IMPACT OF GOVERNMENT SECTORAL EXPENDITURE ON ECONOMIC GROWTH IN ETHIOPIA WITHA PARTICULAR FOCUS ON AGRICULTURE, DEFENSE, EDUCATION AND HEALTH SECTORS

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Impact of Government Sectoral Expenditure on Economic Growth in Ethiopia with a particular Focus on Agriculture, Defense, Education and Health Sectors

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This is to certify that the project prepared by Bazezew Berihun, entitled "The impact of government sectoral expenditure on economic growth in Ethiopia: with a particular focus on agriculture, education, health and defense sectors" and submitted in partial fulfillment of the requirements for the Degree of Master of Arts in Applied Economic Modeling and Forecasting (Fiscal Policy Analysis and Management) complies with the regulations of the University and meets the accepted standards with respect to originality and quality.

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Advisor

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Abstract

The Impact of Government Sectoral Expenditure on Economic Growth in Ethiopia: with a particular focus on Agriculture, Defense, Education and Health Sectors

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This paper investigates the growth impact of government sectoral expenditure in Ethiopia over the period from 1975 to 2013, with a particular focus on sectoral expenditures on education, health, agriculture and defense, by estimating a multivariate co-integration and error correction model to examine the marginal effect of expenditure on each sector on economic growth. The study finds that government spending on education has a positive impact on economic growth in the long-run but an insignificant impact in the short-run. Spending on defense has a negative and significant impact on economic growth both in the long-run and in the short-run.

Government spending on agriculture is negatively correlated to growth in the long-run but is insignificant in the short-run. Spending on health and the effect of consumer price index is found to be insignificant both in the long-run and the short-run. Thus, the results suggest that the allocation of government expenditure towards the education sector should be favored in order to enhance sustainable economic growth.

Keywords: *GovernmentExpenditure, Economic Growth, Co-integration Analysis, Error Correction Model and Sectoral expenditure*

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Table of Contents

List of Figures

List of Tables

List of Acronyms

ADF	Augmented Dickey Fuller
ADL	Agricultural Development Led Industrialization
AFDB	African Development Bank
AIC	Akaike Information Criteria
AR	Autoregressive
CPI	Consumer Price Index
CSA	Central Statistical Agency
DF	Degree of Freedom
ECT	Error Correction Term
ENDF	Ethiopian National Defense Force
EPRDF	Ethiopian People's Revolutionary Democratic Front
ETB	Ethiopian Birr
FPE	Final Prediction Error
GDP	Gross Domestic Product
GTP	Growth and Transformation Plan
HQIC	Hannan-Quinn Information Criteria
HSDP	Health Sector Development Plan
IMF	International Monetary Fund
LDCs	less Developed Countries
LM	Lagrange Multiplier
LM	Likelihood Ratio
MOFED	Ministry of Finance and Economic Development
NBE	National Bank of Ethiopia
OCED	Organization for Economic Cooperation and Development
ODA	Official Development Assistance
OLS	Ordinary Least Squares
PASDEP	Plan for Accelerated and Sustained Development to End Poverty
PP	Phillip-Perron
SDPRP	Sustainable Development and Poverty Reduction Plan
SSA	Sub-Saharan Africa
USD	United States Dollar
VAR	Vector Autoregressive
VECM	Vector Error Correction Model
WDI	World Development Indicator

Chapter One
Introduction

1.1. Background of the Study

Public expenditure is the main instrument used by governments especially in developing countries to promote economic growth which is an essential component for sustainable development (Sharma 2012). Moreover, composition of public expenditure has been attracting the attention of economists in recent times due to its effects on the level of growth (Sunday and Elizabeth 2012). Government expenditure is expected to be a means of reducing the negative impacts of market failure on the economy. However, allocations of public expenditure with lack of consideration for the urgent needs of the country may endanger greater distortion in the economy which may be detrimental to growth. Economic growth is expected to bring 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).

Nearly all the sectors in the national economies of developing countries demand more budgetary allocations every year. Thus, in view of the competing uses of public budgets there is a need to investigate the appropriate way of allocating budgets 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. The role of government in less developed countries (LDCs) like Ethiopia is quite substantial to bring at least short-run growth. Government fiscal policies, which include taxation, expenditure, correcting market failure and providing public goods and services, have become crucial instruments of economic growth in these countries including Ethiopia.

