ADDIS ABABA UNIVERSITY
SCHOOL OF GRADUATE STUDIES

THE IMPACT OF PUBLIC FINAL CONSUMPTION AND INVESTMENT SPENDING ON ECONOMIC GROWTH IN ETHIOPIA: AN APPLICATION OF VECTOR ERROR CORRECTION MODEL

BY:

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A project Submitted to the School of Graduate Studies of Addis Ababa University in Partial Fulfillment of the Requirements for the Degree of Master of Arts in Applied Economic Modeling and Forecasting (Fiscal Policy Analysis and Management)

June 2014

Addis Ababa

ADDIS ABABA UNIVERSITY
DEPARTMENT OF ECONOMICS

This Is To Certify That The Project Prepared By Adnan Abdulaziz Shahir, Entitled: "The Impact Of Public Final Consumption And Investment Spending On Economic Growth In Ethiopia: An Application Of Vector Error Correction Model" and submitted in partial fulfillment of the requirement for the Degree Of Master Of Arts In Applied Economic Modeling And Forecasting (Fiscal Policy Analysis And Management) complies with the regulation of the university and meets the accepted standards with respect to the originality and quality.

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ACKNOWLEDGEMENT

It has become the willingness of Allah to successfully complete my Master program. I, therefore, praise Him.

I would like to forward my appreciation and gratitude to my advisor Alemu Mekonnen (PhD) for his unreserved constructive comments throughout the development of this paper. In addition, it gives me deep pleasure to pass on my heartfelt thanks to Mohammed Seid, my intimate friend and lecturer at Debrebirhan University, who has immense contribution for my acquaintance with Eviews software package. He has important contributions to this paper in the areas of regression as well as a useful comments and suggestions to the finalization of my thesis work.

It is also my pleasure to express my gratitude to the Ministry of Finance and Economic Development of Ethiopia for providing education opportunity and covering all expenses related with this program

Finally, I am also grateful to my wife Seada Mohammed, my parents and the whole family for their appreciation and absolute love at the time of the study.

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LIST OF ACRONYMS

AR1	Auto-Regressive Disturbance Term
G-7	Group of Seven
GDP	Gross Domestic Product
GMM	Generalized Method of Moments
GTP	Growth and Transformation Plan
MOFED	Ministry of Finance and Economic Development
OECD	Organization for Economic Co-operation and Development
NEPAD	New Partnership for Africa's Development
OLS	Ordinary Least Squares
SDPRP	Sustainable Development and Poverty Reduction Program
SNA	System of National Account

Abstract

The Impact of Public Final Consumption and Investment Spending On Economic Growth (The Case Study of Ethiopia): Vector Error Correction Model

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Addis Ababa University, 2014

The objective of this paper was to investigate the impact of public sector investment and final consumption expenditure on economic growth using time series data on Ethiopia (for 54 years). In addition, it intended to explore the pattern and relative impact of public and private consumption and investment decision on the economy. I formulate a simple growth accounting model, adapting Ram (1986) in which total government expenditure is disaggregated into expenditure on (physical) investment and final consumption. The analysis is based on time series data covering the period 1960-2014. The study applies the augmented Dickey Fuller test for stationarity and Johansson co-integration test used to determine whether there is a long run relationship between variables. Vector error correction model is applied to estimate both short and long run models related with Real Gross Domestic Product of Ethiopia.

The empirical results suggest that in the long run government investments and final consumption has positive and negative effect on economic growth, respectively. Similarly, private investment, private final consumption and primary education enrolment rate have positive effects on economic growth. However, all variables included in the model except government consumption do not have an impact on economic growth in the short run.

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CHAPTER ONE INTRODUCTION

1.1 BACKGROUND OF THE STUDY

Government usually adopts either fiscal or monetary policy in order to motivate the economy for further growth or to tackle various shocks occurring in the economy. Government expenditure includes all government consumption and investment but excludes transfer payments made by a state. Government acquisition of goods and services for current use to directly satisfy individual or collective needs of the members of the community is classified as government final consumption expenditure. Similarly, government acquisition of goods and services intended to create future benefits, such as infrastructure investment or research spending, is classified as government investment (government gross fixed capital formation). The above two types of government spending, on final consumption and on gross capital formation; together constitute one of the major components of gross domestic product. Government finances its expenses through tax, aid and loan. Economic growth is one of the most important determinants of economic welfare. Yet, the role of fiscal policy in stimulating growth is poorly understood. In the standard neoclassical growth model, the pace of growth in output over the long run is determined by growth in labor supply, accumulation of physical and human capital, and technological change. If fiscal policy increases the incentive to save or to invest, the equilibrium capital-output ratio will be altered; thus, the growth rate will rise as the economy transitions to a new higher level of output per capita, but in the long-run it will return to its previous level.

The relationship between public expenditure and economic growth has been comprehensively treated in a number of theoretical and empirical literatures. The theoretical foundation of this relationship can be traced as far back as the time of Wagner (1883), to Keynes (1936), Peacock and Wiseman (1961), and later to Musgrave (1969). Two schools of thought arose on the direction of causality between public expenditure and economic growth. One is that, public expenditure is a consequence of economic growth as posited by Wagner (1883) and the other is by Keynes (1936) who stated that public expenditure is a tool adopted by the government to reverse economic downturns by borrowing money from the private sector and then returning it to

them through various spending programs, hence, economic growth is an outcome of public expenditure.

This relationship is considered empirically in the perspective of the growing public sector and its impact on economic growth which happened universally almost right away after the World War II in which two contending views emerged. One view is that the decline in economic growth for both developed and less developed countries results from the growth of public sector as posited by Landau (1983, 1986). The other view is that the decline in economic growth for both developed and less developed countries does not result from the growth of public sector as noted in the works of Ram (1986), Singh and Sahni (1984) and Robinson (1977). Many scholars have supported the fact that increases in government expenditure on socio-economic and physical infrastructures encourage economic growth. For instance, studies conducted by Abu and Abullahi (2010), Al-Yousif (2000), Abdullah (2000) and Cooray (2009) all concluded that expansion of government expenditure induces economic growth positively. Their studies simply suggest that government expenditure on infrastructure and human capital will increase the productivity of labor and increase the growth of national output. Moreover, expenditure on infrastructure such as roads, communications, power, etc, reduces production costs, increases private sector investment and profitability of firms, thus fostering economic growth (Abu et al 2010).

Public expenditure is the core tool used by government especially in developing countries to press forward economic growth which is an indispensable component for sustainable development. Economic growth brings about a better standard of living of the people through provision of better infrastructure, health, housing, education services and improvement in agricultural productivity and food security (Loto 2012). Almost all the sectors in the national economies of developing countries demand more budgetary allocations every year. For instance, the agricultural sector under the Maputo Declaration of 2003 requires African Governments to increase expenditure on agricultural sector to at least 10 percent of the national budgetary resources (New Partnership for Africa's Development (NEPAD), 2011). Thus, in view of the competing uses of public funds there is a need to investigate the appropriate way of allocating

funds and to examine the effect of the composition of public expenditure on economic growth in most countries. In addition, a further justification for continued empirical interest in investigating the effects of government expenditure on economic growth is that previous studies have produced conflicting results.

Ethiopian government has been experiencing increasing government spending in the past 30 years. Especially, after EPRDF took over, Government expenditure both in terms of recurrent and capital have stepped up. At the early stage of the regime much of the expenditure was directed toward stabilizing the war affected areas and affirmative action policy was predominantly applied to bring considerably unprivileged region to benefit from development equally. The current Government has introduced the following 3 successive development plans: SDPRP (Sustainable Development and Poverty Reduction Program), PASDP (Plan for Accelerated and Sustained Development to End Poverty) and GTP (Growth and Transformation Plan). GTP is the latest one and it shows how much the government is committed to implement vast public expenditure programs to facilitate the transformation of economic activity from subsistence agricultural towards modern farming and industrialization. Within the life span of the plan, Ethiopian government has intended to expend much of the budget on productive sector to uphill the quality and availability infrastructure in order to promote the engagement of private investors in the development process and to enhance the productivity of human capital. According to Ministry of Finance and Economic Development (MOFED, 2013/14), the total government expenditure within the GTP period (2010/11-2014/15) will grow at an average of 23% per annum under base case scenarios.

1.2 STATEMENT OF THE PROBLEM

A report from OECD (15/11/2012) shows that public social spending has increased to 22% of GDP on average across the OECD in 2012, up from 19% in 2007. Rising spending-to-GDP ratios are due to a combination of governments increasing expenditure on social supports such as unemployment and income support benefits but also because of GDP stagnating or declining in many countries. Even though Ethiopia is not an OECD member, its government expenditures during this period showed the same trends as OECD countries. Statistics from MOFED and

International Financial Statistics of International Monetary Fund (IMF) show that the Ethiopian government expenditure's trend shows almost a consistent increase throughout the period 1970 until 2013. At the same time its real GDP per capita also shows the same trend.

The Annual Progress Report published by MOFED (2013) reflects the firm prospect of government to utilize public expenditure focusing on investment on growth enhancing pro-poor sectors. During 2011/12, total government expenditure has increased to birr 124.4 billion from 93.8 billion in 2010/11. Out of the total government expenditure, birr 51.4 billion or 41 percent is spent on recurrent expenses, while the remaining 73 billion or 59 percent of the total expenditure is spent on capital expenditures. This spending pattern is consistent with the stated fiscal policy of the government. During the fiscal year, recurrent and capital expenditure have increased by 26.4 percent and 36.7 percent, respectively, indicating that however the economy operated under tight fiscal policy, the capacity and commitment of the government to invest on national development programs has been sustained remarkably.

Even though government expenditure has been increasing through, policy makers and researchers come up with different results regarding the effect of expansion of government on economic growth. There have been numerous studies on the role of components of government spending in the long-term growth of economies (Aschauer, 1989; Barro, 1990; Maingi, 2010; Tanzi and Zee, 1997; Ram, 1986). These studies reported conflicting results about the impacts of government spending on economic growth. Nijkamp and Poot (2002) conducted a meta-analysis of past empirical studies of public expenditure and growth and found that in a sample of 41 studies, 29% indicated a negative relationship between public expenditure and economic growth, 17% a positive one, and 54% an inconclusive relationship. Ram (1986) came up with a finding which shows government size has a positive overall impact on economic growth and it also enlightened a positive externality effect on economic development. Barro (1990) was among the first to formally endogenize government spending in a growth-model and to analyze the relationship between size of government expenditure and rates of growth and saving. He concluded that an increase in resources devoted to non-productive (but possibly utility

enhancing) government services is associated with low economic growth. Tanzi and Zee (1997) found no relationship between government size and economic growth.

