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AN EMPIRICAL TIME SERIES ANALYSIS ON THE DETERMINANTS OF GROSS NATIONAL SAVING IN ETHIOPIA: ARDL APPROACH TO CO-INTEGRATION.

BY

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An Empirical Time Series Analysis on the Determinants of Gross National Saving in Ethiopia: ARDL Approach to Co-integration.

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This is to certify that the project prepared by Yohannes Ghebru, entitled: Empirical Time Series Analysis on the Determinants of Gross National Saving in Ethiopia and submitted in Partial Fulfillment of the Requirements for the Degree of Master of Arts in Applied Economic Modeling and Forecasting (Financial Policy Analysis and Planning) complies with the regulations of the University and meets the accepted standards with respect to originality and quality.

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Abstract

An Empirical Time Series Analysis on the Determinants of Gross National Saving in Ethiopia: ARDL Approach for Cointegration

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The objective of this paper was to investigate the macroeconomic determinants of gross national saving in Ethiopia using time series annual data form 1970/71-2010/11. In this study, effort has been made to identify the long run and short run determinants of national saving in Ethiopia using an ARDL bounds testing approach and ECM to capture both short run and long run relationships. Estimated results revealed that financial development (FD) and Current account deficit (CAD) are significant determinants of gross national saving in Ethiopia in the long run. But gross national disposable income (LGNDI), dependency ratio (DR), budget deficit (BD) and inflation, approximated by consumer price index (CPI), found to be statistically insignificant determinants of gross national saving in Ethiopia in the long run.

However, in the short run, except consumer price index (CPI) and dependency ratio (DR) the rest of the explanatory variables such as gross national disposable income (LGNDI), financial development (FD), current account deficit (CAD) and budget deficit (BD) found to have statistically significant meaning in explaining gross national saving in Ethiopia. The speed of adjustment has value 0.66978 with negative sign, which showed the convergence of saving model towards long run equilibrium. The overall findings of the study underlined the importance of raising the level of income in a sustainable manner, minimizing the adverse impacts of budget deficit and inflation rate and creating competitive environment in the financial sector.

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List of Acronyms and Abbreviations

ADF	Augmented Dickey Fuller
AIC	Akaike Information Criteria
ARCH	Autoregressive Conditional Hetroskedasticity
ARDL	Autoregressive Distributed Lag
CSA	Central Statistical Authority
CV	Critical Value
DW	Durbin Watson
ECA	Economic Commission for Africa
ECM	Error Correction Model
EEA	Ethiopian Economics Association
EPRDF	Ethiopian People's Revolutionary Democratic Front
GTP	Growth and Transformation Plan
I()	Integrated of Order
IMF	International Monetary Fund
MoFED	Ministry of Finance and Economic Development
NBE	National Bank of Ethiopia
OLS	Ordinary Least Square
PP	Phillips and Perron
RGDP	Real Gross Domestic Product
SC	Schwarz Criteria
UN	United Nation
WB	World Bank

Chapter One
Introduction

1.1. Background of the Study

Saving the other side of consumption is vital for the development process of a nation. Again saving what is left after consumption governs the growth path of a country. The more the peoples of the nation saves the more resources are available for investment there by accelerating economic growth. The recent success story in terms of economic growth achieved in Ethiopia has attracted much attention towards how the huge investments are financed in the process analyzing the role of gross national saving on investment.

The remarkable recent growth performance was supported by robust investment—but not matched by similarly high savings rates. The gap between Gross Domestic Savings (GDS) and the investment rate widened over the past three decades. Investment rose from 15.7 percent of GDP in the 1980s to 23 percent in the 2000s, while Gross Domestic Savings declined from 10.5 percent to 6.1 percent of GDP over the same period. Recent revisions in the national accounts of Ethiopia indicate a growing savings rate again over the past years. Investment financing has shifted gradually away from gross domestic savings towards net income transfers, foreign direct investment, and external borrowing. In the 1980s, gross domestic savings mostly financed investment. In the 2000s, an expansion of investment was made possible by an increase in net income transfers and a larger current account deficit (financed, in turn, by FDI and external borrowing) (Ethiopia Economic Update II, World Bank, 2013).

Saving has always figured prominently in both theoretical analysis and policy design in both developed and developing economies. This prominence emanates from its assumed direct theoretical link to future economic growth and current expenditure levels via its link to consumption. Early theories of economic growth emphasized the role of saving as a source of capital accumulation and hence growth. Similarly the aggregate demand based theory of Keynesian economics also focused on aggregate expenditure which has a direct implication to saving. Due to their preoccupation with short-term macroeconomic adjustment and stabilization policies, the emphasis on saving was relatively neglected in the 1980s in many African countries. But the focus on economic growth and hence on saving seems to have resurfaced in the 1990s and after. This interest is partly due to the belief that one of the reasons for slow growth in Sub-Saharan Africa is the low rate of saving relative to other developing regions (Alemayehu Geda and Haile Kibret, 2007).

The behavior of economic agents in the allocation of economic resources is a critical factor that exerts influence on the growth path of a country. One of such allocation issues is concerned with the inter-temporal allocation of income between consumption and saving. The behavior and determinants of such allocation decision are important to understand the mechanisms and interactions across aggregate consumption, saving, capital accumulation and growth processes. In fact, economic policies in most countries attempt to influence the level and growth of these variables so as to achieve growth in productivity and employment, macroeconomic stability and efficient resource allocation. The efficacy of such policies, however, depends on the nature and degree of influence that policies have on these macroeconomic variables (Abu, 2004).

One of the areas towards which public policies have been directed is improving the domestic saving rate of national economies. The rationale of the policy is that saving serves as a source of capital formation which in turn influences the productivity of labor and its growth over time. The fact that investment would be financed either from current or future saving of a national economy coupled with the imperfect international mobility of capital in general and to developing countries in particular, implies that improving domestic saving rate is an important policy target. This lends to the question of what kind of public policies are effective in encouraging domestic saving (Abu, 2004).

Despite the importance of saving for economic growth, saving rate is lower to finance the domestic investment in most developing countries. Sub-Sahara Africa has low gross domestic saving (18% of its GDP) when compare to South Asia, 26% and newly industrialized countries 43% in 2005 (IMF, 2007). For Ethiopia, during the imperial era, gross domestic saving as a percent of GDP was 11% on average. After the socialist state took power in 1974 there were expectations towards the increment of saving by eliminating the luxury life style of the ruling classes. In actual fact the policy of imposing capital ceiling became a serious disincentive to saving class and further encouraged conspicuous consumption (Befekadu and Birhanu, 2000). Instead of increasing, what turned out during the Derg regime was the ratio of gross domestic saving (GDS) as percent of GDP has declined from 11% to 4% on average, while further show a very haphazard rate during the entire Derg regime from high of 7% in 1976-1986 to even less than 1% during the last period of the Derg regime as a consequence of increasing government consumption on military expenditure (Dawit, 2004).

Spurred by the sound economic policy and favorable weather condition, the Ethiopian economy witnessed on encouraging overall economic performance for the last decade as real GDP grew by two digits. Despite this promising and sustainable economic growth performance, gross domestic saving still does not show substantial progress in the same years as it was 4.26 for the period of 2004-2008 with increasing resource gap (NBE, 2008). Ethiopia continues to face a potential shortage of resource to finance public and private investment, which constraints its ability to accelerate economic growth. The chronic resource gap shown is from imbalance between domestic saving and domestic investment. The resource shortage adversely affect ability of government to undertake expenditure in infrastructure and social service to boost domestic demand, encourage private activities and sustain high level of economic growth (ECA, 2006).

Being one of the least developed countries, Ethiopia is experiencing high economic growth and low saving making the nation more dependent on foreign aid and loans from abroad to finance its huge investment requirements which in turn makes Ethiopia exposed to external shocks and other political restrictions. So mobilizing the required saving and making to finance investment is a must.

1.2. Statement of the Research Problem

When one talk's about a Nations Wellbeing he/she is absolutely talking about development, that is, weather the nation is developed or underdeveloped. One can ask a question here "What brings economic development? ". Behind development there is always impressive and sustainable economic growth story in a sense that remarkable and sustainable economic growth leads towards development.

Ethiopia's development efforts in the last decade were very impressive. Ethiopia has been involved in implementing mega investment projects like building dams, railways, roads and so on by developing a comprehensive successive five year growth and transformation plans. Financing these hydro investment projects in different sectors requires mobilization of large national saving. The nation no longer needs to depend on the international development assistance and loans from the international organizations like the World Bank and other lenders to finance its projects because of the unpredictable nature of aid and the political interest of the donor nations. So mobilizing the required resources to finance its investment projects and then foster development makes the nation less dependent on aid on the road and provides the nation the much needed freedom to invest according to its plans and fulfill the needs of its people.

Ethiopia's domestic savings rate is low compared to the fast pace of capital accumulation observed between 2003/04 and 2010/11. Ethiopia has been experiencing single-digit domestic saving rates while economic growth was in double digits, supported by investment rates beyond 25 percent of GDP. Consequently, Ethiopia is confronted with a persistent and wide domestic saving and investment gap, which has been financed by external sources. The Government of Ethiopia has very ambitious public investment plans. Given the current levels of domestic and external savings, however, it may be difficult to finance this investment plan (Ethiopia Economic Update II, World Bank, 2013).

To achieve alarm rate and sustainable economic growth, without any doubt, there is a need for massive and sustainable investment (Private and Public) in the economy. Investment plays a vital role in accelerating economic growth in every nation which ultimately leads to

development and wellbeing of the nation. So to have massive and sustainable investment to build the required capital the nation needs to mobilize huge resources, that is, saving (Private and Public Saving). Therefore, the ultimate source of development and a nation's wellbeing is saving, in as such a way that, more saving leads to more investment and there by higher economic growth which in turn fosters development.

In Ethiopia, the saving culture is very poor relative to other developing economies and that necessitates the need to put in place a coherent economic policy that will be capable of providing the much needed enabling environment and also there is an urgent need to encourage Ethiopians to change their current attitude towards saving, thereby placing the right saving culture by institutions and regulatory agents who influence the decisions of households, firms and government. For instance, during the period 1991 to 2000, domestic savings averaged 6.2 % of Gross domestic product (National Economic Accounts data, 2012) and however this is due to the fact that the low rate of interest rate in the financial sector of the 1990s and saving culture of the people. The impressive economic growth registered and eventually rise in income in the last decade resulted in trivial rise in domestic saving in the period 2000 to 2011 with the saving to GDP ratio rising to 6.6 %.(National Economic Accounts data (NAD), 2012).

Ethiopia, a none oil exporter nation, has registered remarkable economic growth in the last decade averaged around 11 % which makes the nation one of the fastest growing countries in the world. The country is now day's a busy nation in eradicating poverty and achieving development. So it's quite simple to think that how saving has been playing a key role in

what Ethiopia has achieved in terms of real growth in output in the last decade and this economic growth puts Ethiopia on the verge of development.

With the rate of savings standing at only 2.5% in Ethiopia in 2006 (National Economic Accounts data, 2012), there is the need to examine the main constituents of savings in Ethiopia. So manipulating carefully the macroeconomic environment national policy generates variables which could influence the propensity of economic and financial actors to save.

As most of the determinants of saving studies are dominated by panel regression techniques and cross country data country specific studies are relatively few in numbers and studies in this area are two scanty in Ethiopia. So this paper tries to fill gaps and make contributions to the determinants of saving literature. More specifically, this thesis would attempt to examine from policy perspectives, the magnitude and direction of such variables as: gross national disposable income, financial development (measured by currency as share of narrow money), dependency ratio, inflation (measured by consumer price index), current account deficit and budget deficit on savings in Ethiopia. In addition to this, studying the determinants of gross national saving will help to understand and know the factors which affect the mechanisms of saving and produce sound macroeconomic policies to mobilize large saving and there by accelerate economic growth and ultimately bring development.

To summarize, this thesis will discuss on the determinants of mechanisms of saving in the case of Ethiopia. And bring out the factors that determine gross national saving in Ethiopia which there by aid to develop comprehensive macroeconomic policies that will mobilize the much needed saving.

1.3. Objective of the Study

The study has general and specific objectives. The specific objectives are within the framework of the general objective, in a sense that, they are set up in as such a way to achieve the general objective.

1.3.1. General Objective

The general objective of the study is to figure out the main macroeconomic determinants of gross national saving in Ethiopia.

1.3.2. Specific Objectives

- To observe the trend of gross national saving in Ethiopia overtime.
- To examine the role Gross National Saving on Gross Fixed Capital Formation.
- To examine the long run and short run determinants of gross national saving in Ethiopia.

1.4. Significance of the Study

Most of the previous studies conducted on the determinants of gross national saving have given focus on panel data analysis, it can be said that time series analysis has been numbered. On the other hand, Time series studies conducted exert much effort on cross country analysis i.e. there are no plenty country specific studies undertaken. Furthermore, the choices of the variables that influence gross national saving and thereby included in the past studies are not comparable to our country situation. This study will attempt to focus on the determinants of saving with more relevant variables to the Ethiopian economy case.

Furthermore, the study will be significant in a sense that, given the current activities of investment of the Ethiopian government, it will help to figure out the main variable that determine saving thereby manipulate these variables to create the macroeconomic environment to mobilize the required saving rather than depending on external sources to finance investment.

1.5. Scope of the Study

This thesis will discuss about the determinants of saving in Ethiopia. The study aims to provide a better understanding of the short run and long run determinants of saving in Ethiopia. Moreover, the study will focus only on the macroeconomic variables that govern saving and ignores the microeconomic determinants of saving, that is, household level determinants of saving analysis will be ignored.

1.6. Hypothesis of the Study

There are an awful lot of variables that determine the level of saving in a given country. With regard to our country Ethiopia more specific variables are thought to be the main determinants of gross national saving. The paper need to put the expected results or hypothesis on the impact of six explanatory variables on the level of gross national saving. Therefore, in this study it is expected that:

- Gross national disposable income has a positive impact on the level of gross national saving.
- Financial development, which is measured as currency over narrow money, has negative impact on gross national saving.

- Dependency ratio, which is a demographic variable, has a negative impact on the level of gross national saving.
- Consumer price index, which is an indicator of the level of inflation, has a negative impact on the level of gross national saving.
- Current account deficit, which is an indicator of the external sector, has negative impact on the level of gross national saving.
- Budget deficit, which is an indicator of the fiscal policy, has a negative impact on the level of gross national saving.

1.7. Limitation of the Study

Due to the unavailability of time series demographic data like urbanization which is relevant in explaining the behavior of national saving the researcher is not able to include such demographic variables. In addition to this there are also data limitations on some variables. The accuracy of the data is again a limitation to the study since the inconsistency of data collected on the same variable from different institutions is unbelievable. Even though shortage of data and inconsistency of data limit me to do the study, I will try to afford those limitations and do my best to maximize.

1.8. Organization of the Study

The rest of the study is organized in as such a way that. Section two reviews the theoretical and empirical literature related to saving. In section 3, the data used and econometric methodology used for empirical framework are described. In section 4, overview of Ethiopia economy and trend in gross national saving is discussed by focusing on the variables in

clouded in the analysis and those attempted to be included in the analysis. Section 5, reports the results of the empirical analysis in detail and section 6 provides conclusion and policy implication.

Chapter Two
Literature Review

2.1. Theoretical Literature Review

This chapter presents the recent literature in area of saving and its possible implication in the economy. The chapter begins by a review of theoretical literature in which theoretical frameworks are explained. The empirical literature section reviews the major works at the international level and shows how far has been done in Ethiopia to the best of the researcher's knowledge. Last but not least, the researcher tried to cover the available theoretical and empirical works on national saving to his best knowledge.

2.1.1. Measurement Issues

It has to be noted from the outset that data problems in examining saving behavior both at the macro-economic and micro-economic levels, particularly in developing countries, are pervasive. For instance, at the macro-economic level, "saving is not measured directly but is the residual between two large magnitudes [GDP and Consumption], each itself measured with errors (Deaton, 1989, cited in Alemayo Geda and Haile Kibret, 2007)". Similarly, at the micro-economic level, "The standard household survey may well understate saving. The concept of income is itself extraordinarily complex, and most people in developing countries have little reason to distinguish between business and personal cash transactions" (Deaton,1989, cited in Alemayo Geda and Haile Kibret,2007).

These difficult national accounts data issues notwithstanding, it is apparent that domestic and national savings are dominated by private savings, and that household savings form the more substantial part of these in most countries (Deaton 1989). Household savings may be

measured in a number of ways. One approach is provided by the flow-of-funds perspective (Wilson, et.al. 1989), in which the capital expenditures of households are added to their acquisition of financial assets in the first instance. Any changes in their liabilities are subtracted from this to yield their gross personal saving. An allowance for capital consumption yields the net personal saving in the flow-of-funds account. Making further deductions for spending on consumer durables and income adjustments yields personal saving by the flow-of-funds approach on the same conceptual basis as measured by the national income and product accounts approach. Data limitations, however, make it difficult to measure the household saving rate by the flow-of-funds approach in almost all African countries. The National Income and Product Approach in which expenditure is subtracted from income is therefore widely used (Ernest Aryeetey and Christopher Udry, Saving in Sub-Saharan Africa, 2000).

Aryeetey and Udry (1999) also note that in the case of Sub-Saharan Africa, non-financial assets (livestock, stocks of goods for trading, grain and farm inputs) dominate their asset portfolios which in essence are used to smooth out consumption over time. What is more, due to distortions in the trade sector that results in illegal capital outflow (via over-invoicing of imports and under-invoicing of exports, for instance), saving will be underestimated when calculated as the sum of trade and government surpluses and domestic investment (Deaton, 1989). Analysis of saving behavior in the absence of the above considerations therefore will make it inaccurate and in their presence complex (Cited in Alemayo Geda and Haile Kibret, 2007).

