Singapore etc.) using VAR model of Granger causality (GC) test. They find that income growth rate granger causes growth rate of gross domestic savings but gross domestic savings does not granger cause income growth. According to them the positive effect of growth on saving implies that previous estimates of saving on growth may be overstated.

Andersson (1999) used the bivariate vector autoregressive (VAR) or vector error correction (VEC) models to analyze the relationship between saving and GDP for a group of countries that include Sweden, UK, and USA. The results of the Granger causality test indicated that the direction of causal relationship between saving and output differ across the countries. Agarwal (2001) investigated the causality between gross domestic product (GDP) and saving for a sample consisting Asian economies. The author discovered that, in most economies causality runs from Economic growth to saving.

Mohan & Ramesh (2006) carried out causality study between economic growth and domestic saving for selected lower income countries (LIC), lower middle income countries (LMIC), upper middle income countries (UMIC) and higher income countries (HIC) to see if the level of income affects the direction of causality between domestic saving and economic growth. Among lower income countries, there is no evidence of causality between growth and saving in India while unidirectional causality was observed in the case of Indonesia (saving granger causes growth), Senegal and Nigeria (growth granger cause saving) whereas bidirectional causality evidence was observed in the case of Cote d'Ivoire.

In the cases of the lower middle income countries, the finding revealed that growth granger causes saving in countries such as Algeria, Thailand and Colombia. The case of Ecuador, however, witnessed the absence of any causality between GDP growth and domestic saving while Egypt was excluded from the causality test because of the absence of cointegration between the variables.

In the upper middle income countries case, evidence of bidirectional causality has been discovered to dominate as in four countries out of the five namely, South Africa, Brazil, Argentina and Chile the two way causality was obtained. Malaysia was another country categorized under upper middle income level but drooped from causality test due to the absence of cointegration between the variables.

Under the fourth category, higher income countries, bidirectional causality was obtained in eight countries (Norway, Canada, Japan, South Korea, UK, Finland, Iceland and Sweden) out of the selected ten nations. USA was excluded from the test as there was no evidence of cointegration while Singapore's case witnessed the fact that causality runs from saving to economic growth. The Author was not surprised by the case of Singapore as the country applies forced saving system (the Central Provident Fund) where employees have been benefited of 40 percent provident fund (20 percent from employee and 20 percent from the employer).

Saltz (1999) uses both the VECM and VAR model of the Granger causality method to examine the causal relationship between savings and economic growth of seventeen Third World countries. For nine countries whose variables were cointegrated, he used the VECM. For other eight countries whose variables are not cointegrated, he used the Vector Autoregressive (VAR) model to find the causality. The results are that in four countries (Colombia, Jamaica, Peru, and the Philippines) no causality is detected in either direction. For eight countries the empirical results indicated that the growth rate of real GDP positively granger causes the growth rate of gross domestic savings. For two countries (Argentina and Taiwan), it is the growth rate of gross domestic savings which granger causes the growth rate of real GDP. Finally, for two countries (Dominican Republic and Mexico), there is bi-directional causality.

Piotr (2010) analyzed the cause and effect relationship between economic growth and savings in advanced economies and in emerging and developing countries. In his work he used co-integration models and Granger's causality test. The results confirmed the existence of one way causal relationship from domestic savings to GDP in the case of developed countries as well as in developing and transition countries. The same results found by Ramesh (2011), when he investigated the relationship between savings, investment and economic growth for India over the period 1950-51 to 2007-08. He found that the co-integration analysis suggested that there was a long-run equilibrium relationship. The results of Granger causality test showed that higher savings and investment led to higher economic growth, but the reciprocal causality is not observed. Further, it was empirically evident that savings and investment led growth is coming from the household sector.Similarly, Kafayat and Moyo (2013) found that domestic savings is an important aspect of growth in the Botswana economy. In both the short and long run, domestic savings is positively and significantly related to growth, characteristically strongest in the long run. The researchers therefore conclude that the savings – growth relationship in Botswana follows the growth theories of Solow (1956) of savings being indispensable for investment and

economic growth. The role played by domestic savings and hence investment becomes crucial in supporting the country's diversified growth process.

Katircioglu and Naraliyeva (2006) analysed the relationships between domestic savings, direct foreign investment and economic growth in Kazakhstan in the 1993-2002 period using the Granger causality test and co-integration methods. The results of their research pointed at the existence of one-way, positive relation between domestic savings and economic growth in Kazakhstan in a long period of time.

Pahlavani et al, (2006) have explored the relationship between gross domestic savings and economic growth for Iran using Granger causality test. The result indicates that there is positive relationship between economic growth and gross domestic savings and that the direction of causality runs from gross domestic savings to economic growth.

Sajid and Sarfraz (2008) investigated the causal relationship between savings and output in Pakistan by using quarterly data for the period of 1973:1 to 2003:4. The authors employed both co-integration and the vector error correction techniques and discovered that bi-directional long run relationship exists between savings and output level. Moreover, the results showed that there is a unidirectional long run causality from public savings to output (GNP and GDP), and private savings to gross national product (GNP). Furthermore, the long run results favor the capital fundamentalist's point of view that savings precede the level of output in case of Pakistan. In addition, the results showed that unidirectional short run causality runs from gross national product (GNP) to national and domestic savings; and from gross domestic product (GDP) to public savings. Besides, short run causality was shown to run from national savings to gross domestic product (GDP). Finally, the overall short run results favor Keynesian point of view that savings depend upon level of output.

Pinchawee (2011) examine the relationship between domestic saving and economic growth and convergence hypothesis: case study of Thailand by using time series annual data from 1960 to 2010. Granger causality test were conducted, and the results showed that there was uni-directional causal relationship between domestic savings and growth rate of GDP in Thailand. The direct of causality go from economic growth to domestic saving only.

Tang and Chus (2009) re-examined the saving-growth nexus in Malaysia by using the nonparametric methodology. They have found saving and economic growth to be positively related in the long run. They also confirmed that the policies which encourage saving should be implemented because saving, as indicated in the causality test, is an important driver of economic growth through its impact on investment.

Seng (2014) examine the direction of causality between domestic saving and economic growth in Cambodia, using data for the period 1989–2012. The empirical analysis was based on Granger Causality Test. The study found that domestic saving does not Granger cause economic growth. This finding is contrary to the conventional wisdom that causality runs from saving to economic growth. Economic growth itself is also not found to Granger cause saving. So it can be concluded that domestic saving and economic growth are independent of each other in Cambodia.

Anoruo and Ahmad (2001) examined the causal relationship between saving and economic growth in seven African countries (Kenya, Ghana, South Africa, Congo, Côte d'Ivoire, Zambia etc.), using cointegration and the vector error correction model (VECM). The results of the cointegration tests suggest that there is a long-run relationship between economic growth and growth rate of saving. The results from the Granger causality tests indicate that causality runs from growth to saving in five countries while the case of South Africa and Cote d'Ivoire revealed bidirectional causality evidence. It was only in Congo where evidence of granger causality running from saving to growth was observed. Baharumshah et al. (2003) have investigated the relationship between the growth rate of gross domestic savings and the growth rate of real GDP in five Asian countries: Singapore, South Korea, Malaysia, Thailand and the Philippines using Granger causality method based on time series data from 1960-1997 using the Vector Error Correction model. The authors find that the growth rate of gross domestic savings does not granger cause economic growth rate in the countries except Singapore.

Aylit (2003) have also studied the relationship between private savings and economic growth in South Africa using the Granger causality method of causality. He finds that the private saving rate has a direct as well as an indirect effect on growth. The indirect effect is through the private investment rate. In turn, he also finds that growth has a positive effect on the private saving rate. Thus, there is a virtuous cycle as growth enhances saving, which in turn further enhances growth.

Romm (2005) and Odihiambo (2009) both find that there is a bidirectional relationship i.e. that savings supports growth whilst growth also supports savings. Using a Johansen VEC model to assess the direction of causality between saving and growth in South Africa Romm (2005) finds that "while the private saving affects steady state per capita output directly….a higher steady state per capita output positively affects the saving rate".

In Nigeria, Olajido (2009) employed the Toda and Yamamoto (1995) and Dolado and Lutkepohl (1996) TYDL methodology to examine the direction of causal relationship between savings and economic growth between 1970 and 2006. The empirical results proposed that savings and economic growth were positively co-integrated indicating a steady long run equilibrium relationship. Further, the findings revealed a unidirectional causality between savings and economic growth and the corresponding role of FDI in growth. The same results found by Abu (2010) when he employed the Granger-causality and Johansen co-integration test to analyze the relationship between savings and economic growth in Nigeria during the period 1970- 2007. He found out that causality run from economic growth to saving, implying that economic growth proceeded and Granger causes saving. He recommended that government and policy makers should employ policies that would accelerate economic growth so as to increase saving. On the contrary, the study of Adebiyi (2000) examines the empirical evidence regarding gross domestic savings and economic growth relationship in Nigeria using a quarterly data spanning between 1971 and 1998. He investigates the causal links between saving and growth using Granger causality test via vector autoregressive model. In the final analysis the Granger causality tests showed that, in Nigeria, saving-GDP ratio granger causes per capita income.

Emmanuel (2009) examine the direction of causality between gross domestic savings and economic growth (using real per capita GDP as a measure of growth) of Ghana using annual time series data from 1961-2008. By using the Vector Autoregressive (VAR) model and Pairwise Granger Causality Test. The results showed that there was bi-directional causal relationship between growth rate of gross domestic savings and growth rate of real per capita GDP in Ghana.

Waithima (2008) used the Hendry Model with a two-step method to model a saving function for Kenya. The author observed that a 1 percentage increase in GDP growth rate causes a 0.5 percentage increase in private saving. Moreover, the causality tests revealed a unidirectional causality that runs from per capita GDP to private saving.