Most of studies undertaken in Ethiopia have only been concerned about the causality between government expenditure and economic growth and their respective findings were mixed, with some conclusions consisting either of unidirectional causality or bidirectional causality between government expenditure and economic growth. Furthermore the causality test was unable to identify the degree of change or effect from one variable to another; for this reason this study has no interest in testing for causality. On the other hand, as highlighted in an earlier section regarding the two sides of arguments which are the proponents of big and small governments, at this point, the attention is given to identify the right side of these two arguments. In addition I would also like to identify the degree of association between the government expenditure particularly on final consumption and gross capital formation and economic growth. To my knowledge, there are only few studies undertaken on this in Ethiopia and most of them are outdated. Thus, this study attempts to investigate the association between government expenditure and economic growth in Ethiopia from 1960 to 2013.

1.3 OBJECTIVE OF THE STUDY

The general objective of the paper is to investigate the short run and long run impact of public final consumption and investment expenditure on economic growth in Ethiopia. In addition, it also examines and compares the relative importance of public and private expenditure regarding consumption and investment. Specifically, the objectives of this study are:

1. To analyze the structure and extent of public final consumption and investment expenditure trend and its implication on economic growth in Ethiopia throughout the three regimes.
2. To investigate whether government expenditure on final consumption and investment facilitate or impede Economic growth.
3. To assess the relative contribution of private and public sector towards of economic growth.

1.4 SIGNIFICANT OF THE STUDY

Even if public spending plays a considerable role in fulfilling basic need, speeding up economic transformation and alleviating vicious circle poverty in developing country, so far no recent research has been done in Ethiopia regarding the impact of public final consumption and investment expenditure on economic growth. To the best of my knowledge, the only econometric studies on the impact of government expenditure on economic growth are a study by Teshome Ketema (2006) studied "the impact of government expenditure on economic growth" and Tewodros Ayenew (2010) focusing on correlation between fiscal policy tolls and economic growth. In order to fill the research gap in this area, I have tried to analyze the historical relationship between government final consumption and investment expenditure and economic growth in Ethiopia for the past 54 years. In addition, following the adaptation of GTP Ethiopian government has engaged on vast infrastructural and other development activity which requires a huge capital investment. Thus, this research will try to explore whether the considerable resources mobilization is achieving the stated goals of realizing sustained economic growth.

Finally, one of the major advantages of this study is its incorporation of the most recent data and employs both qualitative analysis and advanced econometric technique to study the impact of public final consumption and investment expenditure on economic growth. Thus, the immediate outcome of this study will become a stepping stone on this research area for further studies and to provide pertinent result and policy implication to policy makers by bridging the aforementioned gap. Besides, I believe that the study will provoke and pave a way for further study in the area as it reveals the difficulty in resolving the empirical question of the impact of public final consumption and investment expenditure on economic growth

CHAPTER TWO LITERATURE REVIEW

2.1 THEORETICAL LITERATURE

2.1.1 DEFINITIONS AND CONCEPTS OF *ECONOMIC GROWTH*

Economic growth can be defined as the expansion of a nation's capability to produce the goods and services its people want [Peterson, 1988: 612]. In much the same way Todaro and Smith [2003: 793] described economic growth as the steady process by which the productive capacity of the economy is increased over time to bring about rising levels of national output and income. Economic growth, according to Gillis *et al* [1987: 7] can also be defined as a rise in national or per-capita income and product, where income per-capita is measured as the gross national product (the value of all goods and services produced by a country's economy in a year) divided by the total population.

However, Kuznets [1974: 165, 167-169] proposes that economic growth should not be narrowly confined to changes in the level of output or income, but it should include major structural changes and correspondingly large modifications in social and institutional conditions under which the increase in output or income is attained. In his influential work, he defined a country's economic growth as a long-term rise in capacity to supply increasingly diverse economic goods to its population, and this growing capacity is based on advancing technology and the institutional and ideological adjustments that it demands.

Essentially, economic growth for any nation as specified by Bowden [1992: 812], hinges on the organization and development of a better labour force (better utilization of labour, education, attitudes, skills etc) and getting more and better capital (building more power plants, factories, and producing or importing more machines and equipments). Traditionally, there are three main components of economic growth. These components include capital accumulation, growth in the labour force and improved technology. Capital accumulation is raising the stock of capital in an economy while growth in labour force generally occurs as the level of the population in the economy increases. Improved technology on the other hand is seen as an increased application of

new scientific knowledge in the form of inventions and innovations with regard to both physical and human capital.

In the literature, the terms economic growth and economic development are closely related and are often used interchangeably, but it is important to highlight the difference between them because both terms are often confusing. While economic growth in simple terms refers to an increase in output, economic development entails more. Economic development encompasses a multidimensional process involving major changes in social structures, popular attitudes and national institutions, as well as the acceleration of economic growth, the reduction of inequality and the eradication of absolute poverty [Todaro, 1992: 100]. Therefore economic growth can be seen as a component of economic development.

2.1.2 FISCAL POLICY

Fiscal policy pertains to the use of government expenditures and taxes to vary macroeconomic outcomes. Almost all economic activities are affected directly or indirectly by the government's fiscal policies. Fiscal policy serves a number of purposes essential for the smooth functioning of the economy. The three main functions that are basic and often discussed are: First, government's fiscal activities provide an important role in fixing market failures and promoting efficiency. The government does this by way of distributing and allocating budgetary spending and taxes in a manner that will bring about efficiency while serving the best interest of society. Second, because macroeconomic variables in the economy are affected by changes in government expenditures and taxes, these fiscal policy instruments can be varied to stabilize the economy. The fiscal instruments, needless to say, are themselves inherently volatile and as such have also been a source of macroeconomic fluctuations. Lastly, the government reduces income disparities between households and regions through its fiscal policies by way of charging progressive taxes, supplying subsidies, etc. In sum, government through its fiscal policy can promote macroeconomic stability and economic growth while encouraging efficiency and equity.

To understand the role of fiscal policy, there is the need to look at the government's budget along with its implications on the economy. The government budget or simply the budget is a plan for spending funds and for raising revenues through taxation, fees and other means, and for borrowing funds if necessary [Hyman, 1994: 773]. Government spending can be defined as all outlays from the government budget, including those for recurrent expenditures such as civil service salaries, maintenance, military costs, interest payments and subsidies to cover public enterprise losses as well as capital expenditures such as outlays for construction of irrigation canals, hydroelectric power dams, roads, schools and purchase of non-military equipments owned by government [Gillis *et al*, 1987: 278]. Government expenditures in Ethiopia can be put into two main categories: capital expenditure and recurrent expenditure. Capital expenditures involve all those expenditures incurred on items that can last for a long period of time. It includes expenditures on building of railways, bridges, roads, schools, etc. The recurrent expenditures are government expenditures that are incurred in regular intervals or incurred within a particular year. This includes expenses like wages and salaries, payments of interest rates on loans, etc.

On the other hand, the sources of government revenue have generally been classified into tax and non-tax revenue. Taxes constitute the most important source of revenue for the government in Ethiopia. The taxes are paid by the public to enable government fund certain expenses in the common interest of society which does not entitle the tax payer to receive any direct benefit from the government in return for the tax. The revenue from taxes is used to finance investments in roads, education, health, agriculture and other areas - these spendings will have social and economic benefits to the country. Thus, by expanding the benefits of people and providing new opportunities, taxes play an important role in ensuring economic growth and development. Taxes are classified into direct and indirect taxes. Direct taxes are the types of taxes that are levied on private individuals, corporations and property whereas indirect taxes are levied on goods and services. The non-tax revenue includes fees, fines and penalties, gifts, royalties, loans and grants, sale of government properties and profits from government enterprises. The difference between all government expenditures and all government revenues is referred to as the budget balance. There are three possibilities for the relations between the government expenditures and revenues. If the revenue is exactly equal to the expenditures, the government has a balanced budget; if the

revenues exceed expenditures, there is a budget surplus and; if the revenues fall short of expenditures, there is a budget deficit.

Although the major budgetary decisions that affect the performance of the economy are usually made by the central government, most countries have local or state governments that are responsible for the provision of various services and have the authority to raise revenues through taxation or other means on their own. These budgets are prepared in accordance with national economic policy. In Ethiopia, Regional states have an authority to collect the revenue on their own territory and spend it on their own priority areas. The major sources of revenue for the local governments in Ethiopia include property rates, fines and fees, royalties, etc., which are usually not sufficient. The local governments tend to depend more on grants from the central government due to their inability to raise sufficient funds to cover expenditures.

2.1.3 GROWTH MODELS

2.1.3.1 PEACOCK-SHAW MODEL

Building on the Harrod-Domar framework for economic growth, Peacock and Shaw (1974) showed how fiscal policy affects economic growth. The Peacock-Shaw (PS) model, summarized from Peacock and Shaw [1974], assumes that on the supply side output capacity Y_t^c in period t is given by private investment I_t and government expenditure G_t in the past period. Thus:

$$\Delta Y_t^c = \beta I_{t-1} + \rho G_{t-1} \qquad (2.1.3.1.1)$$

Where β is the output-capital ratio and ρ is the proportion of government expenditure that consists of investment. The PS model assumes the demand side equation to be:

$$Y_t = C_t + I_t + G_t \qquad (2.1.3.1.2)$$

Where consumption C_t, private investment and government expenditure are given by:

$$C_t = bY_t\,(1 - T_y) \qquad (2.1.3.1.3)$$

$$I_t = I_t - 1 = I_{ot} \quad (2.1.3.1.4)$$

$$Gt = gY_t \quad (2.1.3.1.5)$$

T_y is the given rate of income tax, *b* is the marginal propensity to consume and *g* represents the ratio of current government expenditure to the level of total output.

Solving the equations (2.1.1) to (2.1.5) by routine procedures, Peacock and Shaw (1974) further specified the relationship between the fiscal variables and economic growth as:

$$\frac{\Delta Yt}{Yt-1} = (1 - b + bT_y - g + \rho g) = \frac{\Delta It}{It-1} \quad (2.1.3.1.6)$$

Equation (2.1.3.1.6) shows that, in order to utilize capital stock fully, the necessary growth demand must be equal to the required investment growth which in itself is functionally related to changes in both taxes and public expenditures. Thus, changes in taxes or public expenditures would considerably influence economic growth rate. Equation (2.1.3.1.6) in terms of the Harrod-Dormar model suggests that $(1 - b + bT_y - g + \rho g)$ in the model represents the savings rate (*s*) while β (which is output-capital ratio) represents the *1/k ;* where *k* was defined in the Harrod-Dormar model as capital-output ratio. For the Harrod-Dormar model:

$$\frac{\Delta Yt}{Yt-1} = \frac{s}{k} \quad (2.1.3.1.7)$$

Where $\frac{\Delta Yt}{Yt-1}$ represents growth rate, $k = 1/\beta$

And

$$s = (1 - b + bT_y - g + \rho g) \quad (2.1.3.1.8)$$

The equation (2.1.3.1.8) helps the government to predict the required savings rate once the target growth rate and capital-output ratio are given or estimated through its budget policies. Total savings in the economy is equal to the sum of government or public sector savings and private domestic savings. Government savings consists primarily of budgetary savings that arises from any excess of government's revenues over government's current expenditures [Gillis et al, 1983: 260]. Thus for a higher rate of economic growth, the ratio of current expenditures to the level of total output g must be reduced while increasing the ratio that consist of investment ρ (example; spending on roads, schools, health facilities, communication networks and etc). On the other

hand, the PS model proposes that, increasing revenues particularly taxes as suggested in equation (2.1.3.1.8) will help improve the budgetary savings *s* and thereby enhance economic growth.