In Ethiopia the government has a major task to provide public goods and services such as education, health, roads, agriculture and food security, defense, communication and energy to its population of 84.8 million (MoFED, 2013). About 29.6 percent of Ethiopia'spopulation live under poverty line (MoFED, 2013) and the average GDP per capita is $550 (MOFED, 2014). Indeed the major development objectives of the government of Ethiopia as expressed in

various past and present development plans and strategies is poverty reduction,sustainable economic growth and sustained rapid and broad based economic growth. In Ethiopia like other developing countries, government expenditure continues to be the main source of investment expenditure. Accordingly, at the end of the current Ethiopian Growth and Transformation Plan (GTP) in 2014/15 total government expenditure is expected to reach ETB 201.1 billion, up from its ETB 71.3 billion in 2009/10 (MOFED,2010).

However, the effect of government spending on economic growth is still an unresolved issue theoretically as well as empirically. Although the theoretical situations on the subject are quite diverse, the conventional insight is that a large government spending is a source of economic instability or stagnation. Empirical research, however, does not conclusively support the conventional insight.A few studies report positive and significant relation between government spending and economic growth while others find significantly negative or no relation between an increase in government sectoral expenditure and economic growth(see Sharma 2012, Sunday and Elizabeth 2012,Loto 2012). In the light of the above, this study aims to examine the impact of sectoral expenditure on economic growth in Ethiopia.

1.2. Statement of the Problem

A fundamental question in growth theory asks whether increasing government expenditure promotes economic growth. Yet the empirical evidence is inconclusive. Government expenditure is one of the important determinants of economic growth. However, the growth of an economy depends on the size, spending capacity, and effective use of capital expenditure in the development process (Sharma 2012). On the one hand, government expenditure on education and health care are expected to raise labor productivity.

Further, governmentexpenditure on such infrastructure as roads and communications would also boost the rate of private domestic investment, which in turn brings up economicgrowth. In contrast (Barro 1991), for instance, argues that “expenditures on education and defense are more like public investment than public consumption; in particular, these expenditures are likely to affect private sector productivity or property rights, which matters for private investment.” On the other hand, higher government spending may delay overall economic

performance if the major source of this higher expenditure is based on increasing taxes and/or borrowing from the private sector.

There have been a number of studies that attempt to measure the impact of components of government expenditure on economic growth. These studies have continued to generate a series of debate among scholars. Some scholars argued that increase in government expenditure on socioeconomic and physical infrastructureboosts economic growth. However some scholars do not support the claim that increasing government expenditure encourages economic growth, instead they assert that higher public expenditure may slow down overall performance of the economy by crowding out private investment. Empirically a number of studies are conducted and found conflicting results as briefly presented below.

Sunday and Elizabeth (2012), using the vector Autoregressive Approach in Nigeria, found that expenditure on education has failed to enhance economic growth whereas expenditure on health and agriculture has a positive impact on economic growth. On the one hand,Nurudeen and Usman (2010) using a disaggregated method of analysis found results similar toSunday and Elizabeth(2012)regards education expenditure, health and transport and communication sectors. On the other hand,Ditimi (2011) by using multivariate co-integration approach concludes that expenditure on agriculture had a significant influence on economic growth while expenditure on education, health and transport and communication had insignificant influence on economic growth.

In contrast Saad and Kalakech (2009) evaluated the impact of public spending on education, defense, health and agriculture in Lebanon and they found results opposite to those of Ditimi (2011). On the other hand,Musaba et al.(2013) in Malawi by using co-integration analysis evaluated thegrowth effects of government expenditures in agriculture, education, health, and defense, social protection and transport and communication.They find that the short run results showed no significant relationship between government sectoral expenditure and economic growth. While in the long run expenditure on agriculture and defensehas a positive and significant effect, whereas expenditures on education, health, social protection and transportation and communication were negatively related to economic growth.

Yet, fiscal policy is a key element of Ethiopia's macroeconomic policy given the importance of public expenditures in financing investment and consumption activities and their role in meeting the growing need for public social services.

According to the official figures from Ministry of Finance and Economic Development total government expenditures increased from ETB 1032.9 million in 1975 to 153928.7 million in 2013 in order to meet the ongoing increase in demand due to population growth and own financed mega projects in the country. Moreover, composition of public expenditure has been attracting the attention of economists in recent times due to its effects on the level of growth. Government expenditure is expected to be means of reducing the negative impacts of market failure on the economy. However, allocations of public expenditure with lack of consideration for the appropriate needs of the country may cause greater distortion in the economy which may be detrimental to growth.

This study will indicate which sector is better to support and enhance economic growth currently and will give an indicative conclusion about resource allocations based on the results. Moreover, this study attempts to examine the impacts of recently growing government sectoral spending on economic growth and their long run relationship by using recent data sets and will set out to investigate and fill the gap in the literature onthe effect of public expenditure components like agriculture, defense, education and health on economic growth in Ethiopia.