2.1.2. Saving and Consumption Smoothing

Choices by individuals and families about their saving are one set of fundamental determinates of national savings. These decision makers divide the current increment to their resources between consumption, the satisfaction of current wants, and savings that intern will influence their ability to satisfy wants in the future. Any model of rational decision – making by savers must, therefore, focus very explicitly on the trade-off between satisfying wants now and later with in this limitation, however, there is considerable latitude for different specifications of consumer's objectives and the constraints they face in attaining them. The researcher starts with a very simple Franco Modigliani's life cycle hypothesis model of intertemporal decision making about consumption.

2.1.2.1. Franco Modigliani and the Life-Cycle Hypothesis

In a series of papers written in the 1950s, Franco Modigliani and his collaborators Ando and Richard Brumberg used Fisher's model of consumer behavior to study the consumption function. One of their goals was to solve the consumption puzzle—that is, to explain the apparently conflicting pieces of evidence that came to light when Keynes's consumption function was confronted with the data. According to Fisher's model, consumption depends on a person's lifetime income. Modigliani emphasized that income varies systematically over people's lives and that saving allows consumers to move income from those times in life when income is high to those times when it is low. This interpretation of consumer behavior formed the basis for his life-cycle hypothesis (Mankiw, 2009).

The point of departure of the life cycle model is that the hypothesis that consumption and saving

decisions of households at each point of time reflects a more or less conscious attempt at achieving the preferred distribution of consumption over the life cycle, subject to the constraint imposed by the resources accruing to the household over its lifetime (Franco Modigliani, 1966, 162).

The Hypothesis

One important reason that income varies over a person's life is retirement. Most people plan to stop working at about age 65, and they expect their incomes to fall when they retire. Yet they do not want a large drop in their standard of living, as measured by their consumption. To maintain their level of consumption after retirement, people must save during their working years. Let's see what this motive for saving implies for the consumption function (Mankiw, 2009).

Consider a consumer who expects to live another T years, has wealth of W, and expects to earn income Y until she retires R years from now. What level of consumption will the consumer choose if she wishes to maintain a smooth level of consumption over her life? (Mankiw, 2009).

The consumer's lifetime resources are composed of initial wealth W and lifetime earnings of $R \times Y$. (For simplicity, we are assuming an interest rate of zero; if the interest rate were greater than zero, we would need to take account of interest earned on savings as well.) The consumer can divide up her lifetime resources among her T remaining years of life. We

assume that she wishes to achieve the smoothest possible path of consumption over her lifetime. Therefore, she divides this total of $W + RY$ equally among the T years and each year consumes

$$C = (W + RY)/T.$$

We can write this person's consumption function as

$$C = (1/T)W + (R/T)Y.$$

For example, if the consumer expects to live for 50 more years and work for 30 of them, then $T = 50$ and $R = 30$, so her consumption function is

$$C = 0.02W + 0.6Y.$$

This equation says that consumption depends on both income and wealth. An extra $1 of income per year raises consumption by $0.60 per year, and an extra $1 of wealth raises consumption by $0.02 per year (Mankiw, 2009).

If every individual in the economy plans consumption like this, then the aggregate consumption function is much the same as the individual one. In particular, aggregate consumption depends on both wealth and income. That is, the economy's consumption function is

$$C = \alpha W + bY,$$

where the parameter α is the marginal propensity to consume out of wealth, and the parameter b is the marginal propensity to consume out of income (Mankiw, 2009).

Because wealth does not vary proportionately with income from person to person or from year to year, we should find that high income corresponds to a low average propensity to

consume when looking at data across individuals or over short periods of time. But over long periods of time, wealth and income grow together, resulting in a constant ratio W/Y and thus a constant average propensity to consume (Mankiw, 2009).

To make the same point somewhat differently, consider how the consumption function changes over time. For any given level of wealth, the life-cycle consumption function looks like the one Keynes suggested. But this function holds only in the short run when wealth is constant. In the long run, as wealth increases, the consumption function changes. This upward shift prevents the average propensity to consume from falling as income increases. In this way, Modigliani resolved the consumption puzzle posed by Simon Kuznets's data (Mankiw, 2009).

The life-cycle model makes many other predictions as well. Most important, it predicts that saving varies over a person's lifetime. If a person begins adulthood with no wealth, she will accumulate wealth during her working years and then down her wealth during her retirement years. According to the life-cycle hypothesis, because people want to smooth consumption over their lives, the young who are working save, while the old who are retired dissave (Mankiw, 2009).

2.1.3. Saving, Interest Rate and Economic Growth

2.1.3.1. Harrod - Domar Growth Model

Every economy must save a certain proportion of its national income, if only to replace worn-out or impaired capital goods (building, equipment and materials). However, in order to grow, new investment representing net additions to the capital stock are necessary. If we assume that there is some direct economic relationship between the size of the total capital stock, K, and total GDP, Y—for example, if $3 of capital is always necessary to produce a $1 stream of GDP—it follows that any net additions to the capital stock in the form of new investment will bring about corresponding increases in the flow of national output, GDP. Suppose that this relationship, known in economics as the capital-output ratio, is roughly 3 to 1. If we define the capital-output ratio as k and assume further that the national net saving ratio, s, is fixed proportion of national output and that total new investment is determined by the level of total savings, we can construct the following simple model of economic growth (Michael P. Todaro and Stefen C. Smith, Economic Development, 2009).

1. Net saving (S) is some proportion, s, of national income (Y) such that we have the simple equation

$$S = sY \quad \ldots\ldots (3.1)$$

2. Net investment (I) is defined as the change in the capital stock, K, and can be represented by ΔK such that

$$I = \Delta K \quad \ldots\ldots (3.2)$$

But because the total capital stock, K, bears a direct relationship to total national income or output, Y, as expressed by the capital-output ratio, k, it follows that

$$K/Y=k$$

Or

$$\Delta K/\Delta Y=k$$

Or, finally,

$$\Delta K=k\Delta Y\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.3)$$

3. Finally, because net national savings, S, must equal net investment, I, we can write this equality as

$$S = I\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.4)$$

But from equation 3.1 we know that S = sY and from equation 3.2 and 3.3 we know that

$$I = \Delta K = k\Delta Y$$

It therefore follows that we can write the "identity" of saving equaling investment shown by equation 3.4 as

$$S = sY = k\Delta Y = \Delta K = I\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.5)$$

Or simply as

$$sY = k\Delta Y\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.6)$$

Divide both sides of Equation 3.6 first by Y and then by k, we obtain the following expression:

$$\Delta Y/Y = s/k\ \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.7)$$

Note that the left hand side of Equation 3.7, $\Delta Y/Y$, represents the rate of change or rate of growth of GDP.

Equation 3.7, which is a simplified version of the famous equation in the Harrod - Domar theory of economic growth, states that the rate of growth of GDP ($\Delta Y/Y$) is determined

jointly by the net national saving ratio, s, and the national capital-output ratio, k. More specifically, it says that in the absence of government, the growth rate of national income will be directly or positively related to the saving ratio (i.e. the more the economy is able to save – and invest out of a given GDP, the greater the growth of the GDP will be) and inversely or negatively related to the economy's capital-output ratio (i.e. the higher k is, the lower the rate of GDP growth will be) (Michael P. Todaro and Stefen C. Smith, Economic Development, 2009).

The Harrod-Domar model, points out that output depends on the investment rate and the productivity of that investment. In an open economy, investment is financed by domestic saving and foreign savings. This model explains economic growth in terms of a saving ratio and capital-output coefficient.

2.1.3.2. Saving and Economic Growth

If you have ever spoken to your grandparents about what their lives were like when they are young, most likely you learned an important lesson about economic growth: material standards of living have improved substantially over time for most families in most countries. This advance comes from rising incomes, which have allowed people to consume greater quantities of goods and services (Mankiw, 2009).

The question of growth is nothing new but a new disguise for an age-old issue, one which has always integrated and preoccupied economics: the present and the future.

--- James Tobin

Economic growth theories like the Solow growth model explain why our national income growth, and why some economies grow faster than others, by making broaden analysis so that is describes the changes in the economy overtime. The Solow growth model shows how saving, population growth and technological progress affect the level of an economy's output and its growth overtime (Mankiw, 2009). Here in the Solow growth model the role of saving in economic growth is clear.

The Solow growth model shows that the saving rate is a key determinant of the steady state capital stock. If the saving rate is high the economy will have a large capital stock and high level of output in the steady state. If the saving rate low, the economy will have a small capital stock and a low level of output in the steady state. This conclusion sheds light on many discussions of fiscal policy. As it's already known that government budget deficit can reduce national saving and crowd out investment. The long run consequences of a reduced saving rate are a lower capital stock and lower national income. This is why many economists are critical of persistent budget deficit (Mankiw, 2009).

What does the Solow model say about the relationship between saving and economic growth? Higher saving leads to faster growth in the Solow model, but only temporarily. An increase in the rate of saving raises growth only until the economy reaches the new steady state. If the economy maintains a high saving rate, it will maintain a large capital stock and a high level of output, but it will not maintain a high rate of growth forever. Policies that alter the steady-state growth rate of income per person are said to have a *growth effect.* By contrast, a higher saving rate is said to have a *level effect,* because only the level of income

per person—not its growth rate—is influenced by the saving rate in the steady state (Mankiw, 2009).

Now having understood how saving and growth interact, we can more fully explain the impressive economic performance of Germany and Japan after World War II. Not only was their initial capital stocks low because of the war, but their steady-state capital stocks were also high because of their high saving rates. Both of these facts help explain the rapid growth of these two countries in the 1950s and 1960s (Mankiw, 2009).

2.1.3.3. The Importance of Saving

Because capital is a produced factor of production, a society can change the amount of capital it has. If today the economy produces a large quantity of new capital goods, then tomorrow it will have a larger stock of capital and be able to produce more of all types of goods and services. Thus, one way to raise future productivity is to invest more current resources in the production of capital (Principles of Macroeconomics, 2004).

One of the *Ten Principles of Economics* is that people face tradeoffs. This principle is especially important when considering the accumulation of capital. Because resources are scarce, devoting more resources to producing capital requires devoting fewer resources to producing goods and services for current consumption. That is, for society to invest more in capital, it must consume less and save more of its current income. The growth that arises from capital accumulation is not a free lunch: It requires that society sacrifice consumption of goods and services in the present in order to enjoy higher consumption in the future. The

financial market will coordinate saving and investment. In addition to this, the government policies influence the amount of saving and investment that takes place. At this point it is important to note that encouraging saving and investment is one way that a government can encourage growth and, in the long run, raises the economy's standard of living (Principles of Macroeconomics, 2004).

2.1.3.4. Changing the Rate of Saving

In order to move any economy toward the Golden Rule steady state, policymakers should increase national saving. But how can they do that? That is, as a matter of sheer accounting, higher national saving means higher public saving, higher private saving, or some combination of the two. Much of the debate over policies to be taken to increase growth focuses on which of these options is likely to be most effective. The most direct way in which the government affects national saving is through public saving—the difference between what the governments receives in tax revenue and what it spends. When its spending exceeds its revenue, the government runs a *budget deficit,* which represents negative public saving. A budget deficit raises interest rates and crowds out investment; the resulting reduction in the capital stock is part of the burden of the national debt on future generations. Conversely, if it spends less than it rises in revenue, the government runs a *budget surplus,* which it can use to retire some of the national debt and stimulate investment. The government also affects national saving by influencing private saving—the saving done by households and firms. In particular, how much people decide to save depends on the incentives they face, and these incentives are altered by a variety of public policies. Many economists argue that high tax rates on capital—including the corporate income tax, the

federal income tax, the estate tax, and many state income and estate taxes—discourage private saving by reducing the rate of return that savers earn. On the other hand, tax-exempt giving preferential treatment to income saved in these accounts. Some economists have proposed increasing the incentive to save by replacing the current system of income taxation with a system of consumption taxation. Many disagreements over public policy are rooted in different views about how much private saving responds to incentives. For example, suppose that the government were to increase the amount that people can put into tax-exempt retirement accounts. Would people respond to this incentive by saving more? Or, instead, would people merely transfer saving already done in other forms into these accounts—reducing tax revenue and thus public saving without any stimulus to private saving? The desirability of the policy depends on the answers to these questions (Mankiw, 2009).

To summarize, the Solow growth model shows that in the long run, an economy's rate of saving determines the size of its capital stock and thus its level of production. That is, the higher the rate of saving the higher the stock of capital and then, the higher the level of output. In the Solow model, an increase in the rate of saving has a level effect on income per person: it causes a period of rapid growth, but eventually that growth slows as the new steady state is reached. Thus, although a high saving rate yields a high steady-state level of output, saving by itself cannot generate persistent economic growth. The level of capital that maximizes steady-state consumption is called the Golden Rule level. If an economy has more capital than in the Golden Rule steady state, then reducing saving will increase consumption at all points in time. By contrast, if the economy has less capital than in the

Golden Rule steady state, then reaching the Golden Rule requires increased investment and thus lower consumption for current generations (Mankiw, 2009).

2.1.3.5 How Changes in the Real Interest Rate Affect Consumption and Saving

Let's now use Fisher's model to consider how a change in the real interest rate alters the consumer's choices. There are two cases to consider: the case in which the consumer is initially saving and the case in which he is initially borrowing. An increase in the real interest rate rotates the consumer's budget line around the point and, thereby, alters the amount of consumption he chooses in both periods. Here you can see that first-period consumption falls and second-period consumption rises. Economists decompose the impact of an increase in the real interest rate on consumption into two effects: an **income effect** and a **substitution effect** (Mankiw, 2009).

The *income effect* is the change in consumption that results from the movement to a higher indifference curve. Because the consumer is a saver rather than a borrower (as indicated by the fact that first-period consumption is less than first-period income), the increase in the interest rate makes him better off. If consumption in period one and consumption in period two are both normal goods, the consumer will want to spread this improvement in his welfare over both periods. This income effect tends to make the consumer want more consumption in both periods. The *substitution effect* is the change in consumption that results from the change in the relative price of consumption in the two periods. In particular consumption in period two becomes less expensive relative to consumption in period one when the interest rate rises. That is, because the real interest rate earned on saving is higher,

the consumer must now give up less first-period consumption to obtain an extra unit of second-period consumption. This substitution effect tends to make the consumer choose more consumption in period two and less consumption in period one. The consumer's choice depends on both the income effect and the substitution effect. Because both effects act to increase the amount of second-period consumption, we can conclude that an increase in the real interest rate raises second-period consumption. But the two effects have opposite impacts on first-period consumption, so the increase in the interest rate could either lower or raise it. *Hence, depending on the relative size of income and substitution effects, an increase in the interest rate could either stimulate or depress saving which is ambitious* (Mankiw, 2009).

2.1.4. Saving and External Sector

In the case of open economies, the determinants of saving are more complex. For instance, even *ex-post* saving may not equal investment as long as there is no constraint to capital flow across national boundaries. For instance, capital inflows in the form of concessional loans and foreign aid have an impact on national saving. As noted earlier, the usual rationale for granting aid or concessional loans has been to augment domestic saving (Alemayo Geda and Haile Kibret, 2007).

A related issue usually considered in the literature as influencing saving behavior is changes in terms of trade, otherwise known as the Harberger-Laursen-Metzler effect. At a theoretical level, this effect is examined in an inter-temporal optimization model. Accordingly, this theory predicts that a temporary improvement in terms of trade would lead to an increase in saving by increasing temporary income or wealth. But the effect of permanent changes in

terms of trade on saving is ambiguous (Dayal-Gulati and Thimann, 1997, Schmidt-Hebbel et al, 1996).

2.1.5. Saving and Macroeconomic Policies

In principle government policy could have a potentially significant influence on national saving either by directly increasing public saving or implementing policies that increase private saving. Such policies include, "revenue policy (tax structure, tax incentives), expenditure policy (transfers, income redistribution), and the degree of government saving," (Dayal-Gulati and Thimann, 1997). Government policy directed at financial and pension reforms could also potentially affect private saving, in addition to the above routes through which government could influence national saving.

In addition to fiscal deficits, governments could also potentially influence private saving by introducing tax incentives, as noted above. By raising the after-tax rate of return governments could in principle encourage private saving. But the final outcome on national saving is ambiguous because it decreases public saving and if the tax is selective it may lead to portfolio reshuffling to gain from the tax break thereby introducing distortions. The existing available literature seems to shed no light on this issue. Similarly, whether direct income transfers and income redistribution positively affect total (national) saving or not is ambiguous at a theoretical level. That is unless the marginal propensity to save between low income groups on the one hand and between the government and the private sector on the other varies significantly, they may offset each other and hence have no impact on total saving (cited in Alemayo Geda and Haile Kibret, 2007)

Other government policies that may affect saving include financial reform, pension reform and macro-economic instability. Financial reform that results in an increase in interest rate is likely to encourage saving (McKinnon, 1973 and Shaw, 1973) argument. Another potentially relevant determinant of saving is macro-economic instability. Since saving is an inter-temporal decision, how economic agents view the future real value of their wealth affects their saving decisions. For instance, inflation (proxy for macroeconomic instability) reduces the real value of financial assets. Therefore, inflation expectation could discourage saving and encourage consumption and/or lead to portfolio reshuffling away from financial assets.

2.1.6. Saving and Institutional Considerations

2.1.6.1. Financial Intermediation and Capital Markets

Financial intimidation is the process of channeling loanable funds from savers to borrowers. The efficiency and the institutional characteristics of financial markets where this intermediation takes place are likely to influence the type and probably also the volume of assets savers opt to hold when foregoing present consumption. Differences in saving ratios- either in across countries or within a country over time - may be partly explained by differences or changes in the functioning of financial markets. If these markets were perfect, the rate of return to the saver would differ from the risk-adjusted rate of return on investment only by the unavoidable resources cost of intermediation (Cited in Peter H. Sturm, Nature and Determinants of Saving in Uganda).

Well-developed capital markets provide a wide range of alternative financial assets differentiated according to risk, liquidity, and rate of return. Yet imperfections exist in even the most efficient capital markets, partly due to government regulations. There are two possible consequences which are not mutually exclusive:

- ✓ The rate of return on saving is reduced (and/or the cost of capital to net borrowers is increased);
- ✓ Access to credit is limited according to non-human net worth and other eligibility criteria.