Dawit (2005) has investigated the causal relationship between the real economic growth and the growth rate of real gross domestic savings in Ethiopia for the period 1960-2003 using annual time series data and Granger causality method. The findings lend support to the hypothesis that faster growth of real gross domestic savings (RGDS) granger causes higher growth rates of real gross domestic product (RGDP) in Ethiopia**.** Also to the lesser extent, a higher rate of growth of real GDP causes a faster growth of real GDS. Finally, for Ethiopia bi-directional (feedback) causality was found.

There are different conclusions about the relationship between domestic saving and economic growth either from the theoretical or empirical analysis. Different studies provide different findings. This means that findings on the causal relationship between saving and economic growth are still questionable. This may be due to the quality of data or the estimation techniques that were used.

CHAPTER THREE
OVERVIEW OF ETHIOPIAN ECONOMY WITH A FOCUS ON ECONOMIC GROWTH AND GDS

3.1 Trend in real gross domestic product (GDP)

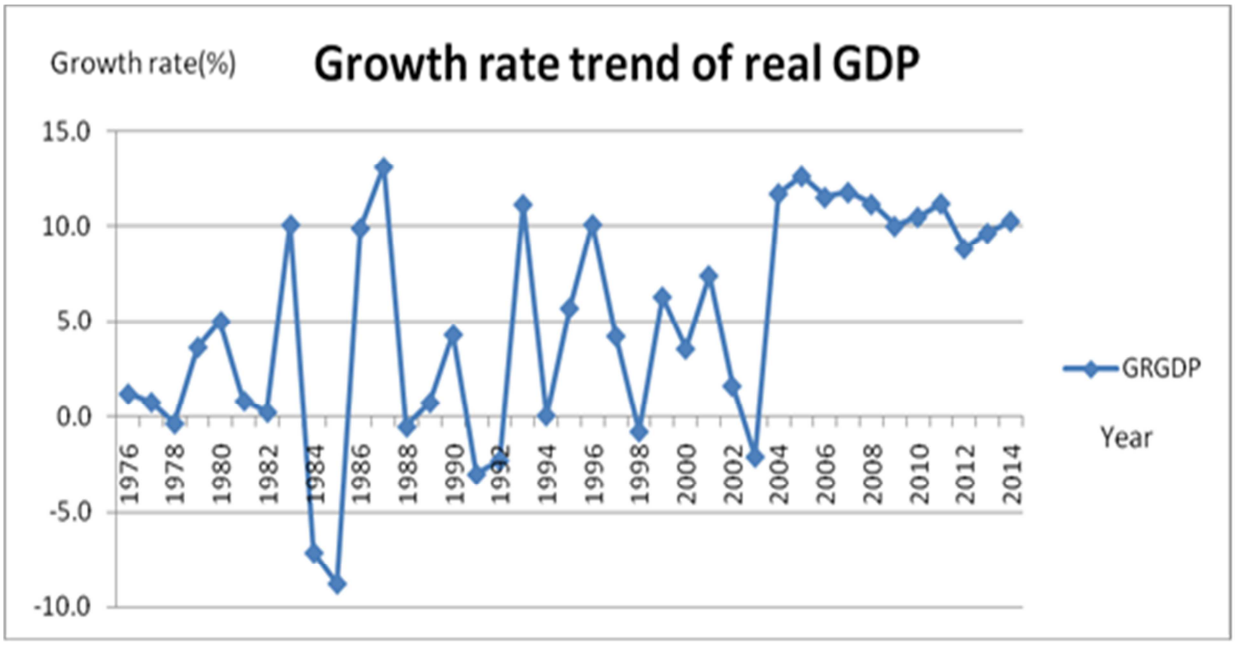
The Ethiopian economy has experienced different growth episodes during the sample period. In the mid-1970s unpleasant overall economic performance dwelled throughout the beginning of the 1990s. That means economic deceleration ended with the demise of the Dergue administration in May 1991. Thereafter, the poor economic performance has been reversed. If there has been any erratic macroeconomic growth path, it is attributed to both policy and non-policy related internal & external shocks in the pre-Dergue Ethiopia.

The evolution of the Ethiopian economy and its growth performance can be considered as taking in different phase as the figure 3.1 show that the growth rate of the nation's economy, which performed unsatisfactorily in real GDP especially in the periods from 1975/76-1990/91. This was the period when the Dergue overthrew the monarchy government, promulgated and implemented centrally planned socialist economic management system. Thus, the centralized economic administration of the military government that lasted seventeen years experienced a dismal macroeconomic performance as depicted below. This had ended up in the increasing degree of macroeconomic distortion and misallocation of scarce resources.

After devastating the nation's private sector undertakings and steadily growing economy, the Ethiopian Peoples' Revolutionary Front (EPRDF) forces overthrew the military government in May 1991. The downfall of the Dergue government paved way for the EPRDF led Transitional Government of Ethiopia (TGE) to adopt a market oriented economic policy and to implement the World Bank and IMF backed structural adjustment programs (SAPs) that were expected to put the economy on its right track by eliminating distortions and resource misallocations at large. However, the figure shows that picture of the country's economy had dramatically changed with the introduction of command economic system in 1975. For the period 1975/76-1990/91 even though the nation's economy was characterized by up and down swings in the growth process, the overall performance was extremely disappointing and poor as already mentioned above. This implies that per capita income was decelerating during the military administration. Large

decelerations were observed in the years 1984/85 and 1990/91. The former was due to drought and famine whereas the latter was due to the civil war and political instability.

In recent time, however, The Ethiopian economy continued to grow and the overall economic performance reflected the rapid expansion of the country. Real GDP continued to grow on average by 10.8 percent in the past decade (2005- 2014). During the year 2014, the real GDP revealed a remarkable growth of 10.3 percent compared to the 5.4 percent forecast for sub-Saharan Africa countries.



Source: Own Calculation using the data from NBE

Figure 3.1 – Trend of real GDP Growth from 1976-2014 in a diagram.

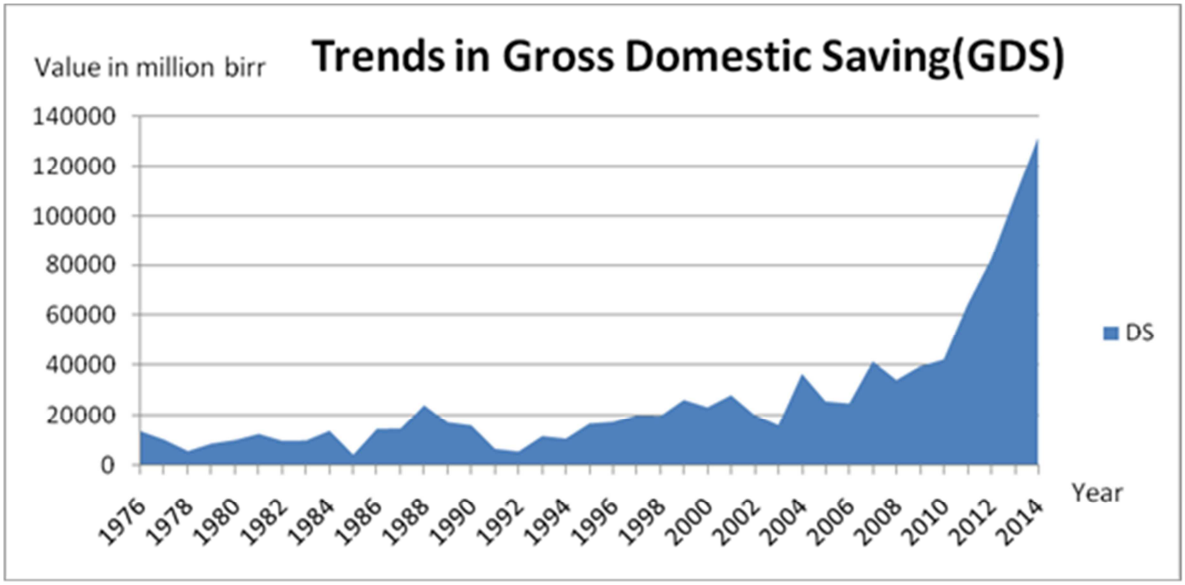
3.2 Trends in Gross Domestic Savings (GDS)

Macroeconomic theory reveals that economic growth is substantially affected by the rate of investment, which in turn is highly influenced by the rate of gross domestic savings (GDS). However, the value of the Ethiopian gross domestic savings was lower in the 1980s in the 1990s. the possible reason for lower value in gross domestic saving at that time was external aggression by the then Somalia expansionist regime from the late 1970s up to the early 1980s had badly affected the country's overall economic activities in general and agricultural sector in particular, which is the nation's mainstay. Continued civil war was also a main cause for this unsatisfactory performance of Ethiopia's gross domestic saving in the 1990s.

In the meantime, the poorest performance of was recorded in 1985, which was one of the worst drought periods in nation's history. The highest rate of was achieved in1987/88 after three years of recovery from the horrible drought in 1984/85, which had caused downturns during the military regime. Despite encouraging economic reform measures, disappointing performance of the country's GDS has continued at the beginning of 1990s.

This could be due to unfavorable economic basis inherited from the previous regime. Furthermore, because of unexpected Eritrea's aggression in May 1998, the country's GDS had reached a rock bottom. Due to the war Ethiopian government and the entire public opted to redirect their material and human resources to defend their country that negatively affected the entire economy.

However, the country's GDS has been showing a recovering trend in the post Ethio-Eritrea border war particularly, in the last 10 year due to sound economic policy, all in all in recent time the Ethiopian gross domestic saving witnessed and encouraging performance.



Source: Own Calculation using the data from NBE

Figure 3.2 – Trend of real GDS Growth from 1976-2014 in a diagram.

3.3 The Relationship between GDP and GDS

There have been numerous studies on the relationship between GDP and savings at the domestic level. The conclusions arising out of these studies depend on the data collected from various income classes of the economy.

