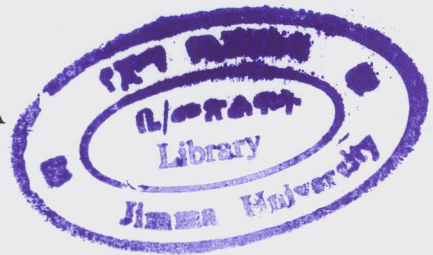# JIMMA UNIVERSITY
SCHOOL OF GRADUATE STUDIES

SAVING AND ECONOMIC GROWTH IN ETHIOPIA: CAUSALITY ANALYSIS

BY

ACHALU BERECHA

JULY 2012

JIMMA

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A Thesis Submitted to the School of Graduate Studies of   Jimma University

In Partial Fulfillment of the Requirement for the Degree of Master of Science

in Economics (Economic Policy Analysis)

JIMMA UNIVERSITY

SCHOOL OF GRADUATE STUDIES

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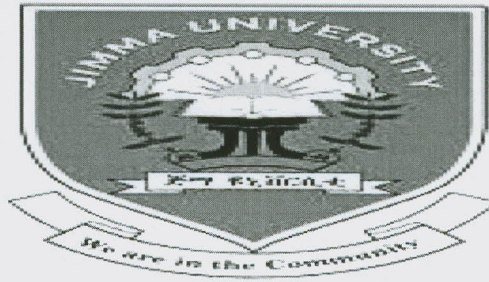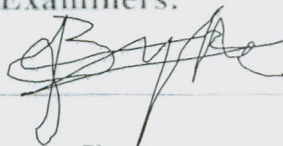## SAVING AND ECONOMIC GROWTH IN ETHIOPIA: CASUALITY ANALYSIS

BY

ACHALU BERECHA DHABA

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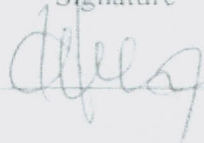Examiner (external)   Signature

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DECLARATION

I, the undersigned declare that this 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 acknowledge.

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ACKNOWLEDGMENTS

ACRONYMS

ADF=Agumented Dickey-Fuller

EB=Ethiopia Birr

ECM=Error Correction Model

DRM=Domestic Resource Mobilization

FCI=Foreign Capital Inflow

FDI=Foreign Direct Investment

FY=Fiscal Year

GDP=Gross Domestic Product

GDS=Gross Domestic Saving

IOCR=Incremental Output Capital Ratio

IMF=International Monetary Fund

LDCs=Less Developed Countries

OLS= Ordinary Least Square

NBE=National Bank of Ethiopia

MoFED=Ministry of Finance and Economic Development

SSA=Sub-Saharan Africa

WB=World Bank

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ABSTRACT

The objective of the paper is to investigate causal relationship between savings growth and GDP growth in Ethiopia by using annual data for the period of 1961 to 2010. In the process, three analyses were undertaken. First, the time series properties of growth rate of domestic savings and the growth rate of real GDP were ascertained using the ADF unit root test procedure. The estimated results indicate both variables are one order of integration at level or I(1). Second, the long-run relationship between the series was explored utilizing both Engel- Granger and Johnson Cointegration Test procedure. The result of the test indicated that the series were cointegrated. Finally, the causal relationship between growth rate of domestic savings and the growth rate of real GDP was performed using the Vector Error Correction (VECM) model and Pairwise Granger Causality test.

Theories and empirical works have shown that the direction of causality between domestic savings growth and economic growth may run in various directions: from gross domestic savings to economic growth, from economic growth to gross domestic savings, bidirectional causality between gross domestic savings and economic growth or no causal relationship between them.

The results of this study suggest the long run relationship between savings and GDP in Ethiopia. Farther, the empirical result prevail that unidirectional short run relationship exists between gross domestic product (GDP) and domestic savings; that causality run from gross domestic product (GDP) to domestic savings. So overall short run results favour Keynesian point of view that savings depend upon level of output.

CHAPTER ONE

INTRODUCTION

1.1 BAKGROUND OF THE STUDY

The issue of economic growth has been the main agenda in economic policy formulation for every nation; especially for the Sub-Saharan Africa (SSA) and other developing countries of the world. Ethiopia is the second-most populated country in Africa with more than 80 million people. It is among the low-income sub-Sahara African countries and has been an exemplary of poverty for a number of decades. Economic growth is among the most important factors affecting the quality of life in a country. With a grave development deficit in every sector of the economy, Ethiopia is in need of huge financial resources to achieve its development plan. Basically, capital formation is determined by the saving rate but developing economies faced by low level of income and hence low level of saving rate; that is why Ethiopia is experiencing a severe resource gap. (Tsegabirhan W. 2010)

Given the close relation between savings and growth, the analysis of savings-growth behavior becomes naturally important in this context. A number of growth models advocate fore a causal relation ship between rate of saving and economic growth. Saving is often being regarded as an important input in order to promote long run economic growth. The amount of savings available in a country gives a limit on the level of its gross investment and therefore limits its growth rate. Higher saving means that nations have large funds available for investment opportunities which can enhance the economic growth. Thus, it is important to study the direction of causality between savings and growth as these have important implications for development policy. (Sajid G. and Mudassira S. 2008)

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The relationship between savings and economic growth is not only an important but also a controversial issue for both academicians and policy makers. Many internationally reputed economists have analyzed this phenomenon as cause and effect relationship.

Solow's (1956) Growth Model mentioned developing countries with lower capital stock will have more rapid growth than the developed countries through increasing saving and investment rates. This means that high saving rate in the developing countries could stimulate the economic growth rapidly. Due to the potential positive effect of saving, many developing countries especially those in the Third World will make some policies to increase their country's saving rate in order to push their growth rate of real gross domestic production (GDP) (Liu and Guo, 2002). The theoretical framework for these policies is that high saving rate could increase the amount of creditable capital which will push up the investment, and then the economic development and economic growth rate (Stern, 1991).

Lin (1992) suggested that the economic development of a country depends largely on its ability to mobilize the necessary savings to finance capital formation in order to raise the nation's productive capacity. In fact, Olajide (2009) findings that a unidirectional causality runs from saving to economic growth suggest that the low level of saving may be responsible for the sluggish and unimpressive growth over time.

This approach is supported by Harrod (1939), Domar (1946) growth models and also results of empirical research by Alguacil, Cuadros and Orts (2004) as well as by Singh (2009) provide support for the hypothesis that increased savings promote economic growth. The theories of economic growth stipulate that the dynamics of the country's economic growth increases if the investment in human or material capital or in scientific research and development (R&D) grows.

Policymakers, including the World Bank, have long advocated policies that lead to higher savings in order to boost economic growth for developing countries. That is why World Bank regularly recommends developing countries   to adopt policies that increase the

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saving rate for those countries to achieve a higher rate of economic growth (World Bank, 1993).

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 increases in output of leads increases in incomes, thus raising the level of saving in the economy. For instance, Carroll and Weil (1994) examine the relationship between saving and growth both on the aggregate and household level. In short, their results give more evidence in favor of a positive temporal causality from growth to saving rather than the other way around, i.e. higher growth precedes higher saving.

Hence, their results contradict the capital fundamentalist view on the aggregate level and consistent with the view of proponents of the Keynesian hypothesis that stressed, it is growth of output (or income) that causes growth of saving.

Generally, the effect of income on saving is inconclusive and varies across countries. Whereas some studies have found savings to cause growth in income, some have found income growth to cause savings, some has found bidirectional causality between gross domestic savings and economic growth and others found no causal relationship between them. The causality from savings to economic growth is supported from the argument that domestic investment is determined by domestic savings. Following this argument, high rate of national saving is a crucial determinant of economic growth (Athukorala and Sen, 2004).In testing for causality between domestic saving and economic growth for some African countries, Anoruo and Ahmad (2001) found a bi-directional causality.

An important issue that arises from the foregoing discussion is the divergence in the perception and empirical findings among scholars. Thus, the aim of this paper will be to investigate the relation and direction of causality between saving and economic growth in Ethiopia.

1.2 STATEMENT OF THE PROBLEM

The vision of ensuring sustainable development and reduction of mass poverty at a meaningful magnitude is enshrined, in one way or another, in the governments' development strategy is well documented of virtually all developing countries. In this respect, Economic growth, which is usually measured as the annual rate of increase in a nation's real GDP, is taken as a main objective for overcoming persistent poverty and offering a hope for the possible improvement of society. (Meier,1971: Tanzi, 1994).

Ethiopia is among the low-income sub-Sahara African countries and it faces major development challenges for a number of decades, with the majority of the population being poor. This situation calls for real growth that creates jobs for both rural and urban areas. Can Ethiopia grow faster by saving more?

Naturally, savings play an important role in the economic growth and development process by determining the national capacity to invest and thus to produce, which in turn, affect economic growth potential of the country. Low saving rates have been cited as one of the most serious constraints to sustainable economic growth in Ethiopia.

One major problem facing Ethiopia in her attempt at accelerated growth and development is lack of capital formation. Inadequate capital formation to undertake the real investment has adversely affected the output level of the economy. Lack of adequate capital formation results from non-availability of credit to replace worn-out capital stock and addition to existing ones. Thus, gross domestic savings in Ethiopia is a very critical and reliable factor in capital formation process.

Growth models developed by Romer (1986) and Lucas (1988) predict that higher saving rates and the related increase in capital accumulation can result in a permanent increase in growth rates. Empirical work by Barro (1990) has provided support to the notion that

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capital accumulation - and savings - is central for understanding growth differentials across countries.

As Sajid and Sarfraz(2008), the examination of the causal relationship between saving and economic growth is very important because it provides useful information on which economic variable(s) that the government and relevant authorities need to control in order to attained the desired level of the targeted variable or variables. The relationship between domestic savings and economic growth has significant implications on the state of the economy.

For example, if the results of causality test indicate that saving precedes and causes economic growth, then government and policy makers can design or employ policies that would promote the mobilization of saving in order to achieve higher economic growth. On the other hand, if econometric investigation reveals the reverse, then, efforts would be made to remove the obstacles to and accelerate economic growth in order to raise the level of saving.