2.1.6.2. Compulsory Public Pension Schemes

Saving for retirement is generally considered the quantitatively most important saving motive of private household during the earning period of their life span. The existence of compulsory public pension scheme which greatly affects retirement finance can therefore be expected to affect saving significantly. The effect of public pension schemes on household saving can be analyzed in the framework of the life cycle theory of saving outlined above. A public pension scheme financed through payroll taxes will affect the household's life-time budget constraint in two ways: first, life time disposable income will be decreased by the amount of payroll taxes paid as contributions to the public pension scheme. Second, life-time disposable income will be increased by the same amount of pension payments received after retirement. If the discounted present value of these two amounts is equal (i.e. if we are dealing with actually "fair" or "balanced" system) the household's budget constraint is unchanged, and thus consumption behavior should not be affected. In economic terms, nothing has changed for the household: institutionally-private retirement saving has merely

been replaced by the public pension scheme (Cited in Peter H. Sturm, Nature and Determinants of Saving in Uganda).

2.1.7. More on Microeconomic Foundations of Saving

Some macroeconomic variables have microeconomic foundations. Saving which is the main policy macroeconomic variable that governs the pace of the growth path of one nation is based on microeconomic foundations. Among the three parts of savers, that is, households, enterprises and government the households saving take the lion share. Let's look at the motives for saving from the household point of view.

2.1.7.1. Saving Motives of Individual Households

From the microeconomic point of view saving represents a decision by households not to consume current income. Three major motives to households leading to such a decision can be distinguished.

- Saving for retirement: the build-up of assets to finance consumption after retirement when current earned income is reduced or even becomes zero.
- Precautionary saving: given the uncertainty about the future developments, the household may wish to hold assets to meet possible emergencies, such as unemployment or sickness.
- Saving for bequest: the build-up of assets to bequeath to a subsequent generation.

Moreover there is also target saving for the acquisition of tangible assets. Obviously these motives are not mutually exclusive, and actual saving will normally be jointly determined by all the various motives. These are discussed briefly in the subsequent topics. In a rational

society, saving decisions should be based on some kind of optimizing behavior by which the levels of consumption and saving are chosen so as to equalize the marginal benefits of these alternative uses of income (Cited in Peter H. Sturm, Nature and Determinants of Saving in Uganda).

2.1.7.1.1. Retirement Motive

Saving for retirement –generally considered quantitatively the most important saving motive forms the bases of Life Cycle Hypothesis models of household consumption behavior. As discussed above in the Life Cycle Hypothesis, models based on life cycle hypothesis generate the time profile of consumption over the economic life-time of the household, the underlying assumption being that the household maximizes its utility from the intertemporal consumption stream subject to an available resource constraint. This requires that at any time the discounted present value net wealth plus the discounted present value of all the future earned income (Cited in Peter H. Sturm, "Nature and Determinants of Saving in Uganda").

2.1.7.1.2. The Bequest Motive

One way in which observed household saving behavior can be reconciled with the Life Cycle Hypothesis is by allowing for a bequest motive, i.e. to assume those households accumulate wealth beyond the levels required to finance retirement consumption. As is the case with most saving determinants, a bequest motive changes the size of the saving ratio only in an economy expanding due to population growth or both. In a stationary economy the bequest motive would simply lead to the next, with no effect on the saving ratio. In a

growing economy the bequest transferred between generations is growing, requiring positive lifetime saving of each generation to guarantee heirs a constant ratio of inherited wealth to initial income. The quantitative impact of the bequest motive on the household saving ratio depends on the interest rate and the size (relative income) of bequest. While intergenerational gifts or bequests are indeed common, it is not clear whether they originate from the desire to leave bequests or from the fact that due to the uncertainty about the date of death there may have been unspent retirement and precautionary savings(Cited in Peter H. Sturm, Nature and Determinants of Saving in Uganda).

2.1.7.1.3 Precautionary Motive

In the basic Life Cycle Hypothesis model the household basis its decisions on events the dates and magnitude of which are assumed to be known with certainty such as the future income stream, the date of death, and the interest rate in each period. But in reality future events are uncertain, and it is therefore relevant to ask whether and how individual behavior will be modified by such uncertainty (Cited in Peter H. Sturm, Nature and Determinants of Saving in Uganda).

In principle there are two augmenting effects of uncertainty on the effects of uncertainty on the demand for precautionary assets and thereby saving, while it is difficult to quantify this relationship. In the first place there are no readily available operational quantitative measures of uncertainty. Customarily in empirical research income uncertainty is measured indirectly by proxy variables such as the rate of inflation, the rate of unemployment, or some transformations of these. Given the difficulty of measuring uncertainty directly and objectively it is difficult to judge the extent to which precautionary saving contribute to the

observed overall level of saving. The impact of interest rate uncertainty on saving depends on the sign of the interest elasticity of saving (Cited in Peter H. Sturm, Nature and Determinants of Saving in Uganda).

2.2 Empirical Literature Review

Giovannini (1985) empirically investigated the hypothesis that savings respond positively to changes in the real interest rate in Less Developed Countries (LDCs). The results pointed out to the presence of very low responses of aggregate saving to the real interest rate. Another empirical study by Doshi (1994) examined the role of life expectancy as a determinant of saving performance. He demonstrated that life expectancy is a statistically significant and important factor affecting LDCs saving levels. However, the overall results were sensitive to the level of development and regional diversity. In an attempt to investigate the determinants of saving rate in Pakistan, Khan et al (1994) used a variety of factors that included income, real interest rate, dependency ratio, foreign capital inflows, foreign aid, changes in terms of trade and openness of economy. The study found a strong and positive effect of per capita GNP on national saving. In addition, it was found that real interest rate, change in terms of trade and openness of the economy positively influenced national saving. On the other way, debt to GNP ratio and dependency ratio were found to have adverse impact on national saving.

Dayal-Ghulati and Thimann (1997) analyzed the empirical determinants of private savings for a sample of economies in Southeast Asia and Latin America over the period 1975-1995. The findings indicated that fiscal policy, particularly social security arrangements, may be

the core policy instruments that boosted saving rates in some Asian countries. In addition, inflation volatility appeared to have a negative effect on the private saving rate in Latin America. The same is true for economic policies that liberalize financial markets and foster financial deepening. Macroeconomic stability and financial deepening were clearly important variables determining saving behavior in the two regions as well. Masson et al (1998) examined the determinants of private savings for a large sample of industrial and developing countries using both time series and cross-section data. The results suggested that there was a partial offset to private savings from changes in public saving for industrial countries, whereas in developing countries demographics and GDP growth were the most important determinants of private saving rates.

The extreme-bounds analysis was used by Hussain and Brookins (2001) to examine the determinants of national savings, based on both cross-sectional and panel data across a large sample of countries. Their results supported that agricultural share in total output; public saving, budget balance, and the current account balance were robust in explaining saving behavior. In another study, the relationship between a variety of macroeconomic variables and private savings was broadly examined by Metin_Özcan and Özcan (2005) using a sample of 15 countries in the Middle East and North Africa (MENA) over the period 1981–1994. The estimated results provided further evidence of the significantly positive effect of the growth rate of income, and per capita income on private savings. In addition, public savings crowded out private savings only partially which means that the Ricardian Equivalence does not hold strictly. Regarding the financial factors, the paper provided evidence that countries with deeper financial systems tend to have higher private savings.

Moreover, macroeconomic stability captured by the inflation rate was found to have a positive impact on savings.

To explore the relative importance of national saving determinants in Oman, Narayan and AL Siyabi, S. (2005) examined the long run and short run effects of Oman's national savings for the period 1977-2003 using the bounds testing approach to co-integration. The main findings provided strong evidence that the current account, the urbanization rate and the money supply had statistically significant impacts on Oman's national savings in the long run.

In an attempt to identify saving in Nageria Tochukwu. E. Nwachukwu and Festus. O. Egwaikhide (2007) examined the determinants of saving in Nigeria. The results reveal that the saving rate rises with the level of disposable income but falls with the rate of growth of disposable income. The real interest rate on bank deposits has a significant negative impact while public saving seems not to crowd out private saving. Furthermore, external terms of trade, inflation rate and external debt service ratio have a positive impact on saving. Davis Adu Larbi (2013) has explored the determinants of savings in Ghana using the Phillips and Ouliaris (1990) residual-based tests for co-integration to determine the long run relationship between savings and its determinants. Financial liberalization, per capita income and inflation were found to have a positive and significant relationship with savings. The positive and significant coefficient of the fiscal deficit variable confirmed the Ricardian Equivalence hypothesis in Ghana. There is a strong willingness to save but the capacity to save is not very robust.

Haile (2012) investigated the determinants of domestic saving in Ethiopia using time series annual data form 1970/71-2010/11. He has made an effort to identify the long run and short run determinants of domestic saving in Ethiopia using an ARDL bounds testing Approach and ECM to capture both short run and long run relationships. His estimated results revealed that growth rate of income (gPCI), budget deficit ratio (BDR) and inflation rate (INF) were statistically significant short run and long run determinants of domestic saving in Ethiopia. But, depositing interest rate (IR), current account deficit ratio (CADR) and financial depth (DFD) were found to be statistically insignificant determinants in the long run. However, in the short run, DFD and IR found to have statistically significant meaning in explaining domestic savings in Ethiopia. The speed of adjustment has value **0.63768** with negative sign, which showed the convergence of saving model towards long run equilibrium.

Kidane (2009) examined time series analysis of the determinants of gross domestic saving in Ethiopia using co-integration and error correction econometric modeling, and employ data for the period 1971-2009. He revealed that growth of per capital income have significant positive influence on domestic saving while the current per capital income level is significant and negatively related with domestic saving in the long run, but turn to insignificant in the short run model. The financial variables represented by real deposit rate and development of broad money supply do not show any impact in improving the domestic saving. Instead they showed insignificant negative coefficient which suggests the existence of under developed financial market in Ethiopia. Inflation rate exerted negative effect on saving in Ethiopia through portfolio adjustment from real money balance toward real asset. He also showed that dependence ratio was a significant negative determinant of saving in

the long run. Tax growth rate showed positive significant effect on domestic saving through its effect on government and private saving slackened. The gross domestic saving growth negatively correlated with lagged domestic saving which indicated that there was no persistence in the behavior of domestic saving in Ethiopia over time.

To make conclusions from the previous literature on the determinants of saving performance, the determinants of saving are diverse. Most empirical studies emphasized the significant and negative influence of government savings on the saving rates, confirming the claim that government savings tend to crowd out private savings. Moreover, direct positive association between GDP growth rate, GDP per capita growth rate and domestic savings, indicates that these variables represent the most important determinants of private and public savings. Interest rate, inflation rate and terms of trade appear to have an ambiguous impact on saving levels. Moreover, demographic factors such as dependency ratio and urbanization rate seem to have a negative effect on domestic saving rates; however, the significance of these variables was mixed between studies.

However, taking into account the differences in economic, social, and demographic conditions among countries, we should not assume that factors, which successfully have explained saving performance in one country or in a group of countries, would be certainly appropriate or successful elsewhere. Some of these factors may be significant in one case, but not in others, and thus they should be carefully examined taking into consideration the characteristics of each case. Thus, we try in this study to examine macroeconomic factors that explain national saving behavior in Ethiopia, which may help policy makers to formulate policies that enhance saving ratios.

Chapter Three
Source of Data and Model Specification

3.1. Type and Source of Data

3.1.1. Type of Data and Variable Description

Due to the very nature of the study, the only source of data used in this study is secondary sources based on a country level macroeconomic data. A yearly time series on Gross National Saving Ratio, Gross National Disposable Income, Current Account Deficit, Budget Deficit, Consumer Price Index and Currency as share of Narrow Money (as an indicator for financial development) is gathered covering the period from 1970/71 to 2010/11. The choice of the period is basically based on the availability of data.

3.1.1.1. Dependent Variable

Gross National Saving Ratio

There is no separate estimation of time series data on Gross National Saving, i.e. Gross National Saving is estimated as a residual by subtracting the private final consumption expenditure and government final consumption expenditure from the Gross National Product. Then the obtained Gross National Saving divided by Gross Domestic Product. Moreover, annual time series data is chosen because Gross National Saving is hardly sensitive to seasonal or cyclical fluctuations.

3.1.1.2. Explanatory Variables

Gross National Disposable Income Ratio

Gross national disposable income indicates the overall income in a given year. It is a measure estimated by subtracting tax from the gross national income, which is the summation of gross domestic product and net factor income, i.e. gross national income after tax is deducted.

Financial Development

In spite of its widely perceived importance for saving, there is no clear indicator of financial depth in Ethiopia. One of the widely used measurements of financial development is broad money a share of Gross Domestic Product or broad money only. But here in Ethiopia the measurement of broad money is under question mark. Three reasons contribute to this; the first one is the financial sector in most developing countries in general and in Ethiopian in particular is underdeveloped and not financially integrated to the rest of the world. Second reason is broad money as a share of Gross Domestic Product is an indicator of degree of monetization i.e how the financial sectors has diversified outputs. Third reason is broad money is not measured accurately in many developing countries due to the quality of data problem. So that the method used in this study to capture the financial development is currency as share of narrow money which will be a good and real indicator of the financial depth in Ethiopia.

Consumer Price Index (Proxy for Macroeconomic Stability)

Consumer Price Index, which is an indicator of inflation, is used as a proxy for macroeconomic stability. Macroeconomic stability which is captured by inflation is

negatively related to saving. When there is higher inflation the purchasing power of money will decline and thus expenditure will be high so that making people less to save.

Dependency Ratio (Demographic Variable)

Dependency ratio which is taken in this study as an indicator of the demographic situations in Ethiopia shows the ratio of dependents to the working class. The impact of dependents which is represented by dependency ratio is negatively related to saving. Higher dependency ratio implies lower saving.

Current Account Deficit (External Sector)

Current account deficit is employed in this study to show how the external sector affect gross national saving ratio. Current account deficit is measured as exports minus imports and since Ethiopia is importing so much good than exporting it turns out to be negative.

Budget Deficit (Fiscal Policy)

Budget deficit is the difference between government revenue and government expenditure which turns out to be negative for Ethiopia. In this study, budget deficit is employed as an indicator for the fiscal policy of government which has a direct impact on gross national saving by reducing public saving given that the Rechardian hypothesis does not hold.

3.1.2. Source of Data

The relevant data will be collected from Ethiopian Economic Association (EEA), Ministry of Finance and Economic Development (MoFED), National Bank of Ethiopia (NBE), Central Statistical Agency (CSA), International Monetary Fund (IMF) database, World Bank (WB) database and other sources which are perceived to be relevant and reliable.

3.2. Method of Data Analysis

In this study both simple descriptive and econometric methods of data analysis are used. In an attempt to meet the first two specific objectives, we used the tools of descriptive statistics such as tables, charts, and trend graphs etc. The rest of the research objective will be achieved using the standard econometric technique which will be discussed in the next topic.

3.3. Model Specification

In this study, in order to test the existence of long run relationship between the dependent variable Gross National Saving and the rest of regressors, we used autoregressive distributed lag bound testing approach developed by Pesaran et al (2001). This approach is chosen because it has some superior advantages over other estimators (such as OLS and ECM). For instance, this method is applicable irrespective of whether the regressors are I (0) or I (1) or mutually cointegrated. In addition to this, endogenity problems and inability to test hypothesis on the estimated coefficients in the long run associated with the Engle-Granger (1987) method are avoided. Apart from this, the long run and short run parameters of the model in question are determined simultaneously (Nasiru, 2012). As stated in Pesaran (1995), applying ARDL model also results in unbiased estimates in the long run. It is also relatively more efficient in the case of small and finite sample data size as it is the case in the study. Another advantage of using ARDL modeling approach is that it can distinguish between dependent and independent variables and thus, allow testing the existence of long run relationship between the variables.

The ARDL has been chosen since it can be applied for a small sample size as it happens in this study. Also, it can estimate the short and long-run dynamic relationships in the variables under consideration. The ARDL methodology is relieved of the burden of establishing the order of integration amongst the variables. Furthermore, it can distinguish dependent and explanatory variables, and allows testing for the existence of relationship between the variables. Finally, with the ARDL it is possible that different variables have differing optimal number of lags.

The ARDL bounds test modeling involves estimating the following unrestricted error correction model (UECM) using OLS.

$$\Delta y_t = \alpha_0 + \sum_{i=1}^{k} \alpha_{1i} \Delta y_{t-i} + \sum_{i=1}^{k} \alpha_{2i} \Delta x_{ti} + \beta_1 y_{t-1} + \beta_2 x_{t-1} + e_t$$

y_t is the vector of dependent variable, x_t is the vector of independent variable and k is the number of lags

The model employed in this study can be written as follows.

$$\begin{aligned}\Delta GNSR_t = {} & \alpha_0 + \sum_{i=1}^{k} \alpha_{1i} \Delta GNSR_{t-i} + \sum_{i=1}^{k} \alpha_{2i} \Delta LGNDI_{t-i} + \sum_{i=1}^{k} \alpha_{3i} \Delta FD_{t-i} + \sum_{i-1}^{k} \alpha_{4i} \Delta DR_{t-i} + \sum_{i=1}^{k} \alpha_{5i} \Delta CPI_{t-i} \\ & + \sum_{i=1}^{k} \alpha_{6i} \Delta BD_{t-i} + \sum_{i=1}^{k} \alpha_{7i} \Delta CAD + \beta_1 GNSR_{t-1} + \beta_2 LGNDI_{t-1} + \beta_3 FD_{t-1} + \beta_4 DR_{t-1} \\ & + \beta_5 CPI_{t-1} + \beta_6 BD_{t-1} + \beta_7 CAD_{t-1} + U_t\end{aligned}$$

Where,

- GNSR = Gross National Saving Ratio.
- LGNDI = Log of Gross National Disposable Income.
- FD = Financial Development.
- DR = Dependency Ratio.
- CPI = Consumer Price Index.
- BD = Budget Deficit.
- CAD = Current Account Deficit.
- K is the number lags.
- U_t a white noise error term.

