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SCHOOL OF GRADUATE STUDIES**

DETERMINANTS OF CAPITAL FORMATION IN ETHIOPIA

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STATEMENT OF AUTHOR

I, **Haileeyesus Ayele**, hereby declare that a research entitled ‘**Determinants of Capital Formation in Ethiopia** ’ submitted by me for the award of the degree of Master of Science in Development Economics of St. Mary’s University, is original work and it hasn’t been presented for the award of any other Degree, Diploma, Fellowship or other similar titles of any other university or institution.

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ACRONYMS AND ABBREVIATIONS

AIC	Akaike Information Criterion
AIH	Absolute Income Hypothesis
ADF	Augmented Dickey Fuller
CSA	Central Statistical Agency
ECM	Error Correction Model
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
GDS	Gross Domestic Saving
GNS	Gross National Saving
GNP	Gross National Product
IMF	International Monetary Fund
EIA	Ethiopian Investment Agency
LDCs	Least Developing Countries
MPC	Marginal Propensity to Consume
MPS	Marginal Propensity to Save
M2	Money Supply
MoFEC	Ministry of Finance and Economic Cooperation
NBE	National Bank of Ethiopia
SNA	System National Accounts
UNSNA	United Nations System National Accounts
VIF	Variance Inflating Factor
WB	World Bank

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ABSTRACT

In economic theory when high savings is tied with high levels of capital formation long-term economic growth can be realized. This study aims to investigate the determinants of Capital Formation in Ethiopia using annual time series data from 1980/81-2015/16. To analyze data Error correction model was applied. The result of co-integration test indicated that there is a long run relationship among variables and error correction model used to estimate the short run dynamics. The result of the models revealed gross national saving, Per Capita Income, Investment, and Consumption have significant role on gross Capital formation in Ethiopia in the long run. But Consumer Price Index, Average Lending, Dependency Ratio, Real Effective Exchange Rate, Taxes and Money Supply, found to be statistically insignificant determinants of gross Capital formation in Ethiopia in the long run. However, in the short run, except Consumer Price Index, Dependency Ratio, Real Effective Exchange Rate, Taxes and Money Supply the rest of the explanatory variables such as Gross National Saving, Per Capita Income, Average lending rate, Investment, and Consumption found statistically significant explaining gross Capital formation in Ethiopia. Further, the findings of the study underlined gross national saving; Per Capita Income and Investment, and Consumption are most important factors that positively and significantly influence gross capital formation in Ethiopia. Therefore, In order to acquire maximum benefit from them concerned bodies have to put their effort to sustain the saving culture through financial literacy. The public authorities should Encourage savings by enhancing Interest rate .The Government should be creating and enabling good atmosphere and provide more infrastructural facilities to cover way for investment which in turn will boost Capital Formation.

The word: *Gross national saving, Gross Capital formation, ECM, Ethiopia*

1. INTRODUCTION

1.1. Background of the study

All over the world, countries, organizations, institutions as well as individuals are able to mobilize adequate Capital formation and for that issue their personal economic development by savings a portion of their income.

Capital formation refers to the net addition to the capital stock of any nation. It is defined as an addition to the stock of capital assets set aside for future productive endeavours in the real sector which will lead to more growth in physical capital assets of the country. Capital formation captures all the real-value-added to the economy in real-asset-terms which will lead to further enhancement of savings, investment, and generation of more wealth in future. Capital formation derives from savings accumulation. It has a positive impact on private savings accumulation in the sense that increase in capital formation will lead to more savings (Shuaib, 2015).

Capital formation is one of the engines of economic growth. Deficiency of capital has been cited as the most serious constraint to sustainable economic growth. On the definition of capital formation, Bakare (2011) stressed that it refers to the proportion of present income saved and invested in order to augment future output and income. According to Ugwuegbu and Uruakpa (2013), capital formation is equivalent to an increase in physical capital stock of a nation with investment in social and economic infrastructure. Bakare classified capital formation into gross private domestic investment and gross public domestic investment. The gross public domestic investment includes investment by government and public enterprises while gross private domestic investment is investment by private enterprises. Gross domestic investment can be attributed to gross fixed capital formation plus net changes in the level of inventories. Economic theories reveal that capital formation plays crucial roles in economic growth (Beddies 1999, Gbura and ThadjiMmichael 1996, Ghura 1997). Growth models like the ones developed by Romer (1986) and Lucas (1988) predict that increased capital accumulation can result in a permanent increase in

growth rates. Youopoulos and Nugent (1976 as cited in Bakkare2011), supported the view of capital fundamentalism.

The process of capital formation is cumulative and self-feeding. It involves three interrelated conditions; (a) the existence of real savings and rise in them; (b) the existence of credit and financial institutions to mobilize savings and to direct them to desired channels; and (c) to use these savings for investment in capital goods (Jhingan, 2006). The decline in capital formation can be as a result of macroeconomic imbalances such as deteriorating foreign exchange rate and corruption in public sector. The inadequacy in economic infrastructure such as poor power supply, bad road network as well as poor health facilities were equally responsible for the decline in capital formation over time (Girma, 2011)

The vicious circles of poverty in developing countries can also be broken through sufficient savings, and it is the key to economic development as well. Additionally, it is notable that the slow rate of development in third world countries are usually attributed to the low levels of national savings that constraint their capacity to invest in capital formation. This leads to lower level of economic growth and development than other countries that have enough savings. So saving is usually considered as the main source of economic growth.

The prosperity of any country depends on the levels of savings and investment as conduits for capital formation. The role of domestic savings in a country's development process is a very important process to promote and support self-sustained economic growth and development. It has been argued that higher savings lead to higher investment, which in turn leads to higher economic growth and development. A country's economic progress depends largely on the ability of a nation to mobilize the necessary savings to finance capital formation in order to increase the rate of economic growth and development. Gross domestic savings could reduce the country's dependency on foreign capital (Ahmad and Marwan, 2003). Foreign borrowing and loans lead to unsustainable foreign debts and hence result in balance of payment disequilibria. Savings, capital formation and growth are inter-related, thus there is need to understand the determinants of gross domestic

savings in a developing country in order to address chronic lack of internally generated resources to propel economic growth.

Ethiopia becomes one of the fastest non-oil rich growing economies in the world (Mulugeta, 2016). To sustain this, Ethiopian government is trying its best in attracting both domestic and especially foreign investors so that the newly created investments can generate high amount of foreign currency, to create high employment opportunities i.e., it may help the society to generate income for previously unemployed ones and higher incomes for the others and government also can generate additional income in the form of fair tax (i.e. fair tax so that investors feel confident in the tax system thereby as they become successful in their investment, they want to expand more. The more investment expands the more positive effects on economic growth such as rise in GDP, savings, foreign exchange, higher employment and so on). When Ethiopia exports goods and services to the rest of the world, we actually get foreign exchange which is one of the determinants of economic growth in the country (Dorosh, et al, 2009). This foreign exchange might be used as to the import of capital goods (equipment, machineries, etc). Since capital goods play a great role in maintaining economic growth of developing countries like Ethiopia, there must be huge amount of foreign currency so that the nation satisfy investors' requirement for saving and foreign currency.

1.2. Statement of the problem

Capital formation is an important component in order to augment future output and income. It usually results from the acquisition of new factory along with machinery, equipment, and all productive capital goods. Capital formation is equivalent to an increase in the physical capital stock of a nation with investment in social and economic infrastructure and contributes to the growth process by increasing the productive capacity, improving the technology, and enhancing the competitiveness of an economy (Rekha, 2011).

The process of capital formation is cumulative and self-feeding. It involves three interrelated conditions; (a) the existence of real savings and rises in them; (b) the existence of credit and financial institutions to mobilize savings and to direct them

to desired channels; and (c) to use these savings for investment in capital goods (Sunny, 2016).

Angus (2005) point out that Africa endures a problem of savings and investment gap. As a result of this, countries faced challenges to finance investments needed for growth from domestic saving and their investment financed through an external source but this can considerably increase debt burden and cannot be a solution in the long run, (Edward, 2003).

According to Ethiopia (GTP II, 2015/16-2019/20) plan, one major problem facing Ethiopia in achieving accelerated growth and development is a low level of capital formation due to the low level of saving. As per IMF, 2014 report "The GTP requires large public sector borrowing and domestic resource mobilization to finance high levels of investment. The current level of domestic savings is insufficient to finance the high investment (particularly public), thus opening up a larger source gap. There is a risk that the investment levels envisaged under the plan would not materialize and may outstrip the absorptive capacity of the economy". As the widening saving-investment gap continues to be financed through external sources, it could become unsustainable. It could not only compromise policy sovereignty but also could lead to accumulation of unsustainable debt.

In the past four decades (1970/71 to 2010/11) the average domestic saving rate was only 7.9% of the GDP. According to Ayalew (2013), during the three consecutive regimes of Ethiopia over the study period reveals that the average saving rate was 13.8% of GDP during the period from 1970/71 to 1973/74, 7% from 1974/75 to 1990/91 and 7.3% from 1991/92 to 2010/11. This classification indicates that during the Imperial regime domestic saving rate was relatively high. However, in the current (that is, EPRDF)" and the Derg regime, domestic saving declined to lower per cents. Furthermore, according to World Bank report (2011), average domestic saving rate of Ethiopia was very low by any standard. For example, if we compare average domestic saving rates of Ethiopia with Sub-Saharan African countries between the periods ranging from 1980/81 to 2010/11, average domestic saving rate in Ethiopia was only 8.6% of the GDP. On the other hand, during the same period, average domestic saving rates for Sub-Saharan Africa countries was 17.2% of GDP.

This suggests that how much the domestic saving rates of Ethiopia were too much low even by Sub-Saharan Africa standards (Ayalew, 2013).

In Ethiopia, the gross capital formation has shown a radical rise. Studies conducted by UNO in 2006 shows that gross capital formation in the country was 13.6 percent, 14.1 percent and 18.3 percent of the GDP for the periods 1980-84, 1989-1993 and 1999-2003, respectively. On the other hand, the gross national savings were 6.5 percent, 4.7 percent and 5.4 percent of the GDP for the same period. Hence, the domestic saving rate is not even sufficient to generate the capital formation, where finance from external source plays crucial role in filling the gap.

This study used Harrod-Domar model to test the theory in the economy of Ethiopia. Harrod-Domar model is suitable model to be used to show such relationship because the theory describes the mechanism by which more savings leads to more economic growth because savings leads to investment and it leads to capital formation, which generates economic growth, so savings is most important factor for economy to grow and develop.

Roy Harrod (1939) and Evsey Domar (1946) suggested that less economically developed countries do not have sufficient incomes to enable high rates of saving, and therefore the capital formation through investment is low.

Mahmud (2008) argued that persistent low domestic saving rates can lead to low growth rates. When domestic resources are not enough to finance investment requirements, external sources are allowed to augment meagre local resources. While depending on foreign savings has its own benefits, it makes countries completely dependent on unforeseen adverse effects such as political crisis and economic shocks coming from other countries.

Empirical work by Barro (1990) has provided support to the idea that saving and capital formation are central for understanding growth differentials across countries. Unfortunately, Low public saving, on the other hand, domestic saving in general and

private saving in particular is the developing stage in Ethiopia that affect the economic growth (Abay, 2010)

As to my knowledge, there is no any investigation on the debate that has been conducted on the same issue previously. Thus, it is highly essential to conduct a detail investigation and it contributes to the existing knowledge in greater magnitude.

1.3. Research Questions

The following are some of the research questions of the study:

- (a) What are the determinants of capital formation in Ethiopia?

1.4 Objective of the study

1.4.1. General objective

The main objective of this study is to investigate the determinants of capital formation in Ethiopian.

1.4.2. Specific objectives

The specific objectives of the study are:

- ✓ To identify the determinants of Capital formation in the short run.
- ✓ To identify the determinants of Capital formation in the long run.

1.5. Significance of the study

Knowledge of the extent to which participation in mobilization on the capital formation of countries is a principal agenda to the policymakers. Most of the previous studies conducted on countrywide on Gross Capital Formation have given focus on generally on the relationship between Gross capital formation and economic growth. To the knowledge of the researcher, there is only one study conducted in this area in Ethiopia. Therefore, the findings of this study are believed to provide a useful contribution to the empirical basis needed for proper understanding of the previous routes as well as give emphasis for the future process on the determinants of capital formation in Ethiopia.

Further, 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 determines deposit thereby manipulate the controlled macroeconomic variables to mobilize the required saving rather than depending on external sources to finance investment.

Moreover, identified results could provide information to the stakeholders for instance Government, banks, to the policymakers and to those interested to make a further study on the related area in the future.

1.6 Scope & limitation of the study

1.6.1 Scope of the study

The geographical scope of the study is enclosed to the political boundary of Ethiopia. It considers only the main macroeconomic factors that affect economic growth in Ethiopia. Therefore, areas and countries other than this boundary are not the subject of this study. The duration covered under this study will be delimited to the time period from 1980 to 2016 by using time series data from different sources. The variables used in this study include one dependent and ten independent variables. The dependent variable representing Gross Capital Formation and the ten explanatory variables namely Gross National Saving, Per Capita Income ,Consumer Price Index, Interest Rate, Dependency Ratio, Investment , Real Exchange Rate , Money Supply, Taxes and Consumption .

1.6.2 Limitation of the study

The study only covers from the period 1980-2016 (Derg regime and EPRDF regime) which covered thirty years of time-series data on macroeconomic variable that can affect economic growth in Ethiopian because of the limitation of data before 1980. In the process of conducting this research, the researcher has encountered some problems which have an adverse effect on the output, quality and efficiency of this research. The first greater challenge of this study is the one associated with data availability.. The second challenge while doing this study is the inconsistency of data from different organizations. So as to avoid such inconsistency attempts made to stick to the same source of data as much as possible. Even the data that are found in the same source is not consistent over time. Thirdly, the main aim of this study is to analyse the determinants of capital formation in Ethiopia. However there are also non-economic factors that affecting capital formation like political stability

institutional factors, rules of economic regulations (monitoring and fiscal policy) and rules of law (property right) and even economic factors like public service and infrastructural development is not addressed in this study. The other problem is shortage of time in order to undertake the research. However, the researcher tries to fix the problems as much as possible in order complete the research on time.

1.7. Organization of the study

The paper consists five chapters with different sections and sub sections. The rest of the paper is organized as follows: the second chapter presents the theoretical and empirical literature reviews related to Capital formation. Chapter three gives insight on the methodological aspect of the study which includes source and type of the data used, model specification, estimation procedure and definition of the variables. Chapter four consist both descriptive and econometric results. It discusses the regression results, main findings and interpretation. Finally, chapter five provides the conclusion and policy implications based on the main findings.

2. LITERATURE REVIEW

2.1. Theoretical Literature Review

2.1.1. Definition and Main Concept of Capital Formation

Academicians come across narrower and broader definitions of capital, reflecting the historical conceptual variations and the practical difficulties in holding economic statistics. In contrast to the narrower definition of capital as physical-produced items that are used in the production process and providing income-generating service, which have an extended concept of capital with a broader definition that includes stocks of physical-produced items, knowledge and skills (human capital) and stocks of natural and environmental assets (Atlawet al., 2011).

The widely applied literature that provides conceptual and accounting framework for capital and capital formation is the System of National Accounts (SNA) of the United Nations. The SNA is an internationally agreed standard for accounting economic activities based on economic principles and as such provides guidance for national accounts. This evolving standard since 1953, with major updates in 1968, 1993 and 2008, frames the concept of capital in the concept of economic asset, which is a store of value for the owner who holds or uses the entity over a period of time. In this system of accounts, the coverage of asset extends only to those assets subject to ownership rights from which economic benefits flow. As such it excludes from the category of asset consumer durables, human capital and natural resources that are not capable of bringing economic benefits to their owners (UNSNA, 2008).

Capital accumulation or formation refers to the net addition to the capital stock after of any nation after depreciation. It is defined as an addition to the stock of capital assets set aside for future productive endeavours in a real sector which will lead to more growth in physical capital assets of the country. Capital formation is a perception used in macroeconomics, national accounts and financial economics and seldom used in corporate accounts.

Gross fixed capital formation is distinct as fixed assets accumulation. It is a definite statistical concept used in national accounts statistics, econometrics and macroeconomics. In that sense, it refers to a measure of the net additions to the

(physical) capital stock of a country (or an economic sector) in an accounting interval or, a measure of the amount by which the total physical capital stock increased during an accounting period. In a much broader sense, the term "capital formation" has recently been used in financial economics to refer to savings drives, setting up financial institutions, fiscal measures, public borrowing, development of capital markets, privatization of financial institutions, and development of secondary markets. In this usage, it refers to any method for increasing the amount of capital owned or under one's control or any method in utilizing or mobilizing capital resources for investment purposes. Gross fixed capital formation via fixed assets accumulation can be increased by bonds financing and equity financing. Corporate houses finance their assets by floating their shares in the stock market. As a result, the supply of shares increase which cause declining share prices. Economic theory suggests that increase in Gross fixed capital formation cause to decline share prices in short run but in long run, production is increased which cause to raise share prices (Shuaib, 2015).

Gross fixed capital formation is called "gross" because the measure does not make any adjustments to deduct the consumption of fixed capital (depreciation of fixed assets) from the investment figures (Kanu et al. 2014). Gross fixed capital formation can be classified as gross private domestic investment and gross public domestic investment. The gross public investment includes investment by government and public enterprises. Gross domestic investment is equivalent to gross fixed capital formation plus net changes in the level of inventories (Venkati, 2016).

Finance is required for different purposes by different organizations, individuals, and other economic agents. In order to provide the needed fund, there are varieties of institutions rendering financial services. Such institutions are called financial institutions.

2.2. Theories of Capital Formation

The core processes through which productive capacities develop are capital formation, technological progress and structural change. Capital formation refers to the creation and addition of means of production which comprises machines, equipments, infrastructure, automobiles, appliances, residential investments and accumulation of inventories by producers. The availability of capital formation in the economy determines the level of output. However, capital formation changes over time and these changes can lead to fluctuation in economic growth. Investment is the vital component which increases the rate of capital formation. According to the definition given by R. Dornbusch and S. Fischer (1994), investment refers to the flow of spending that adds to the capital formation. It is the amount of money spent to add to the existing capital. Fluctuation in investment accounts for the movement in the GDP in business cycle. It is argued that the fluctuation arises from the fact that investment depends on the pessimistic and optimistic belief of investors.

As depicted in Gordon (2000), differences in the level of investment among countries are explained by investment fluctuation. Accordingly, countries that tend to invest greater share of their GDP shows faster economic growth than others, even though, it is only for transitional period of time.

Another component, which brings change in the level of capital formation in the economy, is depreciation. According to R. Dornbusch and S. Fischer (1994), depreciation has two components. The first component is the wear and tear of capital formation arising from use and age, while the second component is economic depreciation, resulting from stoppage of the function of the capital due to various reasons such as rise in the price of input used along with the capital and technological change.

In nutshell, capital formation in the economy is accumulated through increase in the investment rate and depletes through depreciation. In the following section, the focus is to give the role of capital formation in the development process and different theories that indicate the capital formation.

2.2.1. Stock in the production process

The explanation of the sources of economic growth gained wider attention during the 1950's and 1980's. The best known contributor was Robert Solow (1956) who coined the Neo Classical growth theory. The most recent one is known as the endogenous growth theory, with greater contributors such as Paul Romer and Robert E. Lucas.

In the Neo Classical growth theory, production function is used to show and explain the economic growth. Output in the economy grows through the increase in the level of labour, capital formation and through improvement in the level of technology. It explains growth through the interaction among factor supplies, productivity growth, saving and investment. Capital formation is important component on explaining growth rate. As the amount of capital per worker increases, the output also rises. On the other hand, capital formation growth rate is determined by the national saving rate, which depends in turn on income. Income or output in turn depends on capital. Thus, we are set in with an interdependent system in which capital growth depends via saving and investment in the stock of capital formation (Gordon, 2002).