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

Several researchers have examined the dynamic relationship between economic growth and domestic savings for developed countries. Despite its obvious importance, on one hand there has been at best very little empirical attention devoted to developing countries like Ethiopia. One of the problems is that most studies of the saving-growth relationship are based on cross-country regressions, which lump together countries of heterogeneous characteristics and size. On the other hand, those studies tried to explain the savings-

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growth nexus, suffers from a number of shortcomings. These include reliance on cross section data, which may not satisfactorily address country specific issues that are differences among countries may reflect country-specific characteristics—such as the efficiency of government, the degree of corruption, the level of violence, or the attitude of the government and population toward individual achievement or enterprise—that jointly influence saving, investment and economic growth (Carroll and Weil, 1993).

In this context the study of direction of causality for Ethiopia is important, to decide the direction of policies and programmer to achieve increased growth and domestic savings. It is the quest to answer this question of direction that provides the motivation for this study.

This research focus on examining the causal relationship between savings and economic growth in Ethiopia to provide the policymakers in this country with a planning tool that can help them in formulating their policies to promote economic growth.

> Thus the major question that this research needs to answer is whether or not the traditional view of growth that saving's growth promotes economic growth is valid for Ethiopia?
> A second question is whether long-run and short-run relation ship between economic GDP growth and domestic saving growth in Ethiopia?

Before detailing the methodology and the empirical results, it is important to stress this paper's boundaries: that the aim of this paper is not try to estimate a structural model or to identify growth determinants, but to examine an empirical linkage (the saving-growth nexus) in Ethiopia.

1.3 OBJECTIVE OF THE STUDY

The main objective of this paper is to examine the causal relationship between gross domestic savings and economic growth in Ethiopia, using theoretically consistent time

series data; and that help to achieve, whether or not the traditional view of growth that savings growth promotes economic growth is valid for Ethiopia.

To achieve the broad objective, the study has the following the specific objectives

- to provide empirical evidence as to whether there are long-run and as well as short-run a causal relationship between domestic saving growth and economic growth and the particular direction of causality between them;
- to examine the impact of saving on economic growth in Ethiopia

1.3 HYPOTHESIS TESTING

Up to now, several studies came with the mixed result on saving-economic growth nexus in various countries. Some argued that saving granger cause economic growth while others argue the reverse. Even some came with inconclusive result and there is no robust evidence at all. These show that saving-growth nexus is area of controversy and currently a hotly contested debate. Thus, the study hypothesizes that:

- H_0 : there is no direction of causality between gross domestic savings and economic growth in Ethiopia ;
- H_1: there is a causal relationship between gross domestic savings and economic growth in Ethiopia at least from one direction.

1.4 SIGNIFICANCE OF THE STUDY

An examination of the direction of causality between the domestic savings growth and GDP growth rate is also of considerable importance for development policy. For, if savings drive growth through an automatic translation of savings into capital formation, then the main goal of development policy should be to increase savings, while if growth results less from savings and capital formation and more from other factors such as policies relating to technological innovation, human capital, international trade or foreign direct investment, then they should be the main targets of development policy.

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If causation is two-way, a virtuous cycle results as growth leads to more saving, which in turn enhances growth. It is important to determine which direction of causality is dominant: is rapid growth mainly the result of a higher saving rate, or does saving respond mainly to economic growth? If saving is a major determinant of growth, increasing it would be central to policy. Whereas if the converse is true, policy should focus largely on the factors driving growth (Schmidt-Hebbel and Serven 1996)

Generally;

- The study shall enable policymakers to know the direction of causality and whether there is a long run relationship between gross domestic savings and economic growth of the country.
- This study shall further provide government, policy-makers and other stakeholders some planning tools that will be useful in policy formulations and implementations in the right direction which will help accelerate the growth of the economy.

1.6 SCOPE OF THE STUDY

This study is structured to cover the period of 1961 to 2010. This is a fifty years period of coverage. This study looks empirically at the causal relationship between growth rates of gross domestic savings and economic growth in the context of Ethiopia.

1.7 LIMITATIONS OF THE STUDY

Research work involving time series data is affected by lack of adequate data on some economic variables, at least in Ethiopia and other developing countries. This places a limitation on the scope of variables that may be incorporated in the model. In Ethiopia, evaluating the quality of data, there is no adequate, consistent data in domestic sources. The first limitation arises from the problem of inconsistency of data as reported by different institutions. Even data from the same institution shows different figures for the same year.

1.8 ORGANIZATION OF THE PAPER

The remaining part of this paper has five sections. In chapter two, theoretical and empirical literatures are surveyed. This is followed by a brief summary of the performance of the Ethiopian economy. Chapter four is devoted to the model specification, methodology and data description. Chapter five; the econometric analyses and discussion are made. Finally, conclusions and policy implications are presented in chapter six.

CHAPTER TWO

REVIEW OF RELATED LITERATURES

2.1 ECONOMIC GROWTH THEORY

"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.

In economics, economic growth typically refers to growth of potential out put, i.e production at full employment, which is caused by growth in aggregate demand or observed out put. For economy to grow, it has to create the right conditions for growth. Growth depends to a significant extent on the resources a country has. According to economic literatures, source of growths are natural resource, human and physical capital. More capital means more production and more production means more growth. To get capital, countries have to invest more and so the level of investment may be a big determinant of future growth. So to invest more saving is the main determinant factor as

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well. That saving rate is, to have more tomorrow you often have to have less today. To provide funds for investment, there needs to be a good level of savings. This should intern mean more growth in the future. Technological progress, this is perhaps the most widely accepted source of economic growth.

In the view of economic theory that seeks to explain the rate at which a country's economy will grow over time. Growth theory generally distinguishes between those influences on an economy's long-run growth rate and growth only in the short-run. There are several growth theories, such as classical growth theory, the neo-classical growth theory, new growth theory and others

A) **Classical growth theory**: the modern growth conception of economic growth began with the critique of Mercantalism, especially by the physiocrats and with the Scotish Enlightenment thinkers such as David Hume and Adam Smith. The theory of the physiocrats was the productive capacity, itself, allowed for growth and the improving and increasing capital to allow that capacity was the wealth of nations. David Ricardo argued theory of comparative advantage that would be the central basis in favor of free trade as an essential component of growth.

B) **The neo-classical growth theory**: the concept of growth as increased stocks of capital of goods means of production, as the Solow-Swan growth model, which involved a series of equations which showed the relation ship between labor-time, capital goods, out put, and investment. This model, developed by Robert Solow and Trevor Swan in the 1950s, was the first attempt to model long- run growth analytically. This model assumes that countries use their resources efficiently and that there are diminishing returns to capital and labor increases. Following this premises, the neo-classical model makes the following important predictions.

- Increasing capital relative to labor creates economic growth, since people can be more productive given more capital.

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- Poor countries with less capital per person will grow faster because each investment in capital will produce a higher return than rich countries with plenty capital.

- Because of diminishing returns to capital, economies will eventually reach a point at which no new increase in capital will create economic growth. This point is called a steady state. In the long run, out put per capita depends on the rate of saving, but the rate of out put growth should be equal for any saving rate. According to this model, technology improves the steady state level of capital increases, a country invest and growth.

C) **New growth theory**: growth theory advanced again with the theories of economist Poul Romer in the late 1980s and early 1990s. Other important new growth theories include Robert E. Lucas and Robert J.Barro. Unsatisfied with Solow's explanation, economists worked to endogenize technology in the 1980s. They developed the endogenous growth theory that includes a mathematical explanation of technological advancement. This model also incorporates a new concept of human capital, the skilled and knowledge that make workers productive. Unlike physical capital, human capital has increasing rate of return. Therefore, overall all there are constant returns to capital, and economies never reach a steady state. Growth does not slow as capital accumulates, but the rate of growth depends on the type of capital a country invests in.

2.2. DEFINITION OF SAVINGS

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. 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.
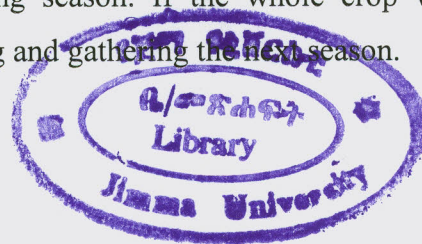
2.3. THEORETICAL LITRATURE

This section provides a theoretical review of the causal relationship between gross domestic savings and economic growth in various models. An important distinction arises in the different models with regard to the effects of gross domestic savings and economic growth on each other.

The controversy about the savings-growth nexus can be grouped into two leading schools. The "growth theorists" (such as Harrod 1939, Domar 1946, Romer 1986 and Lucas 1988) assume that all savings is automatically invested and translated to growth. Thus, Savings leads to Growth.

On the other hand, the consumption theorists (Modigliani 1970, 1986; Deaton and Paxson 1994, 2000; Carroll and Weil 1994) argue that income and its growth determines

consumption and hence, savings. These two schools of thought are further explained below.

In a two-factor growth model, labor per unit of output is added in a full employment economy with labor growing at an exogenous rate. Since labor requirement is not a binding factor in the context of developing countries, which often have unlimited supplies of labor, growth would be proportional to the savings rate. Therefore, Lewis (1954) and Rostow (1960) emphasized that a higher rate of savings would lead to higher economic growth.

On the other hand, Solow's (1956) accelerated growth model, which assumes decreasing marginal returns to capital and allows substitution between capital and labor, concludes that growth eventually stops but the economies with a higher savings rate enjoy a higher steady state income (though not growth). The endogenous growth models (Romer1986; Lucas 1988), which return to the Horrod-Domar assumptions of constant returns to capital, again come to the conclusion that higher savings and investment rates lead to a higher growth rate of output. Thus, growth theories imply that higher savings rates should lead to higher growth rates, at least if the economy is below the steady state rate of output.