In Ethiopia, available data indicate that there is a positive relationship between gross domestic savings and economic growth. This is shown in table 3.1.

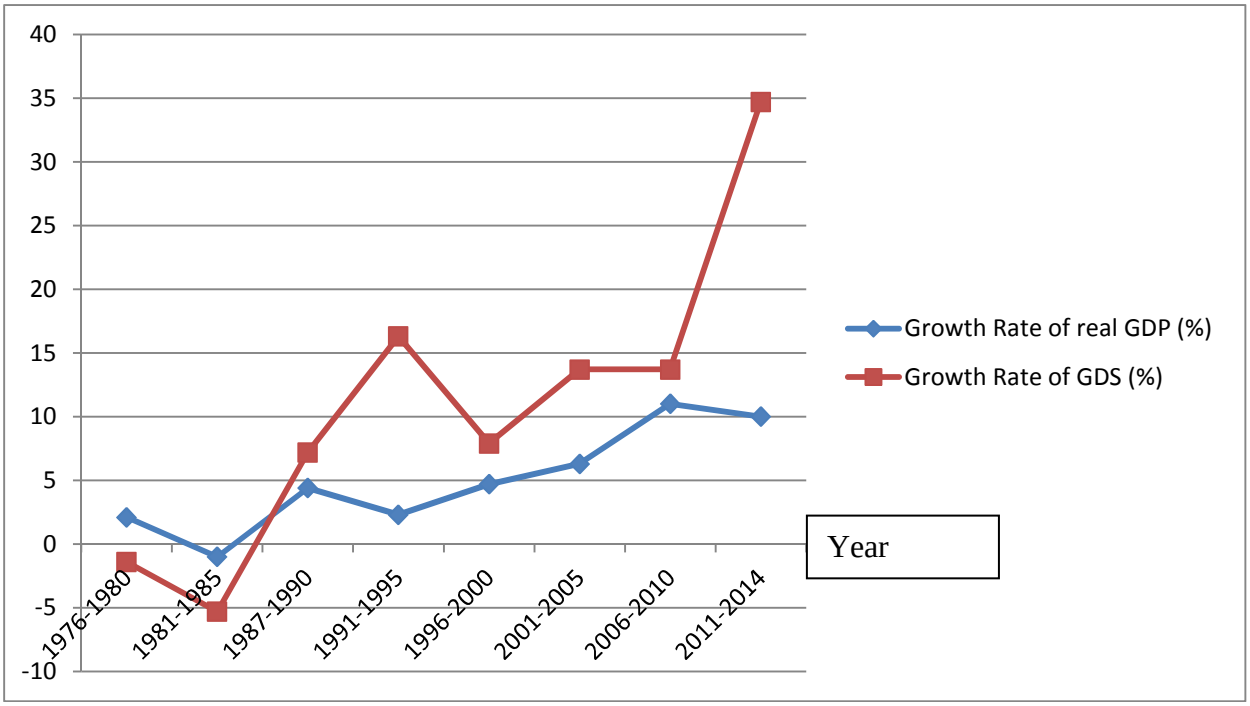
Table 3.1: Growth Rates of real GDP and Gross Domestic Savings

Year	Growth Rate of real GDP (%)	Growth Rate of GDS (%)
1976-1980	2.1	-1.4
1981-1985	-1	-5.3
1987-1990	4.4	7.2
1991-1995	2.3	16.3
1996-2000	4.7	7.9
2001-2005	6.3	13.7
2006-2010	11	13.7
2011-2014	10	34.7

Source: Own Calculation using the data from NBE

The table indicates that periods of high economic growth rates are marked by high savings rates and vice-versa. For instance, for the period 1976-1980 the average growth rate of domestic saving was negative surprisingly between the period 1981-1985 both the average growth rate of gross domestic product and growth rate of gross domestic saving extremely disappointing and poor as shown in the figure and table below. In the year between 1987-1990 it seems both growth rate of real gross domestic product and growth rate of gross domestic saving growing but the sever deceleration in gross domestic product and saving in the year 1985/86 caused by drought starts to revive i.e. a marginal increase in gross domestic product and saving causes a higher growth rate .however, the country's growth domestic product and saving starts to show recovering trend to reach the highest average growth rate of gross domestic product 11 registered between the period 2006-2010 and the highest gross domestic saving of 34.7 percent on average is reached between the year 2011-2014 spurred by sound economic policy, the Ethiopian economy witnessed an encouraging overall economic performance. For example, during fiscal year 2013/14, GDP at constant prices grew double digit (10.3). This high growth achieved for the 10 time in a row (i.e. since 2003/04), placed Ethiopia among the top performing economies

in sub Saharan Africa. Similarly, gross domestic savings showed an improvement through time especially after 2010 GDS increase at increasing rate because of government encourage saving by different mechanism like household saving for housing etc. When the table is plotted on a diagram, we have figure 3.3.



Source: Own Calculation using the data from NBE

Figure 3.3 - Relationship between GDS and real GDP Growth from 1976-2014 in a diagram.

Therefore, in one respire economic growth leads to savings whilst in another respire savings leads to economic growth.

CHAPTER FOUR
DATA SOURCES & METHODOLOGY

4.1. Data Sources and Type

To conduct this study secondary data is used. The data used in this regression is obtained from National Bank of Ethiopia (NBE) & Ministry of Finance and Economic Development (MOFED). In addition, other secondary data sources include journals, reports, books and various websites is used.

The study used time series data on real domestic savings and real GDP as a measure of economic growth in data for 40 years that ranges from 1975 to 2014. The period is selected based on the availability of complete data for consecutive years.

4.2. Model Specification

The close relationship between the gross domestic savings rate of an economy and the economic growth rate has been well specified in a number of empirical investigations (Pagano, 1994; Gavin et al, 2007; Sinha and Sinha, 1998; Saltz, 1999). The empirical analysis presented in this study draws from the model used by Abu (2010) for Nigeria and Piotr (2010). The theoretical model used to evaluate the relationship between saving and economic growth has its basis in the Keynesian premise and the Solow growth model. The Keynesian model reveals that saving (S) is a function of output (Y) and specified as follow:

$$S_t = \psi_0 + \psi_1 Y_t + \mu_1 \qquad (4.1)$$

Where:

S_t = saving

Y_t = economic growth

ψ_0 = free term in the equation

ψ_1 = savings to economic growth sensitivity coefficient,

μ_1 = random component

The coefficient of the term representing economic growth (Y_t) is expected to be positive. This is because as real GDP increases, income will increase thereby saving will increase.

However, Solow argued that higher saving preceded economic growth. Consequently, the Solow growth model specifies economic growth as a function of saving.

$$Y_t = \delta_0 + \delta_1 S_t + \mu_2 \quad (4.2)$$

Where δ_0 represent constants, and δ_1 are the slope coefficients, respectively.μ_2 refer to the disturbance term in the respective equations with zero mean and constant variance.

The coefficient of the term representing saving (S_t) is expected to be positive. This is because as saving increases, loanable fund will increase which lead to increase in investment thereby economic growth.

4.3. Method of Estimation and Analysis

The study used the co-integration techniques and Granger Causality to test the relationship and direction of causality between domestic saving and economic growth. As the above equations (4.1) and (4.2) individually cannot answer the debates regarding this causality issue, simultaneous VAR models where both economic growth and domestic savings growth rates are stated as a function of their own lags and the lags of each other are given in the VAR model bellow.

4.3.1 Unit Root Test

The first step in time series regression analysis is to test stationarity of each variable.In regressing time series variable on another time series variable, a high R^2 may be obtained with absence of any real or meaningful relationship between the variables. This is known as spurious or non-sense regression. This problem arises when the time series are not stationary (Gujarati, 1998). This fact forces us to conduct stationery test.In order to test stationarity of the variables in the data set; the study used the commonly known Augmented Dickey Fuller (ADF) test. The ADF test is preferred due to its simplicity and the fact that it has widely been used with satisfactory result. The presence of unit root indicates that the variables are not stationary.If the time series is not stationary it will be differenced till it becomes stationary. The number of unit root of the variable determines how many times the variable has to be difference to be stationary. The ADF tests equation is stated as:

$$\Delta X_t = \varphi_0 + \beta_1 X_{t-1} + \delta t + \sum^{n}_{i=1} \theta \Delta x_{t-1} + \mu_t \quad (4.3)$$

Where Δ is the first difference operator, t is the time trend, μ is the stationary random error, φ_0 is a constant, and $\beta 1$ is a coefficient. The null hypothesis is that the series contains a unit root which implies that $\beta 1 = 0$. The null hypothesis that the series contains a unit root is accepted if the calculated value, in absolute terms, is less than 1%, 5% or 10% critical value. On the other hand, the null hypothesis is rejected if $\beta 1$ is negative and statistically significant. In this case the calculated value, in absolute terms, is more than 1%, 5% or 10% critical value.

Where the null hypothesis is accepted, it means the series contains a unit root and thus the series is non-stationary. Dynamic modeling using variables when the stochastic process is non-stationary can produce invalid estimates. Granger and Newbold (1974) called such estimates 'spurious regression' results: high R^2 values and high t-ratios yielding results with no economic meaning. In the presence of unit root in the series, the series are differenced to avoid spurious regression results. The equation for differencing is:

$$\Delta y_t = y_t - y_t - 1 = \varepsilon_t \qquad (4.4)$$

Where Δ is the difference operator and ε_t is the stochastic term. ADF test is conducted again on the differenced data. The null hypothesis is rejected if $\beta 1$ is negative and statistically significant else the series should be differenced over again until stationarity is achieved. The standard econometric practice is, however, that series should be differenced up to two. If stationarity is not achieved by differencing two times a variable, the series should be abandoned.