Where in the above model $\beta_1, \beta_2, \beta_3\beta_4, \beta_5, \beta_6, \beta_7$ are the long run coefficients and $\alpha_1, \alpha_2, \alpha_3, \alpha_4, \alpha_5, \alpha_6,$ are the short run coefficients of the ARDL model. The above model will be estimated by OLS to check for the existence of long run relationship.

3.3.1. Test for Cointegration (Bounds Test)

To investigate the presence of long-run relationships among Gross National Saving and the regressors, bound testing under Pesaran, et al. (2001) procedure is used. The bound testing procedure is based on the F-test. The F-test is actually a test of the hypothesis of no cointegration among the variables against the existence or presence of cointegration among the variables, denoted as:

Ho: $\beta 1 = \beta 2 = \beta 3 = \beta 4 = 0$

i.e., there is no cointegration among the variables.

H_1: $\beta 1 \neq \beta 2 \neq \beta 3 \neq \beta 4 \neq 0$

i.e., there is cointegration among the variables.

The ARDL bound test is based on the Wald-test (F-statistic). The asymptotic distribution of the Wald-test is non-standard under the null hypothesis of no cointegration among the variables. Two critical values are given by Pesaran et al. (2001) for the cointegration test. The lower critical bound assumes all the variables are I (0) meaning that there is no cointegration relationship between the examined variables. The upper bound assumes that all the variables are I (1) meaning that there is cointegration among the variables. When the computed F-statistic is greater than the upper bound critical value, then the H_0 is rejected (the variables are cointegrated).

If the F-statistic is below the lower bound critical value, then the H_0 cannot be rejected (there is no cointegration among the variables). When the computed F-statistics falls between the lower and upper bound, then the results are inconclusive here in this case we have to check the error tem for stationarity. In the meantime, we develop the unrestricted error correction model (UECM) based on the assumption made by Pesaran et al. (2001). From the unrestricted error correction model, the long-run coefficient are the coefficient of the one lagged explanatory variable (multiplied with a negative sign) divided by the coefficient of the one lagged dependent variable.

3.3.2. Long Run Representation of the ARDL Model

Here below is the long run representation of the ARDL model. This long run model will be estimated by OLS if the F-statistic exceeds the upper bound critical value and the existence of long run relationship is confirmed. Furthermore, this will be estimated using microfit 4.1 software package.

$$GNSR_t = \beta_0 + \sum_{i=1}^{m} \beta_1 LGNDI_{t-i} + \sum_{i=1}^{m} \beta_2 FD_{t-i} + \sum_{i-1}^{m} \beta_3 DR + \sum_{i=1}^{m} \beta_4 CPI_{t-i} + \sum_{i=1}^{m} \beta_5 BD_{t-i} + \sum_{i=1}^{m} \beta_6 CAD_{t-i} + \varepsilon_t$$

3.3.3. Short Run Representation of the ARDL Model

The short run dynamics of the ARDL model specified as follows:

$$\Delta GNSR_t = \alpha_0 + \sum_{i=1}^{n} \alpha_{1i} \Delta GNSR_{t-i} + \sum_{i=1}^{m} \alpha_{2i} \Delta LGNDI_{t-i} + \sum_{i=1}^{m} \alpha_{3i} \Delta DR + \sum_{i=1}^{m} \alpha_{4i} \Delta FD_{t-i} + \sum_{i=1}^{m} \alpha_{5i} \Delta CPI_{t-i} + \sum_{i=1}^{m} \alpha_{6i} \Delta BD_{t-i} + \sum_{i=1}^{m} \alpha_{7i} \Delta CAD_{t-i} + \delta ecm_{t-1} + e_t$$

3.4. Test of Stationarity

In real Life, most of the time series macroeconomic variables like gross national saving, gross national disposable income, and inflation and so on are non-stationary. Philips (1986) points out that if we treat the non-stationary series with Ordinary Least Square (OLS), the results will be misleading for economic analysis. The model can lead to the problem of spurious regressions with very high R squared (approximately unity) and significant t and F-statistics (Granger and Newbold, 1974). If the series is stationary without differencing, then it is integrated of order zero, I (0) or stationary at level. A series is said to be integrated of order one, or I (1), if it becomes stationary after differencing once and of order two, I (2) if the series becomes stationary after differencing twice. Augmented Dickey-Fuller test proposed by Dickey and Fuller (1979, 1981) is widely used in economic literature to investigate the stationarity of time series data.

Since the study uses time series economic data, testing the variables for stationarity in econometric analysis is becoming mandatory. That is the fact that the variables share common trends will tend to produce significant relationship between the variables rather than the true causation [Harris (1995), Maddala (1992)].

3.4.1 Unit Root Test

Since most economic time series are unlikely stationary, the first step is to test whether the variables are stationary i.e. checking for the presence of unit root, to avoid the problem associated with spurious regression. Prior to the Autoregressive Distributed Lag co-

integration test, or estimation of the of long run relationship of the model, the usual Agumented Dickey – Fuller (ADF) and Philips- Peron (PP) unit root tests will be carried out to determine the order of integration of the series. It is to make sure that the variables are not I(2) or above so as to avoid spurious regression. Philips and Peron test corrects for any serial correlation and hetroscedasticity in the errors (Ut) non- parametrically by modifying the Dickey Fuller test stastics. The ADF test can be given by

$$\Delta y_t = \mu + \psi t + \phi y_{t-1} + \sum_{i=1}^{k} \beta_i \Delta y_{t-i} + \nu_t$$

Where y_t is the variable of interest, t is the time trend, k is the maximal lag length, υ_t is the white noise error term

Then we test the set of hypothesis

Ho: $\phi = 1$ (i.e y_t series is I (1) or has a unit root)

H1: $\phi < 0$ (i.e y_t series is I (0) or non-unit root)

Then the computed value will be compared with Mackinnon (1996) critical values to determine whether the series is stationary or not.

3.5. Lag Length Selection Criterion

In this study the lag structure of the Autoregressive distributed lag model specification will be determined by Akakie Information Criteria (AIC) since it controls the problems of autocorrelation and it is also advantageous for small sample size. In addition to this it is a must to check the presence of serial correlation in the model since bound testing requires the errors to be serially independent. Therefore an LM test will be used to check for the serial correlation.

Chapter Four
Overview of the Ethiopian Economy and Gross National Saving

Before addressing the main determinants of gross national saving, the study first traces the macroeconomic performance in Ethiopia and the major trends in national saving and its structure over time by looking at multi-dimensional determinants of saving and other macroeconomic variables.

4.1. Macroeconomic Performance in Ethiopia

Now days sources of information demonstrate beginning from the recent two decades, the performance of Ethiopian economy has been showing a positive change. National, regional and international sources recognize the change in terms of GDP growth, change in the sectoral structure of the economy, poverty reduction and a change in socioeconomic and political affairs. Even the face of the country is changed in the international stage from a place of drought, political instability and low economic growth into one of the fastest growing economies in the world, more attractive for foreign direct investment and above all a country with a vision to be middle income in near future.

The Ministry of Finance and Economic Development (MoFED) annual report (2010/11) shows that, the Ethiopian economy witnessed an era of sustained and double digit growth rates over the period spanning between 2003/04 and 2010/11 setting the pace for African countries and making the nation a force again in Africa. The report further point out, it is through the formulation of policies and implementation of programmes and putting in place appropriate institutional arrangements the country has registered such a sustained and fast growth (MoFED, 2010/11).

United Nations (2011) stated that, the Ethiopian Economy is on ascendance and has sustained a double digit growth over the past five years. However, this growth has been scarred by rising inflation in 2008-2009 driven largely by the high food and fuel crises and sending home a strong message of to enhance macro-economy resilience as the country pursues high and fast growth strategies.

The report by Ministry of Finance and Economic Development in 2012 indicates the country has registered sustained record of strong economic growth, during the last decade contributing significantly to the sustainable development agenda. GDP has nearly tripled since 1992 with a corresponding reduction in head count poverty from 56% in 1992 to 29.5% in 2011 (MoFED, 2012).

According to a new report by the World Bank (2012), over the past decade, the Ethiopian economy has been growing at twice the rate of the African region, averaging, 10.6% GDP growth per annum between 2004 and 2011 compared to 5.2% in Sub-Saharan Africa.

Many sources also make known the changes in the structural composition of the economy. In a common sense, all sources show the share of service sector in GDP has been rising while that of agriculture has been declining steadily. For instance, according to MoFED (2011), the contribution of agriculture to overall GDP was 47% in 2003/04. The share declined gradually but steadily and reached 41.1% in 2010/11. The share of industry showed no significant change, accounting on average 13.2% of the total value added over the period 2003/04 to 2010/11. On the other hand, during this period, the service sector becomes the

dominant in the economy with its share increasing from 39.7% in 2003/2004 to 46.6% in 2010/11.

Table 1. Overview of Ethiopian Economy

Year		1991/92-2000/01	2001/02-2005/06	2006/07-2010/11
Growth in RGDP		4.3	7.2	11.1
Share of GDP	Agriculture	48.9	47.1	43.4
	Industry	10.5	13.6	13.1
	Service	35.5	40.1	44.6
Growth of GDP by major sectors	Agriculture	9.8	8.1	7.3
	Industry	8.1	9.5	10.1
	Service	12.5	10.7	14.3
Growth in RGDP per capita		3.4	6.2	7.6

Source: Own computations based on MoFED data

The above table shows that average annual growth rate of RGDP and RGDP per capita during the period 1991/02 to 2000/01 are 4.3 and 3.4, respectively which are computed with a data from Ministry of Finance and Economic Development (MoFED) and later on since I have used data from Ethiopian Economics Association (EEA) there may exist inconsistencies among the growth rates for RGDP. In recent years the Ethiopian economy has registered encouraging but mixed results with negative RGD growth rate of 3.3% in 2002/03 as a result of drought, followed by positive performance during all the subsequent years. Consequently, during the 2006/07-2010/11, annual real GDP growth averaged 11.1%.The registered RGDP growth rate, in comparison with the population growth rate of an average of 2.5%, implies that the annual average RGDP per capita growth rate was 8.6%. From the above table we can also look at the sectoral shares composition. The steadily rise of the share of service sector and the decline in share of agricultural sector while there is no notable change in the share of industry sector are the major story lines here. The agricultural

sector holds the leading role in its contribution to GDP for a long time in the above three span of periods while it is declining steadily. Between the periods 1991/92-2000/01 and 2001/02-2005/06, on average the agricultural sector contributes 48.9% and 47.1% followed by service sector which contributes 35.5% and 40.1% in the respective period. However in recent years the service sector has taken the leading position in terms of its share in GDP. It accounted 44.6% followed by agriculture 43.4% and industry 13.1% on average during the last five years i.e. 2006/07-2010/11). The contribution of the industrial sector to the total GDP is limited, which is below 15% through the review period.

United Nations (2011) adds even if the economic growth is emanating from all the sectors it is the service sector, especially construction and retail, which is leading the growth curve. During 2011/12, Agriculture, Industry and Services grew by 4.9%, 13.6% and 11.1% respectively (MoFED, 2012).

On the other hand, there are challenges and problems policy makers need to address. For instance, the African Development Bank group (2010) cautions the country's growth is faced with many problems, among others, structural weakness in the economy is significant. The growing domestic supply-demand gap, in the context of surge in growth, contributed to a rise in inflation and the depletion of foreign exchange between 2007/08 and 2008/09. Besides, the Ethiopian Economy is highly vulnerable to exogenous shocks like drought and adverse terms of trade. It is because of its dependence on primary commodities and rain fed agriculture. MoFED (2011) also adds the prevailing international economic crises had some consequences on the growth performance registered during 2008/09. The high price level occurred led to high level of nominal growth rate.

4.2. Trend of Gross National Saving Over Time (1970/71 to 2010/11)

The table below shows trend and the structure of gross national saving broken down in to the three regimes namely the monarchial regime (i.e Hailessilesie Regime), the Derg Regime lead by Mengestu Hailemariam and the last one is the Ethiopian People's Revolutionary Democratic Front which assumed power since the fall of the Degr regime in 1991/92.

At glance, the data shows a declining trend in the average gross national saving as share of Gross Domestic Product at current market prices between the three governments, that is, in periods between 1970/71 to 1973/74, 1974/75 to 1990/91 and 1991/92 to 2010/11 average gross national saving as share of gross domestic product was 25%, 20% and 19% respectively. This decline in average gross national saving as share of GDP is due to the fact that the nature of governments and their role in the economy is different. Specially, the current government is running budget deficit so that it doesn't have any resource left to save.

Table 2.Trend of Gross National Saving

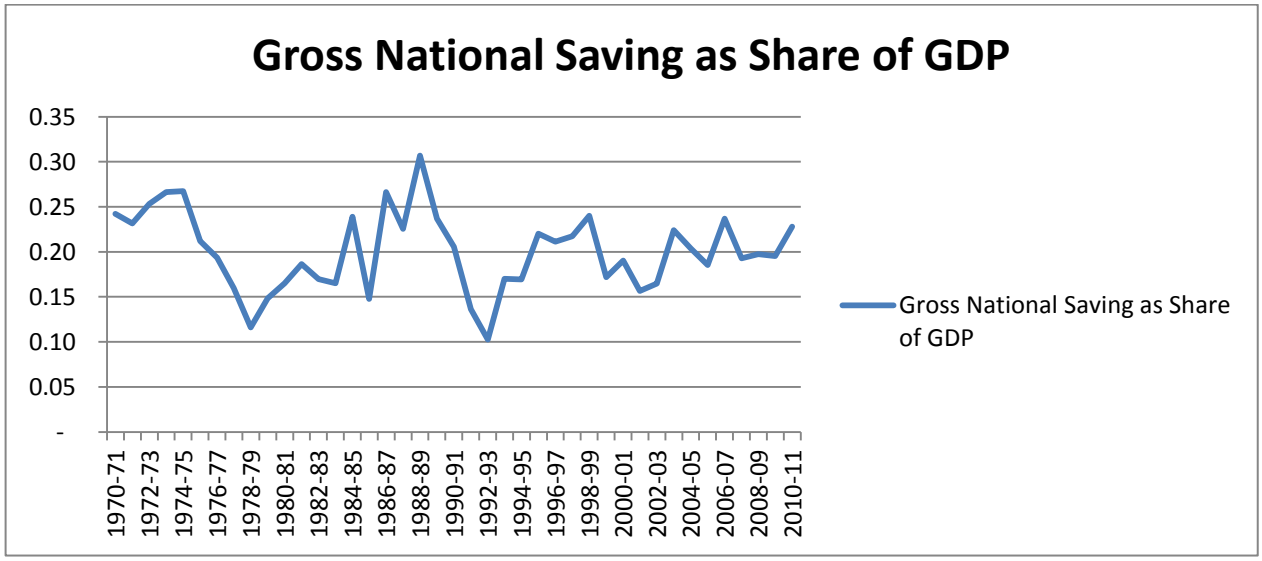
Year	1970/71-1973/74	1974/75-1990/91	1991/92-2010/11
Total Gross National Saving (in Millions Birr)	5,151	37,786	534,533
Average Gross National Saving (in Millions Birr)	1,288	2,223	26,727
Average Gross National Saving as share of GDP	25%	20%	19%
Source: Own Computation from Ethiopian Economics Association Data			

Looking at the average gross national saving in the three governments, the EPRDF has been successful one from both its preceding governments with average gross national saving of 26,727 million birr while in the Derg regime and Hailessilasie regime was 2,223 and 1,288

respectively in nominal terms. This shows that currently we have bigger economy than the earlier two governments.

The graph below shows the trend of gross national saving ratio overtime for the last 41 years. Basically, looking at the graph, the trend of gross national saving ratio overtime has been fluctuating around 20%. Gross national saving ratio reached maximum in 1988/89 which is 30% of the GDP at that time but that time onwards the saving ratio tends to decline and reached 10% in 1992/93.

Figure 1. Trend in Gross National Saving Ratio



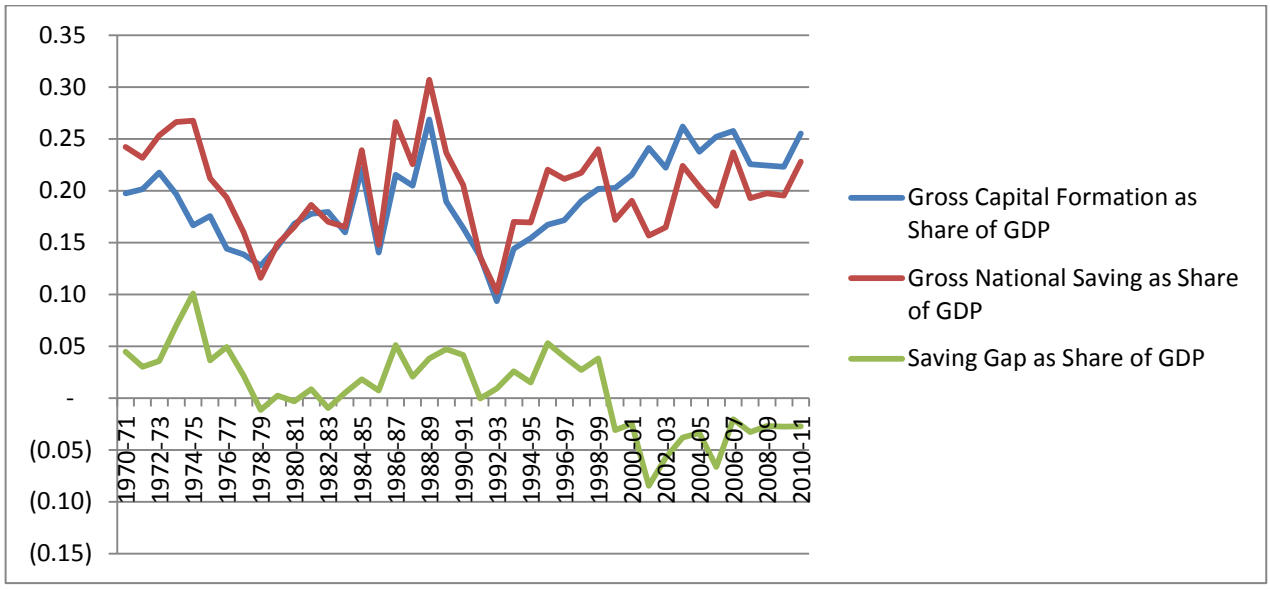
From 1994/95 the gross national saving ratio shows signs of increment till 1998/99 and turns out to fluctuate but in the range of 15% to 25% and stood at 23% of GDP in 2010/11. This shows in recent years associated with the remarkable recent economic growth and relatively stable political and macroeconomic environment the gross national saving ratio seems to be stable.