On the other hand, consumption theories, such as the permanent income and life cycle hypotheses, imply the reverse direction of causality, i.e., they imply that people choose their consumption (and thence also savings) levels depending on current and (expected) future income levels. Modigliani (1970) has argued that the simple version of life-cycle hypothesis implies a positive relation between savings and income growth. He notes that if there were no income and no population growth across generations, the savings of the young would exactly balance the dis- saving of the old and the aggregate savings rate would be zero. Because income growth makes the young richer than the old, the young will be saving more than the old will be dis-saving, resulting in the positive association between savings and growth.

Keynes (1936) defined savings as the excess of income over expenditure on consumption. Meaning that savings is that part of the disposable income of the period which has not passed into consumption. Given that income is equal to the value of current output; and that current investment (i.e. Gross capital formation) is equal to the value of that part of current output, which is not consumed; savings is equal to the excess of income over consumption. Hence, the equality of savings and investment necessarily follow thus:

> ➢ Income = Value of output = Consumption + Investment
> ➢ Savings = Income – Consumption
> ➢ Savings = Investment ex-post.

Carroll and Weil (1994) have argued that, ceteris paribus, an exogenous increase in the aggregate growth will make forward looking consumers feel wealthier and thus consume more and save less - thus implying that the impact of income growth on savings could be negative. On the other hand, if consumption is habit based and changes slowly in response to changing income, a larger fraction of increases in income may be saved resulting in the savings rate increasing with income increases.

Thus the theoretical literature is unclear about both the direction of causality between the savings rate and income or growth and about whether the association between savings and growth should be positive or negative. Thus, in one breathe economic growth leads to savings whilst in another breathe savings leads to economic growth.

2.3.1 Financial Liberalization Theory and Financial Repression Theory

This section presents a broad discussion on the debate between the financial liberalization theorists and the financial repression theorists. These views are an extension of the Classical - Keynesian debates in which the Classical economists maintain that the direction of association runs from savings to investment and hence growth while the Keynesians maintain that the direction of association runs from investment to savings. The implication of the Classical standpoint is that saving is a pre-requisite for investment and, hence, growth, while that of the Keynesians is that what is important for growth is

not prior savings, but rather the prospect of profit and the elastic supply of credit to the private sector (Adebiyi, 2000).

2.3.1.1 Financial Repression Theory

One of the theories on the causal relationship between gross domestic savings and economic growth is the Financial Repression Theory. Advocates of financial repression argue that savings are not necessarily channelled into investment. Tobin (1965) argues that the development of a monetary sector could be damaging. With the introduction of money balances, agents face the choice of allocating resources not used for consumption either to the purchase of physical capital or to money balances. Since it is physical investment that is the source of economic growth, if money balances are not made available for investment, but rather held as a stock of purchasing power, the equilibrium growth path of an economy will occur at a lower level of per capita output than before.

2.3.1.2. Financial Liberalisation Theory

Advocates of financial liberalization theory {Levhari and Patinkin (1968), McKinnon (1973) and Shaw (1973)} have, however, argued for financial liberalization on the basis that saving is complementary to investment in the development process, even with a money economy where saving can go either into the accumulation of money balances or the accumulation of physical capital.

Levhari and Patinkin (1968) see money as a factor of production. The production function can be written as output, a function of capital, labour and real money supply. Thus, production depends on working capital in the same way as it depends on fixed capital. If money were not productive there would be no point using it in production and the economy would revert to a barter system. Money, being a productive factor of production, allows the economy to realize a higher level of per capita output than in its absence.

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McKinnon (1973) argues that money holdings and capital accumulation are complementary in a development process. Because of the lumpiness of investment expenditure and the reliance on self-finance, agents need to accumulate money balances before investment takes place. Positive (and high) real interest rates are necessary to encourage agents to accumulate money balances, and complementarity with capital accumulation will exist as long as the real interest rate does not exceed the real rate of return on investment.

Shaw (1973) stresses the importance of financial liberalization for financial deepening, and the effect of high interest rates on the encouragement to save and the discouragement to invest in low-yielding projects. The increased liabilities of the banking system resulting from higher real interest rates, enables the banking system to lend more resources for productive investment in a more efficient way.

The implication of financial liberalization theory is that saving will drive the growth process, through its positive effect on investment rate.

2.3.2 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.

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2.3.3 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.

2.3.4 Harrod-Domar Growth Model

The Harrod-Domar (1956) model may also be used to illustrate the inter-relationship between savings and economic growth from the point of view of economic theory. The Harrod-Domar growth model, in simple terms, states that the growth of output is equal to the rate of savings divided by the incremental capital-output ratio as follows:

$$g=s/v \quad\text{..} (2.1)$$

where: g is the rate of economic growth, s is savings ratio and v is the incremental capital- output ratio (defined as "i"/change in y; where "i" is investment and change in y is the change in output). According to this model, the government objective is to achieve a target rate of growth of the net national product. In the light of the Harrod-Domar growth model, governments faced with low savings have a number of alternatives. They can adjust the growth rate downwards so that the domestic saving rate exactly balances the rate of investment required to sustain the modified rate of growth. The other alternative can be to raise domestic savings (e.g. through taxation). Finally, they can go for commercial borrowing both domestically and abroad.

Given the desire for fast growth and attainment of better standards of living, it is very difficult for the government to reduce the desired rate of growth. Also, given the extreme inequalities in income and wealth and majority of the population living below subsistence level, government may be reluctant to raise domestic savings through taxation because that would mean pushing up taxation effort. Because of the low standard of living of the bulk of the population, imposing taxation (whether direct or indirect) would only place the burden on the few rich people by reducing their growth in consumption which will negatively affect the growth rate.

2.3.5 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:

$$Y_t = \alpha X_t \dotfill (2.2)$$

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. Each firm faces a technology

with constant returns to scale but productivity is an increasing function of the capital stock.

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

$$I_t = X_{t-1} - (1-\delta)X_t \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots(2.3)$$

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 $(1-\psi)$ leaks from the process of financial intermediation; hence capital market equilibrium is given by:

$$\psi S_t = I_t \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots(2.4)$$

from equation (2.3) the growth rate at time t+1 is given by;

$$g_{t+1} = (Y_{t+1}/Y_t) - 1 = (X_{t-1}/X_t) - 1 \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots(2.5)$$

If we re-arrange;

$$g_{t+1} = \alpha(I_t/Y_t) - \delta \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots(2.6)$$

If we substitute capital market equilibrium in equation (2.4) into equation (2.6), we obtain:

$$g_{t+1} = \alpha\psi(S_t/Y_t) - \delta \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots(2.7)$$

From equations (2.6) and (2.7), we can sum up the steady state solution as follows

$$g_{t+1} = \alpha(I_t/Y_t) - \delta = \alpha\psi \Lambda - \delta \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots(2.8)$$

where $\Lambda = S_t/Y_t$. In the context of this study, equation 2.8 predicts that financial development affects growth by raising the coefficient of savings increasing the social productivity of capital (α), or influencing the saving rate (Λ).

2.3.6 The Life-Cycle Theory of Consumption and Saving

This model developed by Japelli and 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

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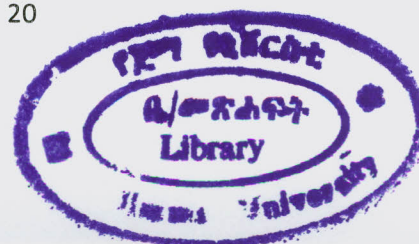
households. The theory assumes individuals live for three periods and this provides an incentive for intergenerational borrowing. Individuals borrow to finance current consumption when they are young and repay the loan and save for retirement in their middle age. They consume the assets accumulated in 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.

2.3.7 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 casual 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.

2.4. EMPIRICAL LITERATURE

A large number of related literatures have been done to determining the relationship between growth of saving and economic growth. Some studies focused on theoretical discussion while the others applied empirical analysis using various tests. Some empirical studies (Adebiyi, 2000) have used cross-section data to study the direction of causality between the two variables whilst others [Carrol and Weil (1993), Mohan (2006), Lean and Song (2009)] have used time series data to study the causality between the gross domestic savings and economic growth.

Again, some studies have used both the growth rates of gross domestic savings and the growth rate of real GDP as dependent variables and have used the lags of growth rates of gross domestic savings and real GDP as explanatory variables. With regards to the gross domestic saving rate, some studies (Adebiyi, 2000) have used gross domestic savings as a ratio of real GDP (Saving-GDP ratio) whilst others [Mohan (2006), Lean and Song (2009)] have used the logarithm of gross domestic savings as both dependent and independent variables. The results and conclusions are differing from each other in different countries.

In the recent decade, many researchers used econometrics techniques to empirically analyze the relationship between saving and economic growth. Saltz (1999) using the model of vector error correction (VEC) and the model of vector auto regression (VAR)

analyzed the relation between savings and economic growth in seventeen countries from all over the world. The results of the analysis indicated that in nine of the analyzed countries economic growth was the cause of increased domestic savings. In two countries the opposite relation was noticed, while in three other countries no causal relation between economic growth and domestic savings was identified. Finally, in two countries, the existence of a two-way causal relation between analyzed variables was confirmed.

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

Baharumshah, Thanoon and Rashid (2003) examined the relation between economic growth and savings in five Asian countries (Singapore, South Korea, Malaysia, Thailand and Philippines). On the basis of statistical data from the 1960-1997 period and using the VECM model, the authors reached the conclusion that the growth rate of savings was not the economic cause of economic growth in Granger sense in all analyzed countries with the exception of Singapore.

Bacha (1990), Otani and Villanueva (1990), in order to analyze the relationships between savings and economic growth used the ordinary least squares method (OLS). Their research proved that the higher the domestic savings rate (share of domestic savings in GDP), the higher the economic growth rate. Also research carried out by Krieckhaus (2002) in 32 countries indicates that higher level of domestic savings led to higher investment levels and thus contributed to higher rate of economic growth in analyzed countries.

Japplli and Pagano (1994) did an empirical research on saving, growth and liquidity constraints. They applied regression analysis for 22 OECD countries from 1960-1987 and found that a higher saving rate induced by liquidity constraints led to higher economic growth. Claus et al. (2001) choose an open economy, New Zealand as their sample,

where the low level of domestic savings and potential consequences of a 'shortfall' for economic growth. They found that the empirical link whether higher domestic saving causes growth or growth causes saving is unclear in New Zealand.