4.3.2 Co-integration Test

When stationarity is achieved, the long run relationship between the variables in the study must be determined. The two widely employed approaches for testing cointegration relationships are the Engle-Granger (1987) two-step procedure and Johansen (1988) maximum likelihood approach. In the Engle-Granger approach the first step is to estimate the cointegrating regressions and then to test whether the residual obtained from the cointegrating regressions is stationary or not; if the residual is stationary, then the independent and dependent variables have long run relationships. This method requires time series in the system to be non-stationery in their level. The drawback of this procedure is that it is difficult to determine the number of equilibrium relationships if the variables are more than two. In addition to this, it needs priori information that the dependent variables are endogenous and the independent variables are

weakly exogenous. In cointegration relationship estimating a single equation is potentially inefficient since information is lost unless each endogenous and weakly exogenous variable is clearly identified. In this paper, the Johansen cointegration test is employed since it offers solutions for the above problem.

Using Johansen co integration test technique, we examined the long run relationship between real GDP and real domestic saving. The Johansen techniques allows the possibility of assessing long-term relationship between variable when they are all integrated of order one, and is thus an improvement on the prior, single estimation techniques. This technique also offers the advantage of allowing us to incorporate feedback effects between the variables, while also allowing for the separation of long-run equilibrium and short run dynamics. The existence of co-integration between the two variables suggests the presence of causality between them in at least one direction. Its absence, however, does not mean there is no causality between the variables.

4.3.3 Granger Causality Test

If the variables in the series are not co-integrated, then the causal relationship between economic growth and gross domestic savings will examine with the help of a Granger causality procedure based on Vector Autoregressive (VAR) model (Adebiyi; Mohan, 2006).

4.3.4 Vector Autoregression (VAR) Model

Vector Autoregression (VAR) approach is usually used to examine the dynamics of the relationship between two or more macroeconomic variables. VAR is frequently applied to avoid shortfalls of endogeneity and integrating order of variables**.** It is based on the property that forecast error variance decomposition allows inferences to be concluded with reference to the proportion of movements in particular time periods due to its own shocks and shocks arising from other variables in the VAR. By using VAR, impact of a shock can be checked in a particular variable traced through the system of equations that determine the impact on other variable and also variables that includes future values of shocked variables (Gujarati, 1998). In this case, the following equations are used to express the relationship between domestic saving and economic growth in the following VAR model.

$$logY_t = \psi_{10} + \psi_{11} logY_{t-1} + \cdots + \psi_{1n} logY_{t-n} + \delta_{11} logS_{t-1} + \cdots + \delta_{1n} logS_{t-n} + \epsilon_{1t} \quad (4.5)$$

$$logS_t = \psi_{20} + \psi_{21} logS_{t-1} + \cdots + \psi_{2n} logS_{t-n} + \delta_{21} logY_{t-1} + \cdots + \delta_{2n} logY_{t-n} + \epsilon_{2t} \quad (4.6)$$

Where:

- Y is real GDP
- S is real domestic Saving
- $\epsilon_{1t}\ and\ \epsilon_{2t}$ refers to error term with zero mean and constant variance
- $\psi_{1n}, \psi_{2n}, \delta_{1n}, \delta_{2n}$ measure elasticity of change in dependent variable to changes in the explanatory variables
- t indicates time measured in year
- n is number of lags included in the model
- $\psi_{10}\ and\ \psi_{20}$ are constants

This approach states that, economic growth granger causes domestic saving if the coefficients of δ_{2n} are statistically different from zero. Similarly, domestic saving granger causes economic growth if δ_{1n} is statistically not equal to zero. In this case, causality between saving and growth does not exist if none of the two situations is true. If both are true, there will be bidirectional causality or feedback between the two and if only one condition is true and the other one is false, unidirectional causality exists.

The above VAR model works only if the variables in the model are stationary at level. If the variables are not stationary at level, there are alternative options to test for causality based on whether such variables are co-integrated or not. According to Powell and Sephoko (2006), the causality testing options are:

- ✓ If x and y are I(0), Granger Causality with variables in level
- ✓ If x is I(0) & y is I(1) or y is I(0) & x is I(1), Granger Causality with I(0) variables in level and I(1) variables in difference

- ✓ If x and y are I(1), there are two different options
  - o x & y are not co-integrated, Granger Causality with variables in first difference.
  - o x & y are co-integrated, Vector Error Correction Model (VECM) based Causality Test as specified bellow will be used.

4.3.5 Vector Error Correction Model (VECM)

Error Correction Method (ECM) is called the speed of adjustment term. This measures the short run adjustments of the deviations of the independent variables from their long- run values. It shows that how much time would be taken by the economy to reach at long run equilibrium. Negative sign of speed of adjustment term shows that the economy will converge towards long run equilibrium and positive shows the economy will not converge to the long run equilibrium. ECM-1 is a residual.

On the other hand, Vector Error Correction Model (VECM) is used where the series are co-integrated. In other words, the VECM allows causality to emerge even if the coefficients of the lagged differences of the explanatory variable are not jointly significant (Fikadu, 2014). In this study, the vector error-correction model is expressed as follows:

$$\Delta logY_t = \sum_{i=1}^{n-i} \lambda_t \Delta logS_{t-i} + \sum_{i=1}^{n-i} \delta_t \Delta logY_{t-i} + \Theta_1 \Sigma_{t1} + \epsilon_{1t} \quad (4.7)$$

$$\Delta logS_t = \sum_{i=1}^{n-i} \psi_t \Delta logS_{t-i} + \sum_{i=1}^{n-i} \beta_t \Delta logY_{t-i} + \Theta_2 \Sigma_{t2} + \epsilon_{2t} \quad (4.8)$$

Σ_{t1} and Σ_{t2} are adjustment coefficients in growth and saving equations respectively. In this specification, θ_1 and θ_2 are elements of the adjustment vector. Under this specification, there are two sources of causality. Equation (4.7) and (4.8) demonstrate unidirectional causality from growth to saving if $\beta_t \neq 0$ and $\theta_2 \neq 0$ and saving to growth if $\lambda_t \neq 0$ and $\theta_1 \neq 0$ or statistically significant. No causality in either direction occurs if $\lambda_t = 0$, $\beta_t = 0$, $\theta_1 = 0$ and $\theta_2 = 0$ or we failed to reject the null hypothesis (H_0) of there is no causality (Saltez, 1999).

4.3.6 Diagnostic Tests

Diagnostic tests are performed to assess the performance of the VAR model or VECM used in running the regression. These tests include autocorrelation test, normality test and stability test.

4.3.6.1 Autocorrelation Test

The model assumes that successive values of the random variable u are temporally independent and that the value which u assumes in any one period is independent from the value it assumed in any previous period. This implies that the covariance of u_i and u_j equals zero. If this assumption is not satisfied, then the value of u in any particular period is correlated with its own preceding value (or values). This is known as autocorrelation or serial correlation of the random variable u. Where the random term is autocorrelated, the parameter estimates are still statistically unbiased but the variances of the parameter estimates are likely to be larger or the variance of the random term may be seriously underestimated or the predictions based on the parameter estimates will be inefficient in the sense that the variance is large. The null hypothesis of no serial correlation at lag order "h" is tested against alternative hypothesis of serial correlation is the VAR model. If the result is insignificant, the null hypothesis is accepted; if the result is significant, the null hypothesis is rejected implying the presence of serial correlation.

4.3.6.2 Normality Tests

The model assumes that the random variable u has a normal distribution. Symbolically: u~N (0, δ^2_U), which reads: u is normally distributed around zero mean and constant variance $\delta^2_{U.}$ This means that small values of u's have a higher probability to be observed than large values. This assumption is necessary for conducting statistical tests of significance of the parameter estimates and for constructing confidence intervals. If the assumption of normality is violated, the estimates of parameters are still unbiased but the statistical reliability by the classical tests of significance (t-statistic and F-statistic) of the parameter estimates cannot be assessed because these tests are based on the assumption of normal distribution of the u's. The null hypothesis is that the u's have normal distribution against the alternative hypothesis that the u's are not normally distributed.

4.3.6.3 Stability Test

Stability test is conducted to assess the stability of the coefficients of the model. Two tests are conducted: root of characteristic polynomial of the VEC model in table form and in graph. The null hypothesis is that the test results satisfy the stability condition when the root lays within the circle against the alternative hypothesis that the results do not satisfy the stability condition when root lays outside the unit circle.

CHAPTER FIVE

EMPIRICAL RESULTS

This chapter analyses the relationship between growth domestic saving and economic growth using annual data from 1975-2014 in Ethiopia. Before we go to the direct estimation of the model, we need to first employ the unit root test to check whether the time-series is stationary or not. After identifying the optimal lag length, the presence of the co-integrating vectors is tested using the Johansen procedure. Further the causality test from the VAR model or the Vector Error Correction Model and its confirmation or refutation by the Pairwise Granger Causality test is employed to find the direction of causality between domestic saving and economic growth. Finally Diagnostic tests are performed to assess the performance of the VAR model or VECM used in running the regression. Both variables are measured in natural logarithm so that their first differences approximate their growth rates.

5.1 Results of Unit Root Tests

To find the causal relationship between gross domestic savings and economic growth, the first thing to determine is the order of integration of the variables to determine whether they are stationary or non-stationary, that is, whether they follow a stochastic trend or follow a random walk. The variables are first presented in their logarithmic forms in graphs to determine the appropriate statistically method to use. For instance, the diagrams determine whether to choose only the intercept or the intercept with trend. The diagrams are presented in figure 5.1 and figure 5.2.