According to Solow(1956) as cited in R. Dornibusch and S. Fischer(1994), based on data in USA ranging for the period of 1909 to1949, the economic growth in this period was largely explained through technological improvement (accounting for about 80 percent), while capital formation accounts for the smallest portion. However, it is argued that the technological improvement arising over this span of time is embodied in capital formation. Hence, capital formation plays decisive role in explaining economic growth.

According to Solow thus, capital stock, labour force and advancement in technology, which was assumed to be exogenous in the model of the Neo Classical economic growth, interact in the economy and influences the level of output. In this regard, firms substitute the factors of production based on the prices of each.

In 1980's economic growth was mainly explained through endogenous growth theory. This theory has gone one step forward in inclusion of human capital in the Neo classical growth theory. According to Romer (1996), human capital is defined as the sum of all nations human knowledge accumulated through education and

training. In addition, the role of research and development was important in enlarging human capital. Thus, according to Romer, the exogenous factor in the Neoclassical growth theory is technical progress which now became part of the model, and hence, endogenous growth theory.

On the other hand, human capital formation brings a desired level of change in the economy if it is accompanied by capital formation. It is also contended that in nations where human capital is scarce, investment in capital formation can not bring any remarkable rise in the level of output. The endogenous growth theory also comprises the development of new idea which further creates innovation of new technology which is embodied in capital formation. Thus, it is strongly stressed that, in the new growth theory, capital formation is more effective and productive with only human capital. On the other hand, human capital formation brings a desired level of change in the economy if it is accompanied by capital formation. It is also contended that in nations where human capital is scarce, investment in capital formation can not bring any remarkable rise in the level of output. The endogenous growth theory also comprises the development of new idea which further creates innovation of new technology which is embodied in capital formation. Thus, it is strongly stressed that, in the new growth theory, capital formation is more effective and productive with only human capital.

2.2.2 .Capital stock adjustment

The existing level of capital formation in the economy is different from the desired level. According to Mankiw (2000) and R. Dornibusch and S. Fischer (1994), the desired level of capital formation is the amount of capital which producers tend to accumulate based on the expected rate of output. The difference between the two arises from the fact that capital formation is expensive and requires more time to invest in it. Hence, based on this, the mechanism of capital formation and adjustment can be formulated.

Based on the literature, the gap between the two is filled by the rate of investment on capital formation. If for instance, the desired level of capital formation is high, then firms tend to invest at greater rate in order to fill the gap. However, it is contended that firms can not absolutely fill the gap, but minimize it, based on the rate of investment.

2.3. Process of Capital Formation

Capital formation is not an automatic process; the rate of capital formation is different in different countries. This shows that capital formation is conditioned by certain factors and as well as process. In most literatures, the process of capital formation involves three steps:

- i. Stage of mobilizing saving: increase in the volume of real saving
- ii. Stage of Channelization of Saving: Mobilization of Saving through Financial intermediaries
- iii. Investment of Saving.

The above process of capital formation is discussed here under one by one.

I) Increasing Real Savings

A high rate of savings is possible if people are-prepared to put forth effort to maximize output even with the resources available and are willing to keep down their expenditure within reasonable limits. In other words, the level of savings in a nation relies on certain factors. Some factors that affect real savings are:

a) Ability (capacity) and Will to Save

According to Jacob & Frank (2013), to permit an efficient and sustainable mobilization of savings, a number of issues must be satisfied. They classified these into the willingness to save and ability to save.

The capacity to save of the community depends upon the size of the average income, the size of the average family, and the standard of living of the people. Other things being equal, if the income of the people increases, or the size of the family is small, or people get accustomed to a particular standard of living which does not lean towards conspicuous consumption, the power to save increases. (Jacob & Frank, 2013)

The capacity to save also depends upon the level of employment in the country. If employment opportunities increase, and existing techniques and resources are employed fully and efficiently, incomes increase, and so do the propensity of the people to save.

Savings also depend upon the will to save. People may themselves forego consumption in the present and save. They may do so to meet emergencies, for family purposes, or for social status. But they will save only if certain facilities or inducements are available. Voluntary savings are fundamental to sustainable economic development. They are the most frequent source of funding for microenterprise startup and expansion. Voluntary savings enable households to smooth consumption in the face of uneven income flows, to accumulate assets for the future, to invest in education, and to better prepare for emergencies. (Brian & Janette 2002)

People save if the government is stable and there is peace and security in the country. People do not save when there is lawlessness and disorder, and there is no security of life, property and business. The existence of banking and financial institutions paying rates of interest on different term-deposits also induces people to save more.

The taxation policy of the government also affects the savings habits of the people. Highly progressive income and property taxes reduce the incentive to save. But low rates of taxation with due concessions for savings in provident fund, life insurance, health insurance, etc. encourage savings.

a) Perpetuation of income inequalities

Perpetuation of income inequalities had been one of the major sources of capital formation in 18th century in England and early 20th century Japan. In most communities, it is the higher income groups with a high marginal propensity to save that do the majority of savings. If there is unequal distribution of income, the society's upper level incomes accrue to the businessmen, the traders and the landlords who save more and hence invest more on capital formation. But this policy of deliberately creating inequalities is not favored now either in developed or developing economics when all countries aim at reducing income inequalities.

c) Increasing profits

The ratio of profits to national income should be increased by expanding the capitalist sector of the economy, by providing various incentives and protecting enterprises from foreign competition. The essential point is that profits of business enterprises should increase because they know how to use them in productive investment.

d) Government Measures

Like private households and enterprises, the government also saves by adopting a number of fiscal and monetary measures. These measures may be in the form of a budgetary surplus through increase in taxation (mostly indirect), reduction in government expenditure, expansion of the export sector, raising money by public loans, etc. If people are not saving voluntarily, inflation is the most effective weapon. It is regarded as hidden or invisible tax. When prices rise, they reduce consumption and thus divert resources from current consumption to investment.

Besides, the government can increase savings by establishing and running public undertakings more efficiently so that they earn larger profits which are utilized for capital formation. In these days, the role of government has greatly increased. In an under-developed country like Ethiopia, government is very much concerned with the development of the economy. Ethiopian Government is also involved in Mega Projects, building dams, roads & rail ways, making factories such as Metal & sugar industries and other forms of real capital in the country. Thus, capital formation takes place not only in the private sector by individual entrepreneurs but also in the public sector by government.

ii) Mobilization of Savings

Mobilization of savings through banks, investment trusts, deposit societies, insurance companies, and capital markets is the subsequently walk of increasing saving in the process of capital formation. Obviously, the prime pre-requisite for mopping up of existing savings resources is the availability of suitable agencies and institutions. Measures for the satisfactory mobilization of domestic savings should take into account the following criteria: safety of investment, yield, liquidity, accessibility, simplicity, divisibility and transferability.

In the urban areas, institutional facilities for savings are greater and the savings habit among the classes who can afford to save is quite well-developed. Measures to improve the mobilization of savings have, therefore, to concentrate on rural areas. Such measures can be Promotion of Small Savings, Popularizing Government Bonds, popularizing Insurance Habit, and Encouragement to Co-operative Institutions.

The Kernal of Keynes's theory is that decisions to save and decisions to invest are made largely by different people and for different reasons. To bring the savers and investors together there must be well-developed capital and money markets in the country. In order to mobilize savings, attention should be paid to the starting of investment trusts, life insurance, provident fund, banks, and cooperative societies. Such agencies will not only permit small amounts of savings to be handled and invested conveniently but will allow the owners of savings to retain liquidity individually but finance long-term investment collectively.(AtlawAlemu et.al(2011)

Most of the saving potentials of rural communities in developing economies remain not mobilized especially in respect to the formal financial system on which an economy depends for growth. In addition to factors discussed above that influence the ability to save such as the level of growth of incomes, per capita income, income distribution and population age structure; the willingness to save to them mainly depend on the nation's financial structure through variables such as the level of inflation and financial deepening. Thus, nearness and variety of financial institutions serving a range of needs of depositors play a central influence over the primeval factor of the ability to save. However, there emerge to be a strong relation between the rates of growth of financial circuits and how extend and resourceful a nation's financial structure can sustainable assemble domestic savings. (Jacob & Frank (2013)

iii) Investment of Savings

The third step in the process of capital formation is the investment of savings in creating real assets. The profit-making classes are an important source of capital formation in the agricultural and industrial sectors of a country. They have an

ambition for power and save in the form of distributed and undistributed profits and thus invest in productive enterprises. Besides, there must be a regular supply of entrepreneurs who are capable, honest and dependable. To perform his economic function, the entrepreneur requires two things, that is; first, the existence of technical knowledge to produce new products; second, the power of disposal over the factors of production in the form of bank credit.

The role of credit is to bridge the gap between enterprise owner's financial assets and the required financial assets of the enterprise. Due to persistence of this imbalance, enterprises are forced to demand credit. Demand for credit, according to Aryeetey et al (1994) can be categorized into perceived, potential and revealed demand. Perceived demand is represented by a situation where enterprises that assume to be in need of cash, mention finance as a constraint. Potential demand is characterized by a desire for credit which is not actualized due to market imperfections and institutional barriers. Revealed demand is characterized as written application for financial support at a given rate of interest. The researcher agrees with the above classification of demand for credit. But, in the case of revealed demand definition which is of basic importance to both lenders and borrowers, a further division needs to be underscored because the application for credit, even if backed by a bankable project, may not necessarily be translated into effective demand since effective demand is the amount of loans that lending institutions are prepared to release to borrowers.

The existence of infrastructure as well-developed means of transport, communications, power, water, educated and trained personnel, etc. further, the social, political and economic climatic conditions in the country must be conducive for the emergence of a growing supply of entrepreneurs.

To sum up the process of capital formation, as meaning of capital formation is that society does not apply the whole of its current productive activity to the needs and desires of immediate consumption, but directs a part of it to the tools and making of capital goods: tools and instruments, machines and transport facilities, plant and equipment— all the various forms of real capital that can so greatly increase the

efficacy of productive effort. The essence of the process, then, is the diversion of a part of society's currently available resources to the purpose of increasing the stock of capital goods so as to make possible an expansion of consumable output in the future.

According Girma, (2011) any economy with problem of mobilizing and using investable resources is due to failures in one of the above three stages (Increasing real saving especially domestic saving, mobilizing saving through financial institution and investment of saving in real asset). Thus the problem of capital formation becomes two-fold: one, how to save more (stage one & two); and second, how to utilize the current savings of the community for capital formation (stage three).

However, banks' participation in the financial sector of developing nations raises many questions which remain unanswered. Key among them is the issue of how effective they have been in mobilizing private domestic savings and in channeling the savings to enhance capital formation through the distribution of credits.

2.4. Theories of Savings

2.4.1. Absolute Income Hypothesis (AIH)

Most studies that have been done both in the developed countries and in the less developed countries have emphasized the dominant role that income plays as one of the determinants of savings. Keynes (1936) link consumption and saving to the level of income through the concept of the Marginal Propensity to Consume (MPC) or consumption (or savings) function. He argues that consumption and savings have a stable relationship with current income.

Keynes thus stresses that savings would increase with absolute income (disposable income).

2.4.2. The Life Cycle Hypothesis (LCH)

One of the major determinants of domestic savings ratio is the growth of income as suggested by the life-cycle hypothesis of savings. The life-cycle hypothesis was proposed by Ando and Modigliani (1963) and provides a theoretical framework of

most determinants of saving behavior used in recent empirical studies. This theory assumes that an individual seeks to maximize the present value of life time utility subject to the income of an individual i.e. the budget constraint. This theory predicts that the consumption and the decision to save in a particular period depend on expectations about life time income of an individual. In this theory, the life time of an individual is divided into a youth period, working period and a retirement period. Individuals are assumed to be net savers during the working period and net dissavers during the youth and retirement periods.

2.4.3. The Permanent Income Hypothesis (PIH)

This theory was developed independently by Friedman (1957). This theory states that choices made by economic agents regarding their consumption/saving pattern are determined not by current income but by their measured longer term income expectations. This is sometimes referred to as consumption smoothing because individuals will save more than the MPS in times of high-income levels and dissave when income levels are low or during retirement period. Permanent income takes into account the long-time expectation over a planning period and a steady state and the consumption maintained over a planning period given the individual's present wealth (Muradoglu and Taskin, 1996).

2.4.4. The McKinnon-Shaw Hypothesis

This theory was developed independently by McKinnon (1973) and Shaw (1973). It states that financial market should be liberalized and that developing economies allow demand for real money balances, real interest rates and investment rates to be determined by market forces. McKinnon (1973) and Shaw (1973) argue that the rate of return on savings, as measured by interest rate would have a positive effect on saving rates. McKinnon and Shaw (1973) argued that policies that lead to financial repression reduce the incentives to save.

Reduced savings result in reduced investment which in turn leads to lower growth. Hence they concluded that higher interest rates resulting from financial liberalization prompt households to increase savings.

The willingness and ability to save represents an inter-temporal choice between present and future levels of consumption. The real interest rate has an overall positive effect on savings.

High interest rates encourage economic agents to postpone present consumption in order to yield future interest income from the savings. However, governments over the years have deliberately kept interest rates below market clearing levels by way of promoting domestic savings and this has been less impressive because saving levels continue to decline since the lowered return on savings do not adequately offset the rising inflation.

Because of this, McKinnon (1973) and Shaw (1973) explain the role of government in mobilizing savings through the financial repression hypothesis. The hypothesis examines the effect of government policy in preventing through controls the real interest rates from adjusting to competitive levels to clear the market. McKinnon (1973) argues that with controlled interest rates it is likely that not all economic agents will access credit and this can lead to two-fold scenario; where those firms that can access subsidized credit would embark on capital-intensive projects and those not favored by the policy would only carry out a short maturity projects with huge returns. Also, another result of financial repression according to McKinnon (1973) and Shaw (1973) is that it substitutes market for non-market forces from determining interest rates. This is manifested through rationing of the available funds to the investors.

This analysis concludes that removing financial restrictions in countries where interest rates are controlled exerts a positive effect on growth rates towards their competitive market equilibrium (Gemech and Struthers, 2003). Many countries have embarked on financial liberalization programmes in order to make real returns on savings more competitive and attractive to savers. This was devised as a way of maximizing savings, investment and growth. Yet there is a trade-off between interest rates and investment levels. It is therefore necessary to strike a balance between saving and investment promotion that is achieved through interest rate adjustments.

2.4.5. Rational Expectations Hypothesis (REH)

Hall (1979) estimated the consumption function based on expectations. The estimated consumption function used the weak efficiency assumptions i.e. the belief that past values can be used to explain the present values (Bodie et al., 2004). Hall

concluded that past consumption values determine current consumption behavior assuming that consumers are rational. This theory assumes that economic agents keep track of their consumption patterns. Consumption (c) decision at any time, say t, takes into account known information and expectations of the consumer about the future flow of income (Branson, 1989). If consumption is expected to fall then the economic agent will smooth out. For example, when consumption is expected to fall then the individual will adjust by saving more. Similarly, when consumption is expected to raise then the individual will have to either deplete their saved income or borrow in order to meet the required level of consumption.

2.5. Theories of Investment

Investment is adding to the existing stock of capital formation and it is the volatile component of the GDP. This indicates that fluctuation in the level of investment affects the level of output and its components. In the following section, different theories of investments are discussed.

The first theory of investment was that of J.M. Keynes, in his book, *The General Theory of Employment, Interest and Money*. He indicated that the rate of investment, which is capital formation, depends on the level of interest rate and the return on capital. Investment, according to him, is highly volatile because it depends on the optimistic and pessimistic decision of the investor, which is regarded as “animal spirit”. This indicates that there is no fundamental reason on which investors base their decision. They will change their expectations easily, which in turn has a power to alter the level of capital formation.

The second theory is referred to as accelerator model of investment, which emerged in 1950's and 1960's. This model, according to Mankiw (2000) assumes that investment spending is proportional to the level of output. It is regarded as constant multiple of the level of output at that time. This idea was originated from the fact that business firms tend to accumulate more capital when they aim to produce larger output. Thus, according to this model, the level of output or aggregate demand influences the rate of capital formation. However, this model failed to explain the rate of capital formation when firms have spare capacity to produce. Accordingly, if business firms do have spare capacity and expects that

output grows in the future, they tend to use the existing capacity rather than capital formation.

The third theory of capital formation is referred to as the flexible accelerator. According to Gordon (2002), flexible accelerator theory was based on the simple accelerator model. This model simplified some of the assumptions of simple accelerator model. Accordingly, expected output is dependant only on the last period's output, however, the flexible accelerator model argues that it depends particularly on the last period's actual output and partially on the expectation. On the other hand, simple accelerator model assumes that desired capital stock is a constant value times expected output. But, flexible accelerator theory contends that the value may vary due to various reasons. Finally, flexible accelerator theory allows for gradual adjustment for capital stock.

The Neo classical investment theory was developed in 1960's by Dale Jorgeson. It is regarded as business fixed investment. As indicated in Mankiw (2000) and Gordon (2002), business firms base their decision on its cost and benefit. It also emphasizes to the rate of marginal product of the capital, the level of interest rate on borrowed funds, the tax system and the rate of depreciation, which are regarded as the user cost of capital. The user cost of capital was derived from microeconomic theory, which is based on profit theory. If the rate of profit that firms expect to obtain in the future is higher than the user cost of capital, then they tend to invest in capital formation in order to produce more.

The final theory of investment is referred to as the Tobin Q. It was developed by Tobin in 1969. This theory of investment is linked to sock market. Q is defined as the ratio of the market value of the installed capital and replacement cost of the installed capital. If the expected market value of the capital is greater than the current value of the capital, then firms tend to invest more in capital formation.

2.6. Determinants of Capital Formation

2.6.1. Gross domestic saving

.Gross domestic saving creates capital formation through investment. Gross domestic saving in this case comprises saving of household, corporations and the government. Early theories of economic growth emphasized the rate of saving as a

source of economic growth. The Neo classical growth developed in 1950's and 1960's also emphasized the importance of saving in economic growth process. According to the Neo classical growth theory, it is assumed that in order for economic growth to materialize, saving must be translated in to investment i.e. saving must be equal to investment. Studies also indicate that there is a positive correlation between saving and growth (for instance Coroll and Weil, 1994), Elbadawi and Mewega, (1998) as cited in Alemayehyet rate of investment. If saving rate increases, the economy will have larger capital and hence larger output. Nevertheless, the increased saving rate affects growth al. (2003).

As indicated in Dornibusch and Fischer, (1994) saving either cause capital formation to grow or replace capital that wears out. However, it is indicated that saving affects growth in the short run only by changing until the economy reaches the new steady state. However, the presumption that all saving is directed to investment must be seen carefully. This is due to the reason that not all savings are directed to productive investment, but some portion of it is used to smooth consumption

2.6.2. Expected output

According to the accelerator theory of investment, the rate of capital formation is determined by expected rate of output. Business firms increase the rate of capital formation if they expect that in the future the level of output rises.

2.6.3 Taxes

The rate of capital formation is affected by the tax system that the country follows. Corporate profit tax and investment tax credit are some of the important components (Mankiw, 2000). Corporate profit tax is a tax collected on the profit created by the corporations. On the other hand, investment tax credit is the provision that encourages firms to accumulate capital. It reduces firms' tax by certain amount on each capital.

2.6.4. Real Effective Exchange rate

Real exchange rate is another factor which determines capital formation especially in developing countries. Developing countries import capital equipment and new technologies from developed nations, where the real exchange rate has great

implication. Exchange rate volatility and real devaluation causes import of capital to be more expensive, thus, contributes to the reduction in the economic growth.