Cashell (2005) analyzed the economic effect of rising national saving in the US for short-term and long-term. In the short-run, he analyzed the problem from the function of consumption to the economy. An increase in saving means a reduction in consumption and there is likely to slower economic growth in the short-run.
When the saving rates rises in the long-run, the demand for financial assets rises as well. Increase in the domestic savings increases the domestic investments and net exports and thus lead to the economic growth in the long run.

Pahlavani et al, (2007) 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.

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 GDP to saving.

In Mexico, 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.

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.

Sinha and Sinha(2007)examined the relationship between per capita saving and 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.

In his paper, Mohan (2006) examined the relationship between domestic savings and economic growth by taking into consideration the income levels of the different countries studied. He grouped the countries into various categories, namely low income countries (LICs), low middle income countries (LMCs), upper middle income countries (UMCs), and high income countries (HMCs). The author's results support the claim that causality runs from economic growth rate to growth rate of savings.

The author submitted that the income level of a country plays an important role in determining the causal relationship between savings and economic growth. In addition, the author reported that empirical results were mixed in the LICs, while causality runs from growth rate to savings rate for most of LMCs.

According to Sinha's (1996, 1998, 1999, 2000 and 2007) series of empirical researches about the relationship between saving growth and economic growth in different developing countries, two types of results were found. The most common result is the economic growth Granger causes the saving growth.

This result can be found in Sinha (1996) on Pakistan, Sinha and Sinha (1998) on Mexico, Sinha (2000) on Philippines and Sinha and Sinha (2007) on Indian. The other result is Sinha (1999) on Sri Lanka where the saving growth Granger causes the economic growth.

Kumar et al. (2008) studies the relationship between economic growth and gross domestic savings in South East Asian countries in respect of the Granger causality test. The relationship between gross domestic savings and economic growth is found to be bi-directional.

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.

Bassam 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.
It was shown that whereas 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 growth to gross domestic product growth in Tunisia.

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CHAPTER THREE

BACKGROUND OF ECONOMIC GROWTH AND DOMESTIC SAVING IN ETHIOPIA

3.1. TRENDS IN GDP AND VALUE ADDED IN VARIOUS SECTORS

The Ethiopian economy has experienced three growth episodes during the period, 1960/61-2009/10.These three different growth episodes are characterized by the three regimes past and current in the country. The Ethiopian economy recorded a sustainable and promising growth performance from1960/61-1974/75 (Bethelemy et al, 2001; Easterly, 2002). This was during the Imperial regime when the three-five-years development plans were designed and implemented. Many researchers invariably noted that the 1960s vibrant economic growth performance was somewhat short lived mainly because of the outbreak of the February, 1973/74 Ethiopian Revolution which is said to have seeded political unrest and economic stagnation in the country.

The last five years were phenomenal for Ethiopia in terms of economic growth, according to national income account figures of Ministry of Finance and Economic Development, real GDP grew at an average rate of 11percent for the period 2005/06-2009/10. This is a significant leap over the 6.2 percent average growth of the five year prior to 2005/06. With an average population growth rate of 2.8 percent in the economy, the high growth in GDP translates in to a comfortably high per capita income growth which had a potential of reducing poverty with significant margins. However, this heavily depends on the quality of growth and most importantly on the nature of specific sector which led the growth.

The service sector dominated the period in terms of growth. Value added in the sector during the period grew at an average rate of more than 14 percent. A growth rate of about 8 percent in the value added of the agricultural sector for such relatively longer period

was unprecedented. Value added in the industrial sector grew at 10 percent accelerating by 2 percentage points over the preceding five years. See table 1 below.

Table 3-1: Sectoral Growth rates

Period	Agriculture	Industry	Service	GDP	Per capita GDP
1960/61-2009/10	1.8	3.83	4.91	2.96	0.04
1960/61-1973/74	2.10	7.04	7.47	3.60	1.33
1974/75-1990/91	0.06	3.60	3.41	1.75	-0.07

Sources: Own computation from MoFED (2010/11) data.

The period has also marked a shift of dominance in the over all economy from agriculture to the service sector. The seemingly high growth rate of 10 percent in the value added in the industrial sector was not robust enough to enable the sector gain a share in the GDP. This is because the industrial sector has a small base and the smallest share in the GDP. In contrast the share of service sector has increased from 36 percent to 46 percent with the same period.

3.2. TRENDS IN SAVING AND INVESTMENT IN ETHIOPIA

Ethiopia has experienced three policy regimes: the imperial regime (prior to 1975), the socialist (or Derge) regime (1975-1991), and the present liberalized regime (1992 onwards). The first regime adopted non-interventionist approach, the second followed rigid inward looking strategy and the third initiated economic reforms to address the long-term structural problems of under development. Beginning in 1992, the Ethiopian government began to implement an economic reform program with a view to revive the economy. Various policy measures, some homebred, others imposed by the IMF and the World Bank, have been undertaken (Sukar and Ramakrishna, 2002). In this section, an

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attempt is made to review the experience of Ethiopia relating savings and investment based on the available data and literatures.

This global trend, nonetheless, conceals significant regional variations in saving rates. The developing countries registered relatively lower rate of saving than the developed countries and among those developing countries those with fast economic growth rate registered significant increase in the domestic saving. Whereas most regional economies either increased or maintained their saving performance, Sub-Saharan African countries lost their ground both in their saving rate as well as growth rate performance. The region is unique in a sense that its saving rate has been not only low but also declining over the last three decades.

The Ethiopian economy has to grow at least at annual growth rate of 10% for more than two decades so that the country can attain the per capita income level achieved today by average Sub-Saharan African (SSA) countries. However, Ethiopia's gross domestic savings as proportion of GDP is quite low, and it is unlikely to achieve this growth rate by mobilizing the meager domestic savings (EEA, 2000 and 2007). Since 1960, domestic savings have been low: from FY 1961/62 to 2008/09, average domestic savings and investment as a percentage of nominal GDP were 12.8 per cent and 19 per cent, respectively (table 3. 2).

Table 3.2: Domestic savings and investment as a percentage of nominal GDP under three political regimes (1961–2009)

1961–2009	12.76	18.98
1961–74	21.9	20.0
1975–92	11.6	16.3
1993–2009	6.9	21.1

Sourse: Own computation from MoFED

The average linear growth rate of GDS to GDP in Ethiopia had been decelerated by 0.6% in the 1960s, 0.82% growth in 1970s, and 2.2% in the 1980s and plummeted into 3.2%

deceleration in the 1990s. Hence, in addition to the then government's economic policies, natural calamities, external aggression by the then Somalia expansionist regime from the late 1970s up to the early 1980s had badly affected the country's over all 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 GDS in the 1990s.

The saving behavior in national economies exhibits inertia and persistence over time. Countries with higher saving rate tend to remain in the same saving profile whereas those countries with low saving rate find it difficult, if not impossible, to break the low saving rate and growth rate vicious circle. Consumption habit formation and its resistance for change might have an important role in the process. Saving transition, a situation in which a low saving country transforms itself into high saving economy, is a difficult process and takes considerable policy and incentive factors to initiate. Moreover, the transition seems to depend in important ways on the growth performance of an economy (Rodrik, 2000) suggesting the need to pursue policies that promote simultaneously growth, investment and domestic saving.

In Ethiopia the data for the period, 1961-2009 exhibits a wide gap between gross domestic savings (GDS) and gross domestic investment (GDI). This gap is large in size and has also widened during this period (World Bank, 2010). In addition, the growth rate of domestic savings is lower than that of investment, and has been declining over time. When we look at the share of gross domestic saving in the GDP, it is about 8.6 % and has come down to 1% in 2008.

However, during 1988, Ethiopia has registered an exceptionally high saving rate (17.7 %). The share of gross domestic investment in the GDP for the same period is found to be 18.4%, while the minimum being 10 .7 % (1992) and a maximum was 25.5% (2004). The resource gap (measured as the difference between I and S) is about 9.8% during this period and reached a maximum of 22.7% during 2006.

Table 2 reveals that, the average GDS as percentage of gross domestic investment (GDI) has been declining during 195 to 2010. For the period 1975 - 1991 it was about 67.75 % but declined to 42.32% of GDI in the years 1992 to 2010. This decline is compensated by an increase in the other sources of investment. For the entire study period, GDS accounts for 51.59% of the GDI, implying that about half the GDI in the entire period was inanced through external resource flows. The FDI flow in to Ethiopia has been insignificant but there is an improvement since 1995. For the entire period FDI accounts for about 6.5 % of the gross investment. The total external debt as a percentage of GDP has been rising since 1975.

During the Derge regime, external debt rose from 25% in 1981 to over 71% of the GDP in 1988 and 1990. The average debt stock was about 60.7% of GDP during 1975 – 1991. In the later years there was a tremendous rise in the external debt of Ethiopia reaching a maximum of 146.6 % of GDP in 1994. However, there was a decline in the external during 2006 – 2009 (World Bank, 2011 and National Bank of Ethiopia).

Table3-3: Gross Domestic Saving and Investment in Ethiopia

Year	GDS %GDI	Net FDI%GDI	Net ODA%GDI	Total External debt % GDP
1975-1991	67.758	0.304	43.203	60.730
1992-2010	42.325	10.025	64.210	78.243
1975-2010	51.592	6.548	53.853	71.503

Source: Own computation from WB (2010) data.

Even by sub-Saharan Africa standards, Ethiopia's rate of domestic saving has been very low. From 1997 to 2010, the average saving rate in low-income countries of the region was about 9 per cent, while it was about 19 per cent for middle-income countries. In the same period, the average saving rate of "fragile" sub-Saharan African states was 11.5 per cent, still significantly higher than Ethiopia's rate of 4 per cent (IMF 2009a: 72 and 2009b: 216).