1.3. Objectives of the study

1.3.1. General Objective

The main objective of this study is to investigate the impacts of government expenditure on economic growth in Ethiopia over the period 1975 to 2013, with a particular focus on sectoral expenditures on agriculture, defense, and education and health sectors.

1.3.2. Specific Objectives

To assess which specific components of government expenditure have significant impact on economic growth

To investigate which public spending component contributes positively to economic growth.

To identify the long-run and short-run linkages between these sectors and economic growth

To assess whether the findings of this study complement or supplement previous research findings, with a particular focus on government expenditure on agriculture, defense, education and health sectors on economic growth

To forward some policy implications that are expected to improve the contribution of these sectors in order to ensure sustainable economic growth

1.4. Significance of the Study

Most of the previous studies on impact of government sectoral expenditure on agriculture, defense, education and health on economic growth were conducted in cross country basis. The study based on cross country analysis doesn't allow us to clearly examine the impact of sectoral expenditure on economic growth in Ethiopia particularly on agriculture, defense, education and health sectors. In this respect, different countries have different result for the impact of sectoral expenditure on economic growth. Hence, such work typically needs to be country specific, to capture the different marginal effects of each sector's expenditure on economic growth. However, in Ethiopian case, the number of studies done so far is limited in number and further study is still required.

Thus, this study sought to contribute to the body of knowledge which exists now by providing empirical evidence specifically on impact of government expenditure components including agriculture, defense, education and health sectors on economic growth in Ethiopia.

1.5. Scope and Limitations of the Study

This paper will focus on the growth impacts of only agriculture, defense, education and health government sectoral government expenditure of Ethiopia during 1975-2013. Shortcomings of this study include absence of disaggregated data (capital and recurrent) over the same time period and variables. And the paper uses only sectoral expenditures on agriculture, defense, education and health and GDP time-series data from the period 1975-2013.

1.6. Organization of the Study

This paper contains six chapters. The first section is an introduction under which the background of the study, statement of the problem, objective of the study and significance of the study are presented. In the second chapter, related empirical and theoretical literatures are summarized. The third chapter contains some theoretical and empirical descriptions of public expenditure and economic growth in Ethiopia. In chapterfour, data and methodology used in the study are discussed in detail and estimation techniques used, and data type and sources are described. In thefifthchapter, empirical results are discussed. In the final chapter, conclusion and recommendations are presented.

Chapter Two
Review of Literature

2.1. Introduction

In this chapter theoretical and empirical literature on sectoral government expenditure and economic growth are briefly reviewed. The chapter is divided into two sections. The first section (2.2) looks at theoretical literature relevant to the current study while section (2.3) looks into empirical literature or empirical findings which are relevant for the current study.

2.2. Theoretical Literature

Public spending is a controversial issue, not only in the basic matter of how much there should be, but also in terms of the details of its distribution and funding, and of how it is defined. The public sector forms a large part of the economy, and as such public spending has a major impact on the macro-economy, as well as on the day-to-day quality of people's lives. Some economic theories have suggested that increasing public spending exercises a negative ("crowding out") effect on private sector economic activity, and some others argued that it has positive impact on economic growth.

The Neoclassical Framework: In Neoclassical models, a shock to government spending generates negative wealth effect on the infinitely lived representative household (higher government spending means higher taxation in present discounted terms), as the household feels poorer, labor supply increases and consumption and real wage falls. (Baxter and King 1993) showed how discretionary fiscal policy affects the macro economy in a neo-classical framework assuming lump-sum tax to finance higher government spending assuming that leisure and consumption are normal goods, labor supply increases as households feel poorer. Given constant labor demand, marginal labor productivity and real wages decline. As a result, consumption decreases while output rises. If the shock persists, marginal productivity of capital rises and hence private investment would increase. Ultimately, a new steady state is reached where real wages have returned to their initial level andprivate consumption has

been lower than before. If, on the other hand, the tax is distortionary, the outcome would be different due to the intra temporal and inter-temporal substitution effect in laborsupply. The result depends on the manner in which the tax rate is designed. For instance, (Burnside et al.2000) show the effect of increase in government expenditure financed by changes in tax rates in a hump shaped manner. The hump shaped government purchases produces hump shaped pattern in output, consumption and employment. In the new steady state, private consumption, investment and output have fallen. In general, the neo-classical models have trouble in producing increase in private consumption unlike what the empirical analysis usually suggests. As (Beetsma 2009) states the main obstacle lies in the rightward shift of the labor supply curve for a given labor demand which yields lower wage.