2.1.3.2 SOLOW NEOCLASSICAL GROWTH MODEL

A typical representation of the neoclassical ideology on growth is the popular Solow growth model by Robert Solow (1956). It expanded on the Harrod-Dormar formulation by adding labour and technology which the author assumed to be an independent variable to the growth equation (and that, its progress is determined exogenously). In his model, Solow employs a Cobb-Douglas production function which is assumed to be characterized by constant returns to scale. Production function at any time t is:

$$Y\ (t) = (t)^{\beta}[A(t)L(\ t)\ ]^{1-\beta} \qquad (2.1.3.2.1)$$

Where *Y* is total output in the economy, *K* is the available capital, *L* is labour and *A* denotes the productivity of labour (also technological progress).

Multiplying equation (2.1.3.2.1) by a factor $\lambda=1/L$ yields:

$$y=Ak^{\beta} \qquad (2.1.3.2.2)$$

Where y is Y/L (output-labour ratio) and k is K/L (capital-labour ratio). Equation (2.1.3.2.2) states that output per labour is a function that depends on the amount of capital per labour and that the more capital with which each worker has to work, the more output that labour can produce. Showing that the total capital stock grows when savings are greater than depreciation, Solow proposed that:

$$\Delta k=sf\ (k) - (\delta+n)\ k \qquad (2.1.3.2.3)$$

The proposed equation above depicts the growth of the capital-labour ratio k, and shows that the growth of k depends on savings $sf\ (k)$, depreciation δk and the new workers joining the labour force n. Assuming a steady state growth, where y and k do not vary (Δy and Δk are equal to zero), equation (2.1.3.2.3) now becomes:

$$sf\ (k*) = (\delta+n)\ k \qquad (2.1.3.2.4)$$

Equation (2.1.3.2.4) represents what the author termed as the stable equilibrium of *k* denoted by *k** and at the steady state if *k* is higher or lower than *k**, the economy will return to it. Evaluating from the above analysis, the model suggests that economic growth can occur when savings and capital levels increase, but that, Solow asserted this will only be a short-run improvement and therefore argued that technological progress is the major determinant of long run growth.

2.1.4 THE IMPACT OF GOVERNMENT SPENDING ON ECONOMIC GROWTH

A number of philosophers and classical economists of the eighteenth century subscribed the doctrine of laissez-faire in the workings of the economy. Adam Smith argued that governments are always and without exception the greatest spend thrifts of society as they spend other people's money. He believed that individuals acting in self-interest will promote public good under the guidance of the invisible hand. Supporters of laissez faire maintained that people should be left unhindered to pursue their best interests and in the process they would benefit the society. The implication of this is that there is a need for minimal level of government expenditure for accelerated economic growth (Dickenson, 1996).

Another profound standard about government expenditure is Wagner's Law of Increasing State Activities. Wagner's law is a principle named after the German economist Adolph Wagner (1835-1917). Wagner advanced his 'law of rising public expenditures' by analyzing trends in the growth of public expenditure and in the size of public sector. Wagner's law postulates that: (i) the extension of the functions of the states leads to an increase in public expenditure on administration and regulation of the economy; (ii) the development of modern industrial society would give rise to increasing political pressure for social progress and call for increased allowance for social consideration in the conduct of industry; (iii) the rise in public expenditure would be more than proportional increase in the national income (income elastic wants) and will thus result in a relative expansion of the public sector. Musgrave and Musgrave (1988), in

support of Wagner's law, opined that as progressive nations industrialize, the share of the public sector in the national economy grows continually.

However, unemployment, which to classical economists was a theoretical impossibility, not only proved possible, but became a major international problem as the great depression of the 1930s revealed. One book, the General Theory of Employment, Interest and Money (1936), by John Maynard Keynes, had an insightful and pervasive influence on economists and on governments for many years. His argument that the government not only could but should use public expenditure as a tool of economic policy to manage a national economy so as to counteract unemployment, found ready acceptance in a world that had not yet recovered from great depression. This required an expansive fiscal policy, in which a government would deliberately aim at a budget deficit by spending more money (through borrowing) than it raised in taxation. The 'multiplier effect' of public expenditure would counter act unemployment. By increasing public expenditure, a government was seen to be doing something about unemployment whilst the public were getting something (additional state benefits) for nothing, as it appeared, since there was no increase in taxation. Thus, such fiscal policy was attractive to the governments since it provides a rationale for spending more money.

This 'pump priming'1 concept did not necessarily mean that government should be big. Instead, Keynesian theory asserted that government spending-especially deficit spending- could provide short-term stimulus to help end a recession or depression. The Keynesians even argued that policy makers should be prepared to reduce government spending once the economy recovered in order to prevent inflation, which they believed would result from too much economic growth. They even postulated that there was a tradeoff between inflation and unemployment (the Philips curve) and that government spending to steer the economy between too much of one or too much of the other (Mitchell, 2005).

[1] The expression 'pump priming' gained nationwide vogue during the Roosevelt New Deal 1933-9. It referred to US Government spending accompanied by deficit financing to promote economic recovery from the Great Depression, which peaked in 1933 at an unemployment rate of 24.9 percent and GNP about 30 percent below 1929 in real terms

Keynesian economists were very influential for several decades and dominated public policy from the 1930s – 1970s. The theory fell into disrepute once it became apparent that spending increases were associated with economic stagnation in the 1970s and that low tax rates and spending restraint triggered an economic boom in the 1980s. But it still influences policy discussions, particularly on whether or not changes in government spending have transitory economic effects. For instance, some lawmakers use Keynesian analysis to argue that higher or lower levels of government spending will stimulate or dampen economic growth.

Break (1982) strongly believes that a comprehensive measure of the economic role of government should be multidimensional. Construction and widespread use of multidimensional measures of size would emphasize two important facts of life about the economic role of governments. One is that there may be no single answer to whether that role is expanding or contracting. The other is that there may be no easy way to place effective limits on the rate of growth of that role.

It is a fact that no society throughout history has ever obtained a high level of economic affluence without a government. Where governments did not exist, anarchy reigned and little wealth was accumulated by productive economic activity as there is little incentive to save and invest because the threat of expropriation is real and constant. The rule of law and the establishment of private property rights often contributed importantly to economic development. Government is a necessary, though by no means sufficient, condition for prosperity (Vedder and Gallaway, 1998). At low level of development there is a conviction that more government intervention would facilitate economic development through providing social overhead capital or infrastructure. On the other hand, however, government investment programs were highly inefficient and wasteful. Government controls over private sector activity were pervasive and costly; and government public sector deficits, excessive investment programs and other government expenditures led to high rates of inflation, with their attendant adverse consequences for economic growth (Krueger, 1990). In the words of Vedder and Gallaway (1998), too much government stifles the spirit of enterprise and lowers the rate of economic growth.

Krueger (1990) provides guidance for policy makers as to how government may spend in order to bring about positive impacts on the economy. First, any decision on government spending can be undertaken only when there is a specified set of procedures or criteria for deciding what fits within the scope of the enunciated policy and also an administrative apparatus for implementing the policy2. Second, even when it appears that government action would actually be effective; there is something of a presumption in favor of policies and programs requiring a minimum of administrative and bureaucratic input. These are important because policies, once in place, appear to have a life of their own and because they divert scarce administrative resources from those in which governmental comparative advantage is stronger. Third, policies directly controlling private activity are likely to be less efficacious in terms of achieving their objectives than policies that provide incentives for individuals to undertake the activities which are deemed desirable. Thus, a presumption exists in favor of choosing a mechanism which provides least scope for rent-seeking. Finally, there is a question of transparency. When the costs of a policy are obscure, special interests in the private sector and government have a great opportunity to use those policies for their own advantage without the consent of voters and other politicians. Thus, choosing the policy with lower information costs is usually preferable.

The classical together with the neoclassical economists deem fiscal policies to be extraneous when it comes to economic growth. The classical theories stipulate that stimulations in government expenditure crowds out private investments, hampers economic growth in the short run and diminish capital accumulation in the long run [Diamond, 1989; cited in Saad and Kalakech, 2009: 3]. In fact, the classical economists believe that increases in government expenditure generate, under most circumstances, increases in prices and temporal increases in the level of output and economic growth. This is because the classical theories suppose that the economy adjusts itself to deviations from long-run equilibrium which is mainly due to the supply-determined nature of output and employment. Within the neoclassical growth framework, government activities and mainly fiscal policies have no role in determining the long-run economic growth rate, since this is determined by the exogenous population growth and

[2] These considerations are due to the view that it is grossly insufficient for economists to assert that the existence of market failures implies that there is a case for government intervention.

technological progress rates. Evident in the Solow neoclassical growth model is that the long-run or the steady-state growth rate of a country is not affected by government policies, but by the exogenous changes in population growth, savings and technological progress.

The performance of the neoclassical growth models in explaining the sources of long-run economic growth was judged inadequate and this stimulated the development of the endogenous growth models. The endogenous growth models present a theoretical framework for analyzing endogenous growth and seek to explain the factors that determine the size and the rate of economic growth that is left unexplained and exogenously determined in the neoclassical growth models [Todaro and Smith, 2003: 147]. In the endogenous growth models, economic growth occurs as a result of capital accumulation, human capital (including education and learning), knowledge or research and development (improved technology) among others. These factors depend on government policies and actions on taxation, law and order, provision of infrastructure services, financial markets and other aspects of the economy [Barro, 1997; cited in Reungsri, 2010: 15]. In that sense, government directs long-run economic growth.

The relationship between government spending and economic growth can be demonstrated by the famous army curve3. The curve illustrates that the output enhancing features of government spending dominate when government is very small, and expansions in government spending are associated with expansions in output. At low level, the productive effects of public spending are likely to exceed the social costs of raising funds. As government grows, however, the law of diminishing returns begins operating. Beyond some point, further expansion of government no longer leads to output expansion, as the growth-reducing aspects of government grow larger, and the growth enhancing features of government diminish. Further expansion of government contributes to economic stagnation and decline (Vedder and Gallaway, 1998). These negative effects may be more evident where financing relies heavily on more distortionary taxes (e.g. direct taxes) and where public expenditure focuses on unproductive activities.