Yet, these various averages for sub-Saharan Africa are not the desired performances to emulate. The average saving ratio in the newly industrialized Asian economies has remained greater than 30 per cent, except during the recent crisis years when it decreased to about 29 per cent. According to the International Monetary Fund (IMF 2009b), savings as a percentage of GDP were 34 per cent for 1987–94, 32 per cent for 1995–2008, and higher than 29 per cent in 2009–10. Similarly, investment rates have remained above 25 per cent for the period except for the last two years, when they declined to about 23 per cent. Average investment as a percentage of GDP was 30 per cent for 1995–2002, declining to about 25 per cent or more for 2003–08 (IMF 2009a: 72 and 2009b: 216). Compared with the newly industrialized Asian economies, Ethiopia has a long way to go to boost its saving and investment rates, achieve the millennium development goals, and transform the lives of its people.

In view of the severe development deficit in the country, in general, the rate of investment in Ethiopia has remained very low. Investment should and could have

increased persistently and substantially had it not been for the short supply of finances. Throughout the last four decades, irrespective of differences in policy regimes, the critical bottleneck on the investment rate has been the severe shortfall in savings. Even the low investment rate may not be sustainable, as it hinges on external resources. Possibilities include enhancing domestic resource mobilization (DRM), increasing external resource mobilization (including official development assistance, foreign borrowing, and foreign direct investment [FDI]), efficient resource utilization, and a blend of these three strategies, (Tsegabirhan W. 2010).

3.3. TRENDS AND COMPOSITION OF EXTERNAL ASSISTANCE

Ethiopia, as in many development countries, has been using foreign aid to complement domestic resources of the country. The inflow of foreign assistance, which was 18.84 percent of government expenditure, reached a maximum of 19.15 percent in the severe drought of 1984/85 period. In contrast, the external loan reached its first peak in 1980/81 period which amounted 494.8 million birr in nominal terms, significantly increased to 748.85 million birr in 1988/89 and then reaching its ever maximum of 1799.4 million birr in 1993/94 fiscal period. As a share of GDP, foreign assistance and external loan contributed to total of 4.18 percent in 1966/67 and then decreased continually to 1.7 percent in 1973/74 but continually increased in the post reform period.

The average real agriculture foreign aid trend in the Imperial period reached its highest level in 1971/72 period to 27.75 million birr which was well beyond its average level of 14.94 million birr. The volume of aid to agriculture was characterized by variety of activities such as agriculture training and research, fishing, coffee development, live stock and technical assistance (Tadesse 1994).

Thus, aid to agriculture was also scattered in different activities in the Derg regime. The real amount of agriculture aid during the Derg regime reached its peak level of 108.7 million Birr in 1984/85 fiscal year mainly due to the severe drought in which external assistance has been given in the form of food aid. In the other year of the Derg regime,

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aid to agriculture was important to the development of minimum package program which was intended to influence as many poor peasants as possible with agricultural advices and necessary inputs (SIDA 1984) as cited in Tadesse (1994).

In contrast, the average real amount of education aid follows an increasing trend throughout the three different eras. In imperial regime its peak level was 12.13 million birr in which its sectoral aid mainly given to development of higher institution and to administrative and advisory service for Ministry of Education (Tadesse 1994). During this regime, the average level of aid rose to 47.25 million birr from 5.89 million birr in the previous regime. Extensive educational campaign in the late 1970's was undertaken by the government in which this assistance has been used to complement government budget. However, its peak level was in 1988/89 reaching 72.8 million birr compared to the lowest level of 6.49 million birr in 1977/78. It then, continues to increase in the post reform period, which is up to 340.84 million in 1993/94 fiscal period.

During the imperial period, transport and communication sector aid reached its first peak level in 1970/71 fiscal year amounting 7.68 million birr which has largely been given in the form of loans together with credits from non concessionary sources for communication development and airline network (Tadesse 1994).

During the Derg period, transport and communication aid reached its highest peak level of 160.65 million birr in 1988/89 compared to its average its ever peak level of 35.19 million birr, as a result of infrastructure and development priorities in post reform period transport and communication sector which received 312.20 million birr on the average In other sectors such as industry, assistance given has been small in the in the imperial era which was left mainly to foreign investor.

However, during the Derg regime assistance to industry were scattered in the establishment and support of different cement factories and textile industries (Tadesse 1994). Aid to the mining and energy sector was 1.40 million birr on average in the Imperial era in which most of the assistance was given for the purpose of infrastructure

and social development. However, this sector received impressively higher amount of aid during the Derg regime which was 141.26 million birr on average, and then to its maximum of 431.44 million birr in the 1988/89, the overall magnitude of the sectoral aid also continues to increase in post reform period.

CHAPTER FOUR

METHODOLOGY

4.1 INTRODUCTION

In this chapter, data sample and data sources for the study are indicated and variables used in the study are explained. A model is then developed for the study. The model conforms to standard econometric technique required for any econometric research work of this nature. This chapter also develops an econometric estimation technique for the causality test as well as the procedure for the evaluation of results from the estimation.

4.2 SAMPLE DATA AND DATA SOURCES

The study employs annual time series data covering the period 1961 to 2010 and the data on domestic savings and real GDP used as a measure of economic growth in Ethiopia. The sources of the data used in this study are secondary data and are obtained from Ministry of Finance and Economic Development (MoFED). All computations are performed using Eviews6 software.

4.3 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, 1996; Gavin et al, 1997; Sinha and Sinha, 1998; Saltz, 1999). The linear model for this study is specified in logarithmic form. The purpose is to eliminate or to reduce considerably any heteroskedasticity in the residuals of the estimated model.

In light of the existing literature, the theoretical model used to examine the relationship between real domestic savings (GDS) and economic growth is stated as follows:

$$DLGDP_t = f\{(DLGDP_{t-i}), (DLDS_{t-i})\} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots(4.1a)$$

$$DLDS_t = f\{(DLDS_{t-i}), (DLGDP_{t-i})\} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots(4.1b)$$

Where, $LGDP_t$ and LDS_t are the natural logarithm of real domestic product(GDP) and domestic savings (DS) respectively, D is difference operator, $DLGDP_{t-i}$ is lagged values of GDP and $DLDS_{t-i}$ is lagged values of (DS).

4.4 ECONOMETRIC ESTIMATION TECHNIQUE

4.4.1. Stationarity and Non – Stationarity

Recent development in econometrics has shown that there are problems associated with time series macroeconomic data analysis due to non – stationary. A data series is said to be stationary if its error term has zero mean, constant variance and the covariance between any two – time periods depends only on the distance or lag between the two periods and not on the actual time which it is computed (Harris, 1995). To avoid the pitfall of wrong inferences from the non-stationary regressions, the time series data should be stationary. If one regresses a non-stationary variable on another non-stationary variable the results obtained might look very attractive, which might be characterized by high R^2 and a low DW statistic whilst in actual fact they are spurious (Lutkepohl, 1993). So Ordinary Least Squares (OLS) may lead to inconsistent and less efficient parameters as they may show that there is a strong relationship whilst in actual fact there is no relationship at all and hence the results obtained from such regressions will not have a meaningful economic interpretation. Hence, prior to estimation of the long run model(s) the time series properties of the variables, unit root test, should be conducted.

4.4.2 The Unit Root Test

Several tests are usually employed to test whether time series variables are stationary or non-stationary; the Dick-Fuller (DF), the Augmented Dick-Fuller (ADF) test, Auto-Correlation Function (ACF) and Phillips-Peron test. In this study the researcher has employed the ADF test to determine the existence of a unit root. By incorporating the autoregressive process of order p, this model becomes superior to DF. Basically this test has been chosen for its consistency, accuracy and resourcefulness. The general form of the ADF equation where only an intercept is included is as follows:

$$\Delta Y_t = A_o + \gamma Y_{t-1} + \sum_{i=2}^{p} \beta_i \Delta Y_{t-i+1} + \varepsilon_t \quad \text{.. (4.2)}$$

For the case where the auto regression includes the intercept and a trend, the equation is of the following form:

$$\Delta Y_t = A_o + \gamma_1 t + \gamma Y_{t-1} + \sum_{i=2}^{p} \beta_i \Delta Y_{t-i+1} + \varepsilon_t \quad \text{........................... (4.3)}$$
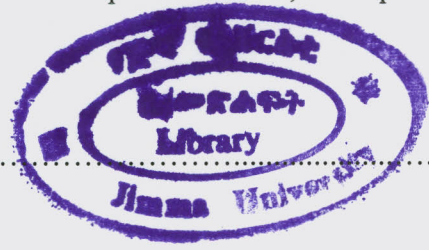
Where, $z Y_t$ is any variable in the model to be tested for stationarity, ε_t is an error term and Δ is the first difference operator.

The null hypothesis of ADF is $\delta = 0$ against alternative hypothesis that $\delta < 0$. Where $\delta = \gamma - 1$. A rejection of this hypothesis means that the time series is stationary or it does not contains a unit root while not rejecting means that the time series is non-stationary (Enders, 1995).

A time series is said to be integrated of order zero, I (0) if it is stationary in levels. Some series needs to be differenced several times before becoming stationary. The number of times a series needs to be differenced before being stationary is the order of integration. So if a time series is said to be integrated of order d, I (d), it means that it has to be differenced d times before the series become stationary. If the series are stationary, running a regression avoids spurious regressions.

4.4.3 Cointegration   Test

According to Engle and granger (1987) cointegration is defined as a situation where two or more series are linked to form equilibrium relationships over span of time. In other words, even if the individual time series data are non stationary, their linear combination could be stationary and they will move closely together over time to make their differences stable (stationery).

Lack of cointegration on the other hand suggests the absence of long-run link between the two variables and this leads to the problem of "spurious correlations". More formally, if two variables say X_t and Y_t are I (d) and the error term ϵ_t is I (0), then the two series are said to be integrated of order I (1,1).

There are two common methods of testing for co-integration. These are the Engle and Granger (1987) {henceforth called EG two-step procedure} and the Johansen (1988) Maximum Likelihood method.