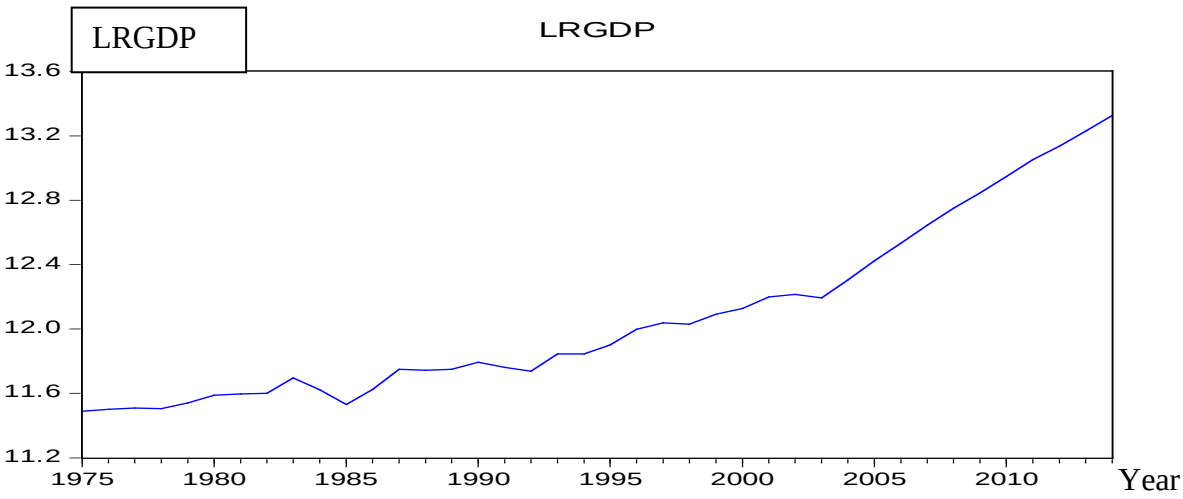


Figure 5.1 - graph of LRGDP in level

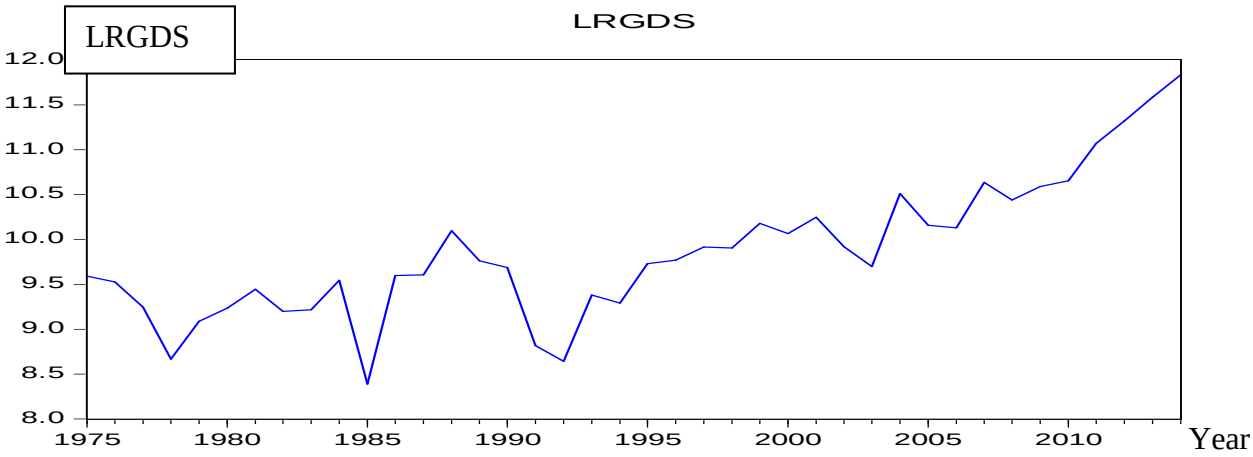


Figure 5.2 - graph of LRGDS in level

A careful examination of figures 5.1 and 5.2 in reveals that the variables are non-stationary. It is very clear that the graph of LRGDP in level exhibits trend whilst that of LRGDS exhibits a falling part for the first part of the graph and a rising trend for the second part of the graph. The Augmented Dickey-Fuller test (ADF, 1971, 1981) statistic is used to affirm or refute the results in figures 5.1 and 5.2. The ADF test takes two forms: intercept without trend and intercept with trend. The lag dimension of the ADF test regressions are determined by the Akaike Information Criterion (Akaike, 1973). The graphs of fig. 5.1 and 5.2 exhibit non-stationarity. The ADF tests confirm the nature of the graphs that they are non-stationary in their levels. Table 5.1 displays the results of the unit root test in levels.

Table 5.1 ADF Unit Root Test in Level

Augmented Dickey-Fuller Test Statistic *Ho: series has unit root; H1: series has no unit root*								
Variable	**without trend**	**ADF Test**	**5% CV**	**probability**	**with trend**	**ADF Test**	**5 % CV**	**probability**
LRGDP		3.6705	-2.9389	1.0000		0.1446	-3.5297	0.9967
LRGDS		0.0587	-2.9411	0.9581		-3.3168	-3.5297	0.0785

Notes: variable LRGDP and LRGDS are the logarithm of real GDP and the logarithm of real domestic saving respectively; CV represents critical values at 5% significance level.

Source: Eview's test output

The ADF test involves testing the null hypothesis of non-stationarity of the variables against the alternative hypothesis of stationarity. Due to the curvature of fig. 5.1 and 5.2, it is more appropriate to apply the ADF test of ***constant with trend*** in testing LRGDP since the graphical representation of LRGDP exhibits trend and in the case of LRGDS apply ADF test of both ***constant & constant with trend***. From table 5.1 at the log-levels, the null hypothesis of non-stationarity (constant and constant with trend) cannot be rejected. This implies that the variables are not stationary at their log-levels and that they are integrated of order one, that is, *I (1)* as shown in column four of table 5.1. The results of the Augmented Duckey-Fuller test in table 5.1 affirm that the variables are non-stationary in their levels.

The graphs of the variables in first difference are shown in figures 5.3 and 5.4 as follows:

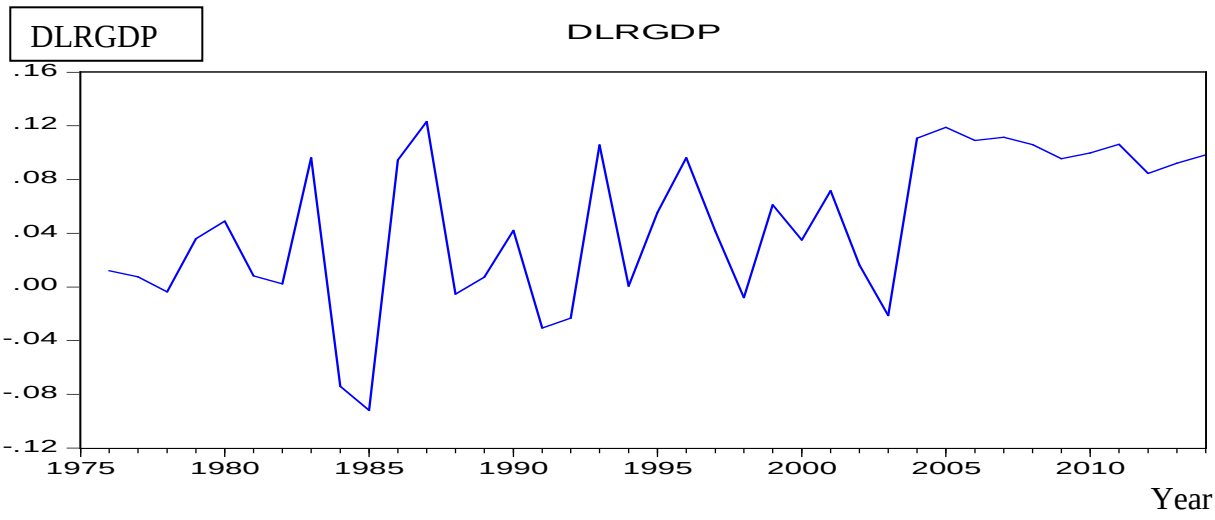


Figure 5.3 - graph of LRGDP in first difference

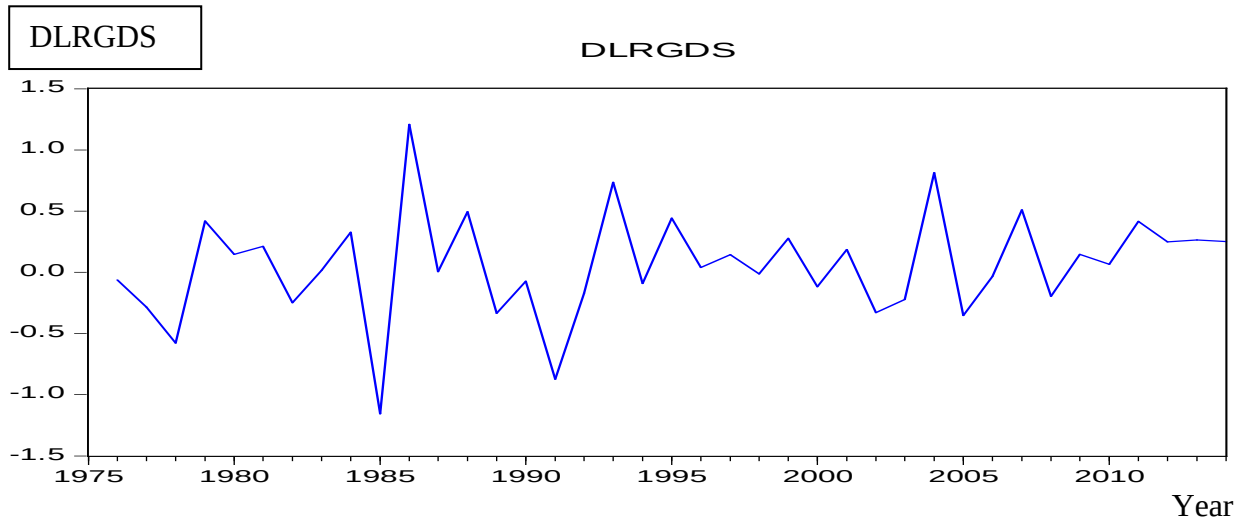


Figure 5.4 - graph of LRGDS in first difference

A careful examination of fig. 5.3 and 5.4 reveals that the series are stationary in first difference. The ADF test is again used to confirm or refute the results of the graphs. The results are presented in table 5.2.