New Keynesian Framework:The New Keynesian models argue that an increase in government spending increases demand and thus economic activity that is output through crowding in or multiplier effect. It, moreover, produces increases in private consumption by introducing nominal rigidities, increasing returns, countercyclical mark-ups and non-Ricardian consumers. Introducing nominal rigidities into a monopolistic competition implies that price is greater that marginal cost. Given the increase in labor supply due to the standard wealth effect (the rise in tax) discussed in the neo-classical literature, the increased demand for goods will be met by firms since prices are sticky and it is greater than the marginal cost in monopolistic competition. To produce the additional output, firms need to employ more labor units which in turn raise the real wage. (Devereux et al.1996) and (Ravn et al.2006) found another mechanism in which the labor demand curve also shifts and positive consumption response might result.

In particular, (Devereux et al.1996) introduced increasing returns where government spending may increase the equilibrium number of firms in intermediate goods characterized by increasing returns to specialization. The increase in productivity in these firms enables them to demand more labor. Consequently, the labor demand shifts outward thereby increasing the real wage. (Ravn et al.2006) introduced “deep habits” instead of increasing returns. “Deep habits” refer to habit formation for a variety of goods in which theindividuals group their demand for good into price elastic and price inelastic components. An increase in demand via higher government spending increases the weight of the elastic component and

induces producers to lower their price mark-up. The counter-cyclical reduction in the wage along with the increase in labor supply (the standard wealth effect) leads to a rise in labor demand, higher real wage and higher consumption. Optimizing consumers, however, can spread the consumption across time and private consumption may not increase substantially. (Gali et al.2007) introduced non-Ricardian, "rule-of-thumb" consumers, an additional imperfection that ensures increased private consumption (Beetsma, 2009).

These are consumers who consume their entire disposable income. If these consumers are large (as in developing countries), the positive current private consumption in general increases as this effect more than offsets the negative wealth effect.However, one of the greatest limitations of Keynesian theory is that it fails to adequately consider the problem of inflation which might be brought about by the increase in government spending.

Non-Keynesian Effects:Non-Keynesian effects of fiscal policy are also considered in the literature. These effects refer to the situation where fiscal consolidation (reduction in government spending and/or increase in tax) causes a rise in output. This negative multiplier effect occurs as a result of reduction or elimination of cost of fiscal consolidation due to favorable expectation effects driving inter-temporal saving choices. These expectations directly influence the two non-mutually exclusive channels namely, consumption and investment channels (Carvalho, 2009). Private consumption can increase after fiscal consolidation because of three effects: Pure expectation effects, wealth effects and substitution effects. The pure expectation effect implies that households expect lower tax burden in the future when taxes are higher and/or spending's are lower today. The lower tax burden allows a reduction in precautionary saving and leads to higher value of the present discounted disposable income thereby increasing private consumption (Feldstein, 1982). The wealth effect, on the other hand, increases private consumption through lower interest rate that increases the market value of the asset held by households and increases the opportunity cost of private saving. However, along with these two effects there is a direct negative effect of fiscal consolidation due to lower disposable income.

Thus, the relative strength between the direct effect of fiscal consolidation that depends on how disposable income is affected and the expectation and wealth effects that is dependent more on permanent income determines the ultimate effect on private consumption. The

financial market plays a crucial role in allowing households to be able to consume based on their permanent income. The third effect relates to the substitution of public consumption by private consumption which is largely a function of private willingness and ability to provide social services like education, health and so on. Private investment is the more pronounced channel that could result in expansionary fiscal consolidation in the literature. Interest rate reduction and the labor market effect are the two ways through which higher investment and hence output results. For details see (Alesina et al. 1998) and(Ardagna2007).

Keynesian framework:This framework explains the effects of fiscal policy in developing countries. It emphasizes the positive role of active fiscal policy as resources are underutilized in these economies. Public expenditure in these countries crowds in private spending either by directly complimenting it or indirectly through increasing aggregate demand.

To summarize, standard Neo-classical and New Keynesian as well as Structural models predict positive response of output to the rise in government spending while the non-Keynesian effect acknowledges the possibility of negative multiplier. Furthermore, neo-classical models typically predict negative response in private consumption that is the neo-classical growth models argue that government fiscal policy does not have any effect on the growth of national output. However, it has been argued that government fiscal policy or intervention helps to improve failure that might arise from the inefficiencies of the market,while New Keynesian models yields the opposite result for a positive shock in government spending. The effect on private investment is more ambiguous. In neo-classical models, private investment responds positively if the shock in government spending is persistent and taxes are non-distortionary. In the New Keynesian models, investment increases if the accelerator effect dominates the higher interest rate effect. The Non-Keynesian effect implies positive response of private consumption and private investment to fiscal consolidation.