Therefore, it can be traced from the above graph of gross national saving ratio that the gross national saving ratio fluctuates in the range of 10% to 30% throughout the study period. Moreover, the saving ratio has been relatively stable in the EPRDF regime where a major reform has been undertaken and at the same time the country has achieved its greatest ever economic growth averaging 10.5% per annum in its entire history.

4.3. Trend of Gross National Saving Ratio, Gross Fixed Capital Formation as share of GDP and Saving Gap Overtime

In bid to achieve sustained economic growth and in the process development, Ethiopia has launched big investment project planes. Therefore it's clear that the role of gross national saving in financing investment requirements has been well documented. Even though gross national saving is unable to cover all the investment requirements at times we cannot ignore

Figure 2.Trend of Gross National Saving ratio, Gross Fixed Capital Formation as share of GDP and Saving Gap



the role it has played in financing gross fixed capital formation in the last 41 years. Here under, it is summarized in a graph gross national saving ratio, gross fixed capital formation and the saving-investment gap in Ethiopia in the period under consideration.

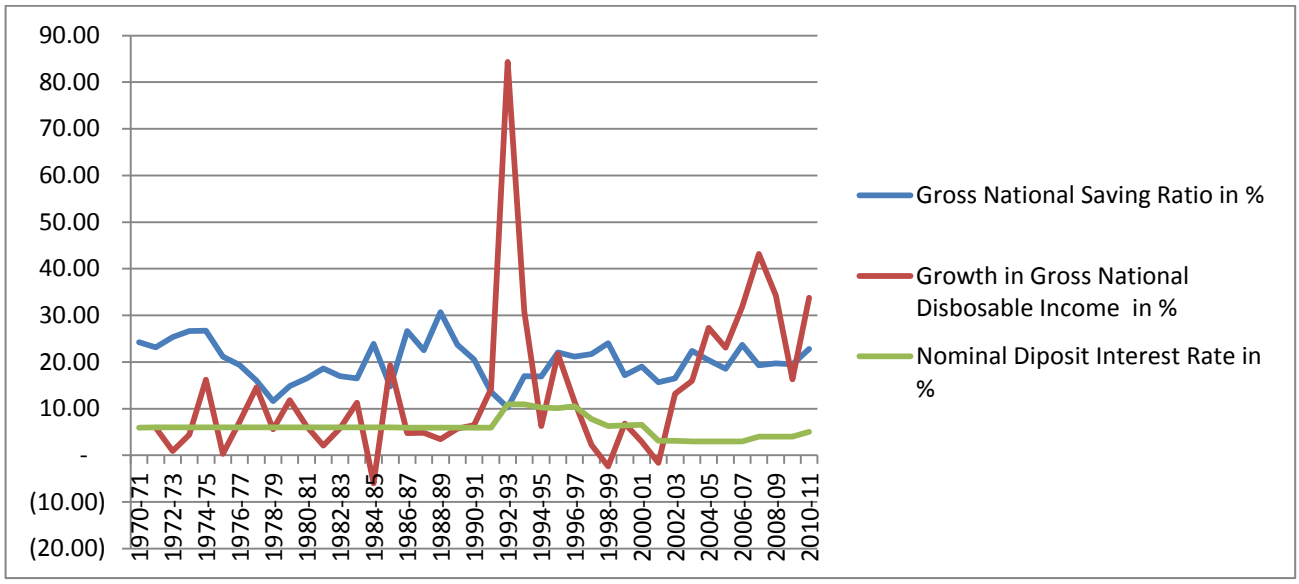
As it can be seen from the above figure, both gross national saving ratio and gross fixed capital formation as share of GDP fluctuate in the same direction confirming further gross national saving is financing the required gross fixed capital formation. From 1973/74 to 1979/80 and 1985/86 to 2000/01 gross national saving as a share of GDP is above gross fixed capital formation as a share of GDP showing that gross national saving covering the required gross fixed capital formation without depending on external assistance. On the other hand, due to the recent huge investment projects to meet the Growth and Transformation Plan of the government of Ethiopia starting from 2000/01 to 2010/11 gross national saving is unable to finance the required investment.

Furthermore, looking at the saving-investment gap usually known as the saving gap, the saving gap fluctuates over time and turns out to increase since 2000/01 showing the widening gap of investment and saving. We can breakdown the trend of saving gap in to four parts. First, from 1970/71 to 1979/80 the saving gap is positive but become wide and wider. Second, from 1979/80 to 1985/86 revolved around zero showing that gross national saving matched the investment requirements during that period. Third, from 1985/96 to 2000/01 in which the saving gap is positive except in 1991/02 which reached zero. Fourth, the range between 2000/01 to 2010/11, this period is characterized by high investment and the saving gap become negative showing the widening of the saving gap in that period and even the saving gap reached around 10% which is the largest gap observed.

4.4. Gross National Saving ratio, Nominal Deposit Interest Rate and Growth in Gross National Disposable Income

Though nominal deposit interest rate is dropped from the econometric analysis due to the fact various reasons and the study tried to look at the trend of the nominal deposit interest rate in line with the trend on gross national saving ratio. With this view, here it is summarized the trends in gross national saving ratio, nominal deposit interest rate and growth in gross national disposable income.

Figure 3. Trend in Gross National Saving Ratio, Nominal Deposit Interest Rate and Growth in Gross National Disposable Income



Nominal deposit interest rate stays stable throughout the entire study period which recorded less than 10%. But slight fluctuation happened in the period ranging 1990/91 to 2000/01 where nominal deposit interest rates become more than 10%. As it is shown in the previous discussions the gross national saving ratio fluctuates between 10% and 30% throughout the entire period of study. With the slight increase in the nominal deposit interest rate in the

period 1990/91 to 1998/99 gross national saving ratio also show some encouraging signs of an increasing trend in which it raised from 10% to more than 20% in that span of period.

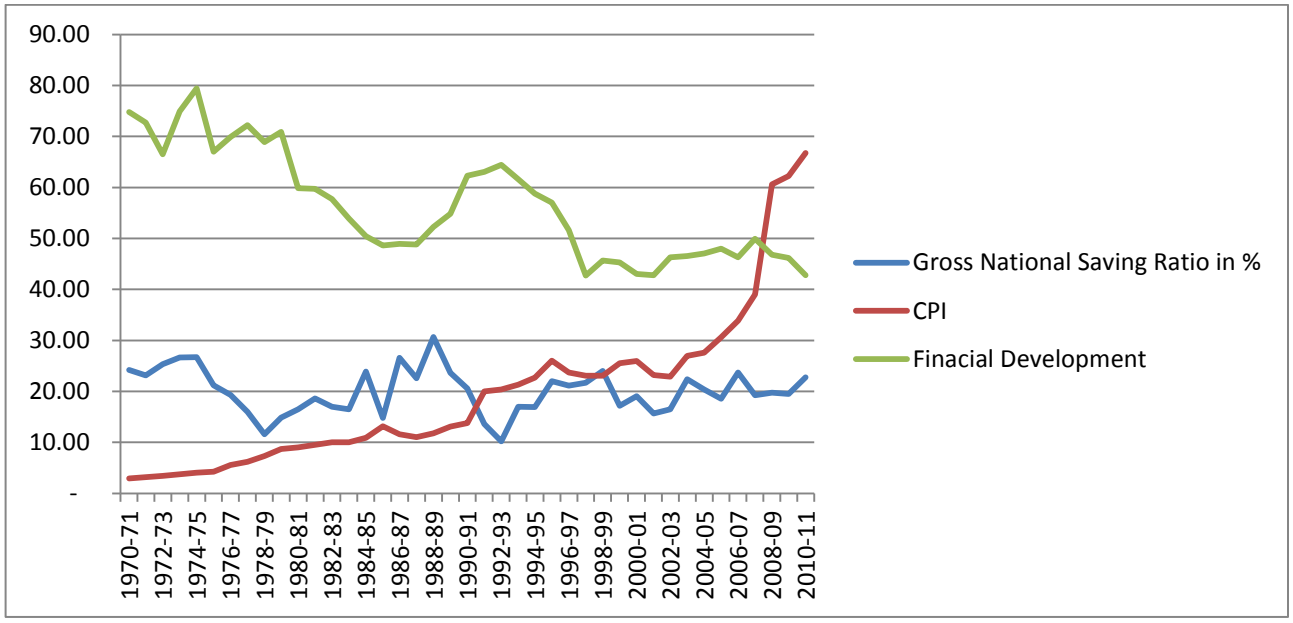
Growth in national disposable income fluctuated highly throughout the entire period of study reaching its maximum during the recovery time in 1992/93 and its minimum in 1984/85 in which it recorded negative growth. Unfortunately, what we can observe from the above figure is that the increase in gross national disposable income is not matched by a subsequent increase in gross national saving ratio. This seems both growth of gross national disposable income and gross national saving as a share of GDP move in the opposite direction.

4.5. Gross National Saving ratio, Financial Development and Macroeconomic Stability

In this study, macroeconomic stability is measured by the level of inflation in the nation. We can classify four types of inflation here in which the saving behavior can change in the different scenarios. These are creeping inflation, walking or trotting inflation, running inflation and galloping or hyperinflation. Creeping inflation ranges below 3% inflation rate per annum and it is an indicator of a healthy economy. Walking or trotting inflation which is between the range of 3% and 7% or less than 10% inflation rate per annum which is again an indicator of a robust economy with some tolerance level in a sense that it is a sign to the policy maker to formulate policies to reduce the inflation rate before it turns out to be a problem for the economy.

Furthermore, the other two types of inflation are not good for the economy. Running inflation ranges between 10% to 20% annual inflation rate which is not good for the economy. The last one is hyperinflation which is more than 20% inflation rate per annum. This one is the worst scenario of inflation rate. Moreover, financial development which is measured by currency as share of narrow money is taken as an indicator of the financial depth in Ethiopia and its trend has been displayed in the above figure.

Figure 4. Trend in Gross National Saving Ratio, Consumer Price Index and Financial Development



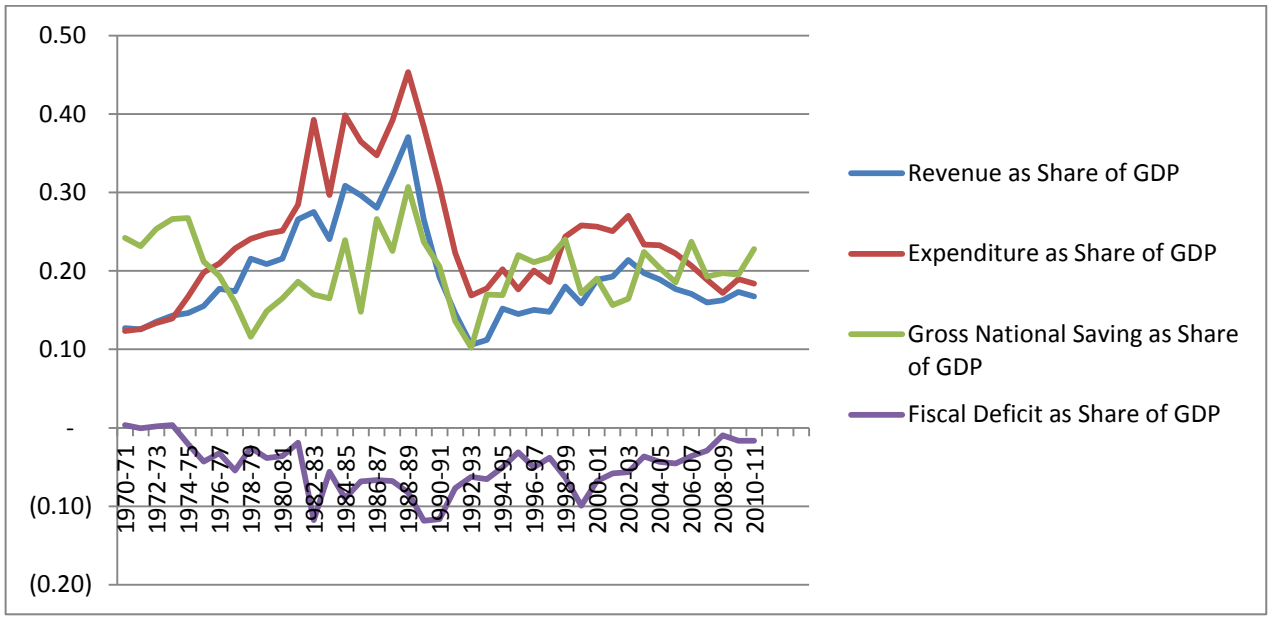
Inflation as measured by consumer price index shows an increasing trend during the entire period of study and reaches its maximum in 2010/11where it registered around 70%. On the other hand the gross national saving ratio fluctuates between the range 10% to 30% throughout the study. When inflation is below 20% saving shows some encouraging improvement, whereas, when inflation is above 20%, hyperinflation, the gross national saving ratio is stagnant around 20% of GDP.

The financial development, as measured by currency as share of M1, shows a declining trend throughout the entire study period while some fluctuations happened in the meantime. This shows that there is a steady improvement or development in the financial sector of Ethiopia. But this has not matched by an improved gross national saving ratio. During the period ranging 1988/89 to 1996/97 the currency over M1 is high and gross national saving ratio is low owing to the negative relationship. Thus, when currency over M1 ratio is high in the economy saving rate is low.

4.6. Gross National Saving and Fiscal Policy

Of the three types of saving, that is, Household saving, corporate saving and Government saving, the Government Saving is different by its nature in the sense that most of the Governments in Africa run budget deficit or they make expenditure more than their revenue.

Figure 5. Gross National Saving Ratio and Fiscal Policy



Ethiopian government is not different from these governments in the sense that the government runes budget deficit each year. Moreover, the study analysis of fiscal policy it refers to the government revenue, expenditure and the budget deficit. Here with the aid of the following figure the study summarized and analyzed the effects of fiscal policy on gross national saving ratio.

As it can be shown from the above figure, gross national saving as share of GDP, government revenue as share of GDP and government expenditure as share of GDP in which the latter two constitute fiscal policy fluctuate in the study period between the range of 10% to 40% as a share of GDP. Moreover, gross national saving ratio, government revenue as share of GDP and government expenditure as share of GDP tend to move in the same direction despite their at the initial stage the government revenue is below gross national saving ratio. While the budget deficit is negative and fluctuates between the range o% and -10%.

Initially, from 1970/71 to 1988/89 government revenue ratio shows steady increase while gross national saving ratio declined during that period even though it turns to grow in the later stages during that period span. From 1988/89 to 1994/95 government revenue as share of GDP declines and gross national saving ratio does the same thing by declining during that time. During 1994/95 to 2010/11 government revenue seems to be stable and gross national saving ratio is stable.

Furthermore, as it can be also seen from the above figure above that, from 1970/71 to 1988/89 government expenditure increases with slight fluctuations and reached its peak in

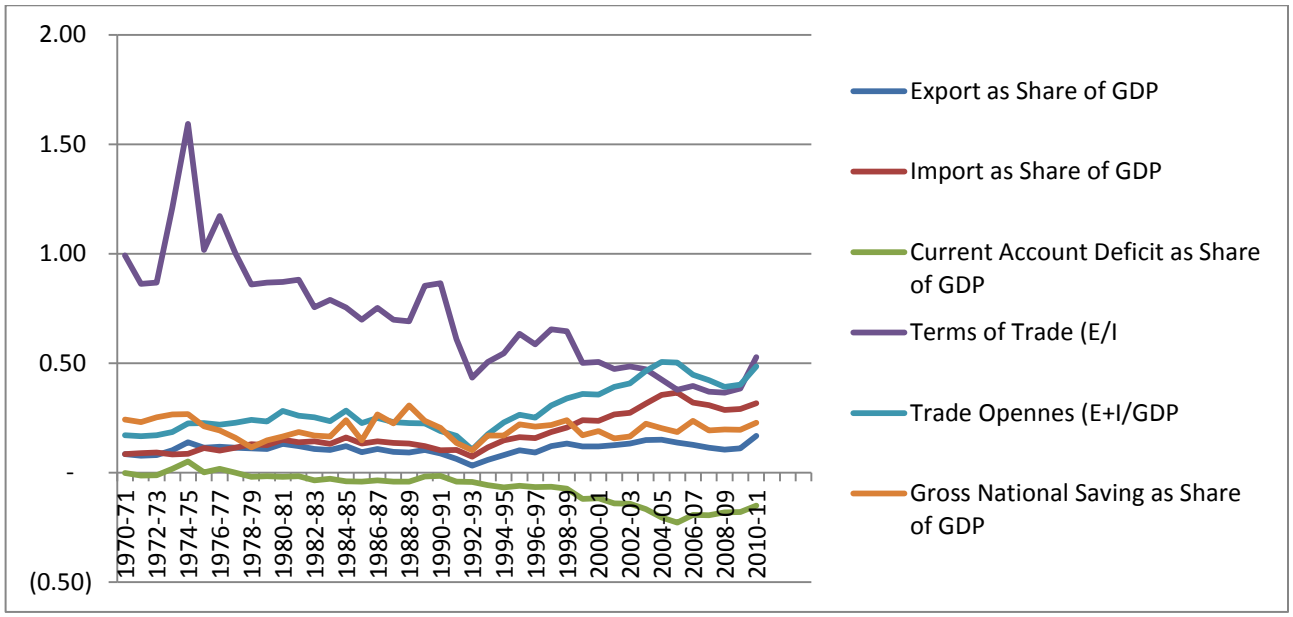
1988/89. During this period gross national saving ratio also shows an increasing trend further confirming that the decrease in public saving due to the rise in government expenditure is equally offset by the increase in privet saving which further indicates the Rechardian Equivalence holds in Ethiopia to some extent. Moreover, from 1988/89 onwards till 2010/11 both gross national saving ratio and government expenditure as share of GDP show decreasing trend with slight fluctuation.