Table 5.2 ADF Unit Root Test at First Difference

Augmented Dickey-Fuller Test Statistic *Ho: series has unit root; H1: series has no unit root*								
Variable	**without trend**	**ADF Test**	**5% CV**	**probability**	**with trend**	**ADF Test**	**5 % CV**	**probability**
Δ LRGDP		-4.3641	-2.9411	0.0013**		-6.2997	-3.5366	0.0000**
Δ LRGDS		-8.5218	-2.9411	0.0000**		-8.8138	-3.5330	0.0000**

Notes: variable LRGDP and LRGDS are the logarithm of real GDP and the logarithm of real domestic saving, respectively. Δ denotes first difference and CV represents critical values at 5% significance level. ** indicate statistical Significant at 1%.

Source: Eview's test output

The result of ADF test in table 5.1 indicates that the variables are non-stationary; however, they become stationary after the first difference. This is shown in table 5.2 where the variables are integrated of order zero, that is, *I (0).* The results affirm the results in the graphs that the series are stationary after their first difference. Thus, the results in table 5.2 above indicated that both real domestic saving and real economic growth are stationary in their first differences with and without trend.

5.2 Result of Lag Order Selection Criteria

Prior to estimating the co-integration test, we need to choose the number of lags to be included in the model. Burnham and Anderson (2004) argue that AIC has theoretical as well as practical advantage because it is derived from principles of information criteria. Thus, optimal lag length is chosen by AIC as indicated in Table 5.3 below.

Table 5.3 Lag Order Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	36.73933	NA	0.000498	-1.929963	-1.841990*	-1.899258
1	43.76754	12.88505*	0.000421*	-2.098197*	-1.834277	-2.006082*
2	45.46061	2.915832	0.000480	-1.970034	-1.530167	-1.816509
3	50.25352	7.721919	0.000462	-2.014085	-1.398272	-1.799149

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Table 5.3 indicates that the appropriate lag length criteria are one. This is based on the Akaike Information Criterion (AIC). In addition Final Prediction Error (FPE) and Hannan-Quinn Information Criterion (HQ) are chose one lag length to be the optimum lag length. The smaller the value of the information criteria, the better will be the model. Hence this study employs the optimal lag length of one for estimation techniques.

5.3 Result of Co-integration Test

Having chosen maximum lag length, accordingly, as Engle and Granger (1987) indicate, there should be a co-integration test. The existence of co-integration between the variables is an indication that there is a long run relationship between the variables. Hence, the Johansen co-integration method is applied. Using Johansen co integration test technique, we examined the long run relationship between real GDP and real domestic saving. As there are only two variables involved, the possible number of con-integrating vector is one. If the test statistics is greater than the critical values, the null hypothesis that there exists r co-integration vectors

against the alternative hypothesis that there are r=1 (for λtrace) or more than r (for λmax) is rejected. It can be concluded that there is a long-run relationship among the variables.

Table 5.4 Unrestricted Cointegration Rank Test (Trace)

Null (H_0)	**Alternative (H_1)**	**Trace Statistic**	**0.05 Critical Value**	**Prob.****
r=0	r≤1	48.23767*	25.87211	0.0000

r indicates the number of co integrating vector

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Table 5.5 Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Null (H_0)	**Alternative (H_1)**	**Max-Eigen Statistic**	**0.05 Critical Value**	**Prob.****
r=0	r=1	30.01593*	19.38704	0.0010

r indicates the number of co integrating vector

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

It can be seen from the above table 5.4 that the unrestricted cointegration rank test (Trace) shows cointegrating vectors at the 5% critical value .As Johansen Co integration Test reveals, the λ_{Trace} Statistics of 48.2 is higher than the 5 percent critical value of 25.9 percent significance level and hence we reject the hypothesis that r=0. That means the null hypothesis of no co-integration between economic growth and domestic saving is rejected at conventional level of significance (5 percent) and that there is a long run relationship between the variables. Also table 5.5 the unrestricted cointegration rank test (Maximum Eigenvalue) witnessed the existence of long-run relationship between domestic saving and economic growth in Ethiopia. The result is presented in appendix 3.

5.4 Result of Vector Error Correction Model

Since the variables are stationary in their first differences and co-integrated as well, Vector Error Correction Model (VECM) is the appropriate technique to test for causality. Therefore the results of the VEC model are presented as follow in equation form based on chosen lag length one.

$$\Delta Y_t = 0.0088 + 1.42\,\Delta Y_{t-1} - 0.17\,\Delta S_{t-1} - 0.96\,\Sigma_{t-1} \quad (5.1)$$

[0.09] [1.91] [-2.02] [-4.17]

$R^2 = 55.5$ Adjusted $R^{2\,=}$ 49.4 F-statistics = 9.04

$$\Delta S_t = -0.0062 - 0.96\,\Delta S_{t-1} + 1.88\,\Delta Y_{t-1} - 0.91\,\Sigma_{t-1} \quad (5.2)$$

[-0.041] [-6.81] [1.55] [-2.44]

$R^2 = 68.1$ Adjusted $R^{2\,=}$ 63.7 F-statistics = 15.44

From growth equation above, the lags of change in real domestic saving are statistically significant to affect change in current real GDP growth in the short run. Over the short run, change in current real GDP growth is not affected by its own lags change. The error term in growth equation also witnessed that domestic saving does help in reducing the disequilibrium in growth over the long run. Also, the overall fitness test indicated by F-statistics does not reject the hypothesis that the change in all the coefficients of the lags of domestic saving in growth equation is equal to zero. When a shock is introduce in the model it came back to equilibrium by 96 % adjustment in equation 5.1. In the saving equation however, the coefficients of the lags of change in real GDP growth are not statistically significant to affect changes in current domestic saving in the short run. The error term in equation (5.2) also revealed that long run disequilibrium in domestic saving can be reduced by GDP growth. In addition, the F-statistic in saving equation also indicates the fact that we can reject the null hypothesis that the coefficients of all lags of change in GDP are equal to zero in the saving equation. When a shock is introduce in the model it came back to equilibrium by 91 % adjustment in equation 5.2. The result is presented in appendix 4.

5.5 Result of Granger Causality Test

When two variables are co-integrated in a bivariate VAR or VEC analysis, Granger Causality exists at least in one direction. The Pairwise Granger Causality Test is performed to affirm or refute the results of the VEC model. Table 5.6 illustrates the results of the Pairwise Granger Causality test.

Table 5.6 Result of Pairwise Granger Causality Test

Pairwise Granger Causality Tests Sample: 1975 2014 Lags: 2			
Null Hypothesis:	**Obs**	**F-Statistic**	**Prob.**
ΔLS_t does not Granger Cause ΔLY_t	37	2.07792	0.1418
ΔLY_t does not Granger Cause ΔLS_t		6.87110	0.0033

Source: Eview's test output

The null hypotheses are in two forms: growth rate of gross domestic savings does not granger cause the growth rate of real GDP and the growth rate of real GDP does not granger cause the growth rate of gross domestic savings against the alternative hypotheses that the growth rate of gross domestic savings granger causes the growth rate of real GDP and the growth rate of real GDP granger causes the growth rate of gross domestic savings. From the results, the null hypothesis that the growth rate of gross domestic savings does not granger cause the growth rate of real GDP is accepted at 5% significance level. Thus, the alternative hypothesis rejected that the growth rate of gross domestic savings granger causes the growth rate of real GDP. However, the null hypothesis that the growth rate of real GDP does not granger cause the growth rate of gross domestic savings is rejected at 5% level of significance. Hence, the alternative hypothesis holds that the growth rate of real GDP granger causes the growth rate of gross domestic savings.

Therefore, there is unidirectional causality between domestic saving and economic growth in Ethiopia. This finding is supported by the VEC model estimated in equations 5.1 & 5.2 above. Baharomshah et al (2003) also found granger causality running from growth to saving in their VEC model study on five Asian countries like South Korea, Malaysia, Thailand and Philippines except Singapore where causality runs from saving to growth. Abu Nurudeen (2010) carried out granger Causality test for the case of Nigeria and found evidence of unidirectional causality running from economic growth to saving. Overall, the causality predominantly running from growth to saving in most low income countries and the case of Ethiopia is not different as the country is categorized under low income economies.

5.6 Results of Diagnostic Tests

Diagnostic tests are performed to assess the performance of the VAR model or VECM used in running the regression. The paper test all diagnostic tests like autocorrelation test, normality test, and stability test. It is worthwhile to check if the residuals of the model are not authocorrelated. In addition to serial correlation test, it is also advisable to recognize if the disturbances in the VEC model are normally distributed. Finally, the stability conditions of the VEC model estimated is checked using the stability condition test.

5.6.1 Result of Autocorrelation Test

The result of the test is presented in table 5.7. Breush-Godfrey Lagrange Multiplier (LM) test is used to perform VEC Residual Serial Correlation Test. Autocorrelation may arise due to omitted explanatory variables, mis-specification of the mathematical form of the model, interpolation in the statistical observations or mis-specification of the true random term. The table shows that at lag order 12, the results are not significant so the null hypothesis of no serial correlation in the model is accepted. This implies that the random variable “u” is not correlated with its previous values; hence there is no serial correlation in the model.

Table 5.7 – Result of Residual Serial Correlation Test

VEC Residual Serial Correlation LM Tests

H_0: no serial correlation at lag order h

Sample: 1975 2014

Included observations: 37

Lags	LM-Stat	Prob
1	4.359676	0.3595
2	7.529127	0.1104
3	8.160515	0.0859
4	1.940758	0.7467
5	8.558790	0.0731
6	6.067975	0.1941
7	6.017755	0.1978
8	4.553440	0.3363
9	1.646236	0.8005
10	4.983643	0.2890
11	0.551822	0.9683
12	0.488577	0.9746

Probs from chi-square with 4 df.