Hence, according to the Keynesian macroeconomic thought, public spending can contribute positively to economic growth. Thus, an increase in the government consumption is likely to lead to an increase in employment, profitability and investment through multiplier effects on aggregate demand. As a result, government spending augments the aggregate demand, which provokes an increased output depending on expenditure multipliers. The opponents of this approach stipulate that government consumption crowds out private investment, hampers

economic growth in the short run and diminishes capital accumulation in the long run (Diamond, 1989).

Moreover, Barro and Sala-i-Martin (1992) classify expenditures as productive and unproductive and assume that productive expenditures have a direct impact on the rate of economic growth and the unproductive expenditures have an indirect effect or no effect at all. However, government spending on basic infrastructure plays a crucial role in economic growth. Having, for instance, an efficient road network could reduce the time and the cost to move goods and services across the country. It also felicitates the connection among the different parts of the country and enhances their interaction. The definition of nation's wealth has extended to contain not only physical capital but also human capital as an independent factor of production essential to achieve high and sustainable economic growth rates. Hence, developing countries have attempted to stimulate the accumulation of human capital through public education expenditure as well as government spending on health and other social services.

Education is one of the important factors that determine the quality of human capital. Moreover, Hartshorne (1985) suggests that formal education plays an important positive role in economic growth. Consequently, human capital with physical capital, are key elements of the nation's wealth. The former is considered to be an independent factor of production that is indispensable to achieve high and sustainable economic growth rates.

In addition several theories explaingovernment expenditure as follows: Musgrave Rostow's theory of expenditure asserts that in early stages of economic growth, public expenditure in the economy should be encouraged. The theory further states during the early stages of economic growth there exists market failures and hence there should be robust government involvement to deal with these market failures. But this theory is faulted because it ignores the contribution to development by the private sector and assuming government expenditure is the only driver of economic growth, whereas the German economist Adolph Wagner made an in depth study relating to rise in government expenditure in the late 19th century. Based on his findings, he advocated a law called "The Law of Increasing State Activity". Wagner's law states that "as the economy develops over time, the activities and functions of the government increase".

According to Wagner's law, comprehensive comparisons of different countries and different times show that among progressive societies, with which alone we are concerned; an increase regularly takes place in the activity of both the central and local governments constantly undertake new functions, while they perform both old and new functions more efficiently and more completely. In contrast Adam Smith wrote in the 'Wealth of Nations' that the government should restrict their activities to defense against foreign aggression, keep internal peace and order and public development work.

All other functions besides these were considered beyond the scope of the state & expenditure on them was treated as unjust & wasteful. On the one hand Peacock and Wiseman conducted a new study based on Wagner's Law of "increasing state activity" and they found out that Wagner's Law is still valid. This theory dealing with growth of public expenditure was advanced by Peacock and Wiseman in their study of public expenditure in the UK for the period (1890 –1955). It's based on a premise that the tax payer is naturally tax averse while the government on the other hand has an inherent desire for expenditure. During times of shocks like disasters and war, the government would expeditiously increase the public expenditure, this necessitates moving taxes upwards. Researchers argued that the tax payers would allow and tolerate such an increase in tax. This scenario is referred to as displacement effect; though it is meant to be a short term phenomenon it normally assumes a long term trend (Wiseman and Peacock, 1961).

This may explain how government expenditure in Ethiopia has taken a consistent upward trajectory. Ethiopia is one of the least developed nations in the world. As per the findings of the studies which have been conducted in the country, the various civil wars that hit the country in the 1970s and 1980s, and the frequent droughts that occurred since the 1960s up to the present are believed to be the reasons behind the underdevelopment of the country (Tsegay, 2008).

Upsizing of the government structure to accommodate the many ministries intended to serve thecitizens, the tax intensity and scope turned in cycle with the public expenditure. One of the shortcomings of this theory is that it sidelines the fact that government can finance an upward displacement in public expenditure using other sources of finance such as donor funds, external borrowing or even sale of government fixed asset and this needless to say may not

affect taxes in an upward trend. But Wagner's law and Peacock-Wiseman hypothesis emphasize on the fact that public expenditure has a tendency to increase overtime. In addition to the above theories, the work of (Barro 1990) has postulated a new perspective in which the investigation of the impact of fiscal budgetary expansion through public expenditure can enhance economic growth.