[3] Borrowing a graphical technique popularized by Arthur Laffer, Richard Army, an economist, developed what he termed army curve to show the relationship between government spending and economic growth.

In this respect Vedder and Gallaway (1998) explained that, while the construction of roads initially assists output expansion, the construction of secondary roads and upgrading primary roads start to have less added positive impacts per dollar spent. Moreover, the taxes and/or borrowing levied to finance higher government expenditure impose increasing burdens, low tax rates become higher. New taxes, such as income taxes are added to low consumption levies, with increasingly adverse effect on human economic behavior. Tariffs are raised, thwarting trade. Consequently, new government spending no longer enhances economic growth. The army curve can be expressed in a simple quadratic form, as follows:

$$RGDP = \alpha + \beta G - \lambda G^2 + \gamma T$$

The positive sign on the linear term, G (government spending), is designed to show the beneficial effects of government spending on RGDP (Real Gross Domestic Product), while the negative sign for the squared term means the variable measures any adverse effects associated with increased government size. Since the squared term increases in value faster than the linear term, the presence of negative effects from government spending eventually will outweigh the positive effect, producing downward-sloping portion of the army curve. To control for factors unrelated to government spending, Vedder and Gallaway (1998) introduce the time variable T. Therefore, the faster expenditure increases, the greater will be the probability of diminishing returns and ineffective use (Leach, 2002).

2.2 EMPIRICAL LITERATURE REVIEW

Even if there are numerous researches carried out on the impact of government expenditure on economic growth, there is no precise and persistent relationship between the two variables established yet. Most of the studies conducted by various scholars come up with contradicting conclusions. Research done on some countries promotes the further increment of government expenditure on the economy because their finding shows a positive relationship between

government expenditure and economic growth. In contrast, lots of researchers advocate a reduction of government spending as their studies found a negative relationship between government expenditure and economic growth.

Investigating the impact of fiscal policy on economic growth has been very fundamental in envisaging future economic growth. Over the past few decades, there has been an upsurge in empirical research directed at unraveling the relationship between the fiscal policy variables and economic growth. Contrary to the neoclassical and the classical frameworks, most recent empirical studies have rejected the assertion that government spending and tax policies only affect economic growth temporarily. Examples of such studies are Barro (1990) using cross sectional data, Amin (1998) using data sets form Cameroon, Abu-Bader and Abu-Qarn (2003) using data from Egypt, Syria and Israel, Ramayandi (2003) using data from Indonesia, Anastassiou and Dritsaki (2005) using data from Greece, M‟Amanja and Morrissey (2005) using data from Kenya, Afonso and Alegre (2008) using a combined cross-section time-series data, Saad and Kalakeck (2009) using data from Lebanon and Adefeso, Hakeem and Salawu (2010) using data from Nigeria. Recent empirical works affirm the Keynesian and endogenous growth point of view and demonstrate that economic growth is meaningfully affected by the level and nature of government spending and taxes in both the short-run and the long-run time periods.

Ram (1986) used cross section data for a larger sample of 115 countries and time-series data (1960-1980) for 17 individual countries to see the effect of government size on economic growth. Estimation was done with OLS and also on the premise of a first-order auto-regressive disturbance term (AR1) for some countries from time series data. The main results are: (1) the overall impact of government size on growth is positive in almost all cases; (2) the (marginal) externality effect of government size is generally positive; (3) although the number of time series observations for each country is relatively small, there is a broad harmony between the estimates obtained from cross section and time-series data; and (4) it is possible that the positive effect of government size on growth is stronger in lower income contexts.

Engen and Skinner (1992) were among the early researchers to empirically evaluate the effect of fiscal policy on economic growth in an endogenous model. The authors employed a sample of

107 countries and assumed a theoretical model that integrates the effects of government spending and distortionary effect of taxation. Engen and Skinner with the aid of the instrumental-variable estimation method found strong and negative effects of both government spending and taxation on GDP growth.

On the contrary, Hseih and Lai (1994) found that government spending contributes a small proportion to the growth of an economy and not as strong and negative as conceived by Engen and Skinner (1992). Relying on Barro‟s (1990) endogenous growth model, the authors studied the nature of the relationship between government spending and economic growth using data for the G-7 countries (United States of America, Canada, Japan, United Kingdom, Germany, France and Italy). They analyzed the degree of responsiveness and the causal pattern of the relationship with the aid of vector autoregressive and other multivariate time series analysis. Their findings suggested that the relationship between government spending and economic growth varies significantly across time and across countries while the responsiveness of economic growth to government spending does not exhibit any consistent pattern across countries as well as across time.

Abu-Bader and Abu-Qarn (2003) examined the causal relationship between government expenditure and economic growth with evidence from Egypt, Israel and Syria. They employed the multivariate co-integration and variance decomposition approach to analyze the relationship between government expenditure, military spending and economic growth for Egypt, Israel and Syria for the period 1975-1998, 1967-1998 and 1973-1998 respectively for each of the countries. The authors observed a bi-directional and a long-run negative relationship between government spending and economic growth when variables were tested within a bivariate system. In addition, the causality test within a trivariate system (where government spending was broken down into share of government civilian expenditures in GDP and military expenditure) showed that military burden has a negative impact on economic growth in all three countries analyzed. Also, they found that civilian government expenditures exhibited a positive impact on economic growth for both Israel and Egypt.

M‟Amanja and Morrissey (2005) explored the relationship between fiscal policy and economic growth in Kenya using an improved version of Barro‟s (1990) endogenous growth model and an annual data for the period 1964-2002. The authors classified government expenditures into productive and unproductive expenditures and tax revenues into distortionary and non-distortionary tax revenues. With the aid of a number of time series regression and testing techniques in their analysis, the results of the study presented a nonaligned relationship between unproductive expenditures and non-distortionary tax revenues and economic growth. The relationship between productive expenditures and economic growth was surprisingly shown to be negative and a significant one. Distortionary tax revenues exhibited no regular effect on economic growth while expenditure components such as government investment and education proved to be positive and significant to economic growth in Kenya. The authors therefore proposed that Kenya's economy will perform better if more government resources are diverted to investment spending since it proved to be very beneficial to growth in the long run.

The findings of Abdullah et al. (2009) further confirmed the conclusions made by Abu-Bader and Abu-Qarn (2003). Abdullah et al. (2009) in their study investigated a similar issue with a sample of 13 Asian countries for the period 1985-2001 using the Arellano and Bond (1991) generalized method of moments (GMM). Their results showed that defense expenditure together with distortionary taxes and the budget balance all have negative and significant effects on economic growth. Government expenditures on health and education showed a highly significant positive effect on economic growth.

In a similar study, Nurudeen and Usman (2010) looked at the link between the government expenditure variables and economic growth in Nigeria for the period 1970-2008 by employing a disaggregated analysis in a simple endogenous model. The authors applied multivariate co-integration and error correction methods in analyzing the relationship between government expenditures and economic growth in Nigeria. The regression results suggested that total capital expenditure, total recurrent expenditures and expenditures on education all have negative effects on economic growth while government expenditures on transport and communication had a positive effect in Nigeria.

In another study from Nigeria, Adefeso, Hakeem and Salawu (2010) examined the relationship between fiscal policy and economic growth using data sets from 1970 to 2005. The authors employed the error correction technique to analyze the data. Following Barro (1990), government's expenditures were categorized into productive and non-productive expenditures while that of taxes were classified into distortionary and non-distortionary taxes. The study showed a positive relationship between productive expenditures and economic growth and also showed no evidence of any distortionary effect of distortionary taxes on economic growth. The study further showed that increases in non-productive government expenditures financed by non-distortionary taxes had neutral effects on economic growth in Nigeria.

The impact of government consumption and investment expenditure on economic growth has received much empirical attention. Barro (1991) and Fischer (1993) found that government consumption expenditure has a negative effect on economic growth. Levine and Renelt (1992) show that public investment expenditure is one of the key determinants of economic growth and Fedderke (1999) shows that private investment and growth are more highly correlated in South Africa than any other form of investment expenditure.

The practical evidence on the relationship between government expenditure and economic growth in Ethiopia is limited and almost all of the studies are out dated. Teshome Ketema (2006) studied the impact of government expenditure on economic growth which is based on data for period 1960/61-2003/04 and the empirical analysis was made based on the Johansen Maximum Likelihood Estimation procedure. Due to limitation in data availability, Teshome applied Dummy variable for Private investment. It found that only expenditure on human capital have long run significant positive impact and both government investment and consumption expenditure has negative and insignificant impact on the economic growth. In contrast, private consumption has positive significant where as private investment has positive insignificant impact on RGDP growth.

Tewodros Ayenew (2010) estimated the impact of Fiscal Policy on economic growth analyzing a data from year 1960/61 up to 2007/08. The author has adopted the Barro type growth model and

used both co-integrated vector autoregressive and error correction techniques so as to draw empirical analysis. The researcher concluded that government investment has a significant role to play in the process fostering short run economic growth but it have a limited impact in the long run. Tewodros wrongly used government capital expenditure data as public investment since it doesn't include various mega projects covered by non-budgetary source.

Finally, most of the studies undertaken in Ethiopia regarding the impact of government expenditure on economic growth including the above two studies relies deeply on recurrent and capital expenditure outlays which only include the budgetary government expenditure. In this study, the author tried to get the correct and real data regarding the whole variable included in the estimation process from both budgetary and non-budgetary source so as portray a realistic relationship in the model.

CHAPTER THREE DESCRIPTIVE ANALYSIS

3.1 TRENDS IN REAL GROSS DOMESTIC PRODUCT

The 'Imperial Regime' refers to the reign of emperor Haile-Sellase I (1930-1974) in particular, and to its predecessors in general. The landed aristocracy and the majority of peasants (tenants) constitute the major socio-economic agents during this period. Land was the critical resource, the control of which was invaluable for any economic agent that aspires for power. In this period an attempt was made to modernize the country through the expansion of modern schools and health facilities, the promulgation of a constitution, the development of infrastructure, and the beginning of medium-term planning. The Imperial Regime pursued a market-based economic policy. According to table 3.1, GDP growth averaged 3 percent over the final phase (1960-1973).