In the EG two-step methodology, taken Y_t as the dependent variable, the **first step** involves regressing Y_t on X_t on their levels and then generating the residuals. *The* **second step** is testing the residual using the Augmented Dicker-Fuller test procedure. If the residual is integrated of order zero *I(0}*, implying that the residual has no unit root, then the variables Y_t and X_t are co-integrated otherwise the variables are not co-integrated.

The EG method is applicable only for single co-integrating vectors. Moreover, it per-assumes that the variable in the right side is weakly exogenous (determined out side the model) while the lift side (dependant variable) being endogenous. But in many instances there exists endogenity character among variables and, inferences made based on such per-supposition, may some time be misleading (Harris, 1995).

The EG procedure, however, is criticized on grounds (Harris, 1995): i) tests for co-integration is likely to have lower power against alternative tests, ii) in finite samples, estimates of long-run relationships are potentially biased, iii) inferences cannot be drawn

using standard t-statistics about the significance of the parameters of the long-run model. Because, since the procedure involves tow-steps, errors committed in the first step are carried over to the next step (Enders, 1995).

By using the Johansen's (1988) Maximum Likelihood estimators, the above pitfalls of the EG test can be avoided. Johansen's test enables estimating and testing for the presence of multiple cointegration relationships, in a single step procedure.

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

4.4.4. Granger Causality Test

If the variables in the series are not co-integrated, then the causal relationship between economic growth and gross domestic savings is examined with the help of a Granger causality procedure based on Vector Autoregressive (VAR) model (Adebiyi, 2000; Mohan, 2006). In this study, the VAR model is expressed in equations (4.4) and (4.5). A VAR model serves as a flexible approximation to the reduced form of any wide variety of simultaneous structural models. Besides, it allows causality to emerge from the joint coefficients (F-statistic) of the lagged values of the explanatory variables even where the variables are not co-integrated. The VAR model is stated as follows

$$DLY_t = \mu_1 + \sum_{j=1}^{p} \gamma_{11} jDLY_{t-j} + \sum_{j=1}^{p} \gamma_{12} \ DLS_{t-j} + \varepsilon_{1t} \dots \dots \dots \dots \dots \dots \dots . \dots \dots \dots (4.4)$$

$$[DLX]_{\downarrow}t = \mu_{\downarrow}2 + \Sigma_{\downarrow}(i = i)^{\dagger}p \not\cong \gamma_{\downarrow}21 \ DLS_{\downarrow}(t - j) + \Sigma_{\downarrow}(i = j)^{\dagger}p \not\cong \gamma_{\downarrow}22 \ \ jDLY_{\downarrow}(t - j) + \varepsilon_{\downarrow}2t \dots \dots \dots \dots)$$

Where ε_{1t} and ε_{2t} are white noise processes and, the null hypothesis that γ_{12} and $\gamma_{22} = 0$ is tested against the alternatives γ_{12} and $\gamma_{22} \neq 0$ in equation (4.4) and (4.5) respectively.

p represents operational lag lengths determined by applying the Akaike Information and Schwartz - Bayesian Criterion, D represents the difference operator, DLY_t is the growth rate of GDP (defined as the changes in the logarithm GDP in period t). DLS_t is the growth rate of gross domestic savings (defined as the changes in the logarithm of GDS in period t). Y_{12} and Y_{21} are the coefficients of growth rates of savings in equations (4.4) and (4.5) respectively. Y_{11} and Y_{22} are the coefficients of growth rates of GDP in equations (4.4) and (4.5) respectively.

In equations (4.4) and (4.5) the lagged values GDP and domestic savings respectively are included in the explanatory variables to eliminate the business cycle effect between GDP and growth rate of domestic savings. According to standard economic theory, during recessions, it is expected that savings will decrease or the growth rate of savings (DLS_t) be less than the growth rate of GDP because consumers dis-save during the hard times to maintain a fairly even consumption pattern.

Similarly, savings is expected to increase or DLSt to exceed DLGDPt during economic boom as people save more in anticipation of the next downturn in the economy. Thus, one expects a positive correlation between gross domestic savings and per capita real GDP simply because of the business cycle effects.

4.4.5 Vector Error Correction Model (VECM)

On the other hand, Vector Error Correction Model (VECM) is used where the series are co-integrated. This procedure is particularly attractive over the standard VAR because it permits temporary causality to emerge from:

(1) The sum of the lagged coefficients of the explanatory differenced variables, and
(2) The coefficient of the error-correction term

The use of error-correction modeling can provide an additional channel through which causality in granger test is assessed. Cointegration is a signal that two or more

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variables reach a long-run equilibrium from which they may deviate in the short run. A class of models that embodies correction of this short-run deviation has been developed, and is referred to as Error-correction models (ECM). 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 (Granger, 1983; Engle and Granger, 1987; Miller and Russek, 1990; Miller, 1991; Dawit, 2005). In this study, the error-correction model is expressed as follows

$$DLY_t = \alpha_{0Y} + \sum_{i=i}^{p} \delta_{1Y} DLY_{t-i} + \sum_{i=i}^{p} \delta_{2j} DLS_{t-1} + \lambda_1 EC_{t-1} + \mu_t \dots \dots \dots \dots \dots \dots .$$
(4.6)

$$DLS_t = \alpha_{0S} + \sum_{i=i}^{p} \delta_{1X} DLS_{t-i} + \sum_{i=i}^{p} \delta_{2i} DLY_{t-1} + \lambda_2 EC_{t-1} + \varepsilon_t \dots \dots \dots \dots \dots \dots \dots$$
(4.7)

Where EC_{t-1} are the lagged error correction terms obtained from co-integration equation I, μ_t and ε_t are serially uncorrelated errors and, λ_1 and λ_2 depict the speed of adjustment. By including these terms, it is possible to conclude that S granger causes Y if λ_s (coefficients of lagged residuals) are significant irrespective of the joint significance of δ's, (Ibid).

P represents the operational lag lengths determined by applying the Akaike Information and Schwartz- Bayesian Criterion, D represents the difference operator, DLY_t is the growth rate of GDP (defined as the changes in the logarithm of real GDP in period t). DLS_t is the growth rate of savings (defined as the changes in the logarithm of GDS in period t) and EC_{t-1} is the error correction term with one lag.

The growth rate of savings causes real GDP growth if the sum of the δ_{2j} 's or λ_1 in equation (4.6) is statistically significant, but neither the sum of the δ'_{2i} s nor the λ_2 in equation (4.7) is statistically significant. The causality is from the growth rate of GDP to growth rate of savings if the sum of δ_{2j} 's or λ_1 in (4.6) is not significant but the sum of

δ'_{21}s or the λ_2 in equations (4.7) is. There is bidirectional causality if both the sum of δ_{2j}'s or λ_1 and either the sum of the δ'_{21}s or the λ_2 are statistically significant.

4.4.6 Pair wise Granger Causality Test

To be double sure of the results of either the VECM or the VAR model, the Pairwise Granger Causality test is performed to affirm or refute the results of any one of the two models already mentioned. The null hypothesis is that there is no causal relationship between the growth rate of domestic savings and the growth rate real GDP. The alternative hypothesis is that there is a causal relationship between growth rate of domestic savings and the growth rate real GDP.

4.4.7 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.

4.4.7.1 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 auto correlated, 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

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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.

4.4.7.2 Normality Tests

The model assumes that the random variable u has a normal distribution. Symbolically: $u \sim N(0, \delta^2_U)$ which reads: u is normally distributed around zero mean and constant variance δ^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 the u's are not normally distributed.

4.4.7.3 Stability Test

Stability test is conducted to assess the stability of the coefficients of the model. Two tests CUSUM Test and CUSUM of Squares test are conducted in the form of graph. The null hypothesis is that the test results satisfy the stability condition against the alternative hypothesis that the test results do not satisfy the stability condition.

CHAPTER FIVE

PRESENTATION AND INTERPRETATION OF RESULTS

5.1 INTRODUCTION

In this chapter, the results obtained from the various tests and model are presented and analyzed. The analysis covers the results obtained from the stationarity tests, the co-integration test, the causality test from the VAR model or the Vector Error Correction Model and its confirmation or refutation by the Pairwise Granger Causality test as well as diagnostic tests.

5.2 EMPIRICAL ANALYSIS AND RESULTS

5.2.1. Result of Unit Root Tests

Before any meaningful regression is performed with the time series variables, it is essential to test the existence of unit roots in the variables and to establish their order of integration. The variables used in the analysis need to be stationary and or should be co integrated in order to infer meaningful relationship from the regression. In other to find the causal relationship between 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 ADF test indicates that both logGDP and logDS have unit roots in the level data. In the presence of unit roots, the variables need to be differenced in order for the series to be stationary. Without differencing the data, a causality test would lead to misspecification. By differencing logDS, the series becomes the growth rates of savings. Because of this technicality in the estimation issue, instead of looking at the causation direction between

savings and economic growth, the hypothesis focuses instead on causation direction between the growth rates of savings and economic growth rate in countries with different income level. Recent studies that use the Granger causality test to determine the relationship between savings and economic growth have to use the growth rate of savings, instead of savings, because of the unit root (nonstationary) problem.

The test results of the standard augmented dickey-fuller (ADF) statistics for all time series variables used in the estimation are presented in table (5.1). Below

Table 5-1: Results of unit root tests for order of integration of the variables

Variables		Augmented Dickey-Fuller					
		Without drift and trend		With drift		With drift and trend	
		Lag 1	Lag 2	Lag 1	Lag 2	Lag 1	Lag 2
LDS		1.646	1.870	-0.152	0.169	-2.690	-2.395
LGDP		2.875	3.366	2.404	4.046	0.268	1.696
DLDS		-5.389**	-3.587**	-5.869**	-4.049**	-5.951**	-4.189**
DLGDP		-3.243**	-2.121*	-4.835**	-2.985*	-6.562**	-3.457*
Critical value	1%	-2.621		-3.602		-3.525	
	5%	-1.949		-2.936		-3.410	

* denote rejection of null at 5% significance level, ** denote rejection of the null at 1% significance. Akaike information criterion (AIC) and Schwartz Bayesian information criterion (SBIC) are used to choose lag length of the variables included in the unit root test.