2.3. Empirical Literature

A number of researchers have attempted to investigate the relationship between government expenditure and economic growth. Alshahrani and Alsadiq (2014) investigated the relationship between government expenditure and economic growth in Saudi Arabia, using VECM. They found economic growth to be positively related to private domestic and public investments, as well as healthcare expenditure in the long run but spending on education, defense, and housing have a negative long run relationship with GDP growth while spending on defense and housing have insignificant impact in the short run.

Similarly, Saad and Kalakech (2009) using the same method as that of Alshahrani and Alsadiq found that government spending on education has a positive effect on economic growth in the long-run and negative impact in the short-run, while spending on defense has a negative impact on economic growth in the long run and insignificant impact in the short-run. As to health spending, it is negatively correlated to growth in the long-run and there is insignificant linkage in the short-run. Finally, spending on agriculture is found to be insignificant in both cases.

On the one hand a study by Ditimi (2011) in Nigeriausing VECM found that expenditure on agriculture had a significant influence on economic growth while expenditure on education, health and transport and communication had insignificant influence on economic growth. And he recommended that the government should reverse the decline in budgetary allocation to the educational and health sector in order to provide the sectors with the needed revenue which is necessary in influencing aggregate output of the economy.

Another study in Kenya by Mudaki and Masaviru (2012) indicated that public expenditure on education was a highly significant and positive determinant of economic growth which is an

opposite result with Ditimi (2011). On the other hand, expenditure on agriculture was also found to be a significant albeit negative determinant of economic growth. A similar study in Nigeria by Barisua and Lezaasi (2010) using OLS method of estimation found that in the short run government spending on education had positive and insignificant impact on economic growth while government expenditure on agriculture has a negative and insignificant relationship with GDP. On the other hand, the study found that government sectoral expenditure on health has a positive and highly significant relationship with GDP.

In addition Abdullah (2000) evaluated the relationship between government expenditure and economic growth in Saudi Arabia. The author reported that the size of government expenditure is an important determinant of the performance of the economy. He advised that government should increase its spending on infrastructure, social and economic activities and should encourage and support the private sector in order to accelerate economic growth.

Similarly Taiwo and Abayomi (2011) indicated that there is a positive relationship between real GDP as against the recurrent and capital expenditure and they recommended that government should promote efficiency in the allocation ofdevelopment resources through emphasis on private sector participation, privatization and commercialization. In another related study, Bose et al.(2007) examine the growth effects of government expenditure for a panel of 30 developing countries over the 1970s and 1980s, with a particular focus on disaggregated government expenditures. This study found that government investment and total expenditures in education are the only outlays that are significantly associated with growth once the budget constraint and omitted variables are taken into consideration.

A study by Saad and Kalakech (2009) in Lebanon investigates the growth effects of government expenditure over a period from 1962 to 2007, with a particular focus on sectoral expenditures. They found that government spending on education has a positive effect on economic growth in the long-run and negative impact in the short-run. On the other hand, they find that spending on defense has a negative effect on economic growth in the long run and insignificant impact in the short-run. As to health spending, it is negatively correlated to growth in the long-run and there is insignificant linkage in the short-run. Finally, spending on agriculture is found to be insignificant in both cases. Accordingly they suggested that the

allocation of government resources towards the education sector should be favored in order to enhance growth.

Moreover, Dunne (2010) in his study titled "Military Spending and Economic Growth in Sub Saharan Africa" finds a clear negative impact of military spending on economic growth for SSA, consistent with the results for all countries.In contrast Ando (2009) based on the Feder model for 109 countries including 30 OECD countries; using panel data over the period between 1995 and 2003 and he find that defense expenditure has a positive impact on the rate of economic growth in all 109 countries.

We find a few studies in the Ethiopian context. Endale (2007) assessed the effect of defense expenditure on economic growth based on the Hauseman (1978) test of random effect estimator. His empirical results showed that defense burden is destructive to real GDP.Another study by Wendwesen (2012) and Fitsum(2013) using vector error correction mechanism found that expenditure on education and road construction have a positive short-run significant impact on economic growth while expenditure on health, agriculture and non-poverty sectors are found to have negative and insignificant effect on GDP growth.

The other study by Teshome(2006) tried to see the impact of various components of government spending on (investment, consumption and human capital) on economic growth and found that only human capital (education and health) has long run significant positive impact on economic growth. Similarly Siraj (2012) using Ram's (1986) framework revealed that public spending on physical investment and human capital development have positive contributions to economic growth while spending on consumption affects growth negatively.

This study is an improvement on other studies on economic growth and government expenditure relationship in Ethiopia for two reasons. First, it considers government expenditure on defense as an important variable that affects economic growth. Recent studies like Wendwesen (2012) did not include the variable expenditure on defense in the growth model. Secondly, this paper extends the study period to 2013.