The Derg (meaning 'the committee' in Amharic) took power after ousting the imperial regime in the 1974 popular revolution. In terms of ideology and general policy, the Derg opted for a socialist economic system where market forces were deliberately repressed and socialization of the production and distribution process pursued vigorously. By all measures they adopted a "hard control" regime. Following the fall of the imperial regime, there was a fundamental shift from market oriented structure towards of a tight command economy. Plenty of production and distribution systems were confiscated and nationalized by the state. Economic growth registered during the derge period was much less than that of the monarchy system. From 1974- 1991, the economy was growing at average of 2% which was lower than the imperial era and also in 1984 the country had -10.4% economic growth which is the lowest record with in fourteen years and attributed to the persistent drought which killed thousands in the northern part of the country. Various factors such as internal instability, war with Somalia, drought and inefficient and illogical policy can be cited as causes of this poor performance.

The period begins following the accession to power of the Ethiopian People Revolutionarily Democratic Front (EPRDF) in May 1991, following the downfall of the Derg. The EPRDF adopted the typical structural adjustment policies of market liberalization, with the support of the Bretton Woods institutions.

Table 3.1: Summary of Real GDP Growth of Ethiopia (1960-2013)

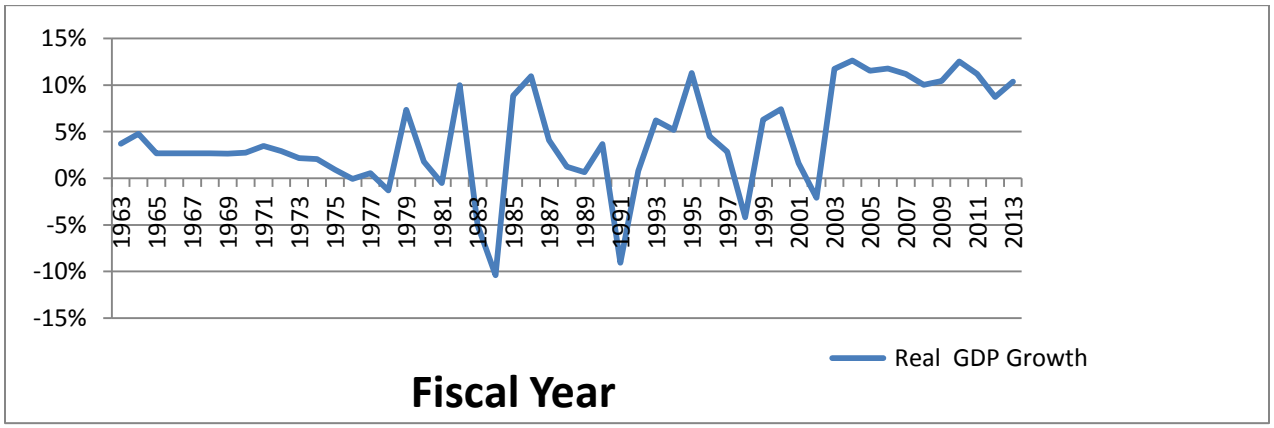
Period	Imperial (1961-1974)	Derge (1974-1991)	EPRDF (1991-2013)
Average GDP growth	3%	2%	7%

Source: Author's compilation based on MOFED (2013/14) relying on basic SNA principle

The growth performance of the post Derge regime seems logical and it has shown a profound improvement through time. The real GDP has grown 7% per year and shows a significant upward trend till now. The adopted economic policy and a relative existence of peace and security in the country have contributed to the economic growth.

The growth pattern of Ethiopian economy is not only diverse but also fluctuating. An observation on the trends of the economic growth shows a very glaring irregularity even within two successive years which is a result of consecutive natural and external shocks since the majority of the population relies on rain oriented primitive agriculture. Figure 2.1 below shows the inconsistent nature of Real GDP growth rate from 1960-2013.

Figure 2.1 Trend of Real GDP growth rate for Ethiopia (1960-2013)



Source: Author's compilation based on MOFED (2013/14) relying on basic SNA principle

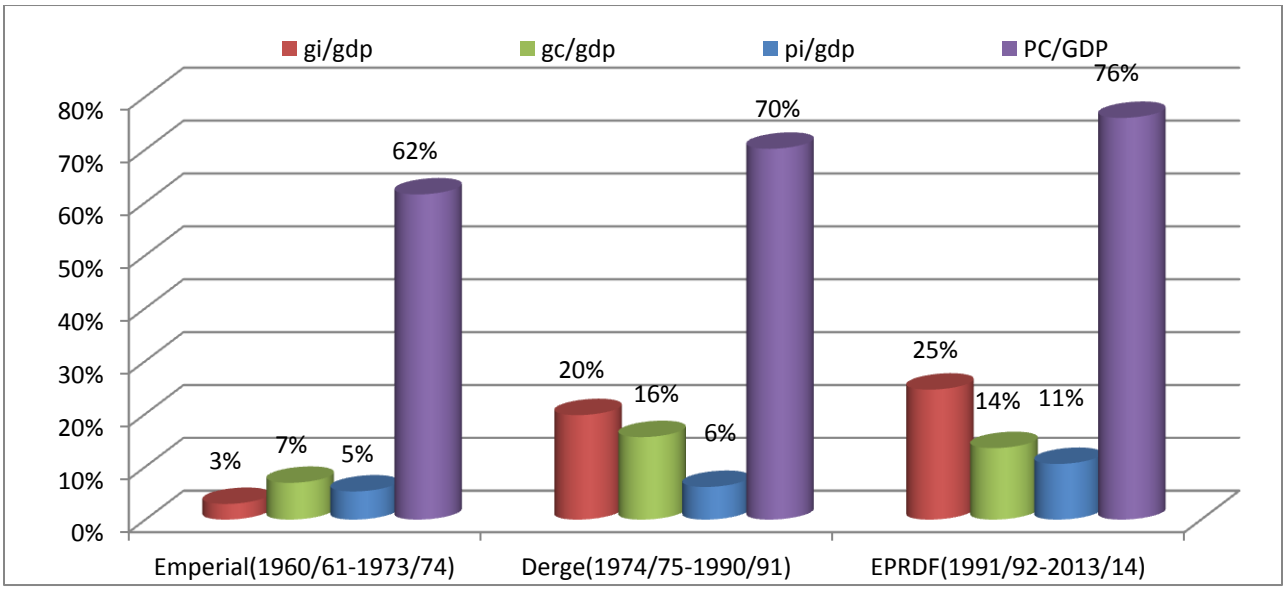
The above figure shows Ethiopia has faced a heavy macro-economic instability and fluctuation during the Derge era than its successor. Prior to 1974, it was in 1973 that the economy performed at is low annual growth rate 2.2%. In the subsequent periods the growth rate decelerated and recorded a negative growth rate in 1976/78. Among other things the instability induced by the emerging new policy as well as the war with Somalia may explain a good part of this negative economic performance. The period 1979-1982 is characterized by relative stability and favorable weather condition; hence the average annual growth rate became 4.7%. However, this economic growth was not sustained in the subsequent years. In 1983 and 1984 the country had a deep in economic growth, decreasing by -5.0% and -10.4%, respectively. This were a period when the country's large portion was devastated by chronic famine and much emphasis was given to provide food and shelter to the inhabitants of drought prone areas rather than speeding up the pace of economic growth. The rate of growth rose to an average of about 10% in the following two years, mainly as a sign of upturn from depression. The fluctuation in economic growth continues up to the final year of the regime even if the intensity of the rise and fall is less in comparison to previous years.

In the period of transition from Derge regime to the new government, the real GDP has fallen by -9%. Even in EPRDF's initial era the economy faced ups and downs from 1992 up to 2002 registering an average 3.6% growth in real GDP. But in 2003, the government launched a three years plan (SDPRP) with intention to eradicate poverty and foster a fast economic growth. Following the implementation of the plan, from 2003 up to 2005 the country attained a fascinating macro-economic performance with an average 12% growth in real GDP. Latter on the regime had another five years plan (PASDEP) which further accelerated the real GDP growth by an average 11.2% during 2006-2010. Furthermore, currently the country is implementing GTP and from 2011 up to 2013 on average the real GDP is growing at 10.1%.

3.2 PUBLIC FINAL CONSUMPTION AND INVESTMENT SPENDING PERFORMANCE IN ETHIOPIA

The size and role of the public sector in the economy has changed over time. Until the mid-70's, the country was striving in order to replace the traditional ways of economic management towards modern market administration. However, with emergence of derge regime to power, sate begun to take the lion share on whole endeavor of developmental activities and government started to confiscate the previously established private businesses. The public sector was dominant and was involved in direct production and commercial activities. The government determined prices, allocation of resources and output levels. From 1991, the private sector and market were promoted by economic reforms. Figure 3.1 below shows the trend of both private and public final consumption and investment spending as a ratio of GDP from 1960/61 up to 2013/14.

Figure 2.1 Trend of final consumption and investment spending of public and private sector with GDP ratio of Ethiopia (1960/61-2013/14)



Source: Author's compilation based on MOFED (2013/14) relying on basic SNA principle

- gi/gdp= government investment gdp ratio
- gc/gdp=government consumption gdp ratio
- Pi/gdp = private investment gdp ratio
- Pc/gdp = private consumption gdp ratio

According to the above graph, during the imperial regime, private investment took a higher share from total gross capital formation and took around 5% of GDP. Even though the public investment was less, government emerged to play an active role in provision of various public goods and public investment attributed 5% of the GDP. Equally with other developing countries, much of the Gross National Income generated in the country was used to finance consumption. Accordingly, 7% and 62% of the fraction of GDP was consumed by public and private sector, respectively.

A sharp increase in total government spending was recorded during the initial period of the Derge regime because of emphasis given to the construction of both rural to rural and cross country roads. As a result of its political ideology, the regime was the main economic actor in the market and taken away lots of privately owned investment projects. Throughout the regime government investment recorded a significant segment of the GDP with 20% and public final consumption became 16% of the GDP. Similarly, private final consumption and investment registered 70% and 6% of GDP, respectively.

The current government has embarked on a cautious program of economic reform, including privatization of state enterprises and rationalization of government spending to keep the fiscal balance. While the process is still ongoing, the government remains heavily involved in the economy. As a result of the developmental state ideology followed by the state, the regime has involved in massive investment program on various developmental sectors such as hydroelectric power plant (for example, Great Renaissance Dam, Gilgel Gibe Dams, Tanabeles and Tekeze Dams), road, railways, sugar industry, telecom and the like in which private sector could not have incentive and capacity to deliver. Through EPRDF regime, both public and private investment share out of GDP has increased than ever to 25% and 11%, respectively. In addition, the private sector final consumption covers 76% of GDP and government final consumption recorded 14% of GDP.