Source: Eview's test output

5.6.2 Results of Normality Test

In addition to serial correlation test, it is also advisable to recognize if the disturbances in the VEC model are normally distributed given the sample size is small. We use the skewness and kurtosis test statistics to check the normality of the disturbances. The results of the VEC normality tests presented in table 5.8 reveal that the chi-squared results of Skewness and Kurtosis are statistically insignificant, so is the result of Jarque-Bera statistic. Thus, the null hypothesis of normal distribution of the residuals is not rejected i.e. there is no normality problem in the VEC model.

Table 5.8 – Result of Residual Normality Test

VEC Residual Normality Tests

Orthogonalization: Cholesky (Lutkepohl)

H_0: residuals are multivariate normal

Sample: 1975 2014

Included observations: 37

Component	Skewness	Chi-sq	df	Prob.
1	-0.238000	0.349304	1	0.5545
2	-0.375850	0.871125	1	0.3506
Joint		1.220429	2	0.5432

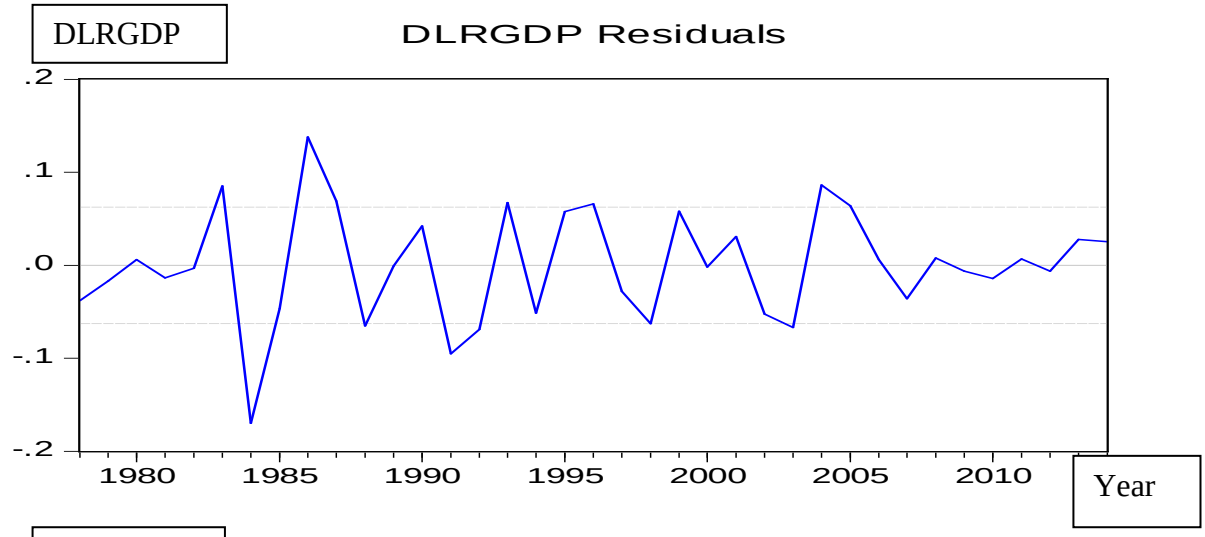
,

Component	Kurtosis	Chi-sq	df	Prob.
1	3.497925	0.382224	1	0.5364
2	2.382672	0.587520	1	0.4434
Joint		0.969744	2	0.6158

Component	Jarque-Bera	df	Prob.
1	0.731528	2	0.6937
2	1.458645	2	0.4822
Joint	2.190173	4	0.7008

These results are confirmed by residual graphs of fig. 5.5 and fig. 5.6. These graphs show that the residuals are normally distributed.

Figure 5.5 Tests for Residual Graphs of DLRGDP



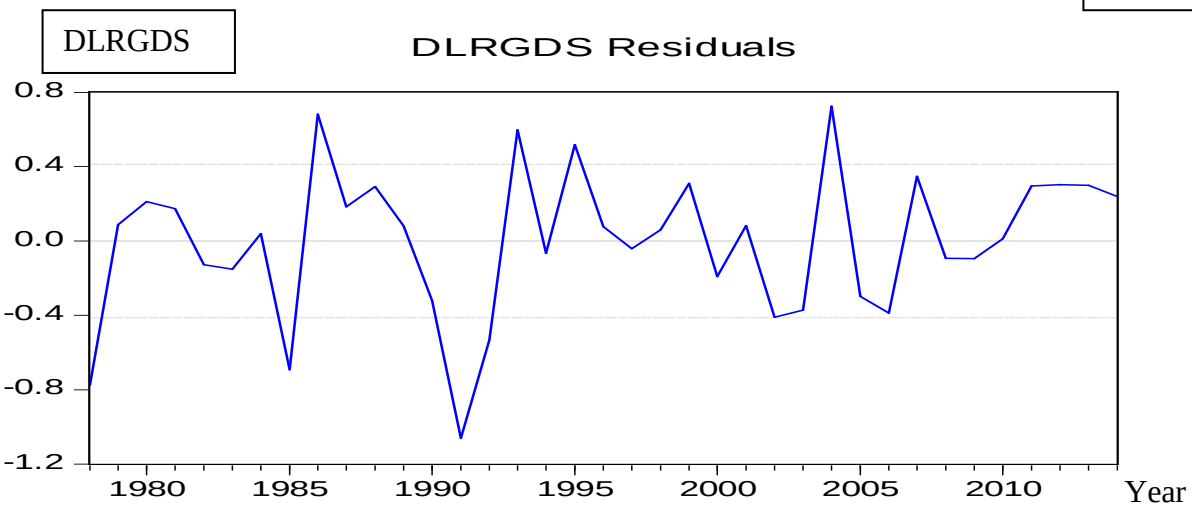


Figure 5.6 Tests for Residual Graphs of DLRGDS

5.6.3 Result of Stability Test

The result of the root of characteristic polynomial of the VEC is presented in table 5.9 and it indicates that the VEC model satisfies the stability condition. This implies that the parameters of the model are stable over the whole of the sample period. This result is confirmed by the graph result of Inverse Roots of Autoregressive (AR) Characteristic Polynomial of figure 5.7. Table 5.9 shows that “no root lays outside the unit circle.” even if one border condition is witnessed which is also not out of a unit circle. Thus, the stability tests reveal that the parameter estimates of the model are stable over the sample period.

Table 5.9 – Result of Stability Test
Roots of Characteristic Polynomial

Endogenous variables: ΔLRGDP ΔLRGDS

Exogenous variables:

Lag specification: 1 1

Root	Modulus
1.000000	1.000000
-0.659970	0.659970
-0.034163 - 0.376197i	0.377745
-0.034163 + 0.376197i	0.377745

Result of Inverse Roots of AR Characteristic Polynomial

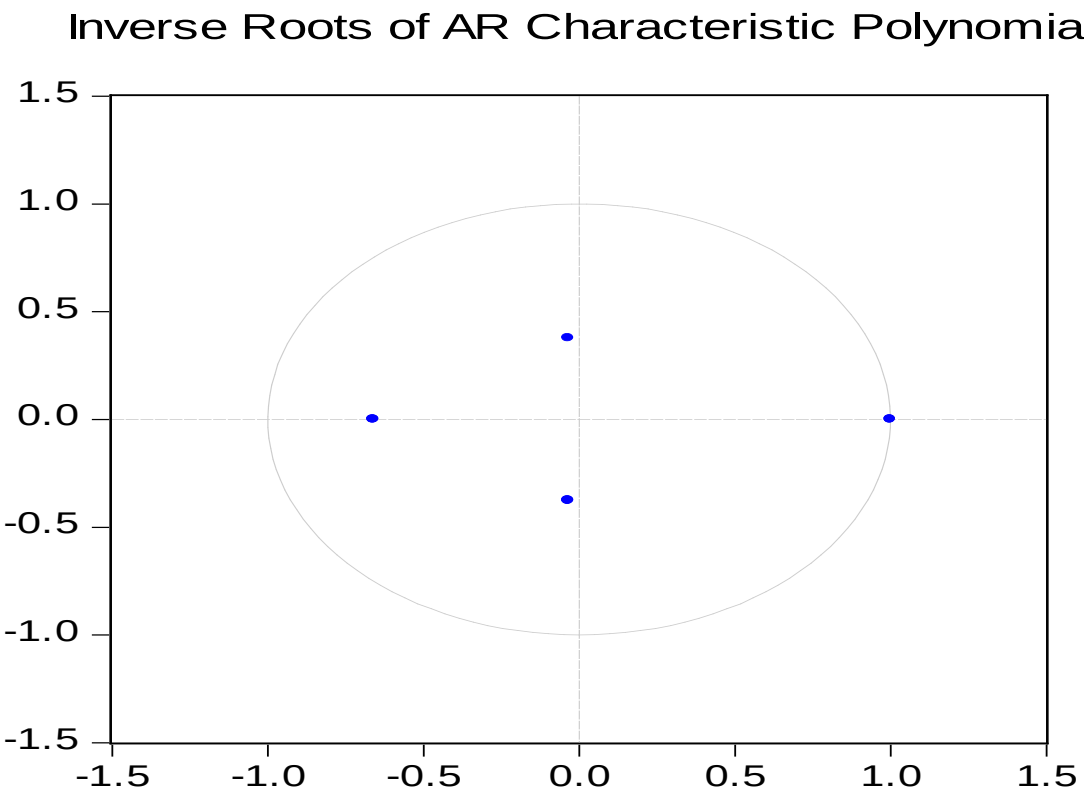


Figure 5.7 - the graph shows stability of the model

Source: Eview's test output

CHAPTER SIX

SUMMARY, CONCLUSION AND RECOMMENDATION

6.1 Summary of Findings

The study finds that there is long run relationship between gross domestic savings and economic growth in Ethiopia. The study, also, finds a positive unidirectional relationship between growth rate of gross domestic saving and growth rate of real GDP. The findings confirm the works of Abu (2010), Andersson (1999), and Pinchawee (2011) whose study on the causal relationship between economic growth and gross domestic savings using Granger causality test found a bidirectional relationship between them.