Chapter Three
Public expenditure and economic growth in Ethiopia

3.1. Public Expenditure Policy in Ethiopia

Ethiopia's public expenditure policy focuses on investing on growth enhancing pro-poor sectors and covering recurrent expenditure from domestic resources. The policy also emphasizes on the importance of eventually covering the government's capital spending requirements from domestic resources. Moreover, the policy emphasizes ensuring efficiency and effectiveness in use of scarce public resources. The major assumptions that have been considered in the course of allocating recurrent expenditure in the last three GTP years include the previous year budget performance, estimation about the following year public service expansion, and price developments. The allocation of capital investment emphasized primarily on giving priority to ongoing projects (MoFED, 2014).

In addition the capital expenditure allocation accommodated new selected investment projects that are given priority in the overall development polices and strategies of the country. Moreover, the capital expenditure allocation focused on the growth-enhancing pro-poor sectors of agriculture development, food security, water and sanitation, education, health, road, and rural electrification programs (MoFED, 2014). [1]Accordingly, in the last three Growth and Transformation Plan periods, total government expenditure was increased to about 20% of GDP on average, up from 17% in 2008/09. Both current and capital expenditure moderately increased during 2010/11-2012/13 compared with 2008/09. An interesting and encouraging aspect of public expenditure in Ethiopia is the importance attached to pro-poor spending. This spending category was about 7% of GDP in 2009 and increased to 12.5% of GDP in 2010. It is also on average increased to 15% of GDP in 2011 and 2012(MoFED 2013, annual government expenditure report).

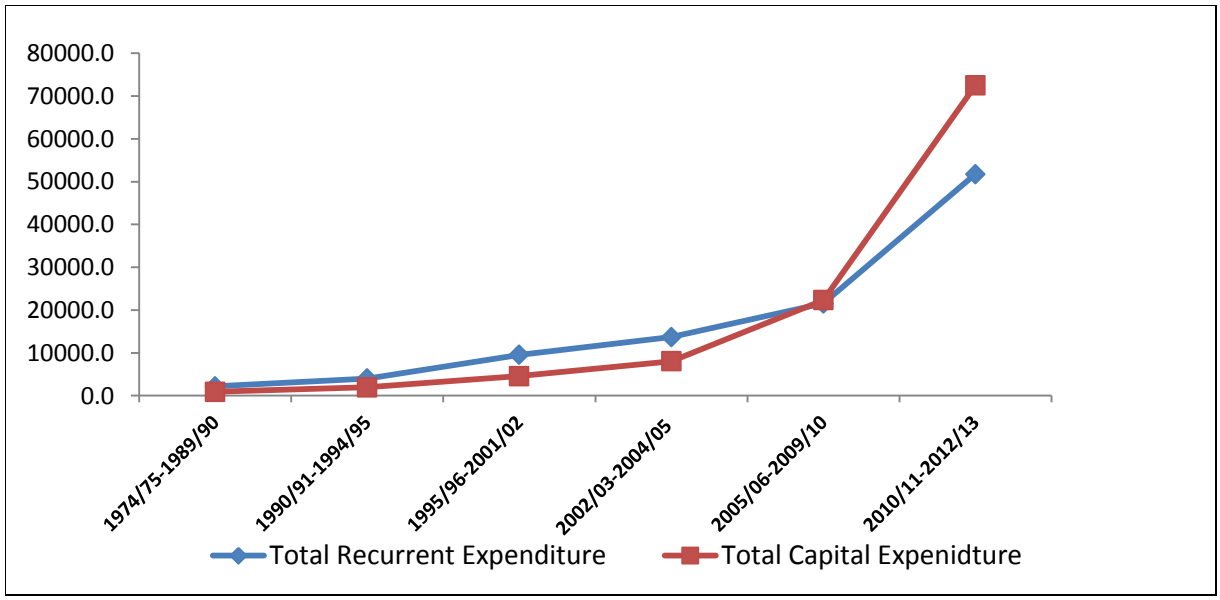
Total government expenditure in Ethiopia was ETB 153.93billion in 2012/13, an increase from ETB 1.033 billion in 1975. In 2013 capital expenditure accounted for 59.2 % of total

[1]Note: all numbers presented in section 3.1 for descriptive analysis are taken from (MoFED 2013) annual government expenditure report based on own computations

government expenditure, while the remaining 40.8% was recurrent expenditure. Between 2009/10 and 2011/12, capital expenditure increased on average by 31.5%, while recurrent expenditure increased on average by 23.2% (MoFED 2013).