CHAPTER FOUR METHODOLOGY

4.1 MODEL SPECIFICATION

In this paper the author use an economic model following Ram (1986) on the relationship between government expenditure and economic growth. It is perhaps the most influential and earliest study on this research area. Ram developed a two-sector production theoretical framework and employs international comparable data on output, investment, and government size, from Summers and Heston (1984) for a large sample of 115 countries for the period from 1960 to 1980. Like most of contemporary studies, he applied time-series analysis. Ram's main results were: (1) government size has a positive overall impact on economic growth and (2) it also shows a positive externality effect on economic development.

Ram's theoretical framework is summarized below. The economy is assumed to have two sectors, government sector (G) and private sector (P). Each sector's output is a function of the factors allocated to the sector, such as Labor (L) and Capital (k). In addition, the output of the private sector depends on the level of output produced by the government sector. This formulation considers the beneficial effects of government sector on the private sector. The production functions for the two sectors can be written as:

$$P=P\ (K_{P,}L_{P,}G) \quad (1)$$

$$G=G\ (K_{G,}L_{G}) \quad (2)$$

Where subscripts indicate sectors and the total inputs in the two sectors are given by:

$$L_P+L_G=L \quad (3)$$

$$KP+KG=K \quad (4)$$

I assume a constant productivity differential between labour in both sectors:

$$G_L/P_L=1+\Omega \quad (5)$$

Where $\Omega > 0$ implies lower productivity in the public sector (the reverse would be the case if $\Omega < 0$) and I assume $\Omega \neq 0$.

Totally differentiating (3) and (4) give that national income Y= P+G, result to;

$$dY= P_k dK_p + G_k dK_G + P_L dL_p + G_L dL_G + P_G dG \quad (6)$$

Where P_K and G_K are marginal products of factor products of K in sector P and G respectively, similarly P_L and G_L for factors L. Further, P_G is the marginal externality effect of public on private sector. From (3) I can write:

$$G_L= (1+ \Omega P_L) \quad (7)$$

Our formulation diverges slightly from Ram (1986) because, although I have the identity $L=L_P+L_G$, I will treat capital as distinct in each sector. [4] Substituting (7) and (4) and rearranging:

$$dY= P_k dK_p + G_k dk_G + P_L(dLp+dL_G)+ \Omega P_L dL_G + P_G d_G \quad (8)$$

Using (7) I can write:

$$dG= G_K dK_G + (1+\Omega)P_L dL_G$$

This implies,

$$\frac{dG}{1+\Omega} - \frac{Gk}{1+\Omega} dk_G = P_L dL_G \quad (9)$$

Substituting (9) in to (8) and collecting terms:

$$dY= P_k dK_p + (1- \frac{\Omega}{1+\Omega}) G_k dK_G + P_L dL_p + [P_G + \frac{\Omega}{1+\Omega}]dG \quad (10)$$

I assume the existence of a linear relationship between the marginal product of labour in each sector and the average output per unit labour in the economy, i.e. $P_L= \beta (Y/L)$. Letting $dk_P= I_P$

[4] Furthermore, and for this reason, we do not have to assume a constant productivity differential between capital in each sector

(private sector investment), and $dK_G = I_G$ (public sector physical investment), I can substitute into (10), dividing through by Y:

$$\frac{dY}{Y} = \alpha \frac{Ip}{Y} + \gamma \frac{Ig}{Y} + \beta \frac{dL}{L} + [P_G + \frac{\Omega}{1+\Omega}](dG/G)\,(G/Y) \qquad (11)$$

Where, $\alpha = P_K$, and $\gamma = (1 - \frac{\Omega}{1+\Omega})\, G_k$

Equation (11) corresponding to Ram (1986) equation (9) except that I keep IP and IG distinct. Thus, equation (11) forms my basic model for regression estimation. For ease of comparison with other studies, I will also estimate (11) with (G/Y) as the variable rather than $(dG/G)\,(G/Y)$. Furthermore, I take it to account the skilled labour force rather than the total labour force included in the Ram model since skilled labour force can be used as a better indicator for technological improvement. I can also estimate with I = IP + IG, in effect testing the restriction $\alpha = \gamma$ (which would imply

$P_K = G_K$, and $\Omega = 0$).

I do not have time series data on $(\frac{dL}{L})$ and will use primary education enrolment rate (PEER) as a proxy. This may appear unreasonable but the motivation is twofold. First, I wish to investigate if PEER has an independent impact on growth. Second, PEER may capture the changing quality of the labour force, and as such may be preferable to (dL/L)

$$g = b_0 + b_1 (\frac{Ip}{Y}) + b_2 (\frac{Ig}{Y}) + b_3 (PEER) + b_4 (\frac{Cg}{Y}) + b_5 + \varepsilon \qquad (12)$$

I can also express the national income function using logarithm

I will estimate a variant of (13):

$$\ln y = \alpha + b1\ln IP + b2\ln IC + b3\ln GI + b4\ln GC + b5 PEER + \varepsilon \qquad (13)$$

Where Cg= Government consumption spending

Ig= government investment spending

PEER= primary education enrolment rate

Ip= private investment

Pc = private consumption

bi = Slope Coefficient

α= Intercept

ε = Error term

The data source for this study includes secondary data from MOFED, National Bank of Ethiopia and Central Statistical Agency. The sample period of the econometric analysis covers from 1960/61-2013/14, the years for which data are available. For the purpose of this study, government expenditure denotes country wide budgetary expenditure which includes the federal government, national states and local government.

4.2 METHODOLOGY

4.2.1 UNIT ROOT TEST

The standard classical methods of estimation are based on the assumption that all variables are stationary.5 However; most economic variables are not stationary. Models containing non-stationary variables will often lead to a problem of spurious regression, whereby the results obtained suggest that there are statistically significant relationships between the variables in the regression model when in fact all that is obtained is evidence of contemporaneous correlations rather than meaningful causal relations. Furthermore, inferences based on the standard statistical tests (i.e., t and F tests) will be invalid.

[5] A given variable (a stochastic) process is said to be stationary if it has a constant mean, constant variance over time, and if the covariance between observations in two time periods depends only on the distance of the lag between the two periods rather than the actual time that the covariance is computed. [See Gujarati, 1995]

Therefore, it is necessary to test for stationarity of time series variables before running any sort of regression analysis. Often, non-stationary variables become stationary after differencing. Such a variable is said to have difference stationary process (DSP). Thus, it is possible to estimate using difference of variables if the differences are stationary. But such a procedure gives only the short run dynamics. And there would be a loss of considerable long run information.

Among the methods of testing the presence of unit roots in the variables, Dickey-Fuller (DF) and Augmented Dickey-Fuller (ADF) test are used in this study. Based on DF test, the series Y is stationary if the absolute value of 'δ' in the equation

$$Y_t = \delta Y_{t-1} + U_t \quad \text{4.1}$$

is less than unity. However, it is not stationary if the absolute value of 'δ' in the above regression is greater than or equal to unity. But testing a null that the absolute value of δ is equal to one is statistically problematic. [See Harris, 1995] Hence, equation (4.1) can be rewritten as:

$$\Delta Y_t = \alpha Y_{t-1} + U_t \quad \text{4.2}$$

Where, α = (1-δ) Hence, the null that δ=1 is equivalent to H0: α=0. However, DF test assumes that the data generating process follows the Auto Regressive of order one [AR(1)] which biases the test in the presence of serial correlation. The ADF test is used to overcome this limitation of DF test. That is why the ADF test is sometimes viewed as a means of conducting a DF test in the presence of auto-correlated errors. The ADF test is identical to the standard DF test but it is constructed within the regression model of the form:

$$\Delta Y_t = \alpha Y_{t-1} + \sum \gamma_j \Delta Y_{t-j} + U_t \quad \text{4.3}$$

It follows the DF test explanation for tests of unit root.

4.2.2 CO-INTEGRATION

Time series variables may be non-stationary but their linear combination is stationary. In such cases, we say there is co-integration (long run relationship) between the variables. Thus, testing for co-integration is almost mandatory. So far, there are two major methods of testing co-integration: the Engel-Granger two-step procedure (EG) and the Johansen Maximum Likelihood procedure.

In the Engle-Granger two-step procedure, variables entering the co-integrating vector are tested for integration of the same order, order one I (1). Thus, the first step in this procedure is pre-testing the variables for their order of integration. The second step is estimating the long-run equation relationship and obtains the residual. And then test whether the residual is stationary. If it is stationary, then the variables are said to be co-integrated, that is, they do have long run relationship. The last step in Engle-Granger procedure is estimate the error correction model (ECM) including the lagged value of the residual as the explanatory variable. The ECM model is estimated to see the short run relationship between the variables.

We can detect two major defects of the EG procedure. First, it assumes that there is one co-integrating vector even when more than two variables are involved in the analysis. Thus, this procedure will not be applicable in the case where more than one co-integration relationship exists. Second, EG procedure a priori categorizes variables as exogenous and endogenous with an implication of simultaneity problem. The Johansen Maximum Likelihood procedure attempts to avoid the above two defects of EG method. Thus the study follows the Johansen procedure.

4.2.3 VECTOR ERROR CORRECTION

The Johansen method is nothing but a multivariate generalization of the Dickey-Fuller test. (Harris, 1995) Hence, given n potentially endogenous variables it is possible to model $\mathbf{X}_t$ as unrestricted vector auto regression (VAR) with p lags of $\mathbf{X}_t$ as:

$$X_t = A_1X_{t-1} + A_2X_{t-2} + \ldots + A_pX_{t-p} + U_t \; ; \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots .4.5$$

$$U_t \sim IN(0,\Omega)$$

Where; $\mathbf{X_t}$= (n x 1) matrix,

A_i = (n x n) matrix of parameters and

U_t = independently and identically distributed n dimensional vector with

Vector mean 0 and variance Ω.

The Vector Error Correction (VECM) can be specified as:

$$\Delta Xt = \sum \prod_i \Delta Xt_{t-I} + \gamma_t D_t + \prod X_{t-p} + \boldsymbol{\varepsilon}_t \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 4.6$$

Where $\prod = -(I - \sum A_i)$,

$\prod_i = -(I - \sum A_j)$ and

D = vector of dummies, intercepts and predetermined exogenous variables.

The number of co-integrating vectors can be obtained by checking the significance of the characteristic roots of $\prod$. It is believed that the rank of a matrix (r) is equal to the number of its characteristic roots that differ from zero. Thus, if $\prod$ has a full rank (i.e., there are r = n linearly independent columns), then all the variables in $\mathbf{X_t}$ are I(0). While if the rank of $\prod$ is zero, then there are no co-integration relationships. If there is reduced rank (that is, there are $r \leq (n-1)$ co-integration vectors), it is possible to represent $\prod$ as $\alpha\beta'$ where β is (n x r) vector of long run parameters and (n x r) α matrix represents speed of adjustment to disequilibrium (Harris, 1995). The test for the number of characteristic roots that are significantly different from unity can be conducted using the following two test statistics:

$$\lambda_{trace}(r) = -T \sum \ln (1 - \lambda_i) \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 4.7$$

$$\lambda_{max}(r,r+1) = -T \ln (1-\lambda_{r+1}) \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 4.8$$

Where; λ_i = the estimated values of the characteristic roots (also called Eigen values)

Obtained from the estimated $\prod$ matrix and

T= the number of usable observations.