2.6.5 .Rental Cost of Capital

The rental cost of capital refers to the cost of using one more unit of capital in production process. According to Mankiw (2000), the rental cost of capital comprises interest rate, rental price of capital and depreciation. The real interest rate is the difference between the nominal interest rate and the rate of inflation, which determines capital formation negatively, if firms use borrowed funds. The rental price of capital is the price charged by firms when renting out capital to other firms. The rental price of capital depends on the existing stock of capital, the amount of labour and the level of technology. On top of this, the wear and tear of capital influences the level negatively. Producers replace physical capital until marginal product of capital is equivalent to the user cost of capital. However, a decline in the marginal product of capital lowers the level of output and hence, the level of capital formation.

2.7. Capital Formation and Economic Growth

As capital formation is an important factor in economic growth, countries that are able to accumulate high level of capital tend to achieve faster rates of economic growth and development. The effects of investment on economic growth are three-fold. Firstly, demand for investment goods forms part of aggregate demand in the economy. Thus a rise in investment demand will, to the extent that the demand is not satisfied by imports, stimulate production of investment goods which in turn leads to high economic growth and development. Secondly, capital formation improves the productive capacity of the economy. Thirdly, investment in new plant and machinery raises productivity growth by introducing new technology and innovation which would also lead to faster economic growth (Orji Anthony, 2012).

According to Orji (2012) Capital formation or accumulation plays a predominant role in any types of economies. Development may not possible without capital formation for which Capital formation refers to all the produced means of further production, such as roads, railways, bridges, canals, dams, factories, seeds, fertilizers, etc.

In developing countries, low level of capital formation has made it difficult for firms to invest in modern machines, information technology and human resources development which are critical in reducing production costs, raising productivity and improving competitiveness. Low investments have been traced largely due to low saving culture of the community and unwillingness of banks to make credits available to manufacturers, owing partly to the miss-match between the short-term nature of banks' funds and the medium to long term nature of funds needed by industries. In addition, banks perceive manufacturing as a high risk venture in the developing countries environment, hence they prefer to lend to low-risk ventures, such as commerce, in which the returns are also very high. (Nwasilike, 2006)

As between countries, differences in climate, political institutions, educational and technical facilities, individual attitude to work, trade union outlook and policy can be as important as differences in natural resources or in the volume of investment in causing divergent rates of development. Economic growth is, in fact, a complex process depending on social, psychological and political as well as economic and technical factors. Although; there are differences in natural resources as well as in other factors as between countries, is not inappropriate to seek an explanation of different degrees of Economic progress partly in differences in the rate of capital formation (Whitaker, 1956)

Economic theories have shown that capital formation plays a crucial role in the models of Economic growth. This view called capital fundamentalism by Youopoulos and Nugent (1976) has been reflected in the macroeconomic performances of many countries. It is clear that even mildly robust growth rates can be sustained over long periods only when countries are able to maintain capital formation at a sizeable proportion of GDP. It has been discovered that any proportion less than 27 percent cannot sustain economic growth. It is estimated that the ratio of gross capital formation to GDP in the sub-Saharan African countries which has experienced poor growth in the 1990s was less than 17 percent compared to 28 percent in advanced countries (Hernandez-Cata 2000).

2.8. Empirical literature review

Currently, there is substantial difference in saving rates and economic performance between countries in the world. This difference is not only between poor and rich countries, but also variation increased amongst developed countries. There is a clear gap between the saving rates in low income, middle and high income countries. One can raise the question whether a country can grow more just by saving more (Opschoor, 2015). For instance, East Asia saves more than 30 percent of gross national disposable income, whereas Sub-Saharan Africa saves less than 15 percent. Over the past three decades, saving rates have doubled in East Asia and go stale in Sub-Saharan Africa, in Latin America and the Caribbean (Loayza, Schmidt-Hebbel, and Servén, 2003). In the neoclassical growth model saving rate was given emphasis. However, it was exogenously given. Due to this poor explanation of saving in neoclassical growth model, economists such as; Ramsey (1928), Cass (1965), and Koopmans (1965) led them to construct an endogenous saving rate in the new economic growth models.

It is a fact that developing countries like Ethiopia needs fast and sustainable investment growth. To do this, countries need required or/and balanced domestic saving. Ethiopia needs enormous amount of financial resources to accomplish its development plan. However, capital formation cannot be easily achieved since it is determined by the domestic saving rate. In other words, developing economies economy is characterized by low level of income and hence low level of domestic saving rate. This is the reason why Ethiopia experiences a severe resource gap (Tsegabirhan, 2010). But, domestic saving rate in Ethiopia was on the lowest for the past several decades. In the past four decades (1970/71 to 2010/11) the average domestic saving rate was only 7.9% of the GDP. According to Ayalew (2013), during the three consecutive regimes of Ethiopia over the study period reveals that the average saving rate was 13.8% of GDP during the period from 1970/71 to 1973/74, 7% from 1974/75 to 1990/91 and 7.3% from 1991/92 to 2010/11. This classification indicates that during the Imperial regime domestic saving rate was relatively high. However, in the current (that is, EPRDF)" and the Derg regime, domestic saving declined to lower per cents. Furthermore, according to World Bank report (2011), average domestic saving rate of Ethiopia was very low by any standard. For example, if we compare average domestic saving rates of Ethiopia

with Sub-Saharan African countries between the periods ranging from 1980/81 to 2010/11, average //domestic saving rate in Ethiopia was only 8.6% of the GDP. On the other hand, during the same period, average domestic saving rates for Sub-Saharan Africa countries was 17.2% of GDP. This suggests that how much the domestic saving rates of Ethiopia were too much low even by Sub-Saharan Africa standards (Ayalew, 2013).

Low income economies like Ethiopia are characterized by low level of domestic saving. It represents major obstacle to achieve development in these countries; because it limits investment and economic growth. In these economies, national and foreign savings can be used as the main source for financing domestic investment. “Low or stagnant national savings usually spurs external borrowing which through the debt service burden constrains future investment”. However, due to the international debt crisis of the early 1980s; majority of developing countries could not get the access to external borrowings (Wubu, 2011). Without the alternative of domestic savings, this situation forces developing countries like Ethiopia to rely on donors' aid to finance a large part of domestic investment, a process fraught with enormous constraints. There are many causes mostly cited to describe the low level of domestic saving in countries like Ethiopia. The first cause is “low per capita income”. This implies that, it is a fact that Ethiopia is one of the least developed countries in the world. In other words; since, less developed countries are characterized by low income, low consumption and low savings. The recent empirical findings have found that the marginal propensity to save in developing countries is related to the level of income and its variation. The second cause is political and macro-financial instability and inflation which attributed to the low level of domestic saving in countries like Ethiopia. “Macro-financial instability” arises due to many factors including “lack of an appropriate legal, regulatory and prudential framework to the financial system, fiscal imbalances, financial distress and misguided monetary and financial policies”. (Zeidy, 1996, pp. 3 & 4).

Gbenga and Adeleke (2013) investigated the relationship between savings, gross capital formation and economic growth in the Nigeria economy, between the period 1975 and 2008. The study adopted co-integration and vector error correction model VECM as the estimating technique with special reference to VAR causality test.

This research work has confirmed the existence of strong linkages among growth, savings and capital formation in Nigeria, The estimation from the findings for growth revealed that there is a positive relationship between growth and capital formation on one hand and a positive relationship between growth and savings on the other hand. The study also showed When the two variables (savings and capital formation) combine together, they have an impact on GDP. Therefore the study recommended that strong policy that would encourage savings from the grass root be established.

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

Singh, (2009) conducted a study in India based on time serious data and found the significant impact of saving on income, these saving contributed for domestic investment to grow and accelerates capital formation which leads to the economy to grow .based on this study most of these saving comes from the surplus domestic household saving sector which finance the deficit private and public sector and fills the resource gap.

Metin_Özcan and Özcan, (2005) used a sample of 15 countries in the Middle East and North Africa to investigate the determinants of private savings. The model used variables such as growth of income, per capita income, public savings, inflation and M2. The findings revealed that the growth rate of income, per capita income and inflation have a positive and significant impacts on private savings. The study also indicated that public savings has negative impact on private savings. The other important conclusion is that countries with well-developed financial sector always are likely to encourage accumulation of private savings.

To examine the long-run determinants of aggregate private saving rates in a dynamic panel of developing countries during the post Second World War period, Sarantis

and Stewart (2001) used panel co-integration and integration tests. The estimated results indicated that the long run equilibrium saving function can be obtained. The study also found that determinants of aggregate private saving rates are numerous and vary from one country to another across developing countries.

In another study, Hallaq (2003) using OLS technique, investigated the determinants of private savings in Jordan. The model used many variables such as dependency ratio, government savings, financial deepening, GDP growth rate, GDP per capita income, the real interest rate, inflation rate, and terms of trade. The estimated results revealed that the dependency ratio and government savings have negative and significant impacts on private savings. Moreover, financial deepening, GDP growth rate and GDP per capita income have positive and 20 significant impacts on private savings. Furthermore, in Jordan, the real interest rate, inflation rate, and terms of trade seem to have no significant impacts on the private saving rate.

In another empirical study carried out using data from ten Asian countries for the period 1961-1988, Fry (1991) examined the effects of economic growth, terms of trade, foreign capital, interest rate and population growth on savings rate. In his study, he used a reduced form model. It was found that variables such as economic growth and interest rate were positive and significant while foreign debt and dependency ratio were negative and significant which means that these are some of important factors which affect saving behavior in Asian countries. Using a similar model, Fry (1994) estimated a domestic saving function for Malaysia for the period 1971-91. The estimated results found that economic growth has a positive impact on domestic savings, while dependency ratio and foreign capital had negative effect on domestic saving rate. The variables used in the model were statistically significant.

In Kenya, Mweget al. (1990) examined the impact of real interest rates on mobilization of savings using the McKinnon (1973) and Shaw (1973) hypothesis. Their model used variables such as demand for real money balances, interest rate, private savings and the growth of real income. The estimated results found that the private savings rate and demand for real money balances do not have significant impact on a real deposit interest rate. In addition, the growth rate of real income does have positive and significant impact on private savings rate in Kenya.

Tiriongo (2005) analyzed the determinants of aggregate domestic private savings using OLS estimation technique in Kenya. He used demographic variables such as young and old age dependency ratios, real per capita income, indicators of

financial sector development, deposit rate used at central bank, current account deficit, spread of interest rate, terms of trade, 21 inflation rate and income tax. The findings indicated that aggregate private savings in Kenya are significantly determined by the ratio of M2 money to GDP, real gross per capita income growth, current account deficit, deposit rate and the old age dependency ratio.

2.9. Conceptual Frame Work

The study was conducted based on the conceptual framework drawn from the theoretical and empirical literature reviews which are explained above. This research is focused on studying the major macroeconomic determinants that are critical to Capital formation in Ethiopia. From the literature review mention above the study has developed the following schematic illustration of the conceptual framework for this study which shows the relationship among the major macroeconomic variables and Capital formation

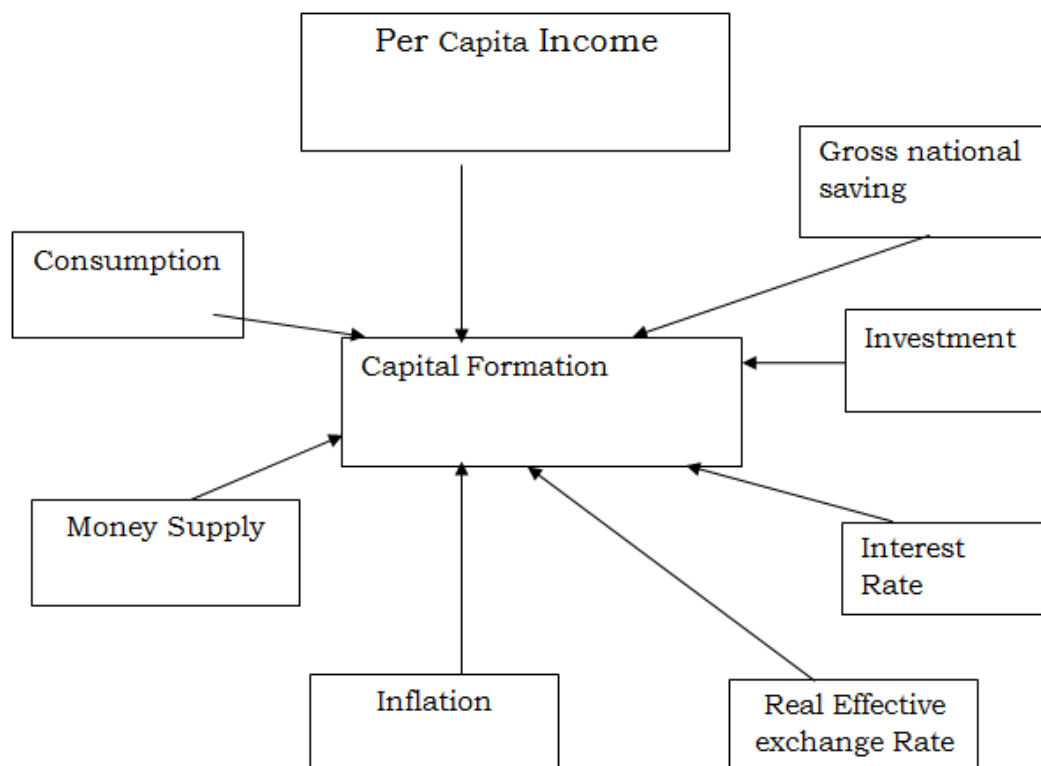


Figure 2.1 Conceptual framework of the study

3. RESEARCH METHODOLOGY

This chapter highlights methodology of the Research, Research Design, Data Source, Model specification and methods of data analysis.

3.1 Research Design and Approach

A research design defined as a plan of action adopted by the researcher in carrying out the research. The main objective of this study is to identify the determinants of Capital Formation in Ethiopia. Hence, this study implements longitudinal research design identifying the relationships between the level of capital formation and explanatory variables using time series data. A quantitative approach is one in which the investigatory primarily uses postpositive claims for developing knowledge (i.e., cause and effect thinking, reduction to specific variables and hypotheses and questions, use of measurement and observation, and the test of theories), employs strategies of inquiry such as experiments and surveys, and collect data on predetermined instruments that yield statistics data (Creswell, 2002). Since the researcher intention was to investigate the determinants of capital formation in Ethiopian, to achieve this objective the researcher used quantitative research approach because it is the best approach to use to test a theory or explanation (Creswell, 2002).

3.2 Data type, Source, and Method of data collection

For the purpose of analyzing the determinants Capital Formation in Ethiopia secondary data from 1980/91 to 2015/16, were used. The research employed quantitative research approach by using secondary data because it is the best approach to use to test a theory or explanation. The data obtained and organized from different governmental organizations that are responsible for the collection and organization of the variables; the organizations are namely: National bank of Ethiopia (NBE), Central Statistical Agency of Ethiopia (CSA), Ministry of Finance & Economic Cooperation (MoFEC), International Monetary Fund (IMF), World Bank (WB).

3.3 Method of Data Analysis

The study employed a time series model in order to decide the determinants of capital formation in Ethiopia. To analyse the data, the study used statistical package STATA version 12. Based on this, the study uses both the descriptive and econometric analysis. Descriptive statistical methods used to briefly explain trends of the variables used in the model and some descriptive statistics summaries such as mean, median, minimum values, maximum values and standard deviations are also included. The econometrics analysis includes unit root, co integration tests, long run and short run analyses were performed.

3.4. Econometric Model specification

In the model specified below, the researcher attempts to investigate the effect of savings on Capital Formation in Ethiopia Within the period of (1980/811-2015/16).

The study used a time series model by estimated single equation models on the basis of previous studies of (Okaro et.al. 2016). In order to get a deeper insight about the capital formation in Ethiopia, the study used the determinants of capital formation in Ethiopia from state-owned banks and institutions. The main variables under consideration are taken from theoretical setups and empirical evidence in different countries. The dependent variable of study is specified as:-

$GCF_t = f$ (Per capita income, Gross national saving, Inflation, Interest rate , Dependency ratio, Investment, Real Exchange Rate, Taxes, Money Supply, Consumption)

$$GFCF_t = \beta_{t1} + \beta_{t2}PCI + \beta_{t3}GNS + \beta_{t4}CPI + \beta_{t5}ALR + \beta_{t6}DR + \beta_{t7}INVS + \beta_{t8}REER + \beta_{t9}TX + \beta_{t10}M2 + \beta_{t11}CONS + \epsilon_t \dots \text{ (Eq.1)}$$

Where, GCF - Gross Capital Formation

PCI- Per capita Income

GNS – Gross national saving

CPI- Consumer Price Index

ALR - Average Lending Rate

DR – Dependency Ratio

INVS- Investment

REER- Real Exchange Rate

TX- Taxes

M2- Money Supply

CONS- Consumption

β 's - Coefficients

ϵ_t -Error Term

Most of the independent variables that explain Capital formation in the model are derived from international literature.

3.5. Test for causality (Granger Causality)

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

3.6. Estimation Procedure

Many economic and financial time series exhibit trending behaviour or non-stationery in the mean. Therefore, it is necessary to test the stability of the series before identification of the relationship between variables. The regression analysis among the variables would not be consistent and spurious regression problem would occur if unstable data are used. So the data must be transformed to stationary form prior to analysis.

3.6.1. Stationary (Unit Root Test)

Before starting the co-integration tests, it is essential to check the stationary properties of time series data. Broadly speaking, a stochastic process is said to be

stationary if its mean and variance are constant over time and the value of the covariance between the two time periods depends only on the distance or gap or lag between the two time periods and not the actual time at which the covariance is computed (Guajarati, 2008). Therefore, to overcome the incidence of non-stationary in this study, the time-series properties of the variables is investigated using the standard Augmented Dickey-Fuller (ADF) unit root tests.

The test results are achieved assuming the presence of unit root (nonstationary of the variable) in the null hypothesis (H₀) and no unit root (stationary of the variable) in the alternative hypothesis (H_a). In this regard, decisions were made based on the calculated statistic and McKinnon's critical value in comparison with the critical values. A variable was considered nonstationary if its calculated value was less than the Mackinnon's critical value and we justify the existence of a unit root. On the other hand, a variable was considered stationary if its calculated value was higher than the critical value and this confirmed the absence of unit root. These values were generated using the ADF test in STATA Version 12.

3.7. Diagnostic tests

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. Heteroscedasticity, Serial correlation, Normality test and Model Stability test are checked because they affect the model's precision.

3.8. Long Run Model Specification

The purpose of ECM estimation is to detect the spurious regression. If the results found spurious, they will not be able to further processing or use. Such results if used to apply wrong results will direct to formulate policies in the economy. Long Run ECM estimation result shows in model Gross capital formation determined by how many percents of R-squared by the independent variables as well as by what percentage of Adjusted R- Squared (coefficient of determination) measures the proportion or percentage of the total variation independent variable explained by the ECM model. The specification of the model can be written as follow:-

$$GFCF_t = \beta_{t1} + \beta_{t2}PCI + \beta_{t3}GNS + \beta_{t4}CPI + \beta_{t5}ALR + \beta_{t6}DR + \beta_{t7}INVS + \beta_{t8}REER + \beta_{t9}TX + \beta_{t10}M2 + \beta_{t11}CONS + \epsilon_t \dots \text{ (Eq.2)}$$

3.9. Short Run Model Specification

Economic theory is mostly interested in equilibrium conditions and has little to say about the nature of economic configurations in disequilibrium. While economic theory proposes that certain macro variables have equilibrium relationships with each other, the data does not confirm that these hold at all times. To overcome this difficulty, economists make a distinction between the short-run and the long-run, (Berhane, 2016).