Looking at the trend of budget deficit and gross national saving ratio, the budget deficit shows increasing trend during the period 1970/71 to 1991/92 while the gross national saving ratio turns to fluctuate during that time span. During the period ranging 1994/95 to 2010/11 budget deficit ratio indicates a decreasing sign and reached near zero in 2010/11. During the same period of time the gross nationals saving ratio fluctuates around 20% as share of GDP.

4.7. Gross National Saving and External Sector

In case of open economies, determinates of gross national saving are more complex. The effect of terms of trade on saving behavior which is known as Harberger-Laursen-Metzler effect is discussed here. Moreover, how the trends in trade openness, current account deficit, export and imports are affecting the trend of gross national saving ratio is summarized under the following figure.

Figure 6. Gross National Saving Ratio and External Sector



As it can be seen from the above figure terms of trade, measured as ratio of export to imports, shows decreasing trend with slight fluctuation reaching its peak in 1974/75 and its lowest point in 2008/09. At the same time when we look at the trend of gross national saving ratio along with terms of trade, gross national saving ratio turns out to move in the same direction as terms of trade is moving. Thus, terms of trade has a positive impact on gross national saving ratio, i.e. higher terms of trade is associated with higher gross national saving ratio.

Export as share of GDP, import as share of GDP and trade openness show stable movement during the time of study period. However, current account deficit as share of GDP shows stable trend during the period ranging 1970/71 to 1990/91 and turns to increase from 1992/93 to 2010/11

Chapter Five
Empirical Analysis and Estimation

This chapter presents and discusses the results of empirical analysis based on the econometric framework given in chapter three. First, the results of various preliminary tests that should be undertaken before estimating the ARDL approach to cointegration and after the estimation of the ARDL approach to cointegration models are presented. Subsequently, based on the ARDL approach for cointegration the relationship and their magnitude of the dependent variable in our case which is Gross National Saving Ratio and its explanatory variables are analyzed. First, the F-statistic for cointegration is presented after unit root tests are undertaken. Following the co integration test a summary of the variables included in the empirical analysis is taken. Furthermore, the long run and short run estimates are presented respectively. Last but not least, Diagnostic test and Model Stability are presented.

5.1. Description of the data set used in Estimation

Before proceeding to the estimation of long run and short run models the study summarizes the variables included in the model in compact way using STATA 12.

The variables included in the study are Gross National Saving Ratio (GNSR), natural Log of Gross National Disposable Income (LGNDI), Financial Development (FD), Consumer Price Index (CPI), and Dependency Ratio (DR), Budget deficit (BD) and Current Account Deficit (CAD). The dependent variable is Gross National Saving Ratio (GNSR) and others such as LGNDI, FD, CPI, DR, BD and CAD are explanatory variables.

Table 3. Summary Statistics

Summary Statistics					
Variable	Obs.	Mean	Std. Dev.	Min	Max
GNSR	41	0.2	0.04	0.1	0.3
LGNDI	41	10.3	1.38	8.5	13.3
FD	41	0.6	0.11	0.4	0.8
CPI	41	19.5	15.58	2.9	66.8
DR	41	95.4	3.31	88.3	98.8
BD	41	-2364.3	2315.77	-8331.9	20.2
CAD	41	-10178.9	19669.08	-76673.5	325.3

Source: Ethiopian Economics Association (EEA)

Table 3 indicates that observations used in the study are 41 staring form 1970/71 to 2010/11. The mean of each variable such as GNSR, LGNDI, FD, CPI, DR, BD and CAD are 0.2, 10.3, 0.11, 0.6, 19.5, 95.4, -2364.3 and 10178.9 respectively. Moreover, the standard deviation, the range of maximum and minimum is also described in the above table.

5.2. Unit Root Test

Even though the ARDL approach for cointegration does not require pre-testing of the variables, it is vital to note that the ARDL approach for cointegration needs that the variables under consideration should be either integrated of order zero or integrated of order one (i.e. I (0) or I (1)) or their combination. So, in order to make sure the variables are either I (0) or I (1) the study carry out the unit root test.

In analyzing time series data testing for stationarity is a vital condition. As it is mentioned earlier, the results obtained by using non-stationary time series may be spurious in the sense that they may indicate a relationship between variables which does not exist and this may lead to make wrong inference about economic relationships. In order to obtain consistent

and reliable results, the non-stationary data needs to be transformed into stationary or it's advisable to look for models that deal with non-stationary time series data like the ARDL approach for cointegration. In contrast to the non-stationary process that has a variable variance and a mean that does not remain near, or return to long run equilibrium overtime, the stationary process reverts around constant long run equilibrium and has a constant variance independent of time.

Before one pursues formal tests for stationarity by checking unit root in the variables using Agumented Dicky Fuller test or other tests, it is always advisable to plot the time series under study because visual plot of the data is the first step in the analysis of any time series. Such a plot gives an initial clue about the likely nature of the time series. The Plots of the variable included in our model are provided in appendix A.4. The first impression that we get from these graphs is that at level most of the time series shown in the figures seem to be "trending" either upward or downward, albeit with fluctuations. These log of gross national disposable income (LGNDI), dependency ratio (DR) and consumer price index (CPI) plots show upward trend, while that of financial development (FD), budget deficit (BD) and current account deficit (CAD) show downward trend, gross national saving ratio (GNSR) seems to have upward trend with very significant fluctuation. This suggests that the mean of all the above variables might be changing which perhaps implies they are not stationary at level. Such an initiative feel is important starting point for more formal tests of stationarity. Thus as explained in chapter three, formal testing for stationarity and the order of integration of each variable are undertaken mainly using two standard methods (ADF and PP).

Consequently, all series are examined for stationarity using the two test types and the results are summarized in Table 4 and Table 5. The lag length for each variable is automatically

selected by Schwartz Information Criterion (SIC) and both intercept and trend are included in the test equation for all variables.

Here under the Augmented Dickey Fuller test for a unit root has employed and the results are as follows. Table 4. demonstrates unit root test at level and first difference and then determine their order of integration. In the process the study makes sure the non-stationary variables are stationary after first difference since the ARDL approach to cointegration requires the variables to be either I(0) or I(1).

Table 4. Results of Augmented Dickey Fuller Test

	Level		First Difference		Order of Integration
Variables	Intercept	Intercept and Trend	Intercept	Intercept and Trend	
GNSR	3.793261(9)**	4.407857(9)***			I (0)
LGNDI	1.638711(9)	1.001498(9)	3.709009(9)***	4.302179(9)***	I (1)
FD	1.559987(9)	4.43665(9)***			I (0)
DR	1.869965(4)	4.51367(4)***			I (0)
CPI	2.438676(9)	0.533823(9)	5.000162(9)***	5.634032(9)***	I (1)
BD	1.983001(9)	4.217221(9)**			I(0)
CAD	4.611467(9)***	3.345648(9)*			I (0)
Makinnon Critical Values					
		Intercept	Intercept and Trend		**Significance**
Makinnon Critical Values	1%	3.605593	4.226815		***
	5%	2.936942	3.536601		**
	10%	2.606857	3.20032		*

Source: Own Computation

Where GNSR is gross national saving ratio, LGNDI is natural log of gross national disposable income at current market prices, FD is financial development as measured currency as share of narrow money (M1), DR is dependency ratio, CAD is current account deficit, BD is budget deficit and CPI is consumer price index as a proxy for macroeconomic

stability. ***, ** and * are significance level at 1%, 5% and 10%respectively. And the value in ( ) indicate the lag length automatically selected by schwartez Information Creation.

As the above table discloses, except LGNDI and CPI (with constant and trend) all the rest of the variables such as GNSR, FD, DR, CAD and BD are integrated order of zero or I (0) (with intercept and trend). LGNDI and CPI become stationary at first difference (with intercept and trend). Therefore, the ADF unit root test above makes sure that none of the variables are integrated order of two which is the required property whenever using the ARDL approaches for cointegration.

Table 5.Results of Phillips—Peron Test

	Level		First Difference		Order of Integration
Variables	Intercept	Intercept and Trend			
GNSR	3.707074(9)***	3.619176(9)**			I(0)
LGNDI	2.083517(9)	0.817153(9)	3.732153(9)***	4.272972(9)***	I(1)
FD	1.56436(9)	2.521686(9)	6.549501(9)***	6.470328(9)***	I(1)
DR	1.634048(9)	6.784757(9)***			I(0)
CPI	2.438676(9)	0.513406(9)	5.085077(9)***	5.644263(9)***	I(1)
BD	0.312831(9)	4.217221(9)***			I(0)
CAD	8.475977(9)	4.950365(9)***			I(0)
Critical Values					
		Intercept	Intercept and Trend		Significance
Makinnon Critical Values	1%	3.605593	4.205004		***
	5%	2.936942	3.526609		**
	10%	2.606857	3.194611		*

Source: Own Computation

Likewise the previous ADF test, the PP test for unit root is undertaken here. And the results show that, even though they are not similar to the results of ADF, all the variables included in the model which are non-stationary at level become stationary after first difference. While

GNSR, BD and CAD are stationary at level at 5%, 1% and 1% level of significance respectively. On the other hand, LGNDI, DR, CPI and FD are non-stationary at level and they become stationary after they are differenced once only and all of them are significant after first difference at 1% level of significance.

So, both the ADF and PP test results for stationarity indicate that the all variables under consideration are either I (0) or I (1). And in both of the tests there is no variable which is integrated order two. Once the nature of variables is determined and all the variables included in the model are mixed in their order in a sense that they are either integrated of order zero or integrated of order one we can proceed to the next step of testing for the existence of cointegration using the F-statistic and comparing to the Narayan critical values to determine whether there is long run relationship or not.

5.3. Bounds Test for Co-integration

Once the study have determined all the variables entered the Gross National Saving equation are either integrated of order zero (I (0)) or order one (I (1)), the next step is testing for the existence of long run relationship among the variables in the equation using the bounds test approach. The test for the long run relationship is done using the F-statistic. It is recommended that the optimal lag length for the ARDL model is maximum two lags. Furthermore, the study used AIC to determine the optimal lag because of the sample size is small.

First the study estimates the Unrestricted Model using OLS which was specified in chapter three and then tests their long run relationship using the variable addition test with the F-statistic which will be compared with the lower and upper bounds of Narayan critical values.

If the F-statistic is greater than the upper bound we can conclude that there is long run relationship among the variables, if the F-statistic is less than the lower bound test we can conclude that there is no relationship among the variables under consideration but these are the two extreme cases in which we can conclude with confidence about the long relationship among the variables. In case the F-statistic falls between these two bound critical values i.e. upper and lower critical values it is inconclusive in a sense that we cannot conclude anything about the long run relationship among the variables. In this case we check the error correction term in the short run model, if the error correction term is negative and significant it is further a confirmation of the existence of long run relationship. Or it is possible to undertake a unit root test for the error term i.e. if the error term is stationary at level there is long run relationship among the variables. The results are presented in table 6.

The critical values reported here are for the case with restricted intercept and no trend (Case II). The study applied the critical values developed by Narayan (2004) due to the reasons explained in the methodology part of the paper. Moreover, 38 observations are used by the F-test.

The result indicates that the F-statistics falls within the Narayan critical value bounds at 5% level of significance, which means a conclusive decision cannot be reached. As indicated in the above table the F-statistics which is 3.8436 falls between the upper bound critical value which is 3.989 and lower bound critical value which is 2.78 at a 5% level of significance with six explanatory variables. Therefore, we have to check the error correction term in the short run estimates i.e. weather the error correction term is negative and significant to indicate the equilibrium relationship among the variables. So, it is inconclusive to say there is a cointegrating relationship among the variables under consideration.

Table 6.Results of F-Test or variable addition test for Cointegration

Dependent Variable is DGNSR				
List of variables added to the regression		BD(-1)	CPI(-1)	
GNSR(-1)	LGNDI(-1)	FD(-1)	DR(-1)	CAD(-1)
38 Observations used for estimation from 1966 to 2003				
Regressor	**Cofficent**	**Standard Error**	**T-Ratio**	**[Prob]**
INPT	0.95113	0.79145	1.2018	0.245
DLGNDI(-1)	0.20734	0.11012	1.8828	0.557
DLGNDI(-2)	0.059267	0.098969	0.59885	0.557
DFD(-1)	-0.069577	0.3311	-0.21013	0.836
DFD(-2)	-0.43699	0.28426	-1.5373	0.142
DDR(-1)	0.11667	0.11182	1.0435	0.311
DDR(-2)	-0.16664	0.10995	-1.5156	0.147
DCAD(-1)	-2.37E-04	4.26E-04	0.55455	0.586
DCAD(-2)	3.35E-04	4.36E-04	0.76997	0.451
DBD(-1)	0.0083533	0.021205	0.36392	0.698
DBD(-2)	-0.0030538	0.0029972	-1.0189	0.322
DCPI(-1)	-0.0012941	0.007854	-0.16477	0.871
DCPI(-2)	-0.0039088	0.0081588	-0.47909	0.638
GNSR(-1)	-1.098	0.2394	-4.5866	0.000
LGNDI(-1)	-0.54522	0.059395	-0.91797	0.371
FD(-1)	-0.50956	0.24004	-2.1228	0.048
DR(-1)	4.71E-04	0.0071767	0.656672	0.948
CAD(-1)	8.02E-04	9.79E-04	0.81908	0.423
BD(-1)	0.0021908	0.018102	0.12102	0.905
CPI(-1)	0.0020314	0.0070352	0.28876	0.776
Joint Test of zero restriction on the coefficents of additional variable:				
Lagrange Multiplier	CHSQ(7)=22.7679 [0.002]			
Likelihood Ratio Statistic	CHSQ(7)=34.7389 [0.000]			
F-Statistic	3.8436			
Narayan Crtical Values	No. of Observation	Lower Bound I(0)	Upper Bound I(1)	Decision
1%	38	3.881	5.241	No Relationship
5%	38	2.78	3.989	Inconclusive
10%	38	2.323	3.376	Exist Relationship

Source: Own Computation

5.4. Long Run Representation of the Auto-Regressive Distributed Lag Model (Bounds Test Approach)

Given that all the variables entered the domestic saving equation are either integrated of order zero (I (0)) or one (I (1)), the estimation of the long run model is performed. The study used microfit 4.1 software to estimate the results of the model. Before estimating the long run model, the study had to make sure the existence of the long run relationship and this is done in the previous topic using the F-statistic. So, the study could proceed to the estimation of the long run model. Moreover, before the long run estimates are displayed the microfit 4.1 asks for the maximum lag length to be used. In this study since the time series data is on annual bases lag length of two which is appropriate for annual time series data was used. Furthermore, the ARDL model is selected based on Akaike Information Criterion since it is best suited for small sample size. So here is the long run estimates as follows.

Estimated Long Run coefficients using the ARDL approach

ARDL (2, 2, 0, 0, 2, 1, 0) selected based on Akaike Information Criterion

Table 7. Results of Estimated long run model

Dependent Variable is GNSR				
38 observations used for the estimation from 1966 to 2003				
Regressor	**Coefficents**	**Standard Error**	**T-Ratio**	**[Prob.]**
LGNDI	0.11886	0.030396	0.39104	0.699
FD	-0.42296	0.24438	-1.7308	0.096
DR	-0.0080253	0.0076357	-1.051	0.304
CAD	0.0023489	0.0012335	1.9043	0.069
BD	-0.03745	0.28247	-1.3258	0.197
CPI	-0.0031085	0.03032	-1.0252	0.315
INPT	1.1261	0.74461	1.5124	0.143

Source: Own Computation

The above results show that financial development (FD) which is negative and current account deficit (CAD) which is found to be positive are significantly determining gross

national saving ratio of Ethiopia in the long run. Whereas log of gross national disposable income (LGNDI), dependency ratio (DR), budget deficit (BD) and consumer price index (CPI) are insignificant in the long run in determination of gross national saving ratio in Ethiopia. The rationale behind the insignificance of log of gross national disposable income is that in the long run countries are in the steady state growth and there is not that much change in the level of income so that wealth becomes the main determinant of gross national saving ratio. Even some studies in developing countries have shown that in the long run wealth will be the main determinant of gross national saving ratio instead of income. Again with regard to the insignificance of dependency ratio, in the long run when countries are developed the dependency ratio will decline and its effect on saving will be negligible. On the other hand, the reason behind the insignificance of CPI and BD is that, in the long run the economy becomes stable and governments avoid deficit financing and then in the process reduce inflation so that both of them have trivial effect on the determination of gross national saving. Above all it's quite true that financial development is the main crucial variable that has a significant effect on gross national saving ratio in the long run since in the long run people will be sensitive to the dynamics of financial sector. Moreover, current account deficit has a significant effect due to the fact that capital inflow and outflow has a major impact on the determination of gross national saving given Ethiopia is financially integrated with the rest of the world in the long run.

The results reveal that financial development is an important determinant of gross national saving ratio at 10% level of significance. Every 1% increase in currency as share of narrow money (which is the approximate measure of financial development) yields 42.3% reduction in gross national saving ratio. The result is inconsistent with papers done previously by

Haile (2012) and Keho (2011) who found financial development insignificant in the long run.

The coefficient in current account deficit variable is statistically significant at 10% level of significance thus suggesting that if current account deficit increases by 1% gross national saving ratio will increase by 0.2%. This result is consistent with other papers done by Abu (2004) and Agrawal etal (2007) in which they suggested that current account deficit positively affects saving in the long run.