The null hypothesis is that the number of distinct co-integration vectors is less than or equal to r against a general alternative. Johansen and Juselius (1990) provide the critical values of λ_{max} and λ_{trace} statistics obtained using simulation studies (Harris, 1995).

CHAPTER FIVE EMPIRICAL ANALYSIS AND INTERPRETATION

5.1. UNIT ROOT TEST

Non-Stationarity of time series data has often been regarded as a problem in empirical analysis. Working with non-stationary variables leads to spurious regression results, from which further inference is meaningless. Hence, the first step in time series econometric analysis is to carry out unit root test on the variables of interest. The test examines whether the data series is stationary or not. To conduct the test, the conventional Augmented Dickey – Fuller (ADF) test is used with and without a trend at both level and first difference. The null hypothesis in these tests is that the series under investigation has unit root. On the other hand, the alternative hypothesis is that the series is stationary. The results of the test for the variables at level and first difference are presented in Tables 5.1 and 5.2 below respectively.

Table 5.1: Unit Root Tests of the Variables at Level

Variable	Augmented Dickey Fuller (ADF)			
	Intercept		Trend and intercept	
	Critical value	P value	Critical value	P value
LGDP	2.411	1	-0.052	0.995
LGC	-0.665	0.846	-2.802	0.203
LGI	-1.141	0.693	-3.264	0.084
LPC	1.739	1.000	-0.610	0.974
LPI	0.003	0.954	-2.750	0.222
LPEER	0.744	0.992	-0.712	0.967

Table 5.2: Unit Root Tests of the Variables at first difference

Variable	Augmented Dickey Fuller (ADF)			
	Intercept		Trend and intercept	
	Critical value	P value	Critical value	P value
DGDP	-9.888*	0.000	-10.485*	0.000
DLGC	-9.741*	0.000	-9.755*	0.000
DLGI	-8.512*	0.000	-8.459*	0.000
DLPC	-10.888*	0.000	-11.274*	0.000
DLPI	-4.883*	0.000	-5.242*	0.000
DLPEER	-4.463*	0.001	-4.763*	0.002

Note: *** imply the rejection of null hypothesis at 5%, ** means the rejection of null hypothesis at **1%** and **5% and** * denotes rejection of the null hypothesis at **1%, 5% and 10% significance** level.

The ADF test statistics as depicted in Table 5.1 illustrates that all variables are non - stationary at levels. That is, it is not possible to reject the null hypothesis of unit root both with and without trend in the auxiliary regression of unit root. Table 5.2 illustrates ADF test applied to the same variables in their first difference becomes stationary at the conventional 1%, 5% and 10% level of significance. The variables are, therefore, integrated of order one (I ~I (1)).

5.2 RESULTS FOR CO-INTEGRATION TEST AND VECTOR ERROR CORRECTION MODEL

5.2.1 VAR LAG LENGTH SELECTION CRITERIA

The Johansen co-integration test result is very sensitive to the number of lags included for the endogenous variables in the estimation of the VAR. This necessitates the determination of an optimal lag order prior to the test of co-integration. The optimal lag order is determined with the sequential modified Likelihood Ratio test statistics [LR], the Final Prediction Error [FPE], the Akaike Information Criterion [AIC], the Schwarz Information Criterion [SIC], and the Hannan-Quinn Information Criterion [HQ]). As shown in Table 5.3, LR, FPE, and AIC suggest an optimal lag of three, all at a 5% level of significance.

Table 5.3 Var lag order selection criterion

Lag	LogL	LR	FPE	AIC	SC	HQ
0	72.62494	NA	2.8E-09	-2.664998	-2.435555	-2.577624
1	361.4367	496.7562	1.15E-13	-12.77747	-11.17137*	-12.16586*
2	400.6885	58.09266	1.07E-13	-12.90754	-9.924783	-11.77169
3	442.1425	51.40298*	1.02e-13*	-13.12570*	-8.766287	-11.46561
4	476.8511	34.70856	1.53E-13	-13.07404	-7.337973	-10.88971

* indicate lag order selected by criterion

From the above table I have 3 selected as optimal lag with the majority of the criterion and it assumed it has the minimum information criterion.

5.2.2 THE JOHANSEN CO-INTEGRATION TEST RESULT

The stationarity test demonstrated that all variables are not stationary at level and it implies that any estimation using this level data will lead to wrong conclusion and policy implication. However, the Granger representation theorem states that it is possible for non-stationary variables to produce a stationary relationship if they are co-integrated. This would imply that there is a meaningful long run relationship among the variables. Thus, the presence of and the number of such co-integrating relationships are checked using the trace and the maximum Eigen value methods.

Table 5.4 Unrestricted co-integration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigen value	Trace Statistic	0.05 Critical Value	Prob **
None *	0.611144	115.5771	95.75366	0.0011
At most 1	0.431651	68.34974	69.81889	0.0651
At most 2	0.337232	40.09875	47.85613	0.219
At most 3	0.228838	19.53224	29.79707	0.4552
At most 4	0.100594	6.539415	15.49471	0.6317
At most 5	0.024463	1.238379	3.841466	0.2658

Trace test indicates 1 co-integrating equation(s) at the 0.05 level, * denotes rejection of the hypothesis at the 0.05 level, **MacKinnon-Haug-Michelis (1999) p-values

Table 5.5 Unrestricted Co-integration Rank Test (Maximum Eigen value)

Hypothesized No. of CE(s)	Eigen value	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.611144	47.22737	40.07757	0.0067
At most 1	0.431651	28.25099	33.87687	0.2022
At most 2	0.337232	20.56651	27.58434	0.3033
At most 3	0.228838	12.99282	21.13162	0.4529
At most 4	0.100594	5.301036	14.2646	0.7035
At most 5	0.024463	1.238379	3.841466	0.2658

Max-Eigen value test indicates 1 co-integrating equation(s) at the 0.05 level, * denotes rejection of the hypothesis at the 0.05 level, **MacKinnon-Haug-Michelis (1999) p-values

The study has found number of co-integrated equations using trace statistics and maximum Eigen value statistics. According to probabilities given in tables 5.4 and 5.5, the analysis rejects the null hypothesis that there is no co-integrated vector (None), there is at most 1 co-integrated vector (At most 1). It shows high association between explanatory and dependent variables used in current study. Since the objective of this paper is to see the impacts of public final consumption and investment spending on real per capita GDP, I estimate the unrestricted co-integrating vectors with ad-hoc normalization on RGDP.

5.2.3 VECTOR ERROR CORRECTION MODEL

Diagnostic Tests

I have tested for VAR stability and the result in the figure in appendix A 1 shows that all Roots of characteristic polynomial lie inside the unit circle which suggests that the VAR is stable. Furthermore, additional tests also listed in the appendix.

5.2.3.1 LONG RUN ESTIMATE

The long run estimates of GDP model are reported in table 5.6. First column is showing the names of variables, similarly, coefficients, standard errors and t-statistics are displayed in 2nd, 3rd and 4th columns, respectively. The 5th column indicates the significant and insignificant relationships of all the variables. As table 5.6 confirms, the null hypothesis of no significance is rejected for the whole variable included in the model. This suggests that the above mentioned variables are statistically significant in influencing RGDP.

The results reveal that government final consumption expenditure has significant but negative coefficient. This implies that for the period under consideration, the role of government final consumption expenditure was negative in improving economic growth in Ethiopia. One percent increase in government final consumption expenditure leads to 0.326 percent decline in GDP on the average in the long run. This result is in line with other studies, Barro (1991) and Fischer (1993) found that government consumption expenditure has a negative effect on economic

growth. The rationale behind the findings is that government consumption expenditure is negatively related to private investment (Barro 1991). Besides, Martine Mariotti (2001) has undertaken a study on the impact of public policy on economic growth of South Africa and concluded that the increases in government consumption expenditure have a negative significant impact on RGDP growth.

Table 5.6 Vector Error Correction Long Run Relationship

Variables	Coefficient	Standard Error	T-statistics	Conclusion
LOGGC(-1)	-0.326	-0.054	6.037	Significant
LOGGI(-1)	0.150	-0.034	-4.354	Significant
LOGPC(-1)	0.718	-0.055	-12.932	Significant
LOGPI(-1)	0.078	-0.039	-2.019	Significant
PEER	0.002	0.000	-5.926	Significant
C	1.929	*	*	*

Government investment spending, on the other hand, has a positive and statistically significant contribution to GDP growth. The coefficient manifests that 1 percentage increase in government investment will result in 0.150 percent rise in RGDP on the average in the long run. Various studies is in favor of the finding, for example Duo Qin, Marie Anne Cagasa, Pilipinas Quisinga and Xin-Hua Hec have undertaken a study on the impact of government investment on economic growth of china. The Empirical result shows the existence of a long run positive relationship between public investment and economic growth. Government investments (especially in countries with the lack of fully developed markets of capital, insurance and information) can succeed in improving the performance of production factors, eliminating market failures and favoring the private sector by spillover effects of these factors. In addition, the increase in government expenditure on developmental infrastructures will crowd in private investment, enhance the productivity of factor inputs and create job opportunity for the unemployed.

In the same manner, the study includes private investment spending. Unsurprisingly I found a positive and significant effect on real GDP of Ethiopia. In particular, if private investment increases by 1 percent, real GDP level will increase by 0.078 percent on the average in the long

run. This may be explained by profit maximizing behavior and efficiency behavior of firms. The regression also shows positive and significant influence of private consumption on RGDP. One percent increase in private consumption leads to 0.718 percent upsurge in real GDP on the average in the long run. Hence this indicates that Ethiopian economy has more direct correlation with private consumption than other variables included in the model. Finally, the estimation result indicated that an improvement in primary education enrolment rate has a positive and significant effect on RGDP. A unit increase in enrolment rate will result in 0.002 percent rise in RGDP. The rise in school enrolment rate will lead to increase in the stock of skilled labor potential needed to boost and sustain the desired productivity and economic growth.

5.2.3.2 SHORT RUN MODEL

Table 5.7 shows the short run relationship outcome of the error-correction model, from which the short-run impact of public investment, public consumption, private investment, private consumption and government size on economic growth (real GDP) can be analyzed. The coefficient of the error correction term for the equation is negative and significant. This tells us that there is a reasonable adjustment towards the long run steady state. This guarantees that although the actual real GDP may temporarily deviate from its long-run equilibrium value, it would gradually converge to its equilibrium. The error correction term of -0.715shows that about 71.5 percent of the deviation of the actual real per capita GDP from its equilibrium value is eliminated every year; hence, full adjustment would require a period of less than two years.