ECM has been used to find out the short-run dynamics. The term 'error correction models' applies to any model that directly estimates the rate at which changes the independent variable return to equilibrium after a change in an independent variable. The ECM model has a nice behavioural justification in that it implies that the behaviour of dependent variable is tied to independent variable in the long run and that short-run changes independent variable respond to deviations from that long-run equilibrium (Abdulsalam, 2013).

Short Run model specification is given as:-

$$GFCF_t = \beta_{t1} + \beta_{t2}PCI + \beta_{t3}GNS + \beta_{t4}CPI + \beta_{t5}ALR + \beta_{t6}DR + \beta_{t7}INVS + \beta_{t8}REER + \beta_{t9}TX + \beta_{t10}M2 + \beta_{t11}CONS + ECM + \epsilon_t \dots \text{ (Eq.3)}$$

3.9.1. Definition of Variables and Hypothesis

Dependent Variable

Capital Gross Formation:

Capital accumulation or formation refers to the process of amassing or stocking of assets of value, the increase in wealth or the creation of further wealth. The capital formation can be differentiated from savings because accumulation deals with the increase in the stock of needed real investments and not all savings are necessarily invested. Recent literature has confused investment with capital formation. Investment can be in financial assets, human (capital) development, real assets that can be productive or unproductive. The increase in investment through non-financial

assets has been held to increase value to the economy and the increase in the gross domestic product through a further increase in employment (Ugwuegbe, et.al 2013).

Gross capital formation as a percentage (%) of GDP consists of Nation's investments, without deducting disposals, in fixed assets during a given period. It also includes certain additions to the value of non-produced assets realized by producers or institutional units. Fixed assets are tangible or intangible assets produced as outputs from production processes that are used repeatedly, or continuously, for more than one year (Muluneh, 2015).

Explanatory Variables

Per capita Income (PCI): Per capita income or average income measures the average income earned per person in a given area (city, region, country, etc.) in a specified year. It is calculated by dividing the area's total income by its total population.

Dependency Ratio: A measure of the portion of a population which is composed of dependents (people who are too young or too old to work). The dependency ratio is equal to the number of individuals aged below 15 or above 64, divided by the number of individuals aged 15 to 64, expressed as a percentage. A rising dependency ratio is a concern in many countries that are facing an aging population, since it becomes difficult for pension and social security systems to provide for a significantly older, non-working population.

Gross National saving: Saving is the other side of consumption vital for the development process of a nation. 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 thereby accelerating economic growth. It is generally equal to a nation's income minus consumption and government purchases. National savings is the sum of private and public savings. (Okaro, 2015)

Taxes: Taxes are generally an involuntary fee levied on individuals or corporations that is enforced by a government entity, whether local, regional or national in order to finance government activities. In economics, taxes fall on whoever pays the burden of the tax, whether this is the entity being taxed, like a business, or the end consumers of the business's goods.

Inflation (INF): This is a general rise in prices measured against a standard level of purchasing power. There are many measures of inflation depending on the specific circumstances. The consumer price index (CPI) measures the percentage change through time in the cost of purchasing a constant basket of goods and service representing the average pattern of purchases made by a particular population group in a specific time period. Inflation is expected to have a positive or negative impact on saving.

Real Effective Exchange Rate:

- The nominal exchange adjusted for inflation. Unlike most other real variables, this adjustment requires accounting for price levels in two currencies. The real exchange rate is: $R = EP^*/P$ where E is the nominal currency price of foreign currency, P is the domestic price level, and P* is the foreign price level.
- The real price of foreign goods; i.e., the quantity of domestic goods needed to purchase a unit of foreign goods. Equal the reciprocal of the terms of trade.
- The relative price of traded goods in terms of none traded goods.

4. RESULTS AND DISCUSSIONS

This chapter contains both the descriptive and econometrics analysis. Under the descriptive statistics the trends and overall performances of the variables of interest are presented. The econometric analysis begins by testing the necessary tests such as stationary tests, diagnostic tests and bound test. After passed the necessary tests both the long-run and short-run is estimated using Error Correction Model. After estimation has been made the interpretation and discussion are continued based on the model results.

4.1. Descriptive Statistics results

4.1.1. Trend of Gross Capital Formation in Ethiopia (1980 to 2016)

It is also called gross physical capital formation or gross physical capital accumulation and measured by gross investment. According to Mankiw (2010), physical capital accumulation includes machinery, plant and building, means of transport and communication, electricity plants and social overheads like roads, railways, schools, colleges, hospitals etc.

The gross capital formation was 19,176 million birr in 1980 and 311,484 million birr in 2015 (NBE, 2015). However like GDP the rate of capital formation is not consistent throughout the periods. There are ups and downs on the levels of gross capital formation in the country for last forty years. As we seen from the figure (1) below gross capital formation was at the beginning seems stable for ten years and decline and increase up to 1990. However, it starts to increase from 1991 to 2000 and finally it increases at increasing rate starting from 2001 onwards. Even though there are improvements in recent few years the gross capital formation was lower in many years. Based on the gross capital formation the current government is better than the Derg regime.

In order to achieve sustained economic growth in the process development, it's clear that the role of capital formation requirements has been well documented. Countries that are able to accumulate high level of capital tend to achieve faster rates of economic growth and development (Teklu, 2014). (Gbenga, 2013) defines capital formation as the total change in the value of fixed assets in the economy in addition to fixed assets either for replacing or adding to the stocks, it refers to the increase in the fixed capital stocks of the capital formed.

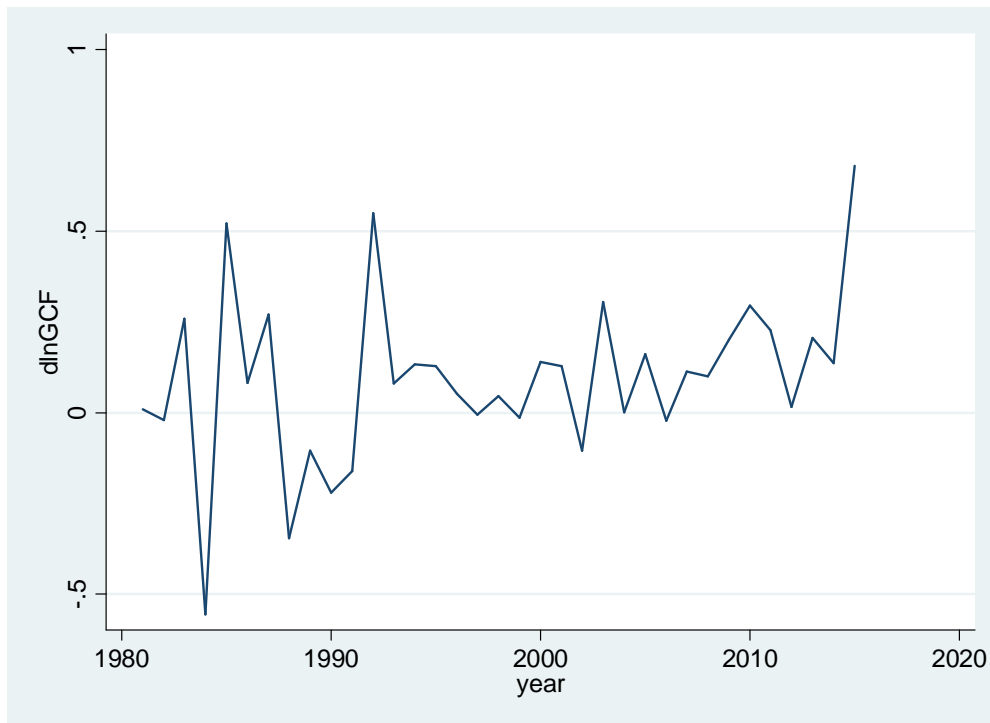


Figure 4.1 Trend of Gross Capital Formation in Ethiopia (1980 – 2016)

Source: Own Result(2018)

Figure (4.1) depicts that Capital formation in Ethiopia registers many ups and downs during the sample periods, as figure indicates that Gross capital formation shows stable till 1983/84 and turns down to fluctuate up to 1990/91. From 1991 the gross capital formation shows a continuous increment this because the regime has involved in massive investment program on various developmental sectors such as hydroelectric power plant (for example, Gilgel Gibe Dams, Tanabeles, Tekeze, and Great Ethiopian Renaissance Dam), road, railways, sugar industry, telecom and the like in which private sector could not have incentive and capacity to deliver. According to National Bank of Ethiopia report In the EPRDF regime, both public and private investment share out of GDP has increased than ever to 36%. However, compared to the country's requirement, investment is still very low in Ethiopia.

It is important to see the share of GCF as a percentage of GDP in Ethiopia. Accordingly As we see from the above figure gross capital formation as percentage of GDP is no consistent throughout the periods. Relatively from 1992/93-2000/01

the rate of Gross capital formation as a percentage of GDP was stable but starting from year 2000 gross capital formation as a percentage of GDP exhibited an up and down trend.

4.1.2. Gross National Saving

Gross National Savings (% of GDP) for Ethiopia in 2015 is 26.988 %. Data are based on individual countries national accounts statistics. For many countries, the estimates of National Saving are built up from National accounts data on gross domestic investment and from balance of payments –based data on net foreign investment.

This makes Ethiopia No. 38 In world rankings according to Gross National Savings (% of GDP) in year 2015. The world's average Gross National Savings (% GDP) value is 17.53%; Ethiopia is 9.46 more than the average.

In the previous year, 2014, Gross National Savings (% of GDP) for Ethiopia was 26.66% Gross National Savings (% of GDP) for Ethiopia in 2015 was or be 1.24% more than it was or will be in 2014.

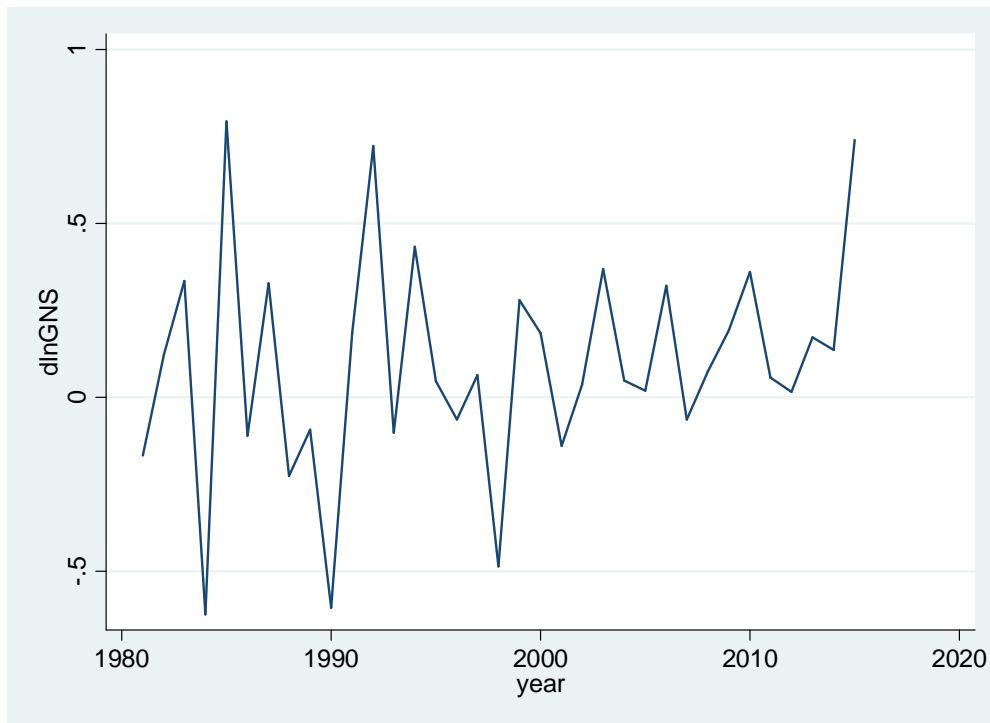


Figure 4.2 Trend Gross National Saving In Ethiopia (1980– 2016)

Source: Own Result (2018)

4.1.3 Investment

The Ethiopian Investment Agency (EIA) and Regional Investment Offices licensed a total of 407 projects in 2014/15. All of which entered operational stage. The projects started operation with investment capital of Birr 4.1 billion showing 173.5 and 640 percent annual growth in total investment capital and number of projects, respectively.

All the investment projects were private. Out of the total private investment projects for the year, 362 (89 percent) were domestic with a capital of Birr 1.5 billion; whereas 45Projects were foreign having Birr 2.6 billion as capital.

The average capital per project for domestic investment projects was Birr 4.2 million and that of foreign was Birr 57.9 million; implying that foreign investment projects were more of capital intensive than domestic investment projects.

The investment projects have created job opportunities for about 11,227 permanent and 10,505 casual workers (NBE)

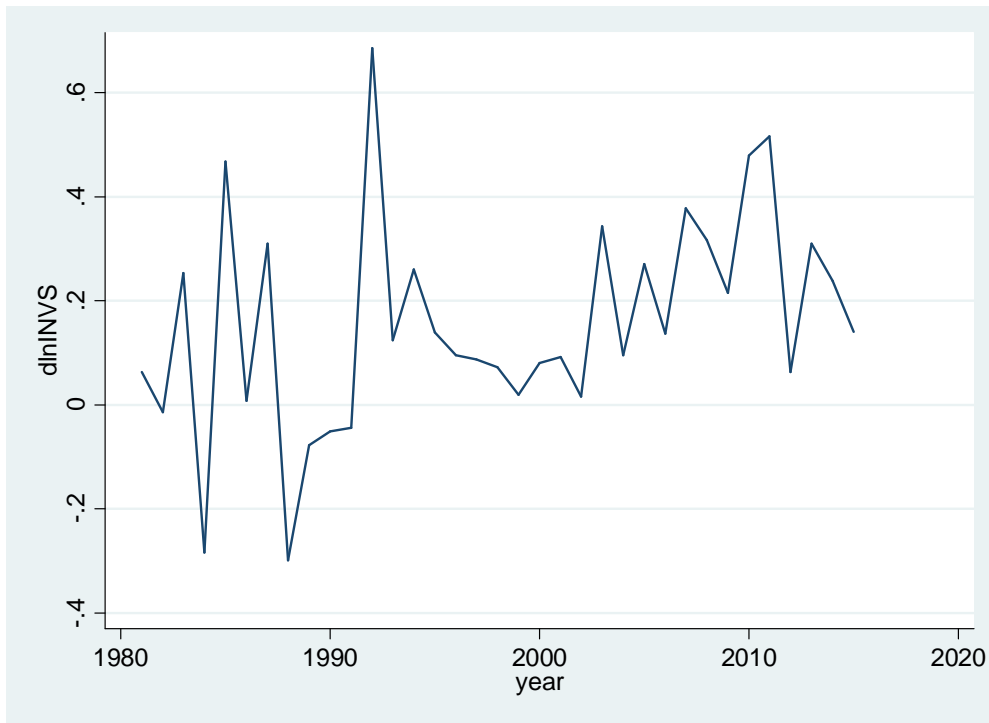


Figure 4.3 Trend of Investment in Ethiopia (1980-2016)

Source: Own Result (2018)

Investment (% of GDP) for Ethiopia in year 2015 is 39.795 %. Data are based on individual countries' national accounts statistics. For many countries, the estimate of national saving are built up from national accounts data on gross domestic investment and from balance of payments-based data on net foreign investment. This makes Ethiopia No. 11 in world rankings according to Investment (% of GDP) in year 2015. The world's average Investment (% of GDP) value is 21.76 %; Ethiopia is 18.04 more than the average.

In the previous year, 2014, Investment (% of GDP) for Ethiopia was 34.48 % Investment (% of GDP) for Ethiopia in 2015 was or will be 15.40% more than it was or will be in 2014. In the following or forecasted year, 2016, Investment (% of GDP) for Ethiopia was or will be 38.82 %, which is 2.46% less than the 2015(NBE).

4.1.4 Trends of Saving and Investment in Ethiopia (1980 - 2016)

In Ethiopia, the rate of growth of investment and saving are not equal. According to IMF, Rate of Investment has reached on average 26.3% of GDP whereas saving has reached on average 30.1% of GDP. The trend of saving as a ratio of GDP and investment as a percentage of GDP is summarized as follows: -

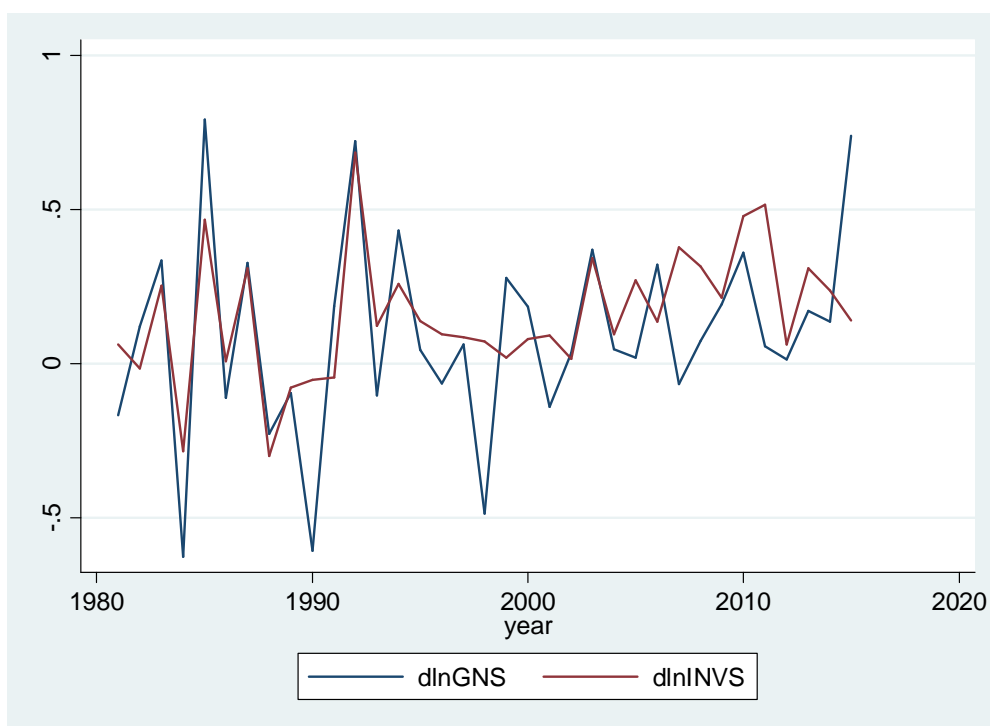


Figure 4.4 Trends of Gross National Saving and Investment in Ethiopia (1980– 2016)

Source: Own Result (2018)

Saving-investment gap was 10.70 percent of GDP in 1980, which has increased to about 12.8 percent in 2016. From this saving-investment gap, one can see that national saving in Ethiopia has becoming less and less to support huge growth in investment recently. Widening saving-investment gap implies that national saving mobilization is not sufficient to finance investment and fully financing investment depends on foreign borrowing. (See Appendix)

4.1.5 Per capita Income

Ethiopia has recorded a rapid economic performance of 10.2 % in 2014/15 (NBE), continuing the double digit growth trend of the last decade with a broad contribution

of all sectors. Accordingly, Industry grew by 21.6%, services 10.2% and Agriculture 6.4%. Their contribution to the annual growth was 3.0%, 4.7% and 2.5%, respectively.