The rest variables such as the log of gross national disposable income, dependency ratio, budget deficit and consumer price index are insignificant though they face in similar way expected sign in their estimated coefficients. For instance, log of gross national saving having positive sign shows that higher income is associated with higher saving. On the other hand, the sign of dependency ratio is negative expressing that the higher dependents in the entire population the lower saving will be. Moreover, the sign of budget deficit which is negative is well deserved by voicing whenever there is deficit financing there will be lower saving. On the top of that, the sign of consumer price index (a proxy for macroeconomic instability) is negative showing that saving favors stable macroeconomic environment indicating to policy makers stable macroeconomic environment is a prerequisite for everything the nation achieves including higher saving. Above all, log of gross national disposable income, dependency ratio, budget deficit and consumer price index are insignificant at all levels of significance like 1%, 5% and 10%.

5.5. Short Run Representation of the ARDL Model Bounds Test Approach (Error-Correction Representation)

Once the study identified the presence of long run cointegration through the F-statistics and estimation of the long run coefficients, we proceed to the estimation of the error correction representation of long run relationship. The ECM shows the short run dynamics of the model which is consistent with the long run equilibrium of the model. The results of the ECM are reported in table 8.

Error-Correction Representation for the selected ARDL model

ARDL (2, 2, 0, 0, 1, 0) selected based on Akaiki Information Criterion

Table 8. Estimated results of the Short Run Model

Dependent Variable is DGNSR				
38 Observations used for estimation from 1966 to 2003				
Regressor	**Coefficent**	**Standard Error**	**T-Ratio**	**[Prob]**
DGNSR1	-0.29795	0.15597	-1.9103	0.067
DLGNDI	-0.1297	0.063163	-2.0533	0.05
DLGNDI1	0.21173	0.07039	3.008	0.006
DFD	-0.28328	0.13749	-2.0604	0.049
DDR	-0.005375	0.0041869	-1.2838	0.21
DCAD	0.0024723	9.26E-04	2.6696	0.013
DCAD1	9.15E-04	3.57E-04	2.5657	0.016
DBD	0.0094404	0.0029931	3.154	0.004
DCPI	-0.002082	0.001688	-1.2334	0.228
DINPT	0.75424	0.38075	1.9809	0.058
ECM(-1)	-0.66976	0.2438	-2.7472	0.011
R-squared	0.77197	R-Bar-Squared	0.64	
SE of Regression	0.035109	F-Stat F(10, 27)	8.1248	[0.000]
Mean of Dependent Variable	-0.0026316	S.E of Dependent Variable	0.059215	
Residual Sum of Squares	0.029584	Equation Log-Likelihood	82.0843	
Akaiki info. Criterion	68.0843	Schwartez Bayesian Criterion	56.6212	
DW-statistic	2.022			

Source: Own Computation

Note: R-squared and R-bar-squared measures refers to the dependent variable dGNSR and in cases where the error correction model is highly restricted, these measures could be negative.

The ECM coefficient shows how fast variables restore to their equilibrium value and it should be statistically significant, negative and between zero and one. ECM term is one period lagged residual saved from the estimated dynamic long run relationship. The ECM_{t-1} , which measures the adjustment to restore equilibrium in the dynamic model, appear with negative sign and is statistically significant at 5% level of significance level, ensuring the long run equilibrium can be attained. Bannaerjee et al, (1998) holds that a highly significant error correction term is further proof of the existence of stable long run relationship. Indeed he has argued that testing the significance of ECM_{t-1}, which is supposed to carry out negative coefficient, is relatively more efficient way of establishing Cointegration.

As indicated in the bounds test approach for cointegration, the result of F-statistic falls between the upper and lower bounds and the study is unable to make any conclusion about the long run relationship of the variables under consideration. So, as stated in such cases we have to check for sign and significance of ECM_{t-1} to conclude about the long run and short run relationship among the variables. Since the sign of ECM_{t-1} is negative and significant at 5% level we can conclude that there is existence of long run relationship among the variables under consideration.

Therefore, the coefficient of the error correction term that captures the speed of adjustment towards the long run equilibrium is found with the correct sign and magnitude. The speed of adjustment is -0.66979, which implies that around 67% deviations from long-term equilibrium are adjusted every year and the rest 33% in the coming year. This shows it takes the error correction term around one and half year to correct any deviation from the equilibrium. This also indicates once the disequilibria happened, it will take more than

one year to adjust itself towards the long run equilibrium. The speed of adjustment is quite similar with what Haile (2012) found which is -0.63768 or 64%.

The results of the ECM for the gross domestic ratio imply that most of the coefficients, except DR and CPI, are statistically significant at 10% level of significance in the short run. While DR and CPI are insignificant in the short run the rest such as dGNSR (-1), dLGNDI (-1), dLGNDI, dFD, dCAD, dCAD (-1), dBD and dBD (-1) are statistically significant in the short run at 10% level of significance.

Savings rates of the previous period have a negative and highly significant effect on today's savings rates. The coefficient is about -0.29795 indicating that savings rates clarify a certain degree of persistence.

The results indicate that the log of gross national disposable income has a negative effect in the short run which is not as expected and statistically significant at 5 percent level in the short run. A one percentage change increase in log of gross national disposable income seems to bring about 0.1297 percent decrease in the domestic saving rate. This doesn't provide support for the argument that, for countries in the initial stages of development, the level of income is an important determinant of the capacity to save.

The financial development as captured by currency as share of narrow money has a negative and statistically significant effect on gross national savings ratio in the short run. This finding confirms that an increase in financial depth, approximated by the decrease in the Currency/M1 ratio, is likely to have positive effect on gross national saving ratio especially in a country such as Ethiopia, in which its financial development is still underdeveloped and there is no intention from the central government in undergoing a financial liberalization.

Regarding the effect of dependency ratio (DR), it is found that in the short run it has negative and statistically insignificant effect. When dependency ratio is high, as in the case of Ethiopia and most African countries in most years of the study, individuals tend to save less of their income since there are many dependents on them as a result they consume so much. In this case reduction in dependency ratio will result improved savings.

The study also found that macroeconomic uncertainty or macroeconomic instability as measured by the Consumer Price Index (CPI) has a negative but statistically insignificant effect on gross national saving ratio in the short run. This doesn't provide support of precautionary motives for saving in the face of increased economic uncertainty in Ethiopia. In addition, the antagonistic effect of inflation rate also indicates that rising inflation rate in Ethiopia reduces gross national saving rate either by reducing the purchasing power of individual's income or through portfolio adjustment from depositing in the form of money in banks to another fixed asset such as gold and land.

Current account deficit (CAD) recorded a positive and statistically significant effect in the short run at 5 percent level. The results indicate that 1 percent increase in current account deficit leads to 0.0024 percent increase in the gross national saving ratio in the short run. An increase in external saving or the current account deficit is met by an increase in gross national saving, as external saving may tend to act as a complimentary to gross national saving.

The conventional analysis of sustained budget deficits indicates that an increase in the budget deficit reduces domestic saving unless it is fully offset by an increase in private saving. Our results confirm this viewpoint, where the budget deficit has a positive and

statistically significant effect on the national saving ratio in the short run. This result indicates that there is a full offset on private savings of changes in government saving, and thus Ricardian Equivalence hold strictly. The positive impact of budget deficit imply that private saving is able to offset the increasing budget deficit and hence, increased national saving ratio for a long period of time.

5.6. Determinants of Gross National Saving in the Study (Expected Vs Actual Sign)

It is already stated in chapter one that the study stated the hypothesis and clearly put the expected sign of the variables under consideration. Here an analysis of expected or hypothesized and actual signs observed after estimation is presented in a compact way.

Table 9. Hypothesized and actual sign obtained after estimation

Variable Category	Specific Variable	Hypothesis	Result/Finding
Economic Growth Indicator	LGNDI	Positive	Positive
Financial Development Indicator	FD	Negative	Negative
Demographic Indicator	DR	Negative	Negative
Externat Sector Indictaor	CAD	Negative	Positive
Fiscal Indicator	BD	Negative	Negative
Macroeconomic Instablility indicator	CPI	Negative	Negative

Source: Own Computation

The above table shows that, except for the external sector indicator of current account deficit, for all the other variables are their expected sign coincides with the obtained result sign of the variables after estimation. Unfortunately, for current account deficit (CAD) its expected sign is negative but in contrast to what is expected the actual finding turns out to be positive. This is due to the fact that capital inflows in to the economy supplements gross national saving.

5.7. Diagnostic Test

Testing robustness of the model is performed using the diagnostic test. After estimation is done, it is must to check whether the model has achieved the desired properties. In this study, various diagnostic checks are performed. Serial correlation, Functional form test, Normality test and Hetroscedasticity are carried out. The various diagnostic tests perform perfect indicating on the regression analysis of the dynamic model which incorporates both the long run and short run model simultaneously.

Table 10. Results for the various Diagnostic Tests

Test Statistics	LM Version	F – Version
A: Serial Correlation	CHSQ(1)=0.05351 [0.817]	F(1,23)=0.32438 [0.859]
B: Functional Form	CHSQ(1)=0.57111 [0.450]	F(1,23)=0.35094 [0.559]
C: Normality	CHSQ(2)=1.8010 [0.406]	Not applicable
D: Hetroscedasticity	CHSQ(1)=0.23528 [0.628]	F(1,36)=0.22429 [0.639]
A: Lagrange Multiplier Test of residual serial correlation. B: Ramsy's RESET test using the square of the fitted values. C: Based on a test of skewness and kurtosis of residuals. D: Based on the regression of squared residuals on squared fitted values.		

Source: Own Computation

A: In testing for the serial correlation both the lagrange multiplier and F-statistic fail to reject the null hypothesis of no serial correlation indicating that there is no serial

dependency among the errors. So, we accept the null hypothesis of no serial correlation. Furthermore, the Durbin Watson test confirms this result.

B: The test result also couldn't reject the Ramsey RESET test which is based on the null hypothesis that the model is specified correctly. Therefore, Ramsey RESET test for functional form specification accepts the regression specification of the dynamic model. Furthermore, failing to reject the null in Ramsey reset test also further confirms that our model did not suffer from omitted variable bias (Tsadkan, 2013). Therefore, the model is specified correctly.

C: The above results also indicate that, we couldn't reject the null hypothesis that the residuals are normally distributed or residuals follow normal distribution. Since the lagrange multiplier P value (0.406) is greater than the value that lead us to the rejection of the null i.e. at 5% level of significance.

D: The study couldn't reject the null hypothesis of no autoregressive conditional hetroskedasticity in the residual at 5% level of significance. This shows that there is no hetroscedasticity and indicates the existence of constant variance.

Above all, there is no error autocorrelation and conditional heteroskedasticity, the functional form is also acceptable and errors are normally distributed indicating in the process the model is robust.

5.8. Model Stability – The CUMSUM Test

One the ECMs have been estimated, Pesaran and Shin (1997) suggested that structural stability of the long-run and short-run relationships for the entire period is better examined by the cumulative sum (CUMSUM) and the cumulative sum of squares(CUMSUMSQ) of the recursive residual test as proposed by (Brown et al, 1975) to assess the given parameter consistency. The null hypothesis of these tests is that the regression equation is correctly specified.

Figure 7. Plot of Cumulative Sum of Recursive Residuals

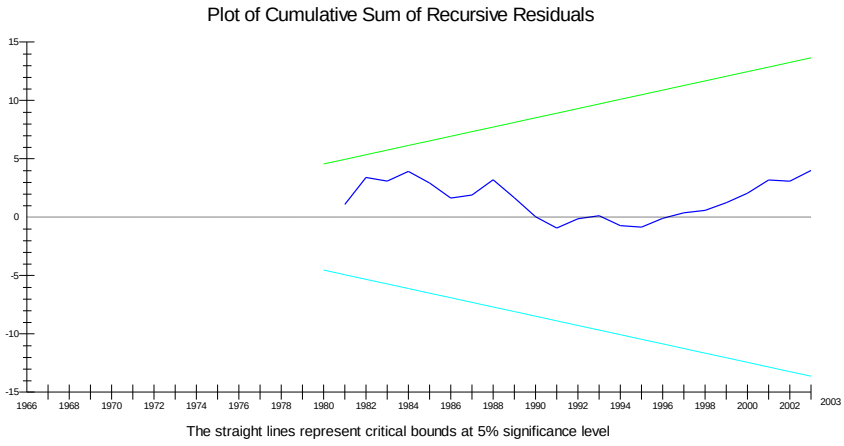
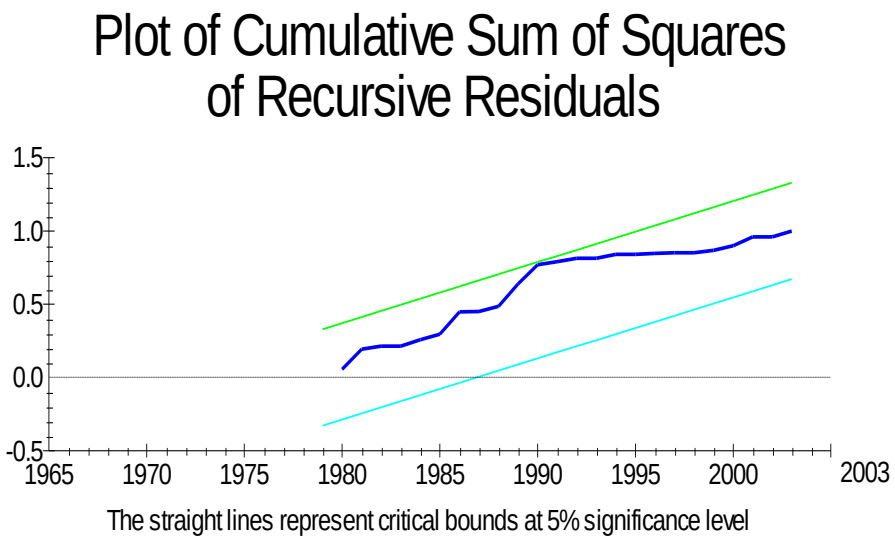


Figure 8. Plot of Cumulative Sum of Squares of Recursive Residuals



The above two graphs we have the tests presented in figure 5.1 and figure 5.2. The pair of two straight lines in the above two graphs which are parallel indicate the 5 percent significant level and if the plotted CUMSUM and CUMSUMSQ graphs remain inside the straight lines the null hypothesis of correct specification of the model can be accepted. Otherwise, the null hypothesis is rejected at 5 percent level of significance and it can be concluded that the regression equation is miss-specified. The two plots disclose that the plots of CUMSUM and CUMSUMSQ stay within the lines, and, therefore, this confirms the equation is correctly specified and the model is stable. Furthermore, the results reveal that there is no structural instability in the model during the sample period. The selected model

adopted in study seem to be good and robust in estimating the short run and long run relationship between gross national saving and its determinants.

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

Chapter Six
Conclusions and Policy Recommendations

6.1. Conclusions

The study tries to empirically investigate the significance of some macroeconomic variables in determining gross national saving in Ethiopia by using time series data from 1970/71 to 2010/11. The method used is a bound testing approach to cointegration developed with an ARDL framework to examine the existence of short run and long run equilibrium relationship between GNSR, LGNDI, FD, DR, CPI, CAD and BD.

The trend of gross national saving ratio fluctuates between 10% and 30% as share of GDP during the entire period of study and turns out to be stable in the later years. Furthermore, the role of gross national saving in financing gross fixed capital formation has improved with time except in the latter years of the study period in which the saving gap becomes wider and wider. The relationship among gross national saving ratio and the explanatory variables such as financial development, external sector, growth of gross national disposable income, fiscal policy and macroeconomic stability has been discussed with the help of graphs.

The results of the study provide evidence that gross national saving in Ethiopia is determined by the following factors. Financial development play a stronger negative role in determining both the short run and long run behavior of gross national saving in Ethiopia. Current account deficit turns out to affect gross national saving negatively both in the long run and short run but in the short run it turns out to be insignificant while it is significant in the long run. Dependency ratio and consumer price index are also found to have adverse

effects in the short run and long run while they are insignificant both in the long run and short run. However, the effect gross national disposable income is found insignificant in determining gross national saving in the long run. Furthermore, budget deficit recorded mixed results in its sign and its significance both in the short run and long run. In the long run the effect of budget deficit on gross national saving is insignificant while in the short run the effect of budget deficit on gross national saving is statistically significant in Ethiopia.

The coefficient of the error term that captures the speed of adjustment towards the long run equilibrium is found with the correct sign and magnitude. The speed of adjustment is -0.66779, which implies that around 67% deviations from long run equilibrium are adjusted every year and the rest 33% in the coming year. Thus, it takes around one and half year to correct any deviation from the equilibrium.

6.2 Policy Recommendations

The study has useful implications for policy and future researchers in the area of macroeconomic determinants of gross national saving in Ethiopia. Given the government's ambitious public investment plans, Ethiopia is challenged with a persistent and wide saving and investment gap in recent years which have been financed by external sources. And the risk associated with external sources of financing offers the motivation of relying on national saving to finance the investment. This gives an additional incentive to the government to increase gross national saving.

The following policy recommendations emerge from the analysis of the thesis. The measures to be taken can be classified into two policy areas these are macroeconomic policy and financial sector measures.

First, establishing a stable macroeconomic environment with low level of inflation is among the main policy tools to increase the saving rate in Ethiopia. A stable macroeconomic environment is a precondition for every good thing the country achieves. Moreover, maintaining the current pace of economic growth is again an effective policy device to improve the saving rate in Ethiopia.

Second, implementing financial development strategies, while keeping inflation under control, could be an efficient means to increase the saving rate. That is, financial deepening with a vibrant banking sector that supports both public and private sector of the economy are a key for improving the saving rate. Therefore, more competition on the financial sector could increase saving products through innovation.