From the above test result, it is evident that the variables are non-stationary at level but are stationary at their first difference. Hence, the variables are considered as I (1) processes.

Thus, the results from all the tests suggest that the variables are integrated of order one, that is, *I(1)* in their log-levels but become integrated of order zero, that is, *I(0)* in their first difference indicating the presence of unit root in the data.

5.2.2. Co integration and estimation of the long-run model

5.2.2.1. Cointegration in single equations: the Engle-Granger Approach

Having achieved stationarity, 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. The co-integration test is performed using Engel and Granger two-step residual based test. Granger (1981) introduced the concept of co integration that was further extended by Engle and Granger (1987). This concept is based on the idea that, although economic time series exhibit non-stationary behavior, an appropriate linear combination between trending variables could remove the common trend component.

The resulting linear combination of the time series variables will thus be stationary, which means the relevant time series variables are cointegrated.. From an economist's perspective cointegration is of interest because of the possible existence of a long run or steady state equilibrium relationship. Since it is shown that variables in equation are integrated of order one, we compute what is known as the first step of Engle-Granger procedure for cointegration of single equation:

Table 5-2a : Results of Engel-Granger Cointgration Test – Variables in Levels

Step one: Dependent variable: LGDS

Variable	Coefficient	Stad.error	t-statistics	Prob.
LGDP	0.890	0.044	20.163	0.000
Constant	-1.387	0.448	-3.094	0.003

R^2= 0.89   F-statistics = 406.57(0.001)   DW = 1.190

Now we can go to the second step of the Engle-Granger procedure and check the stationarity of residual series obtain from step one.

Table 5-2b : Results of Engel-Granger Cointgration Test; residual test

step two

	ADF	PP	KPSS	DF-GLS
Test statistics	-8.683**	-8.645**	0.039**	-8.299**
Critical 1% level	-3.605	-3.600	0.739	-2.622
Critical 5% level	-2.935	-2.935	0.347	-1.611

** indicates significant at 1%

The result of the cointegration test clearly shows that we are able to reject the null hypothesis of no cointegration. Hence, the residual are stationary at levels and the series are cointegrated.

While the Engle-Granger single equation based cointegration test have been used very frequently in the literature, it has some shortcomings.

One of the most important problems with the methodology is that it does not give us the number of cointegrating vectors (see Hall (1989)). To be double sure of the results of either the variables are co-integrated or not let us check with the Johansen Approach of co integration .

5.2.2.2. Johansen Approach of Cointegration test

The approach developed by Johansen (1988, 1991) and extended by Johansen and Juselius (1990) is considered superior to the Engle-Granger method.

We calculate the trace statistics and the maximum eigenvalue statistics. The null hypothesis of no co-integration vector is tested against the alternative hypothesis of one co-integrating vector. Trace test is used to check whether there exists co-integration between variables or not. The results indicate that co-integration relationship between savings and level of output exist. The results of the test are reported in table 5.3

Table 5.3: Result of Johonsen cointegrating test

Variables	lags	λ trace test				λ max test			
		H_0	H_1	Trace stat.	λTrace 95%	H_0	H_1	Eigen stat.	λmax95%
LDS LGDP	1 2	r=0	r>0	21.086**	15.494	r = 0	r =1	16.340**	14.264
		r<=1	r>1	3.7458	3.841	r = 1	r= 2	3.745	3.841

NOTE: In case of λ trace test the critical values for the hypothesis r = 0 at 5% and 1% significance levels are 15.19 and 6.936 respectively. In case of λ max test the critical values for the hypothesis r = 0 at 5% and 1% significance levels are 14.036 and 6.936 respectively. ** denote rejection of the null at 5% significance.

The results of the Johansen test show that the null hypothesis of no cointegration is rejected at 5% significance level. The existence of co-integration relationship between savings and level of output suggests that there is long run relationship between the two series and the residuals obtained from the co-integrating vectors are stationary at their levels, *i.e.* I (0). According to both maximal eigenvalue and trace statistic tests, our results indicate the existence of one cointegrating vector.

We infer from the fact that economic growth and growth rate of saving are cointegrated for this country (1) that there is a long-run equilibrium relationship between the two time series and (2) the existence of causality in at least one direction.

Generally, one needs to consider the sign of a variable in the cointegration equation, to determine whether the response is consistent with an economic relation or whether the co integration is just picking out some undefined long run correlation. The long run cointegrating vector in the non-trended case is given in equation 5.2

$$LDS-0.5219LGDP=\varepsilon_t \quad \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots(5.2)$$

Therefore, we find that there is a positive long run relationship between GDP and GDS. Now, we need to proceed with causality tests to see if there is any causal relationship between the growth of GDP and GDS.

In the analysis of cointegration, if two variables are cointegrated, the finding of no-causality in either direction is ruled out. However, although cointegration indicates presence or absence of Granger-causality, it does not indicate the direction of causality between variables. This direction of the Granger causality can only be detected through the vector error-correction model (VECM) derived from the long-run cointegrating vectors.
In addition to indicating the direction of causality amongst variables, the VECM also allows us to distinguish between short-run and long-run Granger-causality. The

significance test of the explanatory variables (in first differences) indicates the "short-run" causal effects, whereas the "long-run" causal relationship is implied through the significance or otherwise of the t-test of the lagged error-correction terms which contains the long-run information.

5.2.3 Vector Error Correction: A Test of Causality

If cointegration is detected, then the Granger-causality must be conducted in vector error-correction model (VECM) to avoid problem of misspecification (see Granger 1988). Otherwise, the analyses may be conducted as a standard vector autoregressive (VAR) model. VECM is a special case of VAR that imposes cointegration on its variables. Vector error correction model (VECM) is estimated to examine the causal relationship between savings and level of output in Ethiopia. The long run causality is checked by using the t-values of the error correction terms. They are basically the coefficient of speed of adjustment which shows how strongly the deviation from equilibrium feed back into the system.

The short run causality is determined by the t-values of the coefficients of the lagged terms of independent variables. This procedure is particularly attractive over the standard VAR because it permits temporary causality to emerge from

(1) the lagged coefficients of the explanatory differenced variable and (2) the coefficient of the error correction term.

In addition the VECM allows causality to emerge even if the coefficients of lagged differences of the explanatory variables are not significant. It must be pointed out that the standard Granger causality test omits the additional channel of influence, *i.e.* the significance of the coefficient of error correction term.

The ECM has been estimated using the OLS technique and the results are summarized in table 5-4a and 5-4b below. Akaike information criterion (AIC) and Schwartz Bayesian information criterion (SBIC) are used to choose optimum lag length of the variables included in the VECM

Table 5-4a : Result of the specific vector error-correction model (VECM)

Growth Equation				
Variables	Coefficient	Std. Error	t-value	Prob.
constant	0.034	0.018	1.878	0.067
DLGDP_1	0.248	0.119	2.079**	0.045
DLGDP_2	0.499	0.080	6.210**	0.000
DLDS_1	-0.013	0.016	-0.826	0.414
DLDS_2	0.005	0.012	0.489	0.637
ECMt_1	-0.034	0.077	-0.440	0.002

$R^2 = 0.66$ Adjusted R^2=0.62   DW = 1.87   F=16.909(0.000)**

AR1-2 $F(2,42)$=0.55(0.581)

RESET $F(1, 41)$=1.399(0.2435)

$Chi^2 (2)$ $F(2,41)$=0.067(0.967)

Tests on the significance of joint variables

DLGDP(-1) DLGDP(-2) $F(2, 42)$ = 7.103(0.002)*

DLDS(-1) DLDS(-2) $F(2,42)$=0.3013(0.741)

Table 5-4b: Result of the specific vector error-correction model (VECM)

Saving Equation				
Variables	Coefficient	Std. Error	t-value	Prob.
constant	-0.039	0.088	-0.441	0.661
DLDS_1	-0.517	0.113	-4.576**	0.000
DLDS_2	0.519	0.084	6.145**	0.000
DLGDP_1	2.112	0.843	2.504**	0.0174
DLGDP_2	0.241	0.557	0.433	0.667
ECMt_1	-0.606	0.191	-3.167**	0.002

$R^2 = 0.7007$ Adjusted R^2=66.549   DW = 1.94   F-sta. = 19.900(0.000)**

(DLGDP_1 +DLGDP_2)   F(1,42)=6.404(0.016)**

AR1-2   F(2,42)=0.383(0.684)

RESET   F(2, 41)=1.924(0.158)

LM Chi^2 (2)   =1.172(0.556)

Tests on the significance of joint variables

DLGDP(-1) DLGDP(-2)   F(2, 42) = 7.103(0.016)*

DLDS(-1) DLDS(-2)   F(2,42)=4.250(0.0261) *

Tables 5.4a and 5.4b present the results of the VEC model used for the Granger Causality test. The model has two equations: one with $DLGDP_t$ as the dependent variable whose results are presented in table 5.4a and the one with $DLDS_t$ as the dependent variable whose results are presented in table 5.4b.

In table 5.4a the constant of growth function has the expected correct positive sign because the intercept of the aggregate demand curve should start from the positive value of the y-axis. The dependent variable ($DLGDP_t$) has two lags used as independent variables. Both lags have the expected positive sign and are statistically significant, meaning that the current growth rate of GDP is strongly positively influenced by its immediate past growth rates.

The table also shows that, the first and second lags of growth rate of domestic saving ; the first has negative sign and the second has positive, and both are statistically insignificant. The R-squared value of 0.6265 implies that more than 62% of the value of the dependent variable has been explained by the independent variables.

Table 5.4b has the growth rate of savings ($DLDS_t$) as the dependent variable. Here too, the intercept has the correct negative sign because the intercept of the savings function is negative on the y-axis. The coefficients of the first and second lags of the growth rate of GDP have the expected positive signs and the first is statistically significant, however the second is insignificant. This implies that the growth rate of GDP of the immediate past year positively influences the growth of savings in the current period.