While agriculture remained a dominant sector, its share in GDP slightly declined from 40.1% in 2013/14 to 38.8% in 2014/15. The share of industry scaled up to 15.2% from 13.8% while that of service sector remained at 46.6% over the same period, revealing a gradual structural transformation, measured by change in shares of major economic sectors. GDP Per capita has also increased to USD 691 compared to USD 639.6 last year while Overtly is estimated to have declined to 22% from 38.7% a decade ago. At the same time, investment to GDP ratio improved to 39% from 38% compared with 21.9% average for Sub-Saharan Africa. Similarly, the ratio of domestic savings to GDP rose to 21.8% during the review fiscal year vis-a-vis 16% estimated average for sub-Saharan Africa. This outcome was achieved as a result of a number of saving enhancing measures such as expansion of financial institutions, introduction of housing schemes, saving bonds, reforms in employees' pension scheme etc undertaken over the last few years not to mention the effect of growing per capita income in line with economic growth.

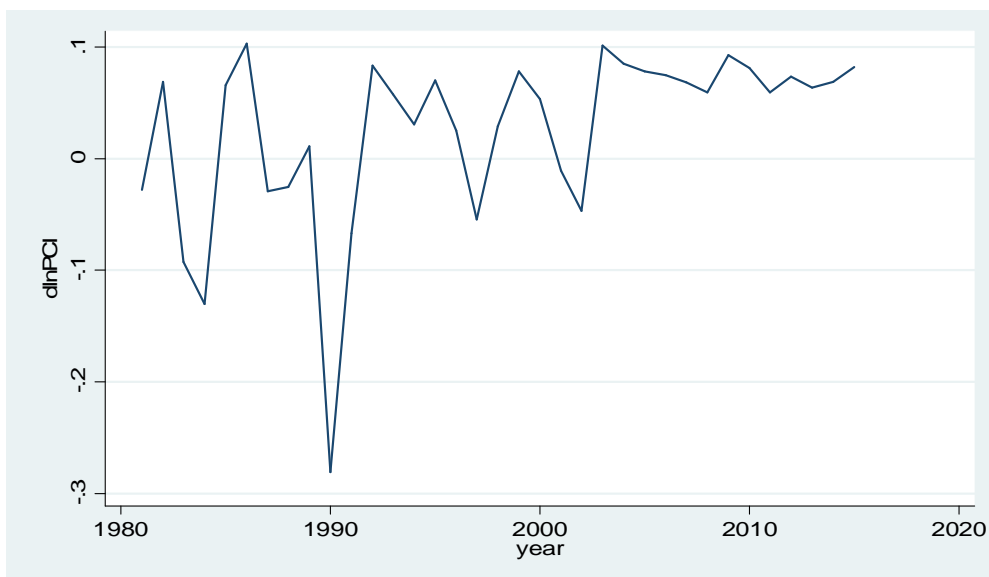
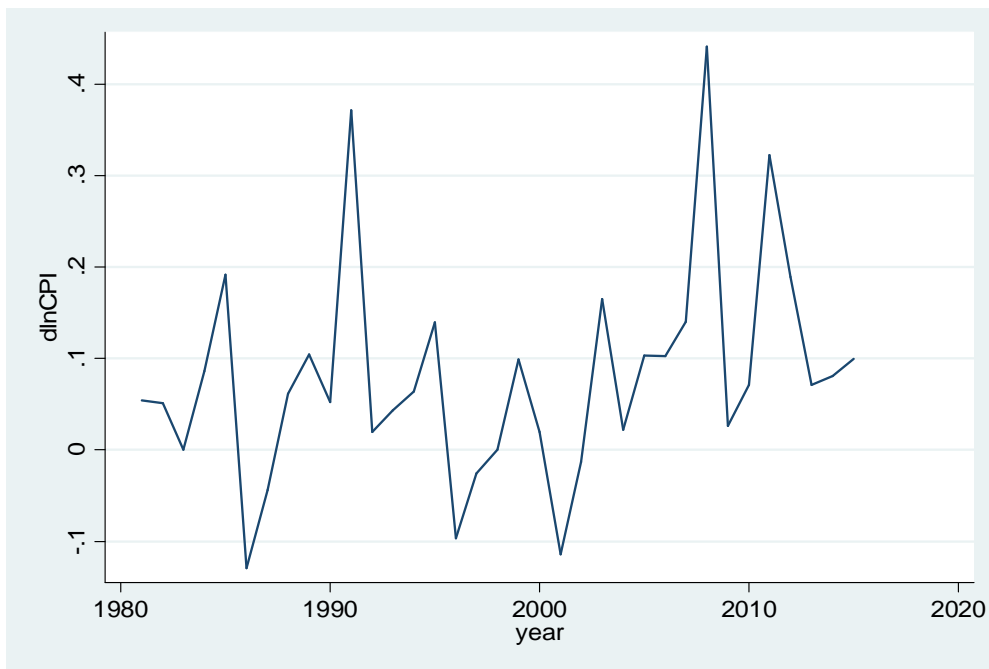


Figure 4.5 Trend of Per Capita Income in Ethiopia (1980 – 2016)

Source: Own Result (2018)

4.1.6 Consumer Price Index

Trends in inflation show moderate ups and downs from 1985 to 2002, with exceptions in 1991-1992, 1998, 2003, and 2010. In 1985, a devastating drought claimed the lives of many Ethiopians and created the current image of the country in the world. Since the country depends on rain-fed agriculture as a main source of income, the drought diminished output growth, which in turn has a significant impact on the inflation rate. In 1991-1992, there was a political transition in the country. It was a time when a group of guerrilla fighters overthrew the extreme dictatorial government which ruled the country for 17 years. In 2003, the economy again suffered from drought, which resulted in a fall in GDP. After that, the inflation rate never returned to its previous levels. The major sources which make the inflation rate to increase at an alarming rate include an increase in money supply, the nature of the investment in the country, widening of the national deficit, and ways of financing it, and others (Geda and Tafere, 2008). The graphs on money supply clearly show that they have a positive growth, but for inflation and real exchange rate, the trend exhibits fluctuations from time to time, especially the real exchange rate, which fluctuates for all the years under study.



Figure

4.6 Trend of Consumer Price Index in Ethiopia (1980 – 2016)

Source: Own Result (2018)

4.1.7 Interest Rate

In 2014/15, both minimum and maximum deposit interest rates remained unchanged at 5.0 and 5.75 percent, respectively. With average interest rate on savings deposit staying at 5.38 percent while weighted annual average interest rates on time deposit rose to 5.77 percent from 5.66 percent a year earlier. Interest rate on demand deposits also tended to rise. Similarly, average lending rate stood at 11.88 percent. Yet, real rate of interest, except the lending rate, were negative given a surge in the inflation rate from 8.5 to 10.4 percent in 2014/15 (NBE).

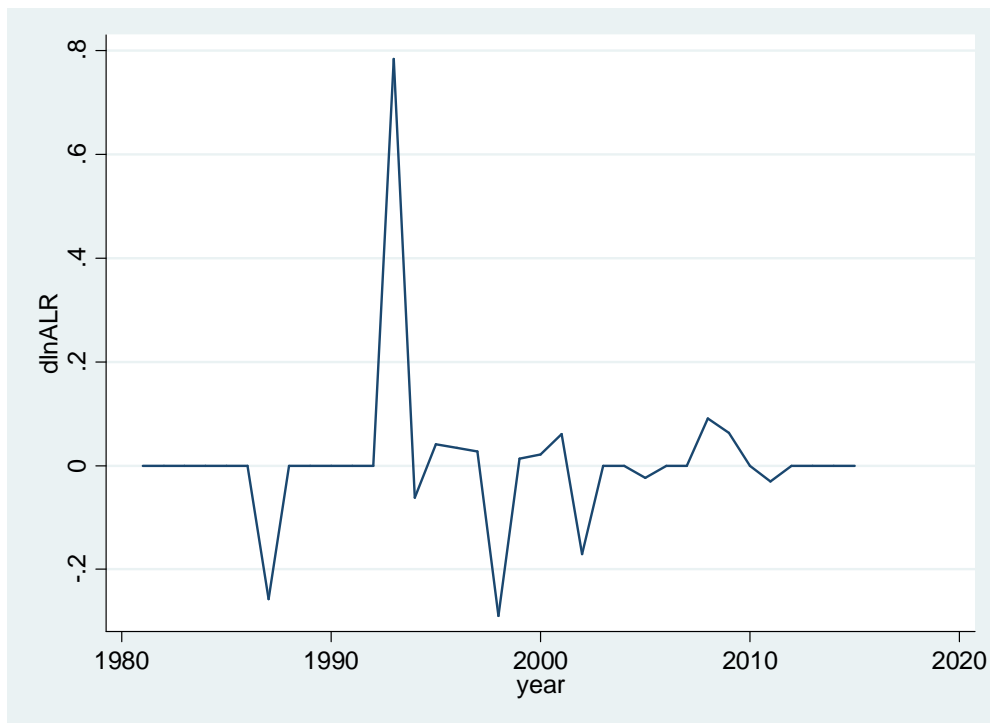


Figure 4.7: Trend of Average Lending Rate in Ethiopia (1980– 2016)

Source: Own Result(2018)

4.1.8 Dependency Ratio

According to world economic outlook, (2016) the total population in Ethiopia is 99.4 million. Ethiopia is one of the labour abundant countries in the world with total labour force of 54.7 million (WB, WDI, 2015).Economic theorist give heavy hand to economic growth of a country as it depends on labour force availability. The labour force in Ethiopia grows continually owing the fast growth of population. According World Bank development indicators the total labour force in Ethiopia was 16.7 million in 1974 and reaches 54.7 million in 2015.

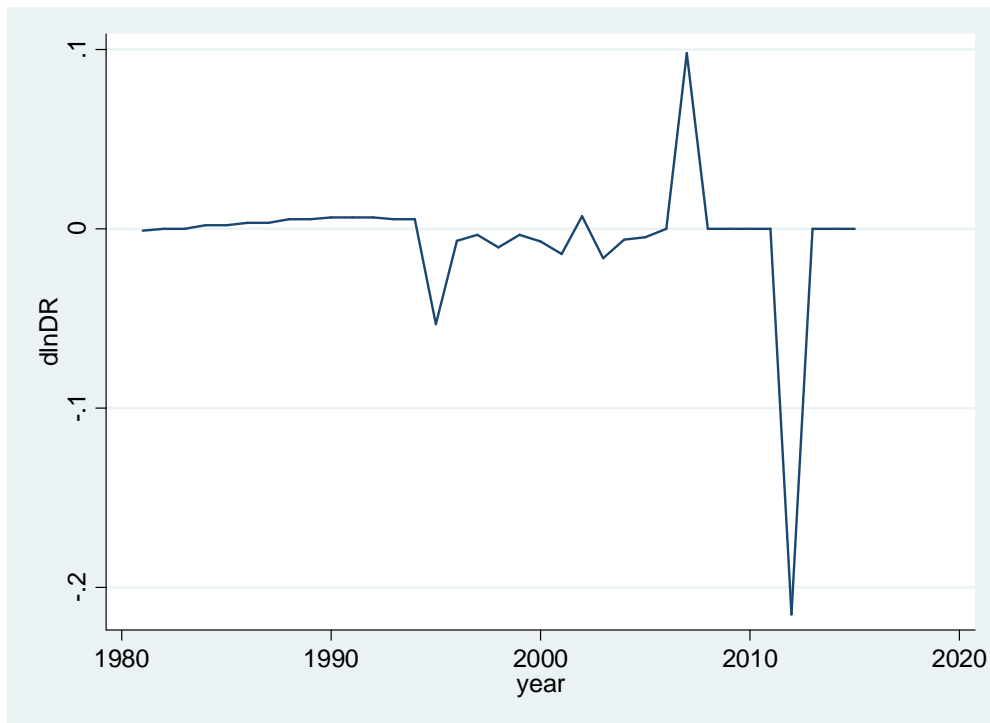


Figure 4.8 Trend of Dependency Ratio in Ethiopia (1980 – 2016)

Source: Own Result (2018)

4.1.9 Real Effective Exchange Rate

The real effective exchange rate of the Birr (REER) has been appreciating since 2010/11 due to higher domestic inflation relative to that of major trading partner countries. In 2014/15, REER of the Birr highly appreciated by 11.9 percent compared to 0.44 percent appreciation in the previous year due to the combined effect of relatively higher domestic inflation and fast depreciation of trading partners' currency against USD than that of the Birr (NBE). Accordingly, the nominal effective exchange rate (NEER) of the Birr appreciated by 4 percent annually compared to 3.3 percent depreciation in 2013/14.

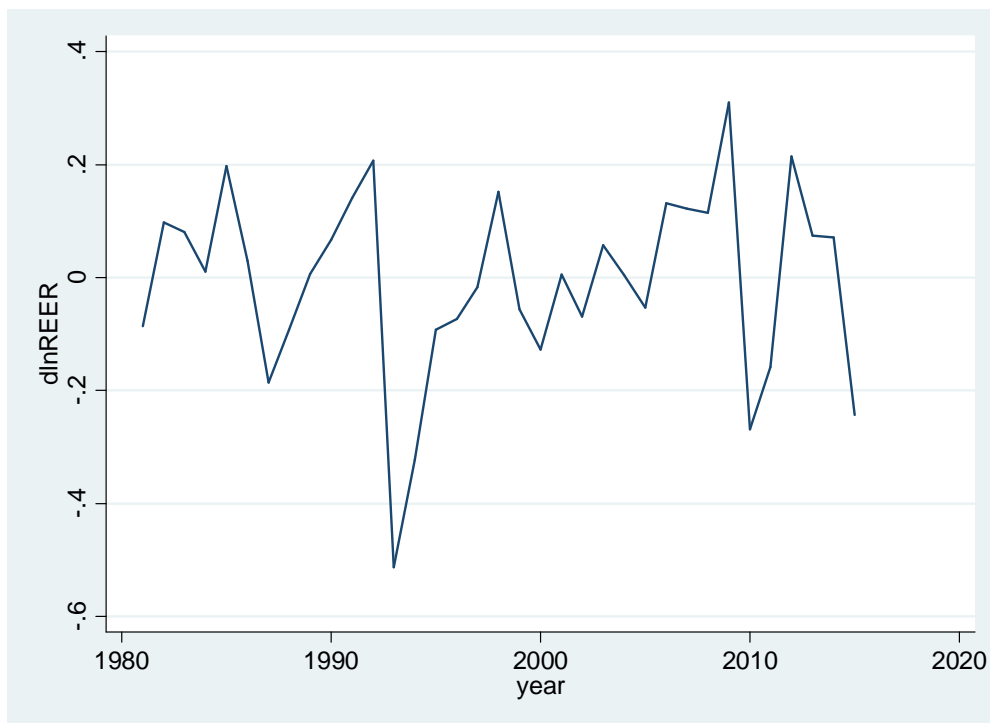


Figure 4.9 Trend of Real Effective Exchange Rate in Ethiopia (1980 – 2016)

Source: Own Result (2018)

4.1.10 Taxes

General government revenue, including grants, registered 26.3 percent increase to Birr 199.6 billion in the review year (NBE). Its GDP ratio increased to (15.1 percent) from 13.8 percent in 2013/14.

About 88.6 percent of the total domestic revenue was generated through taxes which surged by 24.2 percent and reached Birr 165.3 billion on account of improved collection of taxes from direct taxes (27.9 percent) and indirect taxes (22.1 percent). Hence, the respective contributions of direct and indirect taxes to tax revenue were 36.4 percent and 63.6 percent in 2014/15.

A total of Birr 21.3 billion was collected through non-taxes in 2014/15, which showed a 63.2 percent growth over last year same period due to improvements in all components of non-taxes except reimbursement & property sales (NBE).

External grants stood at Birr 13 billion, about 9.4 percent higher than a year ago. All in all, total revenue performance including grants in the 2014/15 was about 103 percent of the total annual budget.

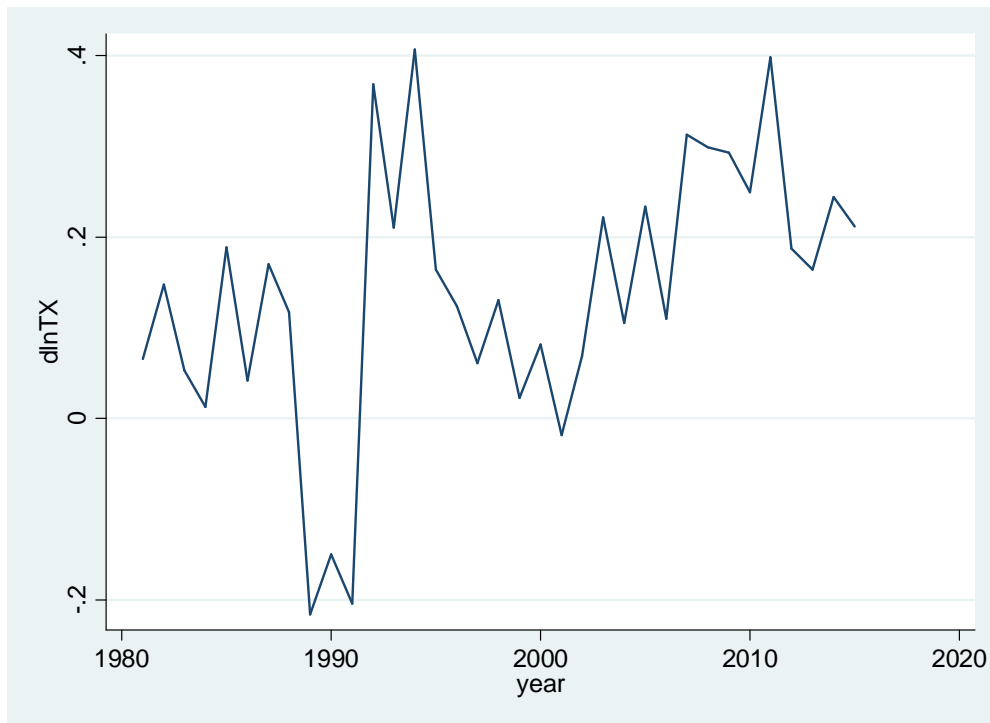


Figure 4.10 Trends of Taxes in Ethiopia (1980– 2016)

Source: Own Result (2018)

4.2.1 Money Supply

Ethiopia's monetary policy continued to be geared towards keeping inflation rate at single digit. Accordingly, the National Bank of Ethiopia has been closely monitoring monetary development throughout the fiscal year so as to sustain the single digit inflation and manage inflation expectations. By end June 2015, annual headline inflation reached 10.4 percent slightly above the single digit target.

Broad money supply to GDP ratio is a proxy measure of financial development through financial deepening. The financial system in developing countries faces several difficulties that prevent it from operating efficiently. These countries usually suffer from financial crises due mainly to increases in interest rates and increases in uncertainty. But as the figure (12) indicates there is some improvements in financial depth in Ethiopia from time to time relatively with constant increasing rate until 2010 and increase by increasing rate onwards.

At the end of 2014/15, domestic liquidity, as measured by broad money supply (M2), reached Birr 371.2 billion reflecting a 24.7 percent annual growth mainly due to a 31.3 percent surge in domestic credit. The high growth of domestic credit was attributed to a 32.8 percent increase in credit to the non-central government and 14.1 percent growth in credit to central government. (Table 5.2) Component-wise, narrow money expanded by 15.3 percent due to the rise in demand deposits and currency outside banks reflecting the growth in economic activities and improvements in money demand for transaction purposes. Similarly, quasi money, that comprises savings and time deposits, went up by 32.3 percent and reached Birr 216.6 billion in line with the increased capacity of banks in deposit mobilization with the opening of 485 new branches and stability of domestic prices (NBE).