Third, improving the current account deficit and Budget deficit will be an effective policy tool to meet the saving mobilization of the five year Growth and Transformation Plan (GTP). Moreover, efforts must take place in reducing the dependency ratio through employment opportunities so that saving can be improved.

Finally, the government should maintain the various recent initiatives to increase saving ratio. The recent measures taken include schemes to increase household saving through improved financial sector accessibility, attracting funding from the large Ethiopian diaspora and maintaining macroeconomic stability.

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Appendices

Appendix 1: Estimates of Long Run Model

Estimated Long Run Coefficients using the ARDL Approach
ARDL (2,2,0,0,2,1,0) selected based on Akaike Information Criterion

Dependent variable is GNSR
38 observations used for estimation from 1966 to 2003

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
LGNDI	.011886	.030396	.39104[.699]
FD	-.42296	.24438	-1.7308[.096]
DR	-.0080253	.0076357	-1.0510[.304]
CAD	.0023489	.0012335	1.9043[.069]
BD	-.037450	.028247	-1.3258[.197]
CPI	-.0031085	.0030320	-1.0252[.315]
INPT	1.1261	.74461	1.5124[.143]

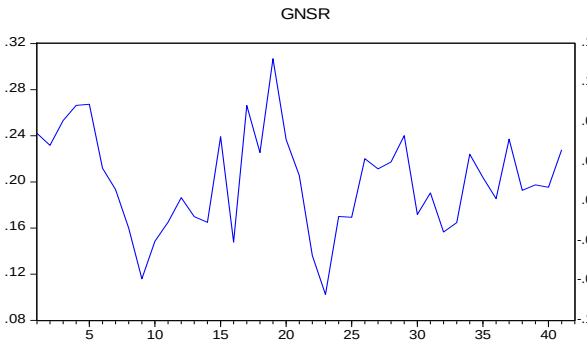
Appendix 2: Estimates of Short Run Model

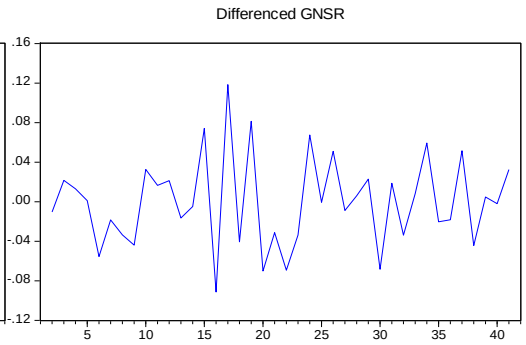
```
          Error Correction Representation for the Selected ARDL Model
      ARDL(2,2,0,0,2,1,0) selected based on Akaike Information Criterion
********************************************************************************
*
 Dependent variable is dGNSR
 38 observations used for estimation from 1966 to 2003
********************************************************************************
*
Regressor               Coefficient       Standard Error         T-Ratio[Prob]
dGNSR1                     -.29795            .15597           -1.9103[.067]
dLGNDI                     -.12970           .063163           -2.0533[.050]
dLGNDI1                     .21173           .070390            3.0080[.006]
dFD                        -.28328            .13749           -2.0604[.049]
dDR                      -.0053750          .0041869           -1.2838[.210]
dCAD                      .0024723          .9261E-3            2.6696[.013]
dCAD1                     .9148E-3          .3565E-3            2.5657[.016]
dBD                       .0094404          .0029931            3.1540[.004]
dCPI                     -.0020820          .0016880           -1.2334[.228]
dINPT                       .75424            .38075            1.9809[.058]
ecm(-1)                    -.66976            .24380           -2.7472[.011]
********************************************************************************
*
 List of additional temporary variables created:
 dGNSR = GNSR-GNSR(-1)
 dGNSR1 = GNSR(-1)-GNSR(-2)
 dLGNDI = LGNDI-LGNDI(-1)
 dLGNDI1 = LGNDI(-1)-LGNDI(-2)
 dFD = FD-FD(-1)
 dDR = DR-DR(-1)
 dCAD = CAD-CAD(-1)
 dCAD1 = CAD(-1)-CAD(-2)
 dBD = BD-BD(-1)
 dCPI = CPI-CPI(-1)
 dINPT = INPT-INPT(-1)
ecm = GNSR  -.011886*LGNDI +   .42296*FD + .0080253*DR -.0023489*CAD +  .0374
50*BD + .0031085*CPI   -1.1261*INPT
********************************************************************************
*
R-Squared                        .77197   R-Bar-Squared                    .64845
S.E. of Regression              .035109   F-stat.    F( 10,  27)    8.1248[.000]
Mean of Dependent Variable    -.0026316   S.D. of Dependent Variable      .059215
Residual Sum of Squares         .029584   Equation Log-likelihood         82.0843
Akaike Info. Criterion          68.0843   Schwarz Bayesian Criterion      56.6212
```

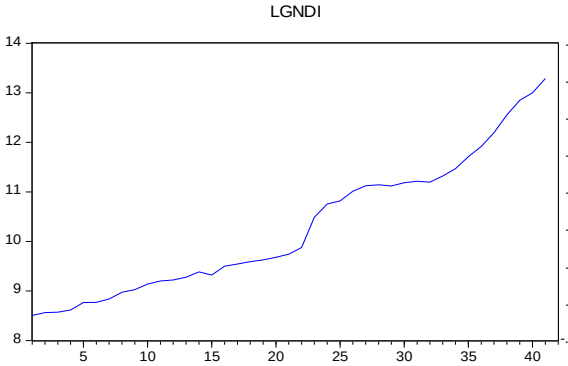
Appendix 3: Diagnostic Tests

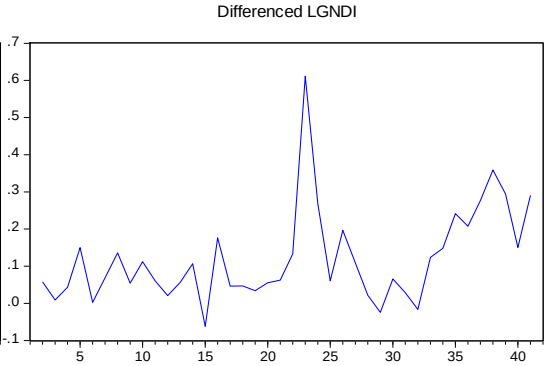
```
     Diagnostic Tests
*****************************************************************************
*
*    Test Statistics *        LM Version        *         F Version
*****************************************************************************
*
*                     *                          *
*A:Serial Correlation*CHSQ(   1)=  .053518[.817]*F(   1,  23)=  .032438[.859]
*                     *                          *
*B:Functional Form   *CHSQ(   1)=   .57111[.450]*F(   1,  23)=   .35094[.559]
*                     *                          *
*C:Normality         *CHSQ(   2)=   1.8010[.406]*       Not applicable
*                     *                          *
*D:Heteroscedasticity*CHSQ(   1)=   .23528[.628]*F(   1,  36)=   .22429[.639]
*****************************************************************************
*
   A: Lagrange multiplier test of residual serial correlation
   B: Ramsey's RESET test using the square of the fitted values
   C: Based on a test of skewness and kurtosis of residuals
   D: Based on the regression of squared residuals on squared fitted values
```

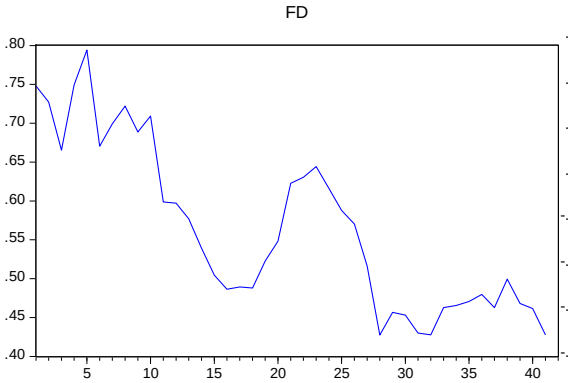
Appendix 4: Variable Used in Empirical Analysis at Level and First Difference

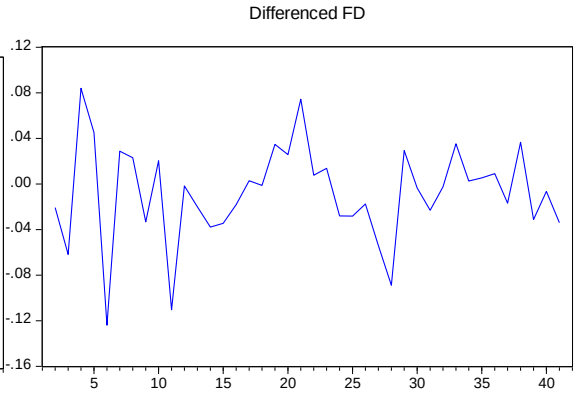


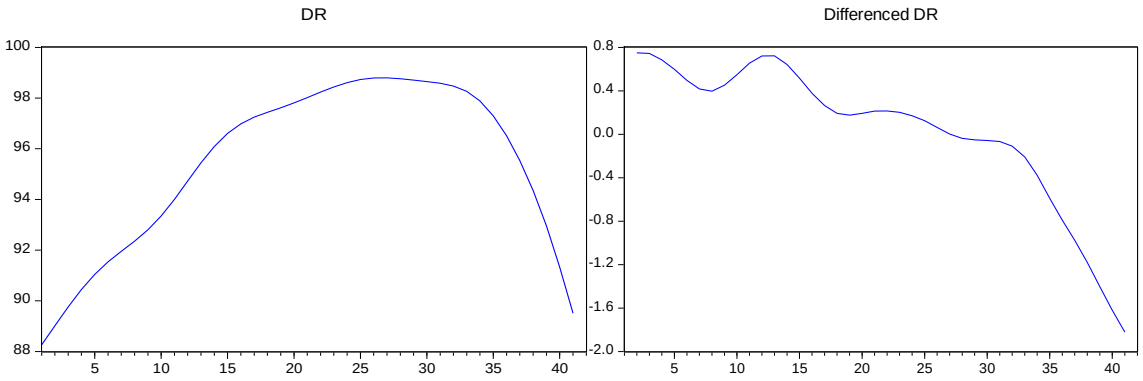


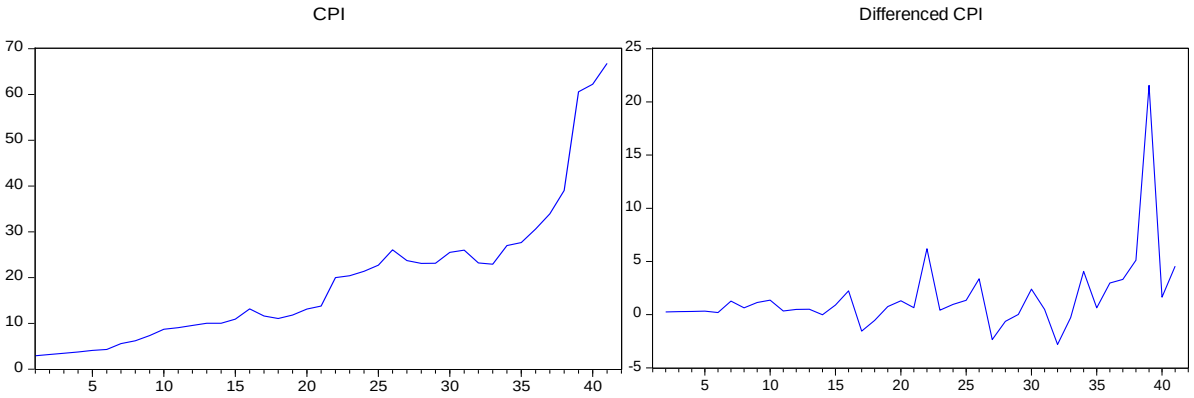


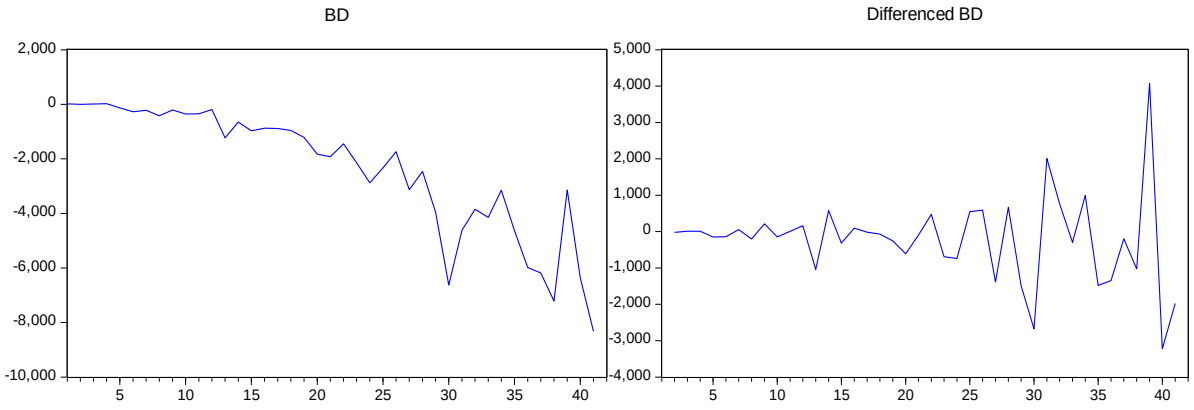


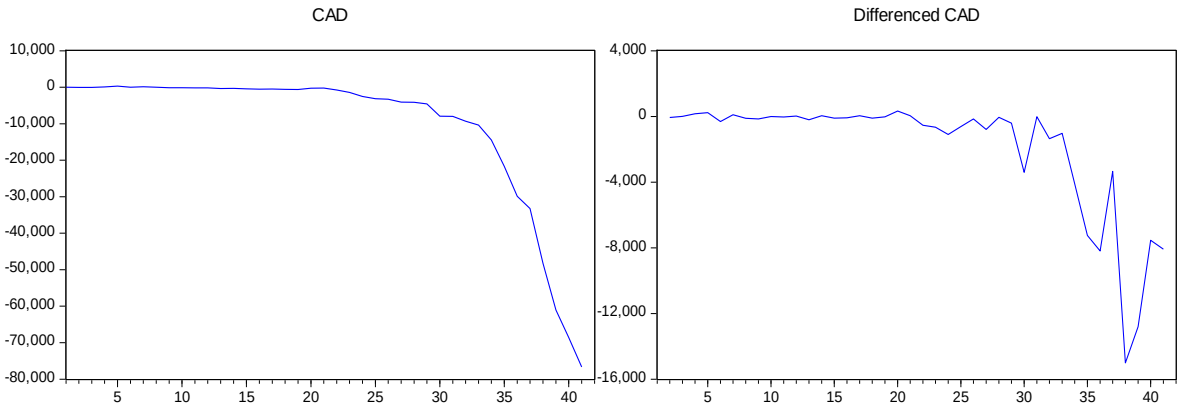




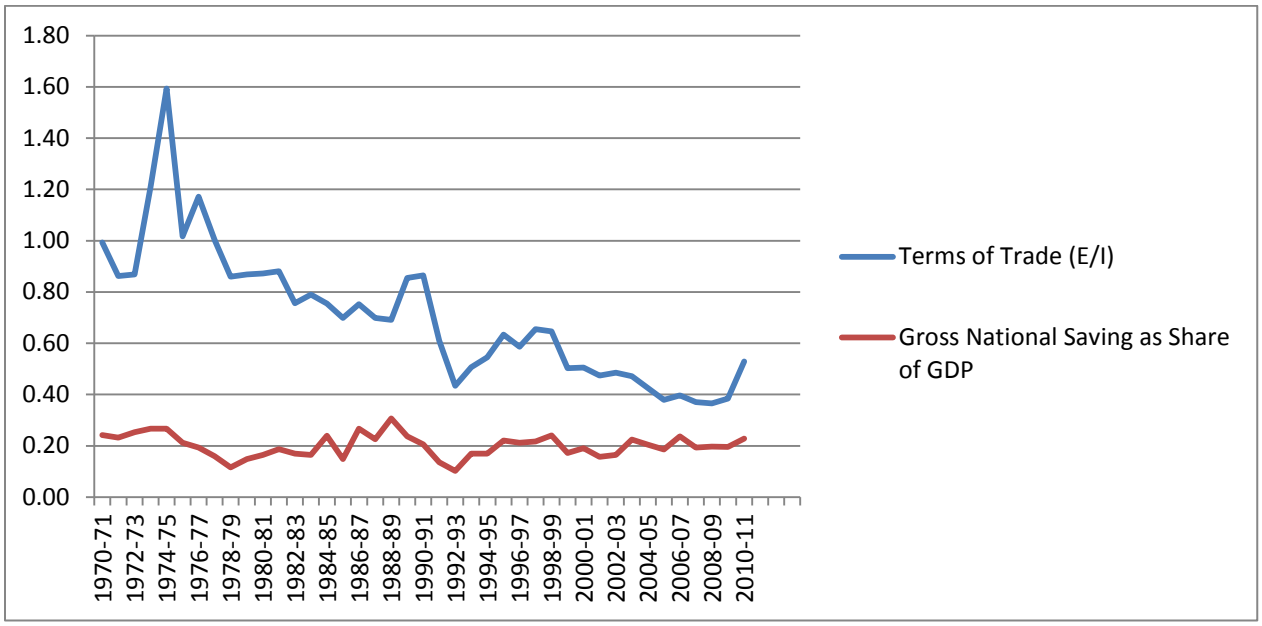

DR
Differenced DR


CPI
Differenced CPI


BD
Differenced BD


CAD
10,000
0
-10,000
-20,000
-30,000
-40,000
-50,000
-60,000
-70,000
-80,000
5
10
15
20
25
30
35
40
Differenced CAD
4,000
0
-4,000
-8,000
-12,000
-16,000
5
10
15
20
25
30
35
40

Appendix 5: Gross National Saving and Terms of Trade (Harberger-Lasrsen-Metzler effect)



Declaration

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

Declared by:

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Confirmed by (advisor)

Name: Fantu Guta (PhD)

Signature: ……

Date: ……

Place and date of submission: ……