The first lag of savings has unexpected negative sign and statistically significant, while the second lag has positive sign and statistically significant too. This implies that the growth rate of savings is negatively influenced by its immediate past value and positively influenced by its remote past values. The R-squared value of 0.66.549 indicates that more than 66.55% of the dependent variable is explained by the independent variables.

Again, table 5.4a clearly indicating that the coefficient of DLDS_1 and DLDS_2 of growth equation are jointly statistically insignificant. Similarly, the coefficient of the lagged error term (EC_{t-1}) carries an insignificant t- statistics in regression equation $DLGDP_t$. However, table 5.4b shows that the coefficient of lagged $DLGDP_t$ and the lagged error term (EC_{t-1}) are statistically significant in the regression equation of $DLDS_t$. Finally, over all result clearly show that a one way causality from $DLGDP_t$ to $DLDS_t$ in the long-run as well as short –run.

5.2.4 Result of Pairwise Granger Causality Test

The results of the ECM model suggest uni-directional causality in both long- run and short- run. In other words, the growth rate of real GDP granger causes the growth rate of gross domestic savings. The Pairwise Granger Causality Test is performed to affirm or refute the results of the ECM model. Table 5.5 illustrates the results of the Pairwise GC test.

Table 5-5: Results of the Pairwise Granger Causality test

Pairwise Granger Causality Tests Sample: 1961 2010 Lags: 2			
Null Hypothesis	Obs	F-Statistic	Prob
DLGDS does not granger cause DLGDP	48	0.043	0.957
D LGDP does not Granger Cause DLGDS		5.85	0.005

The null hypotheses are in two forms: growth rate of domestic savings does not granger cause the growth rate real GDP, and the growth rate of real GDP does not granger cause the growth rate of domestic savings; against the alternative hypotheses that the growth rate of domestic savings granger causes the growth rate of real GDP and the growth rate real GDP granger causes the growth rate of domestic savings.

From the results, the null hypothesis that the growth rate of GDP does not granger causes the growth rate of domestic savings is rejected at 5% significance level.

Thus, the alternative hypothesis holds that the growth rate of GDP granger causes the growth rate domestic savings. However, the null hypothesis that the growth rate of domestic savings does not granger causes the growth rate of GDP is accepted.

The findings of this study fail to accept the null hypothesis that there is no causal relationship between growth rate of domestic savings and growth rate of GDP. The findings, however, fail to reject the alternative hypothesis that there is a causal relationship between growth rate of domestic savings and the growth rate of real GDP. The finding of this study finds a unidirectional causality between growth rate of GDP and the growth rate of domestic savings. Thus the classical view that saving as the engine of growth is refuted in Ethiopian context.

Again, the findings of this study consistent with the findings of Anoruo and Ahmed (2002) who found the direction of causality running from the growth rate of real GDP to the growth rate of gross domestic savings for the sample countries, namely Ghana, Kenya, Nigeria, and Zambia.

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5.2.5 RESULTS OF DIAGNOSTIC TESTS

The results obtained from the various diagnostic tests are presented below. The results include autocorrelation test, normality test and stability test.

5.2.5.1 Result of Autocorrelation Test

Breush-Godfrey Lagrange Multiplier (LM) test is used to perform VECM 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. See appendix A.

5.2.5.2 Results of Normality Test

The results of the normality tests presented in appendix B reveal that the chi-squared results of Skewness and Kurtosis are statistically insignificant, so is the result of Jarque-

Bera statistic. And normality showed in tables. Thus, the null hypothesis of normal distribution of the residuals is not rejected. See appendix B.

5.2.5.3 Result of Stability Test

The result of the CUSUM tests and CUSUM of squares tests are presented in figures appendix C; and they indicate that the model satisfies the stability condition. Thus, the stability tests reveal that the parameter estimates of the model are stable at least over the sample period.

The CUSUM test (Brown, Durbin, and Evans, 1975) is based on the cumulative sum of the recursive residuals. This option plots the cumulative sum together with the 5% critical lines. The test finds parameter instability if the cumulative sum goes outside the area between the two critical lines.

The CUSUM of squares test provides a plot at the pair of 5% critical lines. As with the CUSUM test, movement outside the critical lines is suggestive of parameter or variance instability. CUSUM of Squares Test also shows that stability in the equation during the sample period. From the figure, the test clearly indicates stability in the equation during the sample period. see appendix C

CHAPTER SIX

CONCLUSION AND RECOMMENDETION

6.1 CONCLUSION

This paper investigates that savings and economic growths are positively cointegrated, indicating a long-run equilibrium relationship; that implying the long run co-movement or a tendency of convergence between savings and output in Ethiopia.

Further, the findings revealed a unidirectional causality between growth rate of domestic product and growth rate of saving in short run; that causality run from economic growth to rate of saving growth. The study uses a cointegration and error correction procedures to investigate the causal relationship between economic growth and the growth rate of domestic savings for Ethiopia. Specifically, the study adopted both Engel-Granger and Johansen cointegration, VECM and Granger pairwise causality to determine the long-run and short-run relation between the interest variables and to ascertain the direction of causality between the two series.

The results of the research concerning the correlation between savings and economic growth in Ethiopia are generally consistent with economic growth theories. From the point of view of a standard theory of economic growth, positive cause and effect relation between domestic savings and economic growth may appear in advanced economies, in which quite high domestic savings may constitute an essential source of financing domestic investment and an economic growth factor, without the necessity of using foreign investment.

For the same reason, in the poorest countries like Ethiopia there should not be any relation between domestic savings and economic growth, as these countries, in order to finance their investment, use mostly foreign savings as their domestic savings are quite scarce.

As the empirical results of this study indicates that there is no significant positive impact runs from domestic saving to economic growth in Ethiopia; because of the fact that; high

resource gap in Ethiopia and it depends heavily on foreign aid and borrowing to meet its investment requirements or due to less saving retention and the economy depends on external resources to meet the investment need.

The research results also confirmed the existence of positive, unidirectional causal relationship between economic growth and savings. Namely, the growth of Domestic Product was the cause of growth of Domestic Savings in Ethiopia.On the other hand, growth of Domestic Saving was not the reason for the growth of Domestic Product in this country's economy.

In summary, based on the results, the study favors the hypothesis that the causality is from economic growth rate to growth rate of savings. This finding that economic growth Granger-causes growth in domestic savings is consistent with Sinha and Sinha (1998), and Saltz (1999). And thus, which are consistent with the Keynesian hypothesis.

6.2. RECOMMENDATION

The recommendation that emerges from this study is that the authorities should be aware of the possibility of causality running from economic growth to domestic savings. To this effect, policymakers should formulate and implement policies that promote economic growth, since such strategies will lead to higher growth in domestic savings.

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APPENDICES

APPENDIX A.

Result of Residual Serial Correlation Test VECM Residual Serial

VEC Residual Serial Correlation

LM Tests

Null Hypothesis: no serial

correlation at lag order h

Sample: 1961 2010

Included observations: 46

Lags	LM-Stat	Prob
1	4.927274	0.2948
2	1.233977	0.8725
3	2.961382	0.5643
4	10.17014	0.0577
5	2.871093	0.5796
6	1.579103	0.8125
7	10.33922	0.3051
8	9.555139	0.4086
9	3.582182	0.4655
10	3.545932	0.4709
11	5.943673	0.2034
12	3.774060	0.4374

Probs from chi-square with 4 df.

APPENDIX B :

Result of Residual Normality Test VEC Residual Normality Tests

VEC Residual Normality Tests

Orthogonalization: Cholesky (Lutkepohl)

Null Hypothesis: residuals are multivariate normal

Sample: 1961 2010
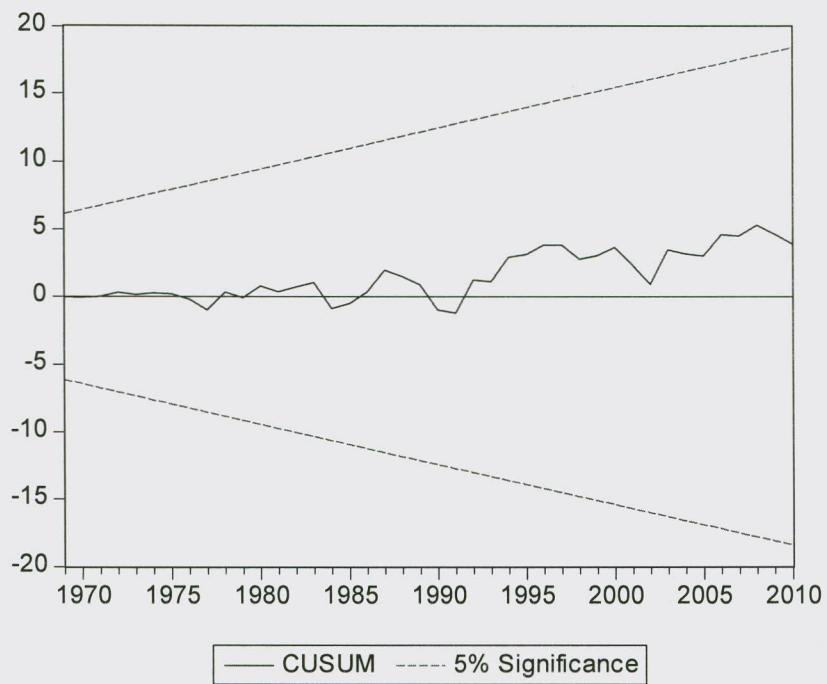
Included observations: 46

Component	Skewness	Chi-sq	df	Prob.
1	0.044181	0.014965	1	0.9026
2	-0.119870	0.110160	1	0.7400
Joint		0.125125	2	0.9394

Component	Kurtosis	Chi-sq	df	Prob.
1	2.332259	0.854600	1	0.3553
2	2.100172	1.551907	1	0.2129
Joint		2.406507	2	0.3002

Component	Jarque-Bera	Df	Prob.
1	0.869565	2	0.6474
2	1.662067	2	0.4356
Joint	2.531632	4	0.6390

APPENDIX C

i. CUSUM Test figure

ii: CUSUM of Squares Test figure