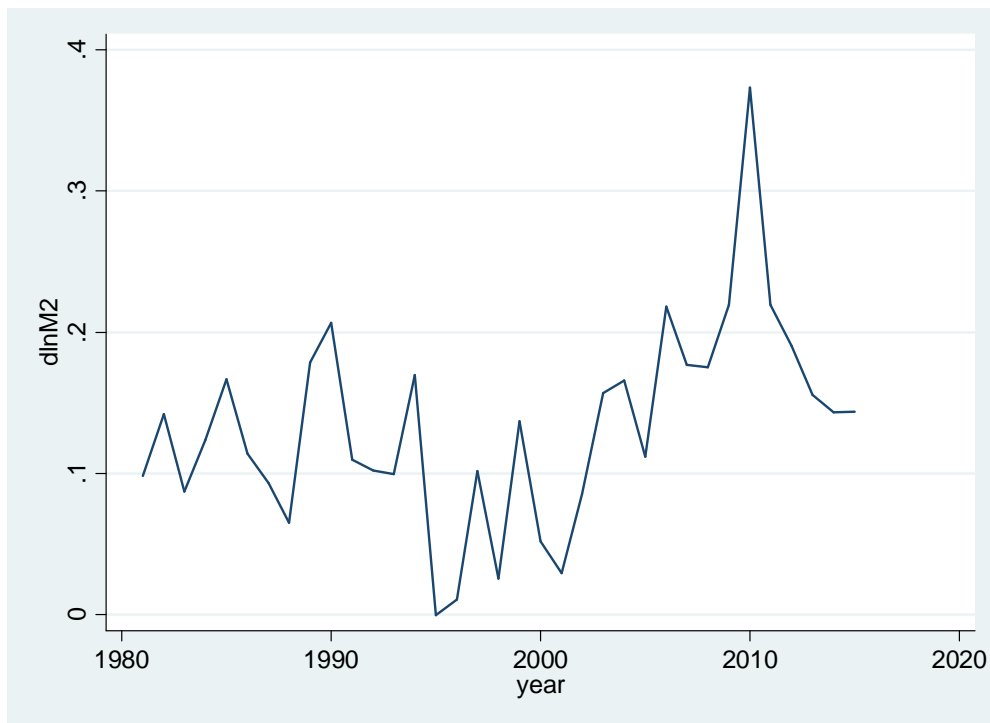


Figure 4.11 Trend of Money Supply in Ethiopia (1980– 2016)

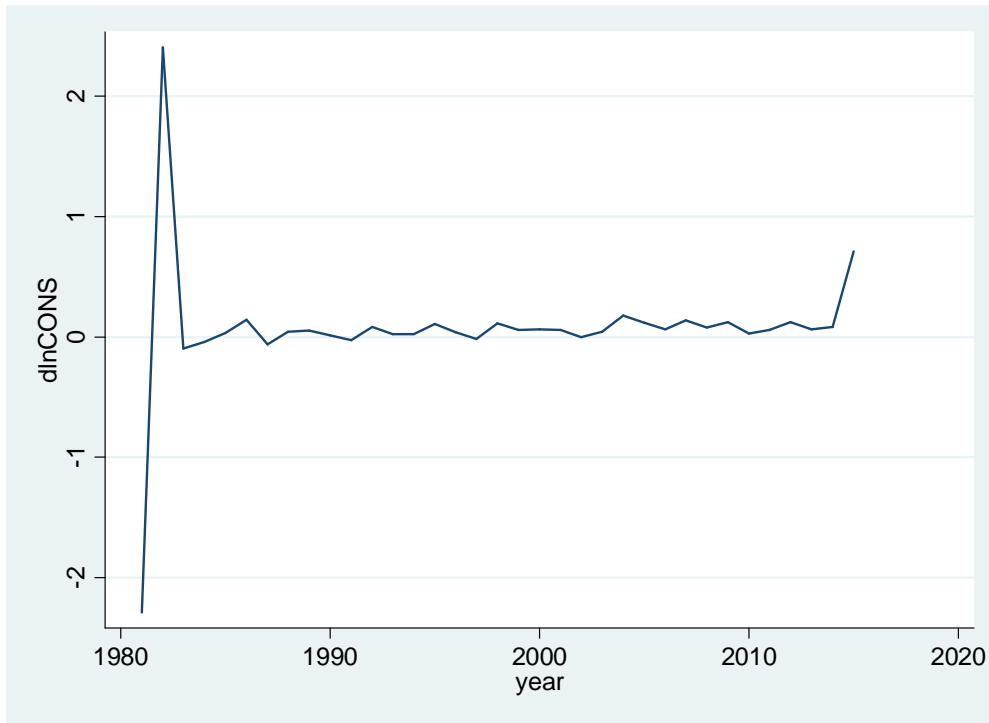
Source: Own Result (2018)

4.2.2 Consumption

Total consumption expenditure (public and private) in percent of GDP went down slightly to 78.2 percent in 2014/15 from 79.5 percent last year and 85 percent GTP target set for the year. The performance in total consumption expenditure was mainly attributed to a 1 percentage point decline in private consumption expenditure to GDP ratio and 1.3 percentage point rise in capital formation.

Consequently, gross domestic saving to GDP ratio rose to 21.8 percent from 20.5 percent in the previous year, and 15 percent GTP target for the year. The slowdown of total consumption expenditure to GDP ratio contributed 1.3 percentage points improvement in domestic savings (MoFEC). While the level of domestic saving increased by 23.6 percent, total consumption expenditure rose by 14.8 percent during FY 2014/15. The trade deficit to GDP ratio remained stable at 17.5 percent against the preceding year and 13.1 percent GTP I target owing to the decline in the value of import and export to GDP ratio, by 1.8 percentage points each.

During 2014/15, the level of gross capital formation to GDP ratio reached 39.3 percent; showing 1.3 percentage point improvement over last year and compared to the GTP target of 28.2 percent for the same year. Gross capital formation and private consumption expenditures were the main sources of aggregate demand. Public consumption merely constituted 9 percent of GDP while that of private consumption expenditure was 69.2 percent.



Figure

4.12 Trend of Consumption in Ethiopia (1980 – 2016)

Source: Own Result (2018)

4.3. Summary of Descriptive Statistics

The following summary of descriptive statistics of all dependent and explanatory variables gives the general distribution of the data set and used in order to get insight into the trend of capital formation in Ethiopia and for those variables incorporated in this study over a period of time.

Variables	Mean	Std. Dev.	Min	Max	Average growth rate/annum
lnGCF	17.81106	.8899177	16.59228	20.18826	0.19467
lnGNS	17.70512	.8940274	16.33811	20.02152	0.20096
lnPCI	8.275487	.3457815	7.786822	9.089756	0.10989
lnCPI	3.270191	.80136	2.197225	4.964941	1.25909
lnALR	2.337525	.2479344	1.916923	2.74084	0.13825
lnDR	4.479671	.0664138	4.317488	4.551769	-0.04444
lnINVS	16.69793	1.687908	14.68025	20.19344	0.37534
lnREER	4.990218	.3161524	4.53582	5.651787	0.05222
lnTX	16.18275	1.452932	14.37912	19.25644	0.3396
lnM2	16.40896	1.324347	14.3551	19.00071	0.32404
lnCONS	19.01605	.8144177	16.09155	20.90258	0.13772

Table 4.1 Summary of Descriptive Statistics

Source: Own analysis Result (2018)

Table (4.1) shows the summary descriptive statistics contains different characteristics of in the analysis. The standard deviation shows how much dispersion exists from the average value. A low standard deviation indicates that the data point tends to be very close to the mean, whereas high standard deviation indicates that the data point is spread out over a large range of values. As shown in the summary statistics, all have low standard deviation except Investment, Taxes and Money Supply. This shows stability in the long run relationship between Gross capital formation and explanatory variables.

The maximum and minimum values of the series are also given for each series under the row maximum and minimum, respectively. The measure of dispersion around

the mean in the series is calculated as the standard deviation. Standard deviation is difficult to interpret in absolute terms. However, it can be interpreted in relative terms by comparing the standard deviation for two different distributions, i.e., the distribution with smaller standard deviation exhibits less dispersion and larger standard deviation shows higher dispersion. Accordingly, in Table (4) lnDR is a less dispersed series with the value of .0664138. While lnINVS is the highly dispersed with value of 1.687908. The larger the dispersion between the values is the higher the standard deviation that shows greater volatility of Investment.

4.4. Econometrics Results

4.4.1 Unit Root test

Most macroeconomic time series are trended and therefore in most cases are non-stationary. If non-stationary of the macroeconomic variables is not corrected, it would lead the problem of spurious regression (false relationships among the variables). So before to utilizing the data in estimating ECM, it is imperative to check the time series properties of each series. When a series contains unit root, it is common to transform the variables through differencing so as to make it stationary. In order to determine the degree of integration, a unit root test is carried out using the standard Augmented Dickey Fuller (ADF) test. Moreover in applying Error Correction model all of the variables should not be integrated of order two (I (2)). But they should be a mixture of integrated of order zero (I (0)) and integrated of order one I(1).

When the ADF test statistic is larger than the critical value in absolute terms and lower, Mackinnon (1996) one sided p values, the null hypothesis of unit root test is rejected; and if the absolute value of ADF test statistic is lower than that critical values or higher Mackinnon (1996) one sided p values, we fail to reject the null hypothesis.

Table (4.2) shows the results of ADF for unit root. The test was done for two alternative specifications. First it is tested with Intercept but no trend and then it is tested with Intercept and trend. All variables are in logarithmic for

Table 4.2 ADF Unit Root Test Result

Variables	ADF t statistics in level			ADF t statistics in first difference	
	With intercept	With intercept and trend	None	With intercept	With intercept and trend
LPCI	1.565214	-3.620719**	1.466491	-2.338174	-5.842589*
LGNS	0.280288	-2.458695	1.763329	-7.576433*	-3.494252***
LCPI	1.208005	-0.878197	4.13857	-5.207544*	-5.503063*
LALR	-1.890777	-2.244982	0.133344	-6.137138*	-6.041239*
LDR	-0.622684	-2.038406	-0.774009	-5.359779*	-5.392521*
LINVS	1.824292	-1.037996	4.694969	-6.115532*	-7.121803*
LREER	-1.614931	-1.75259	-0.366627	-4.73763*	-4.527486*
LGCF	2.699597	-0.983274	2.445683	-6.580519*	-7.405377*
LTX	1.995971	-0.547061	2.637393**	-2.971723**	-3.952967**
LM2	1.141629	-3.491092***	3.145964	-3.318722**	-3.603328
LCONS	3.366089**	1.294987	0.667829	-17.30502*	-2.548144

Note: *, ** and *** represent significant at 1%, 5% and 10% level respectively

Note that the rejection of the null hypothesis is based on Mackinnon (1996) critical values. Akaike Information Criteria (AIC) is used to determine the lag length while testing the stationarity of all variables. The sign *** indicates the rejection of the null hypothesis of non-stationary at 1% significant level. The results from this test show that ten variables are non-stationary in their levels (for both types of specifications) and consumption is stationary in its level with intercept and trend. On the other hand in their first difference all of the variables are stationary. The results indicate that, with intercept and trend eight of the variables are I (1) and one variable I (0). The ADFtest is also tested and according to its results one variable (consumption) is stationary at their level and the remaining variables used in the

model are stationary at their first difference. The ADF test result is presented in the appendix part of this study (refer Appendix (1)).

Based on the ADF test some variables are stationary and some have unit root test at levels. In such condition it is impossible to carry out either short -run or long-run analysis and hence taking the first difference is necessary to have all the relevant variables stationary in the same order.

As conclusion, the unit root test reveals that some of the variable used in the LCONS is I(0)while others are I(1) in ADF test. In order to continue with the analysis, all variables in each model should be integrated in the same order .As shown in the table above; all variables become integrated at first order and not at levels. Due to this reason the analysis will continue with the co-integration technique studying the long -run relationship.

The model estimated has the following form:

$$\Delta GFCE = \beta_1 + \beta_2 \Delta PCI + \beta_3 \Delta GNS + \beta_4 \Delta CPI + \beta_5 \Delta ALR + \beta_6 \Delta DR + \beta_7 \Delta INVS + \beta_8 \Delta REER + \beta_9 \Delta TX + \beta_{10} \Delta M2 + \beta_{11} \Delta CONS + \Delta \varepsilon \text{-----} (2)$$

4.5. Diagnostic Tests

For the error correction model, three diagnostic tests are employed to check the problem of normality, serial correlation and heteroscedasticity. Jarque –bera test is used for normality, Breusch Godfrey LaGrange Multiplier (LM) test is used to check for the problem of serial correlation and Autoregressive conditional Heteroscedasticity(ARCH)LM test is to verify whether a problem of heteroscedasticity exists or not.

4.5.1 Test for Multicollinearity

The variance inflation factor, VIF, is a measure of the reciprocal of the complement of the intercorrelation among the predictor variables: $VIF = 1 / (1 - r^2)$ where r^2 is the multiple correlations between the predictor variable and the other predictors. Multicollinearity is said to be a problem when the variance inflation factors of predictors becomes large. How large appear to be a subjective judgment. According to Haan (2002) & Robert (2007); VIF values greater than 10 indicate possible

problem of multicollinearity. Thus, in table 4.5 below there is no VIF score above value 10; i.e., there is no perfect co-linearity among independent variables.

4.5.2 Results of Normality Test

The results of the normality tests reveal that the chi-squared results of Skewness and Kurtosis are statistically insignificant, so is the result of Jarque-Bera statistic. The JarqueBera result is shown in the following table.

Table 4.3 Skewness to test Normality

Equations	Skewness	Chi-square	Degree of Freedom	Prob>Chi-square
dlnGCF	0.8807	3.77	1	0.1519
dlnPCI	0.0000	19.86	1	0.0000
dlnGNS	0.9283	1.20	1	0.5492
dlnCPI	0.0082	9.54	1	0.0085
dlnALR	0.0000	37.67	1	0.0000
dlnDR	0.0000	38.65	1	0.0000
dlnINVS	0.5878	1.18	1	0.5547
dlnREER	0.0425	5.97	1	0.0506
dlnTX	0.1847	2.77	1	0.2503
dlnM2	0.0609	7.47	1	0.0239
dlnCONS	0.9195	16.55	1	0.0003

Source: Our analysis Result (2018)

Here we can reject the null hypothesis of the variables such as PCI, CPI, ALR, DR, REER, M2, and CONS. It says that the residuals are not normally distributed. This is because as we can see from this table, the probability values for all the five equations are Insignificant. This implies that, all the probability values for the above equations are less than 5% critical value. But here we cannot reject the null hypothesis of the equations such as GCF, GNS, INVS and TX. It says that the residuals are normally distributed. This is because as we can see from this table, the

probability values for the equations are significant. This implies that, the probability values for the above equations are more than 5% critical value.

4.5.3 Correlation Analysis

The correlation analysis was done to analyze the relationship between lnGCF, lnPCI, lnGNS, lnCPI, lnALR, lnDR, lnINVS, lnREER, lnTX, lnM2, and lnCONS. To examine the relationship among these variables, Pearson correlation coefficients were calculated. In this section of the study, the analysis and interpretations of the correlation results between dependent and explanatory variables are presented. As indicated in the correlation analysis between Gross National saving, Investment, Taxes, Consumer price Index and Gross capital formation has strong relation. This strong correlation between capital formation and investment suggests that performance of the latter is directly tied with increased capital formation.

The correlation matrix in Table 4.4 (see the appendix) resulted in a positive correlation between Gross national saving, Investment, Taxes and, Gross capital formation. And thus, these relations are statistically significant at 1%, 5% and 10% level. Nevertheless, the rest of the variables resulted insignificant positive relationship with gross capital formation.

In the correlation matrices results, it can be seen that there is strong (with out controlling) pair-wise correlation between the explanatory variables (GNS, PCI, CPI, ALR, DR, INVS, REER, GCF, TX, M2 and CONS). As a rule of thumb, inter-correlation among the independents above 0.80 signals a possible multicollinearity problem (Gujarati, 2008). As concluding analysis, almost all variables have high correlation power and this implies exist multicollinearity problem in the explanatory variables.

On the other hand, Table 4.4 (see the Appendix) reveals the extent of relationship between dependent and explanatory variables. The correlation coefficients for Investment, Gross national saving, and Taxes with GCF are 98.46.23 percent, 98.34 percent and 98.33 percent respectively.

Moreover, pair-wise correlation matrix is one method of detecting multicollinearity among explanatory variables. If the pair-wise correlation among two repressors is in excess of 0.8, we suspect that multicollinearity poses serious challenge to our estimates (Gujarati, 2003).

To sum up the correlation analysis, although the pair wise correlations give proof of relationship between two variables; these measures do not allow us to identify causes and effect relationships between such variables. From the results of correlation analysis, it is difficult to say whether independent variables have effect on capital formation. Simply the correlation result shows the coefficient and the direction of relationship between two variables with the level of significance. Another shortcoming of correlation analysis is that it does not provide reliable indicators or coefficients of association in a manner which control for additional explanatory variables.

4.6. Long Run Model

The long run relationship between dependent variable (Gross Capital formation) and independent variables (Gross National Saving, Per Capita Income, Consumer Price Index, Average Lending Rate, Dependency Ratio, Investment, Real Exchange Rate, Taxes, Money Supply and Consumption is presented below.

Table (4.5) reveals that Tree variables GNS, DR, andINVS are statistically significant while,PCI, CPI, ALR, REER, TX, M2 and CONS are insignificant. The intercept is statistically significant at 5 percent. The adjusted R-squared values measures the proportion of the variation in the dependent variable accounted for by the explanatory variables and interpreted as the dependant variable Gross Capital formation was explained by 99% of the independent variables.

Table 4.5 Long run estimation

Variables	Coefficient	Std. Error	t-Statistic	Prob.
LnGNS	.3972969	.0804434	4.94	0.000***
LnPCI	.1545339	.2169443	0.71	0.483
LnCPI	-.2308966	.1734034	-1.33	0.195
LnALR	-.0813763	.1734034	-0.64	0.526
LnDR	-.8106417	.3141291	-2.58	0.016*
LnINVS	.5211493	.1670402	3.12	0.005***

LnREER	-.0237035	.1022865	-0.23	0.819
LnTX	-.0423788	.1781045	-0.24	0.814
lnM2	-.1472139	.1509638	-0.98	0.339
LnCONS	.0169579	.0461344	0.37	0.716
Constant	8.269862	2.427723	3.41	0.002

Source: Our analysis Result (2018)

R-squared	0.9929
Adjusted R-squared	0.9901
F-statistic	349.51
Prob(F-statistic)	0.0000

As we seen from table (4.5) above the estimated coefficients of Gross National saving , per Capita Income , Investment , and Consumption have the expected signs while Consumer Price Index , Average Lending Rate , Dependency Ratio, Real Exchange Rate, Taxes and Money supply have unexpected signs. In addition the estimated coefficients of gross National saving, per Capita Income, Investment, and Consumption are all statistically significance while Consumer Price Index, Average Lending Rate, Dependency Ratio, Real Effective Exchange Rate, Taxes and Money supply are statistically insignificance irrespective of sign changes in some variables.

The coefficient for gross national saving is as expected positive sign and statistically significant which revealed that GNS (which is the approximate measure of financial development) is an important determinant for Capital Formation. The result suggests that in Ethiopia, in the long run, an increase in gross national saving by 1percent increases capital formation by 39% percent. Thus, the empirical results of this study clearly demonstrate that, within the Ethiopia context, there is a significant and positive relationship between capital formation and Goss national saving is accepted. This finding is consistent with papers done in Ethiopia previously by Muluneh (2014) in general and in African countries particularly by Gbenga et.al

(2013), Okaro(2015). They revealed that gross national saving has a significant positive effect on capital formation.