On the other hand, this study also finds that the direction of association between economic growth and gross domestic savings running from economic growth to domestic savings. . This result supports the economic growth theorists like Life Cycle Theory of Consumption and Savings of Japelli and Pagano (1994), Absolute Income Hypothesis of Keynes (1936), permanent income hypothesis of Friedman (1957) the financial repression theorists such as Tobin (1965) and empirical works of Carrol and Weil (1993), Sinha (1998), Waithima (2008) and Anoruo and Ahmed (2001).

6.2 Conclusion

Saving is one of the main factors to economic growth, once saving help create investment, production, employment, and finally enhance economic growth. Countries which have high rate of national saving are not mainly depend on foreign direct investment or external saving which create chance of risk from unstable currency.

Therefore, the primary purpose of this paper, “Causal relationship between domestic saving and economic growth: case study of Ethiopia”, has to examine the long-run relationship between economic growth and domestic saving of the country, whether there is a causal relationship between them and if so, where the angle of causality between them runs for Ethiopian economy. For this purpose, Granger Causality and Cointegration techniques were applied on annual time series data ranged from 1975-2014. Since the variables are not stationary at level, but co integrated after differencing, we applied VECM for granger causality test where the results suggested that economic growth leads gross domestic savings to happen i.e. the direction of causality is from economic growth to domestic savings in the Ethiopian context. Therefore, the

study rejects the Solow's claim that saving precedes economic growth, and accepts the Keynesian theory, that it is higher economic growth that leads to higher domestic saving growth. This result might explain that Ethiopia is of a consumption society which means high proportion of income goes to consumption when income of the society increase and has fewer propensities to save at micro and macro level for national investment or the society lacks sufficient income to save.

6.3 Recommendations

The result of the paper is from gross domestic product to savings. So, the paper leads to recommend that growth enhancing policy should be directed in order to increase individual income level so as to create surplus that in turn increases saving. That is, growth should be enhanced to scale up saving. Although the paper found growth leads to saving, it doesn't necessarily mean that saving doesn't contribute anything to growth. In fact, growth theory suggests that saving plays crucial role in promoting economic growth. Therefore, the on-going effort by the government to enhance saving should also be encouraged as one of the means that leads to the road to growth and development.

Given the conventional wisdom of the Keynesian premises that saving is a function of economic growth has been prevailed while the Solow's model where growth is believed to be a function of saving is not empirically materialized in Ethiopia, so the study believe that the following recommendations could be among the remedies to enhance domestic saving in the future, if not the only factor to be considered in mobilizing sufficient domestic savings to fasten the country's economic growth:

- Policy makers should employ policies that would accelerate economic growth so as to increase saving. These include among others the following. Firstly, governments have to increase its investment in the provision of infrastructure like power, roads, education and so on. This will help to reduce the costs of doing business as well as increase the profitability of firms, thereby raising the economy's production of goods and services. Secondly, governments have to encourage the monetary authority like the central bank of Ethiopia to reduce interest rate so that prospective investors can increase their investment and raise the nation's production capacity. Other measures include sustenance of political stability that country currently enjoys; encouragement of inflows of foreign direct investment; and sustenance of the war on corruption.

- Improve the method of production by modernizing subsistence farming and other agricultural activities as agriculture is undoubtedly the key area to be improved at this initial level of development. In this case, extensive mechanized farming as well as intensive small holding farming has to be technology supported to increase land and labour productivities. This creates surplus output for domestic as well as external market and undoubtedly boosts the rise in income sufficient for consumption and saving.

- The development of micro and small scale enterprises has a very vital role in creating new jobs for the disadvantaged sectors of the community. Therefore, to enhance earning capacity of the public, government must strongly enhance the development of these enterprises to create new jobs. This in short means that though enhancing production through modernizing production techniques in the real sectors is the key factor to boost income and then saving, various job creating mechanisms like organizing community into micro and small scale enterprises is the most effective means of creating income so as to enhance saving derived from income generation.

- The other main factors such as FDI or external saving which state in causality empirical part might be perform as the main variables of economic growth. Of course this is beyond the scope of this paper, but this is open another agenda for future research.

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APPENDIX

Appendix 1: The Result of Unit Root Tests of variables at level using ADF Test

Null Hypothesis: LRGDP has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on AIC, maxlag=1)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		3.670562	1.0000
Test critical values:	1% level	-3.610453	
	5% level	-2.938987	
	10% level	-2.607932	

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

Null Hypothesis: LRGDP has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on AIC, maxlag=1)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		0.144630	0.9967
Test critical values:	1% level	-4.211868	
	5% level	-3.529758	
	10% level	-3.196411	

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

Null Hypothesis: LRGDS has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on AIC, maxlag=1)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		0.058784	0.9581
Test critical values:	1% level	-3.615588	
	5% level	-2.941145	
	10% level	-2.609066	

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

Null Hypothesis: LRGDS has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on AIC, maxlag=1)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.316837	0.0785
Test critical values:	1% level	-4.211868	
	5% level	-3.529758	
	10% level	-3.196411	

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

Appendix 2: The Result of Unit Root Tests of variables at first difference using ADF Test

Null Hypothesis: D(LRGDP) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on AIC, maxlag=1)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.364122	0.0013
Test critical values:	1% level	-3.615588	
	5% level	-2.941145	
	10% level	-2.609066	

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

Null Hypothesis: D(LRGDP) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 1 (Automatic - based on AIC, maxlag=1)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.299742	0.0000
Test critical values:	1% level	-4.226815	
	5% level	-3.536601	
	10% level	-3.200320	

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

Null Hypothesis: D(LRGDS) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on AIC, maxlag=1)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-8.521816	0.0000
Test critical values:	1% level	-3.615588	
	5% level	-2.941145	
	10% level	-2.609066	

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

Null Hypothesis: D(LRGDS) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on AIC, maxlag=1)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-8.813833	0.0000
Test critical values:	1% level	-4.219126	
	5% level	-3.533083	
	10% level	-3.198312	

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

Appendix 3: Result of Johansen Co-integration Test

Date: 03/28/15 Time: 15:18
Sample (adjusted): 1978 2014
Included observations: 37 after adjustments
Trend assumption: Linear deterministic trend (restricted)
Series: DLRGDP DLRGDS
Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.555694	48.23767	25.87211	0.0000
At most 1 *	0.388891	18.22173	12.51798	0.0050

Trace test indicates 2 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.555694	30.01593	19.38704	0.0010
At most 1 *	0.388891	18.22173	12.51798	0.0050

Max-eigenvalue test indicates 2 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):

DLRGDP	DLRGDS	@TREND(76)
23.23836	1.196533	-0.071954
27.96681	-5.082338	-0.047005

Unrestricted Adjustment Coefficients (alpha):

D(DLRGDP)	-0.046979	-0.009417
D(DLRGDS)	-0.309277	0.203749

1 Cointegrating Equation(s): Log likelihood 43.84562

Normalized cointegrating coefficients (standard error in parentheses)

DLRGDP	DLRGDS	@TREND(76)
1.000000	0.051490	-0.003096
	(0.02792)	(0.00065)

Adjustment coefficients (standard error in parentheses)

D(DLRGDP)	-1.091725
	(0.18058)
D(DLRGDS)	-7.187082
	(1.73159)

Appendix 4: Result of Vector Error Correction Model

Vector Error Correction Estimates
Date: 03/28/15 Time: 16:49
Sample (adjusted): 1981 2014
Included observations: 34 after adjustments
Standard errors in ( ) & t-statistics in [ ]

Cointegrating Eq:	CointEq1		
DLRGDP(-1)	1.000000		
DLRGDS(-1)	0.009002 (0.06055) [0.14868]		
ET(-1)	-1.089635 (0.07948) [-13.7087]		
C	-1.557296		
Error Correction:	**D(DLRGDP)**	**D(DLRGDS)**	**D(ET)**
CointEq1	-1.539347 (0.84840) [-1.81441]	-1.024761 (1.38258) [-0.74119]	0.404060 (0.08360) [4.83317]
D(DLRGDP(-1))	1.417299 (0.74162) [1.91109]	1.880574 (1.20857) [1.55604]	0.621311 (0.07308) [8.50189]
D(DLRGDS(-1))	-0.174416 (0.08621) [-2.02324]	-0.956259 (0.14048) [-6.80688]	-0.004539 (0.00849) [-0.53429]
D(ET(-1))	-0.963597 (0.23104) [-4.17063]	-0.919081 (0.37652) [-2.44101]	-0.349168 (0.02277) [-15.3366]
C	0.008838 (0.09112) [0.09700]	-0.006233 (0.14849) [-0.04198]	0.007546 (0.00898) [0.84041]
R-squared	0.555074	0.680563	0.996060
Adj. R-squared	0.493705	0.636503	0.995516
Sum sq. resids	8.160755	21.67260	0.079242
S.E. equation	0.530477	0.864483	0.052273
F-statistic	9.044846	15.44619	1832.685
Log likelihood	-23.98451	-40.58861	54.80339
Akaike AIC	1.704971	2.681683	-2.929611
Schwarz SC	1.929436	2.906148	-2.705146
Mean dependent	0.008930	0.004131	0.008393
S.D. dependent	0.745529	1.433857	0.780645
Determinant resid covariance (dof adj.)		0.000390	
Determinant resid covariance		0.000242	
Log likelihood		-3.160535	
Akaike information criterion		1.244737	
Schwarz criterion		2.052811	