RGDP lag has insignificant negative impact so that it doesn't explain the RGDP in the short run. Government investment has negative and significant impact on RGDP. One percentage increase in government investment at lag one, lag two and lag three result in 0.142 percent, 0.114 percent and 0.075 percent decline in RGDP, respectively. But, one and two period's lag of government consumption spending has positive significant impact on RGDP in the short run. Accordingly, one percentage increase in year lag government consumption will result in 0.135 percent rise in the RGDP where as one percent increase in government consumption at two lag period will lead to 0.152 percent up shift on RGDP. All private expenditure failed to explain RGDP in the short

run except that of private consumption spending at lag two. Thus, one percent increase in private consumption at lag two results in 0.503 percent fall in RGDP. Finally, the short run estimation shows that only two year lag of primary education enrolment rate significantly affects RGDP and one unit increase in primary education enrolment rate lead to 0.002 percent decline in RGDP at 10% level of significance.

Table 5.7 Vector Error Correction Short-run Relationship

Variable	Coefficient	Standard Error	t-Statistic	Prob.
ECM	-0.715	0.191	-3.745	0.001
D(LRGDP(-1))	0.294	0.264	1.111	0.276
D(LRGDP(-2))	0.173	0.210	0.823	0.417
D(LRGDP(-3))	0.241	0.237	1.017	0.317
D(LGC(-1))	0.135	0.062	2.194	0.036
D(LGC(-2))	0.152	0.073	2.094	0.045
D(LGC(-3))	-0.062	0.054	-1.150	0.259
D(LGI(-1))	-0.142	0.032	-4.401	0.000
D(LGI(-2))	-0.114	0.030	-3.788	0.001
D(LGI(-3))	-0.075	0.028	-2.712	0.011
D(LPC(-1))	-0.243	0.212	-1.142	0.263
D(LPC(-2))	-0.503	0.215	-2.342	0.026
D(LPC(-3))	-0.217	0.200	-1.089	0.285
D(LPI(-1))	0.052	0.050	1.034	0.309
D(LPI(-2))	0.070	0.046	1.528	0.137
D(LPI(-3))	0.002	0.047	0.050	0.960
D(PEER(-1))	-0.001	0.001	-0.577	0.568
D(PEER(-2))	-0.002	0.001	-1.697	0.100
D(PEER(-3))	-0.001	0.001	-0.696	0.492
Constant	0.035	0.006	5.529	0.000
R- Squared	0.733	Durbin- Watson stat		2.081
Adjusted R-squared	0.564	F-statistic		4.34

CHAPTER SIX CONCLUSION AND POLICY IMPLICATION

6.1 CONCLUSION

The objective of this paper was to investigate the impact of public sector investment and final consumption expenditure on economic growth using time series data on Ethiopia (for 54 years). In addition, it intended to explore the pattern and relative impact of public and private consumption and investment decision on the economy. The theoretical foundation of the study is Barro (1990) building on the model of Ram (1986). The result is fairly consistent with expectations. Most of the research undertaken on Ethiopia usually employs the aggregated government budget based on recurrent and capital expenditure out lay. However, but it is difficult to know whether any government expense is incurred either for investment purpose or for final consumption. In this study the researcher analyzed the specific impact of government direct investment and consumption spending on economic growth applying vector error correction approach.

According to the human development report, still large portion of Ethiopian population lives below the poverty line and comparing to other African countries, Ethiopia is characterized by poor infrastructural establishment and low productivity of factor resource. Government is trying to improve the life standard of the citizens through designing various socio-economic programs. Official data from MOFED (2013/14) shows the increasing government expenditure from time to time. Government invests much to enhance extremely deteriorated infrastructure with intention to motivate and attract both local and foreign businesses to operate in the country.

The result shows that government investment has considerable effect on pushing the economy forward in the long run but just like any investment, government investment need time to provide a fruit to the economy. The result is in line with economic theory which says when a country is far away from its steady state, any capital accumulation either by public or private sector speed up the rate of RGDP growth till the country maintains its equilibrium. However, the study result shows that government final consumption expenditure is inversely proportional to the RGDP growth in the long run and positively related in the short run. Therefore, the study concludes that

government spending on consumption has only short term economic effect but the expenditure directed towards investment has a long term benefit.

Moreover, strong beneficial effect of private investment, private consumption and primary education enrolment rate in the long run is witnessed. In contrast, most of the variables included in the model have limited impact in the short run.

The estimated error correction short run model indicates that for any shock occurring in the economy, the real GDP will converge to its long run equilibrium. The speed of adjustment is large implying that it needs less than two periods for RGDP to retain its equilibrium position following its distortion from optimal point.

6.2 POLICY IMPLICATION

The study has provided empirical evidences on the impacts of government final consumption and investment spending on the Real Gross Domestic Product. Based on the findings reported in the preceding section, the study recommends the following policy measures to help government achieve the desired GDP growth in Ethiopia.

One immediate implication of the analysis is that government consumption spending, despite its significant role in welfare advancements has been detrimental to economic growth: for it to enhance growth, there is the need for policy makers to examine its composition. Measures should be tailored towards reducing government consumption expenditures. Those expenditures that are likely to crowd-out private investments should also be critically looked at.

The Government needs to increase its investments and introduce such policies that would protect and enhance private investments. There is also the need for policies that will help control those investments that compete with private investments. Since private investment has substantial impact on economic growth in the long run, government has to design more favorable bureaucratic system which minimizes corruption and rent seeking, provide much more loan and

improve the availability of and quality of various developmental infrastructures such as electricity, telecom and road etc.

Another implication of the results is that labor force represented by proxy of primary education enrolment rate has a positive effect on economic growth in the long run. Thus, a government policy that ensures increased and sustained education can potentially improve the pace of Ethiopia's long-run economic growth.

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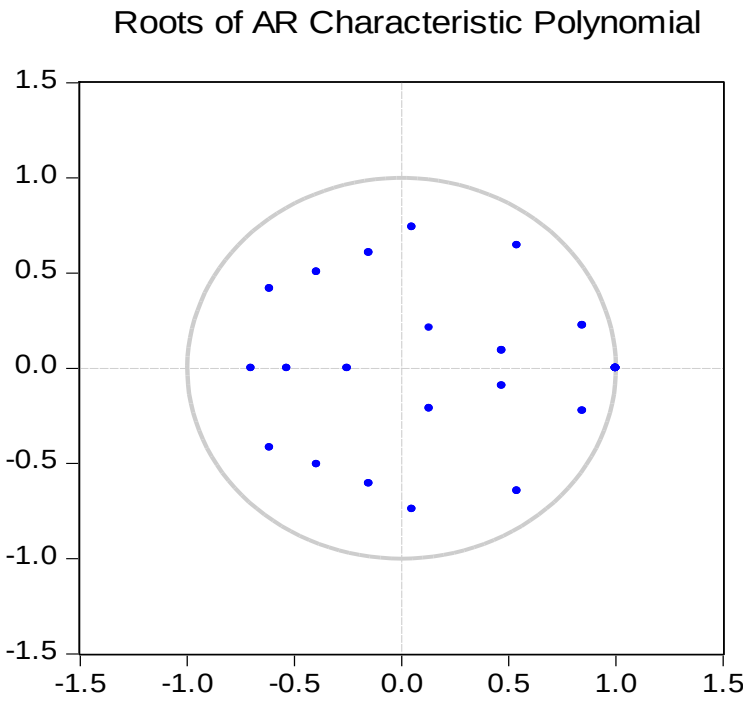
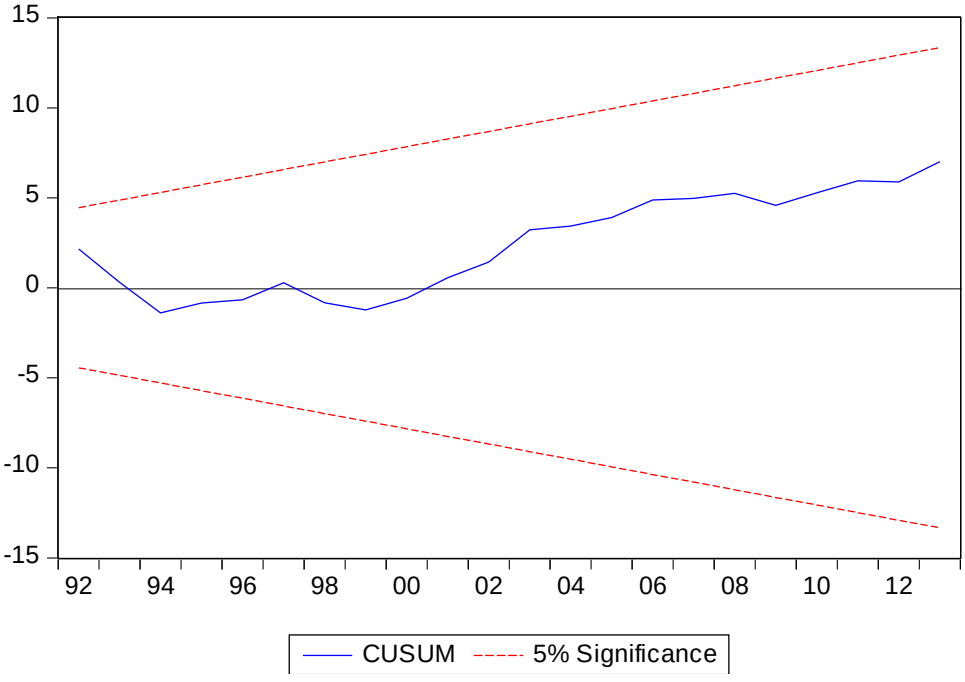
APPENDIX A

1) **Model Stability Test**



2) Parameter Stability Test



3) Test for Residual Heteroscedastic

No Cross Terms (only levels and squares)

Joint test:

Chi-sq	Df	Prob.
805.7836	798	0.4165

4) **Test for Residual Normality**

Component	Jarque-Bera	Df	Prob.
1	0.102747	2	0.9499
2	3.797270	2	0.1498
3	0.806047	2	0.6683
4	1.336170	2	0.5127
5	0.058753	2	0.9711
6	2.055586	2	0.3578
Joint	8.156574	12	0.7728

5) **Test for Residual Autocorrelation**

Null Hypothesis: no serial correlation at lag order h

Lags	LM-Stat	Prob
1	25.94642	0.8919
2	38.36048	0.3630
3	56.82565	0.1501

Probs from chi-square with 36 df.