Per Capita Income (PCI) is used in the process of capital formation, by utilizing the savings and provide to an individual or organization to enhance capital formation through the distribution of funds. As expected in the theoretically the coefficient of Per Capita Income has positive and significant relation with capital formation in long run. Interpret as Per Capita Income increases by 1 percent; also increase capital formation by 15 percent, so the positive impact of Per Capita Income which improves net investment in Ethiopia may show that effective using of saving by extending of credit for the capital formation of the country which improves the productive capacity of the economy.

Since the researcher has specified the Harod –Domar theory in a log-linear form, the coefficients of the dependent variable is interpreted as elasticity with respect to Gross National saving and Investment . The long run model result indicates that gross capital formation and Investment is statistically significant at 1% significance level. Thus, holding other things constant a one percent increase in Gross National Saving a 0.39and 0.52 percent increase in Gross capital formation. Therefore it is the most significant variable that positively affects the Gross Capital Formation .The result is consistent with Patrick Enuet *al.* (2013) and Mahmud (2014) etc.

The Consumer Price index (CPI) rate, as showed in the above table (6) has negative impact on Gross capital formation In Ethiopia, even though statistically insignificant. In the Ethiopian history, inflation remained at a reasonable low level rate until 2002/03. But after 2004, the inflation rate increased and reached 36.4 percent in 2009 (NBE, 2013/14), which was caused primarily by food inflation and affect the wellbeing of the society than harming the macroeconomic performance.

Interest Rate (ALR) has a negative significant impact to the Gross Capital Formation in the long run. This is due to the costs incurred for interest and loan repayments. From this finding a one percent increase in Interest Rate the Gross Capital Formation has been decreased by 0.08 percent. The result is also in line with Tekluet *al.* (2014) andMulugeta (2014) had investigated that Interest Rate (ALR) had a negative insignificant impact in the long run on Gross Capital Formation and Positive significant impact in the short run on in Ethiopia.

Finally the long run estimated model is presented as follows with figures in the parenthesis indicates the calculated t-value.

$$LGCF=8.26+0.39GNS+0.15PCI-0.23CPI-0.08ALR-0.8DR+0.52INVS-0.02REER-0.04TX-0.14M2+0.02CONS$$

(3.41) (4.94) (0.71) (-1.33) (-0.64) (-2.58) (3.12) (-0.23) (-0.24) (-0.98) (0.37)

4.7. Short Run Dynamics

After determining the long run relationship among the variables in the long run model and their long-run coefficients, the next step is to determine the coefficients of the short-run dynamics. Economic variables have short-run behaviour that can be captured through dynamic modelling. If there is a long-run relationship between the variables, an error correction model can be formulated that portray both the dynamic and long-run interaction between the variables.

The ECM model has a nice behavioural justification in that it implies that the behaviour of dependent variable is tied to independent variable in the long run and that short-run changes independent variable respond to deviations from that long-run equilibrium.

4.6 Short run estimation

Variables	Coefficient	Std. Error	t-Statistic	Prob.
dlnGNS	.2965002	.0863949	3.43	0.002
dlnPCI	.3033743	.33416	0.91	0.373
dlnCPI	-.2579174	.1757249	-1.47	0.155
dlnALR	.0097663	.1373014	0.07	0.944
dlnDR	-.4127589	.4821149	-0.86	0.400
dlnINVS	.7346277	.1703822	4.31	0.000
dlnREER	-.0984337	.1346193	-0.73	0.472
dlnTX	-.1664451	.2154737	-0.77	0.447

dlnM2	-.4081242	.296802	-1.38	0.182
dlnCONS	.0177564	.0356727	0.50	0.623
Constant	.0355353	.0417765	0.85	0.403

Source: Our analysis Result (2018)

R-squared	0.8424
Adjusted R-squared	0.7767
F-statistic	12.82
Prob(F-statistic)	0.0000

Table (4.6) shows the short run relationship outcome of the error-correction model, from which the short-run effect of gross national saving , per capita income, consumer price index, average lending rate , dependency ratio, investment , real exchange rate , taxes , money supply and consumption on capital formation can be analyzed.

The coefficient of determination (R-squared) is high explaining that about 84.24% of the variation in the Gross Capital Formation is attributed or explained by the variations of the variables that are used in the model. In addition the F-statistics is significant that shows the model is good to explain the relationship between the variables in the short run.

As we seen from the above table (4.6) result similar to the long run gross national saving in the short run is statistically significant even at 1% significance level. Other things remains constant a one percent increase in gross national saving leads a 0.29 percent increase in Gross capital formation in the short run. This result is consistent with the classical and neo-classical foundations in the theory of economic growth. Other empirical studies like Biswas and Kumar (2014) and Tewodros (2015).

Investment is also very significant factor in Gross capital formation even in the short run. Other things being constant a one percent increase in Investment will lead a 0.73 percent increase in Gross capital formation.

Interest rate (presented by ALR) is a positive Impact in short run and significant at 10% significant level but insignificant in the standard level of significance (i.e. 5% significance level).So Interest Rate (ALR) is in the short run it has not that much negative influence. The grand cost comes in the long run but there may also short-term loan repayments in the short run.

4.8. Error Correction Model (ECM)

Table 4.7 Estimation Result error correction model

Variables	Coefficient	Std. Error	t-Statistic	Prob.
dlnPCI	.0053265	.2491514	0.02	0.983
dlnGNS	.4188148	.0673888	6.21	0.000
dlnCPI	-.2609375	.1268872	-2.06	0.051
dlnALR	-.1308675	.1033815	-1.27	0.218
dlnDR	-.9397798	.3650312	-2.57	0.017
dlnINVS	.5721829	.1275995	4.48	0.000
dlnREER	-.2341702	.1012359	-2.31	0.030
dlnTX	-.1912236	.1556727	-1.23	0.232
dlnM2	-.2664358	.2163359	-1.23	0.231
dlnCONS	.0375683	.0260869	1.44	0.163
LU(-1)	-1.375994	.2867199	-4.80	0.000
Constant	.0277783	.0302088	0.92	0.367

Source: Our Analysis Result (2018)

R-squared	0.9212
Adjusted R-squared	0.08836
F-statistic	24.45
Prob(F-statistic)	0.0000

From the ECM estimation result, the coefficient of the lagged error correction term LU (-1) has a negative sign which satisfies the theoretical expectation that in the short run the rate of capital formation converges to its equilibrium point. In other words, the negative coefficient of LU (-1) be interpreted that in case of any equilibrium that the capital formation rate will be back towards its long -run path. The speed of this adjustment however is determined by the magnitude of the coefficient. Based on the result of table (4.7), the value of the coefficient for the error correction term is -1.375994 implying the shock to the capital formation is adjusted in each year. On the other hand, the coefficient of Gross National saving (GNS) in the error correction model shows the effect of multiplier that measures the immediate effect that a change in log (GNS) will have on Gross capital formation (GCF). This shows the sort-run effect of national saving on capital formation. According to ECM result given table (4.7), the coefficient for GNS is too small and insignificant. Though in the long-run the variation of the capital formation explained by gross national saving, but in short run a one percentage point in the Gross national saving leads to 0.42% of variations in Capital formation. However, this result is statistically insignificant, because the probability value of the t-statistic is quite high,i.e. More than 0.05.

In conclusion, short –run changes in gross national saving do not have astron and significant effect on the change of capital formation as it has in the long-run. The other important economic interpretation in the error correction model is the coefficient of the lagged error correction term LU (-1), it reveals that in a case of shock and equilibrium, the model converges to its equilibrium position in the long-run. From the estimation result, it revealed that the disequilibrium is adjusted in each year. The next step after estimating the error correction model is to check for the adequacy of the model by performing diagnostic tests.

4.9. Granger causality Test

Granger causality test gives important information of the causal direction between the variables and knowing the direction of causality and it helps to make long-run and short-run analysis between variables.

Table 4.8 Granger causality Wald tests

Null hypothesis	F-Statistic	Probability
Log(GCF)doesn't granger cause log(GNS)	6.1353	0.047
Log(GNS)doesn't granger cause log(GCF)	3.871	0.144

Source: Our analysis Result (2018)

From the above table (4.8) shows that the hypothesis that log (GNS) does not granger cause log (GCF) can not reject at 5% significance level because P-value 0.144 is greater than 0.05 as a result we accept our null hypothesis which says log (GNS) does not granger causes to log (GCF).

On the other hand if we see our null hypothesis log (GCF) does not granger causes log (GNS) P-value is 0.047 which is less than 0.05 this means that reject our null hypothesis, so log (GCF) is granger cause for log (GNS). From the table (4.8) we can conclude that there is uni-causal direction between log (GCF) and log (GNS) in Ethiopia for the year 1980 -2016 only log (GCF) is cause for log(GNS).

4.10. Discussion of Findings

From the estimated result in Table (4.5) Gross National Saving, Per Capita Income, Investment, and Consumption have a positive impact on capital formation in both short run and long run estimation in Ethiopia, but consumer price index, dependency ratio, real effective exchange rate, Taxes and Money supply has a negative impact all in the long-run and short run, However average landing rat has negative impact in the long run but positive impact in the short run.

The ErrorCorrection Model is statistically significant at 5% level and is negative. Thus, it will rightly act to restore any distortion in the equilibrium with a speed of adjustment of 35.5% annually.

From the ECM estimation result, the coefficient of the lagged error correction term LU (-1) has a negative sign which satisfies the theoretical expectation that in the short run the rate of capital formation converges to its equilibrium point. In other words, the negative coefficient of LU (-1) be interpreted that in case of any equilibrium that the capital formation rate will be back towards its long -run path. The speed of this adjustment however is determined by the magnitude of the coefficient.

i) The overall Regression is significant at 5% and 1% level of significance in the long-run as the probability of F-stat (0.0000) in table 6. It is also significant in the short-run. So we accept the fact that there is a significant relationship between gross National saving and capital formation.

ii)Gross National Saving is significant at 5% (Prob. of t-stat =0.000) level in the long-run. It is also significant at 5% in the short run, so we reject the null hypothesis and conclude that gross National saving enhances Gross capital formation.

iii) The prob. of t-stat. for average lending rate is not significant at 5% level in both the long-run and the short-run. Due to that average lending rate can notplays a crucial role in Gross capital formation in Ethiopia in the long-run and short run.

iv) Due to the high probability value of savings both in the long-run and short-run, we accept the null hypothesis and conclude that savings does not exert any significant positive impact on gross capita; formation in Ethiopia.

v) Interest Rate is significant in the Short-run and we deduce that it plays a significant positive role on capital formation in Ethiopia.

Vi) Consumer Price Index is insignificant both in the long-run and short-run. So we conclude that it does not contribute positively to Gross Capital Formation in Ethiopia.

5. SUMMARY, CONCLUSION AND POLICY RECOMMENDATIONS

5.1. Summary

Savings play vital role in the economic development of a country by promoting capital formation through rising of the financial resources. Encourage saving by giving various types of incentives to the saver. These savings are made available to the businessman; make use of them for productive purposes in the country. Ethiopia has made a significant progress towards becoming a functioning market economy and establishing a satisfactory track record of macroeconomic stabilization and performance and also good progress has been made in capital formation. Consequently this study investigated the effect of savings on Capital formation in Ethiopia. The study was undertaken based on Error Correction Model (ECM) by employing time series data of 36 years. The study used one dependent, ten independent variables, the dependent variable representing gross capital formation (GCF) and ten explanatory variables representing Per Capita Income (PCI), Gross National saving (GNS), Consumer Price Index (CPI), Average Lending Rate (ALR), Dependency Ratio (DR), Investment (INVS), Real Exchange Rate (REER), Taxes (TX), Money Supply (M2), and Consumption (CONS).

5.2. Conclusion

The objective of this study is to analyze the Long and Short run determinants of capital formation in Ethiopia during the specified study period. To determine the long run and short run relationship among the variables, Error Correction Model (ECM) was applied. Finally, the study findings are discussed in the subsequent paragraphs as follows:

This work investigated the determinants of capital formation in Ethiopia. The analysis discovered that there is a significant positive impact of gross national saving on capital formation in Ethiopia both in the short-run and long-run. The positive effect of national saving on capital formation conform a prior expectation since increased national savings will lead to greater availability of investment fund which will lead to greater productivity, and higher growth of capital formation in the economy. It also discovered that rate of savings is significant to enhance economic development. This regression finding is supported by descriptive analysis that on

average the national saving over the sample period accounted to be 12.81 percent as compared to GDP and also shows upward trend over the sample period.

Lastly, interest rate (ALR) had insignificant effect on capital formation in long -run in Ethiopia. This result of the study implies that depositors are not sensitive on interest rate. Thus, accumulation of financial saving in Ethiopia is determined more by the desire to invest than the desire to live on interest income.

To sum up, the findings of correlation analysis reveal that there exist strong significance positive relationships between National saving, Capital formation Investment and Taxes. On the contrary, correlation analysis reveals that there exist insignificance relationships between capital formation, Real Effective exchange rate, Dependency ratio, and Average lending rate.

5.3. Policy Recommendation

Based on the finding of the study, the following policy recommendation made:

- Since Gross National saving has been very significant factor for capital formation in Ethiopia for short and long run. So the public authorities should encourage savings by enhancing interest rate. The government should be creating an enabling atmosphere and provide more infrastructural facilities to pave way for investment which in turn will boost capital formation. Government should induce the money and capital market to function adequately in order to enhance investor's confidence. This will go a long way in boosting the capital formation and thereby enhance economic growth.
- Since investment is very significant factor for Physical capital formation in Ethiopia for short and long run. So the government of Ethiopia should give greater attention by continuing the current trend to investment on infrastructures such as roads, telecommunication, hydro powers, railways, and industries etc. which are the engines for economic growth.
- The paper recommended based on the econometric results that the government should encourage savings, create conducive investment climate and improve the infrastructure base of the economy to boost capital formation and hence promote sustainable growth. Recently, Ethiopia implemented various domestic resource mobilization schemes like improving pension fund policies, introducing housing scheme and issuing long term

bond for power generation. In addition, financial sectors especially banks have improved their outreach throughout the country to mobilize sufficient funds. However, as observed from the widening saving-investment gap to GDP ratio from merely 10.75% in 1980 to about 12.81% in 2016, the fast and high economic growth during the last decade relies more and more on foreign loans and grants. Therefore, to make investment sustainable from own resource mobilization, further resource mobilization schemes must be in place.

- Regarding with Real Effective Exchange Rate and Taxes both has a negative effect on the Gross capital formation. But for developing countries like Ethiopia, where capital is to scarce it is inevitable to depend on alternative sources to finance its mega projects and to fill its resource and budget gaps. So the government and other concerning bodies should set a clear cut policy that will lead to the proper management of Real Effective Exchange Rate and Taxes received by allocating them to the intended purpose.
- Consumer price index has Negative impact on Gross Capital Formation in both short and long run for this research. But moderate or low inflation is important for Gross capital formation because it increases or creates supply of goods and services. So the government should keep it as much as possible 3%-7%. The researcher will recommend the one will have interest to do further research on the area in order to investigate the effect of inflation on Capital formation in Ethiopia by including other relevant variables.
- Finally, as the findings of this study shows that Ethiopia faces challenge with wide saving and investment gap in recent years which have been financed by external sources. And the risk associated with external sources of financing suggests the motivation to depend on national saving to finance the domestic investment sustained economic growth. The financial sector in Ethiopia does not properly play its role. Finance is very important to facilitate either investment or the day to day activities as a whole. so the government should have a proper monetary policy in order to enhance business activities and increase the economic growth by developing the financial sector.

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APPENDIX

Table1: Trend of Gross National Saving (% of GDP) in Ethiopia from 1980-2016

Year	%
1980	5.005
1981	6.009
1982	5.17
1983	5.427
1984	8.091
1985	5.916
1986	7.301
1987	5.564
1988	10.196
1989	8.191
1990	7.151
1991	4.951
1992	6.554
1993	7.484
1994	9.228
1995	13.486
1996	12.23
1997	10.034
1998	12.527
1999	7.396
2000	16.798
2001	19.708
2002	16.612
2003	18.022
2004	25.468
2005	17.14

2006	13.021
2007	21.926
2008	20.829
2009	15.41
2010	24.494
2011	33.059
2012	31.176
2013	28.058
2014	26.658
2015	26.988
2016	28.157

Source: IMF

Table (2) Trend of Investment (% of GDP) in Ethiopia from 1980 - 2016

Year	%
1980	15.749
1981	15.30
1982	15.497
1983	13.74
1984	18.744
1985	12.057
1986	17.90
1987	16.785
1988	22.784
1989	15.69
1990	13.81
1991	11.516
1992	10.594
1993	16.389
1994	17.47

1995	12.352
1996	17.515
1997	13.393
1998	15.194
1999	15.203
2000	20.217
2001	21.528
2002	22.838
2003	21.006
2004	25.05
2005	22.384
2006	23.914
2007	20.781
2008	21.244
2009	24.677
2010	25.524
2011	32.108
2012	37.098
2013	34.081
2014	34.483
2015	39.795
2016	38.816

Source: IMF

Table 3: Trend Of National Saving and Investment in Ethiopia from 1980 - 2016

Year	NS/GDP (ratio in %)	I/GDP (ratio in %)	S-I Gap/GDP (ratio in %)
1980/1981	5.005	15.749	(10.744)
1981/1982	6.009	15.30	(9.291)
1982/1983	5.17	15.497	(10.327)
1983/1984	5.427	13.74	(8.313)
1984/1985	8.091	18.744	(10.653)
1985/1986	5.916	12.057	(6.141)
1986/1987	7.301	17.90	(10.599)
1987/1988	5.564	16.785	(11.221)
1988/1989	10.196	22.784	(12.588)
1989/1990	8.191	15.69	(7.499)
1990/1991	7.151	13.81	(6.659)
1991/1992	4.951	11.516	(6.565)
1992/1993	6.554	10.594	(4.04)
1993/1994	7.484	16.389	(8.905)
1994/1995	9.228	17.47	(8.242)
1995/1996	13.486	12.352	1.134
1996/1997	12.23	17.515	(5.285)
1997/1998	10.034	13.393	(3.359)
1998/1999	12.527	15.194	(2.667)

1999/2000	7.396	15.203	(7.807)
2000/2001	16.798	20.217	(3.419)
2001/2002	19.708	21.528	(1.82)
2002/2003	16.612	22.838	(6.226)
2003/2004	18.022	21.006	(2.984)
2004/2005	25.468	25.05	0.418
2005/2006	17.14	22.384	(5.244)
2006/2007	13.021	23.914	(10.893)
2007/2008	21.926	20.781	1.145
2008/2009	20.829	21.244	(0.415)
2009/2010	15.41	24.677	(9.267)
2010/2011	24.494	25.524	(1.03)
2011/2012	33.059	32.108	0.951
2012/2013	31.176	37.098	(5.922)
2013/2014	28.058	34.081	(6.023)
2014/2015	26.658	34.483	(7.825)
2015/2016	26.988	39.795	(12.807)

Source: -IMF

Variable	VIF	1/VIF
DlnINVS	3.80	0.263235
DlnTX	2.84	0.352451
DlnGNS	2.53	0.395250
DlnPCI	2.11	0.473959
LU	1.65	0.604970
DlnREER	1.55	0.646487

DlnALR	1.37	0.729455
dlnM2	1.30	0.768015
DlnCPI	1.25	0.803088
DlnCONS	1.23	0.813371
DlnDR	1.23	0.813371
Mean VIF	1.90	

Table 10: Result of Variance Inflating Factor (VIF)

Source: Result From My Data

Equations	Kurtosis	Chi-square	Degree of Freedom	Prob>Chi-square
dlnGCF	0.0625	3.77	1	0.1519
dlnPCI	0.0011	19.86	1	0.0000
dlnGNS	0.2894	1.20	1	0.5492
dlnCPI	0.0342	9.54	1	0.0085
dlnALR	0.0000	37.67	1	0.0000
dlnDR	0.0000	38.65	1	0.0000
dlnINVS	0.3655	1.18	1	0.5547
dlnREER	0.1311	5.97	1	0.0506
dlnTX	0.3699	2.77	1	0.2503
dlnM2	0.0257	7.47	1	0.0239
dlnCONS	0.0000	16.55	1	0.0003

Table 12: Kurtosis to TestNormality

	LnPCI	lnGNS	LnCPI	lnALR	lnDR	LnINVS	lnREER	lnGCF	lnTX	LnM2	lnCONS
lnPCI	1.000										
lnGNS	0.8780	1.0000									
lnCPI	0.8418	0.9489	1.0000								
lnALR	0.3057	0.5318	0.5316	1.0000							
lnDR	-0.6477	-0.6142	-0.6007	-0.2613	1.0000						

lnINVS	0.8923	0.9738	0.9817	0.5275	-0.6269	1.0000					
lnREER	-0.1445	-0.3704	-0.3143	-0.6821	0.2518	-0.3725	1.0000				
lnGCF	0.9201	0.9834	0.9488	0.4976	0.670	0.9846	-0.3603	1.0000			
lnTX	0.8998	0.9696	0.9488	0.5233	-0.6375	0.9970	-0.3875	0.9833	1.0000		
lnM2	0.8225	0.9519	0.9858	0.5167	-0.5891	0.9848	-0.3892	0.9519	0.9812	1.0000	
lnCONS	0.7494	0.8765	0.8729	0.4260	-0.5365	0.8786	-0.31510	.8656	0.8832	0.8953	1.0000

Table (13) Pair-wise Correlation Matrix between variable

Source: Result From My Data

```
. sum lnGCF lnPCI lnGNS lnCPI lnALR lnDR lnINVS lnREER lnTX lnM2 lnCONS
```

Variable	Obs	Mean	Std. Dev.	Min	Max
lnGCF	36	17.81106	.8899177	16.59228	20.18826
lnPCI	36	8.275487	.3457815	7.786822	9.089756
lnGNS	36	17.70512	.8940274	16.33811	20.02152
lnCPI	36	3.270191	.80136	2.197225	4.964941
lnALR	36	2.337525	.2479344	1.916923	2.74084
lnDR	36	4.479671	.0664138	4.317488	4.551769
lnINVS	36	16.69793	1.687908	14.68025	20.19344
lnREER	36	4.990218	.3161524	4.53582	5.651787
lnTX	36	16.18275	1.452932	14.37912	19.25644
lnM2	36	16.40896	1.324347	14.3551	19.00071
lnCONS	36	19.01605	.8144177	16.09155	20.90258

```
. gen LlnPCI=L.lnPCI
(1 missing value generated)
```

```
. gen dlnPCI= lnPCI-LlnPCI
(1 missing value generated)
```

```
. dfuller dlnPCI, trend regress
```

Dickey-Fuller test for unit root Number of obs = 34

Test Statistic	Interpolated Dickey-Fuller		
	1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	-4.994	-4.297	-3.218

MacKinnon approximate p-value for Z(t) = 0.0002

D.dlnPCI	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
dlnPCI						
L1.	-.8914859	.1785195	-4.99	0.000	-1.255579	-.527393
_trend	.0033291	.0014418	2.31	0.028	.0003886	.0062696
_cons	-.0336357	.0267038	-1.26	0.217	-.0880985	.0208271

```
. dfuller dlnGCF, trend regress
```

Dickey-Fuller test for unit root Number of obs = 34

Test Statistic	Interpolated Dickey-Fuller		
	1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	-7.405	-4.297	-3.218

MacKinnon approximate p-value for Z(t) = 0.0000

D.dlnGCF	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
dlnGCF						
L1.	-1.355374	.1830255	-7.41	0.000	-1.728657	-.9820912
_trend	.009371	.0039301	2.38	0.023	.0013555	.0173864
_cons	-.0403136	.0767531	-0.53	0.603	-.1968526	.1162255

```
. dfuller dlnGNS, trend regress
```

```
Dickey-Fuller test for unit root           Number of obs   =       34
```

Test Statistic	Interpolated Dickey-Fuller			
	1% Critical Value	5% Critical Value	10% Critical Value	
Z(t)	-7.750	-4.297	-3.564	-3.218

```
MacKinnon approximate p-value for Z(t) = 0.0000
```

D.dlnGNS	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
dlnGNS						
L1.	-1.365132	.1761488	-7.75	0.000	-1.72439	-1.005874
_trend	.0069812	.0054441	1.28	0.209	-.0041222	.0180846
_cons	.0092529	.1084956	0.09	0.933	-.2120254	.2305311

```
. dfuller dlnCPI, trend regress
```

```
Dickey-Fuller test for unit root           Number of obs   =       34
```

Test Statistic	Interpolated Dickey-Fuller			
	1% Critical Value	5% Critical Value	10% Critical Value	
Z(t)	-5.503	-4.297	-3.564	-3.218

```
MacKinnon approximate p-value for Z(t) = 0.0000
```

D.dlnCPI	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
dlnCPI						
L1.	-.9886393	.1796525	-5.50	0.000	-1.355043	-.6222356
_trend	.0032487	.0022043	1.47	0.151	-.001247	.0077444
_cons	.0220694	.0427445	0.52	0.609	-.0651085	.1092473

. dfuller dlnALR, trend regress

Dickey-Fuller test for unit root Number of obs = 34

Test Statistic	Interpolated Dickey-Fuller			
	1% Critical Value	5% Critical Value	10% Critical Value	
Z(t)	-6.041	-4.297	-3.564	-3.218

MacKinnon approximate p-value for Z(t) = 0.0000

D.dlnALR	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
dlnALR						
L1.	-1.081383	.1790003	-6.04	0.000	-1.446457	-.7163099
_trend	-.0001934	.0028296	-0.07	0.946	-.0059645	.0055776
_cons	.0129303	.0567986	0.23	0.821	-.1029111	.1287717

. dfuller dlnDR, trend regress

Dickey-Fuller test for unit root Number of obs = 34

Test Statistic	Interpolated Dickey-Fuller			
	1% Critical Value	5% Critical Value	10% Critical Value	
Z(t)	-5.807	-4.297	-3.564	-3.218

MacKinnon approximate p-value for Z(t) = 0.0000

D.dlnDR	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
dlnDR						
L1.	-1.044316	.1798501	-5.81	0.000	-1.411123	-.6775094
_trend	-.0007887	.0007624	-1.03	0.309	-.0023436	.0007662
_cons	.0082008	.0150984	0.54	0.591	-.0225927	.0389943

. dfuller dlnINVS, trend regress

Dickey-Fuller test for unit root Number of obs = 34

Test Statistic	Interpolated Dickey-Fuller			
	1% Critical Value	5% Critical Value	10% Critical Value	
Z(t)	-7.122	-4.297	-3.564	-3.218

MacKinnon approximate p-value for Z(t) = 0.0000

D.dlnINVS	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
dlnINVS						
L1.	-1.249951	.1755105	-7.12	0.000	-1.607907	-.8919949
_trend	.0096813	.0037417	2.59	0.015	.00205	.0173126
_cons	.0303572	.0693076	0.44	0.664	-.1109966	.171711

. dfuller dlnREER, trend regress

Dickey-Fuller test for unit root Number of obs = 34

Test Statistic	Interpolated Dickey-Fuller			
	1% Critical Value	5% Critical Value	10% Critical Value	
Z(t)	-4.630	-4.297	-3.564	-3.218

MacKinnon approximate p-value for Z(t) = 0.0009

D.dlnREER	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
dlnREER						
L1.	-.8510964	.1838179	-4.63	0.000	-1.225995	-.4761973
_trend	-.0000984	.0030567	-0.03	0.975	-.0063327	.0061359
_cons	-.0034563	.0612453	-0.06	0.955	-.1283669	.1214542

. dfuller dlnTX, trend regress

Dickey-Fuller test for unit root Number of obs = 34

	Test Statistic	Interpolated Dickey-Fuller		
		1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	-4.259	-4.297	-3.564	-3.218

MacKinnon approximate p-value for Z(t) = 0.0036

D.dlnTX	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
dlnTX						
L1.	-.7383751	.1733613	-4.26	0.000	-1.091948	-.3848025
_trend	.0048669	.0026088	1.87	0.072	-.0004538	.0101875
_cons	.0204424	.0471901	0.43	0.668	-.0758025	.1166873

. dfuller dlnM2, trend regress

Dickey-Fuller test for unit root Number of obs = 34

	Test Statistic	Interpolated Dickey-Fuller		
		1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	-3.603	-4.297	-3.564	-3.218

MacKinnon approximate p-value for Z(t) = 0.0296

D.dlnM2	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
dlnM2						
L1.	-.5945032	.1649876	-3.60	0.001	-.9309976	-.2580087
_trend	.0015977	.0012143	1.32	0.198	-.0008789	.0040743
_cons	.0520973	.0261314	1.99	0.055	-.0011979	.1053926

. dfuller dlnCONS, trend regress

Dickey-Fuller test for unit root Number of obs = 34

Test Statistic	Interpolated Dickey-Fuller		
	1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	-17.116	-4.297	-3.218

MacKinnon approximate p-value for Z(t) = 0.0000

D.dlnCONS	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
dlnCONS						
L1.	-1.519357	.0887666	-17.12	0.000	-1.700398	-1.338317
_trend	-.0039495	.0051717	-0.76	0.451	-.0144972	.0065983
_cons	.2383171	.1035759	2.30	0.028	.0270726	.4495616

. dfuller U, trend regress

Dickey-Fuller test for unit root Number of obs = 35

Test Statistic	Interpolated Dickey-Fuller		
	1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	-5.216	-4.288	-3.216

MacKinnon approximate p-value for Z(t) = 0.0001

D.U	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
U						
L1.	-1.158519	.222098	-5.22	0.000	-1.610918	-.7061204
_trend	-.0005117	.0013309	-0.38	0.703	-.0032228	.0021993
_cons	.0092605	.0270116	0.34	0.734	-.0457604	.0642813


```
. predict U, residual
```

```
. gen LU=L.U
```

```
(1 missing value generated)
```

```
. reg lnGCF lnPCI lnGNS lnCPI lnALR lnDR lnINVS lnREER lnTX lnM2 lnCONS
```

Source	SS	df	MS	Number of obs =	36
Model	27.5215149	10	2.75215149	F(10, 25) =	349.51
Residual	.196859387	25	.007874375	Prob > F	= 0.0000
				R-squared	= 0.9929
				Adj R-squared	= 0.9901
Total	27.7183743	35	.79195355	Root MSE	= .08874

lnGCF	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
lnPCI	.1545339	.2169443	0.71	0.483	-.2922713 .6013391
lnGNS	.3972969	.0804434	4.94	0.000	.2316207 .5629731
lnCPI	-.2308966	.1734034	-1.33	0.195	-.5880276 .1262344
lnALR	-.0813763	.1266181	-0.64	0.526	-.3421511 .1793985
lnDR	-.8106417	.3141291	-2.58	0.016	-1.457603 -.1636808
lnINVS	.5211493	.1670402	3.12	0.005	.1771236 .8651749
lnREER	-.0237035	.1022865	-0.23	0.819	-.2343665 .1869594
lnTX	-.0423788	.1781045	-0.24	0.814	-.4091918 .3244341
lnM2	-.1472139	.1509638	-0.98	0.339	-.4581296 .1637017
lnCONS	.0169579	.0461344	0.37	0.716	-.0780576 .1119734
_cons	8.269862	2.427723	3.41	0.002	3.269873 13.26985

```
. sktest dlnGCF dlnPCI dlnGNS dlnCPI dlnALR dlnDR dlnINVS dlnREER dlnTX dlnM2 dlnCONS
```

Skewness/Kurtosis tests for Normality

Variable	Obs	Pr(Skewness)	Pr(Kurtosis)	joint	
				adj chi2(2)	Prob>chi2
dlnGCF	35	0.8807	0.0625	3.77	0.1519
dlnPCI	35	0.0000	0.0011	19.86	0.0000
dlnGNS	35	0.9283	0.2894	1.20	0.5492
dlnCPI	35	0.0082	0.0342	9.54	0.0085
dlnALR	35	0.0000	0.0000	37.67	0.0000
dlnDR	35	0.0000	0.0000	38.65	0.0000
dlnINVS	35	0.5878	0.3655	1.18	0.5547
dlnREER	35	0.0425	0.1311	5.97	0.0506
dlnTX	35	0.1847	0.3699	2.77	0.2503
dlnM2	35	0.0609	0.0257	7.47	0.0239
dlnCONS	35	0.9195	0.0000	16.55	0.0003

```
. hettest
```

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity

Ho: Constant variance

Variables: fitted values of dlnGCF

chi2(1) = 1.10

Prob > chi2 = 0.2941

Granger causality Wald tests

Equation	Excluded	chi2	df	Prob > chi2
lnGCF	lnGNS	3.871	2	0.144
lnGCF	ALL	3.871	2	0.144
lnGNS	lnGCF	6.1353	2	0.047
lnGNS	ALL	6.1353	2	0.047

Prais-Winsten AR(1) regression -- iterated estimates

Source	SS	df	MS	Number of obs =	36
Model	52.5242814	9	5.83603126	F(9, 26) =	782.11
Residual	.19400885	26	.007461879	Prob > F =	0.0000
				R-squared =	0.9963
				Adj R-squared =	0.9950
Total	52.7182902	35	1.50623686	Root MSE =	.08638

lnGCF	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
lnPCI	.128354	.1787722	0.72	0.479	-.2391176	.4958256
lnGNS	.401793	.0761936	5.27	0.000	.2451748	.5584112
lnCPI	-.2266456	.1679711	-1.35	0.189	-.571915	.1186239
lnALR	-.0861995	.1249024	-0.69	0.496	-.3429401	.1705411
lnDR	-.8280822	.2777308	-2.98	0.006	-1.398966	-.2571982
lnINVS	.485905	.1289285	3.77	0.001	.2208887	.7509214
lnREER	-.0145223	.0909837	-0.16	0.874	-.2015419	.1724973
lnM2	-.1477234	.14498	-1.02	0.318	-.4457341	.1502873
lnCONS	.0139476	.0457413	0.30	0.763	-.0800749	.1079702
_cons	8.403979	2.219638	3.79	0.001	3.841448	12.96651
rho	-.1704813					

Durbin-Watson statistic (original) 1.849153
 Durbin-Watson statistic (transformed) 1.716172

. vif

Variable	VIF	1/VIF
dlnINVS	3.80	0.263235
dlnTX	2.84	0.352461
dlnGNS	2.53	0.395250
dlnPCI	2.11	0.473959
LU	1.65	0.604970
dlnREER	1.55	0.646487
dlnALR	1.37	0.729455
dlnM2	1.30	0.768015
dlnCPI	1.25	0.803088
dlnCONS	1.23	0.812754
dlnDR	1.23	0.813371
Mean VIF	1.90	

Cleaned Data (In millions)

year	LPCI	LGNS	LCPI	LALR	LDR	LINVS	LREER	LGCF	LTX	LM2	LCONS
1980	8.1919	16.6727	2.1972	2.1748	4.5009	14.68	5.1778	16.901	14.379	14.355	18.379
1981	8.16399	16.5059	2.2513	2.1748	4.4998	14.744	5.0913	16.91	14.445	14.453	16.092
1982	8.23274	16.6277	2.3026	2.1748	4.4998	14.729	5.1885	16.89	14.592	14.595	18.493
1983	8.14009	16.9629	2.3026	2.1748	4.4998	14.983	5.2694	17.148	14.646	14.682	18.398
1984	8.00986	16.3381	2.3888	2.1748	4.502	14.7	5.2802	16.592	14.658	14.806	18.356
1985	8.07583	17.1317	2.5802	2.1748	4.5042	15.168	5.4777	17.113	14.847	14.972	18.387
1986	8.17866	17.0215	2.451	2.1748	4.5076	15.176	5.5078	17.195	14.889	15.086	18.53
1987	8.14934	17.3494	2.4069	1.9169	4.5109	15.486	5.322	17.465	15.059	15.179	18.471
1988	8.12379	17.1227	2.4681	1.9169	4.5163	15.187	5.23	17.119	15.176	15.244	18.513
1989	8.13459	17.0287	2.5726	1.9169	4.5218	15.11	5.2364	17.015	14.961	15.423	18.564
1990	7.85369	16.423	2.6247	1.9169	4.5283	15.059	5.3033	16.795	14.811	15.629	18.58
1991	7.78682	16.6097	2.9957	1.9169	4.5347	15.015	5.4441	16.634	14.608	15.739	18.555
1992	7.87005	17.3324	3.0155	1.9169	4.5412	15.701	5.6518	17.184	14.976	15.841	18.641
1993	7.92757	17.2302	3.0587	2.7014	4.5465	15.825	5.1387	17.265	15.186	15.941	18.663
1994	7.95826	17.6631	3.1224	2.6391	4.5518	16.085	4.8154	17.398	15.593	16.11	18.688
1995	8.02815	17.7091	3.2619	2.6797	4.4987	16.225	4.723	17.526	15.757	16.11	18.795
1996	8.05344	17.6449	3.1655	2.7134	4.492	16.321	4.6492	17.578	15.881	16.12	18.833
1997	7.99886	17.7083	3.1398	2.7408	4.4886	16.408	4.6318	17.573	15.942	16.222	18.814
1998	8.02762	17.2223	3.1398	2.451	4.4785	16.48	4.7833	17.618	16.072	16.247	18.926
1999	8.10585	17.5008	3.2387	2.4639	4.4751	16.5	4.7274	17.604	16.095	16.384	18.984
2000	8.15928	17.6859	3.2581	2.4849	4.4682	16.58	4.6002	17.744	16.176	16.436	19.049
2001	8.14867	17.5462	3.1442	2.5455	4.4543	16.672	4.605	17.872	16.158	16.465	19.106
2002	8.10182	17.5818	3.1311	2.3749	4.4613	16.687	4.5358	17.768	16.227	16.551	19.103
2003	8.20319	17.9514	3.2958	2.3749	4.445	17.03	4.5931	18.072	16.449	16.708	19.146
2004	8.2882	17.9997	3.3178	2.3749	4.4391	17.126	4.5971	18.074	16.554	16.874	19.322
2005	8.36648	18.019	3.421	2.3514	4.4344	17.398	4.5444	18.236	16.787	16.986	19.438
2006	8.44123	18.3399	3.5234	2.3514	4.4344	17.535	4.6766	18.214	16.897	17.204	19.501
2007	8.50973	18.2752	3.6636	2.3514	4.5326	17.912	4.7983	18.327	17.21	17.381	19.639
2008	8.56905	18.3497	4.1043	2.4423	4.5326	18.229	4.9127	18.428	17.509	17.556	19.716
2009	8.66157	18.5427	4.1304	2.5055	4.5326	18.444	5.2231	18.629	17.802	17.775	19.84
2010	8.74285	18.903	4.2017	2.5055	4.5326	18.924	4.9541	18.924	18.051	18.148	19.871
2011	8.80203	18.9597	4.524	2.4749	4.5326	19.44	4.7958	19.151	18.449	18.368	19.929
2012	8.87555	18.9747	4.7131	2.4749	4.3175	19.504	5.0106	19.167	18.636	18.558	20.05
2013	8.93921	19.1462	4.7842	2.4749	4.3175	19.814	5.0845	19.373	18.8	18.714	20.111
2014	9.00783	19.2823	4.8652	2.4749	4.3175	20.053	5.1556	19.509	19.045	18.857	20.192
2015	9.08976	20.0215	4.9649	2.4749	4.3175	20.193	4.9119	20.188	19.256	19.001	20.903