The government of Ethiopia in its Growth and Transformation Plan (2010/11–2014/15) has committed to allocating more resources to build economic and social infrastructure and to ensure the provision of basic services aimed at eradicating poverty and achieving rapid and sustained economic growth. The GTP intends to increase budgetary allocation to social sectors and economic service such as health, education, agriculture, water supply, food security and infrastructure, to support poverty eradication, in the form of capital expenditure, while attempting to contain increases in recurrent expenditure (MoFED, 2012).

Figure 1: Average capital and recurrent government expenditure (1975 -2013)



Source: MoFED

3.2. Education and Educational Expenditure

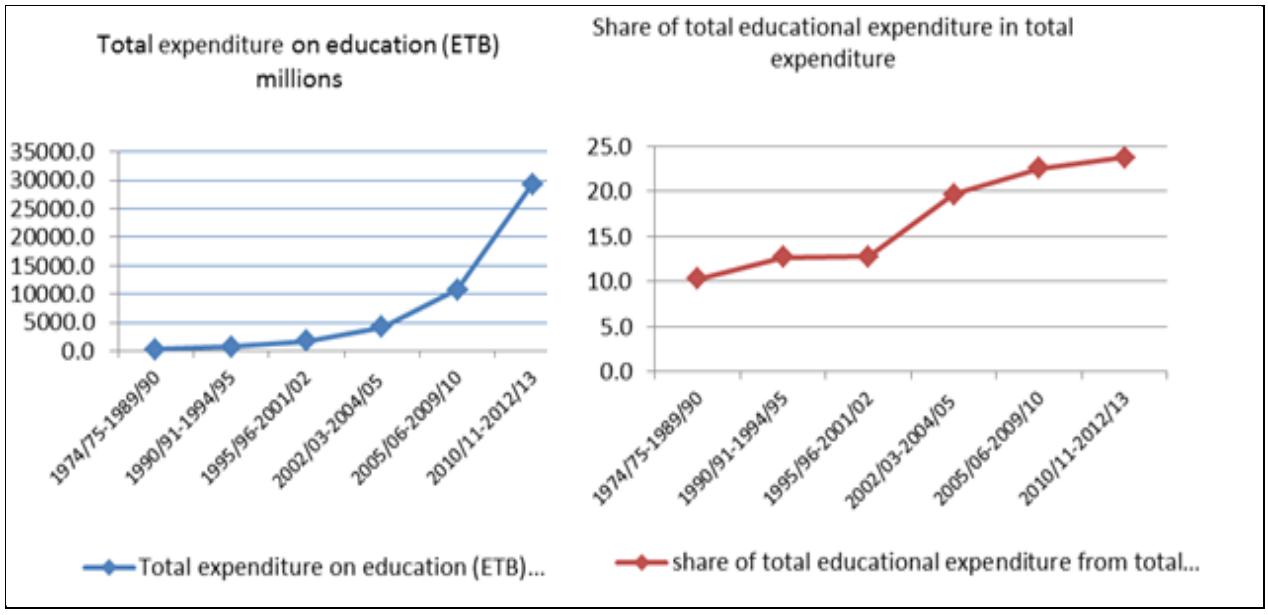
The government of Ethiopia is committed to achieving education for all by 2015, and has an education policy that is committed to improving access to quality basic education for all children and adults, with particular emphasis on female's participation. Indeed, the education sector in Ethiopia has experienced remarkable expansion in recent years through the growth of both formal and informal schools for primary and secondary education, as well as through

alternative ways to education such as basic education centers and non-formal and adult education.

[2]The government of Ethiopia has consistently increased its educational spending on average since the derg regime (1974/75-1989/90). Total average expenditure on the education sector increased from ETB 297.6 million in the derg regime to an average of ETB 29261.2 million during 2010/11-2012/13. By 2013, over 22.5 % of public expenditure was allocated to education, an increase from 15.6% in 1975. In 2013, education accounted for 6.2 % of GDP, up from 2.3% in 1975(MoFED, 2013, annual government expenditure report report).

The education sector once again comes to the lead of all other poverty reduction sectors in the EPRDF- led government based on its share of expenditure next to road and urban development. Except a significant reduction in expenditure for three years during the Ethio-Eritrea conflict, in 2010/11, a major increase in expenditure has been recorded. As depicted in Figure 2 both the total and share of educational expenditure to the total expenditure shows an increasing trend.

Figure 2: Public expenditure on education, 1975–2013



Source: Own calculation based on MOFED data

[2]Note: all numbers presented in section 3.2 for descriptive analysis are taken from (MoFED 2013) annual government expenditure report based on own computations

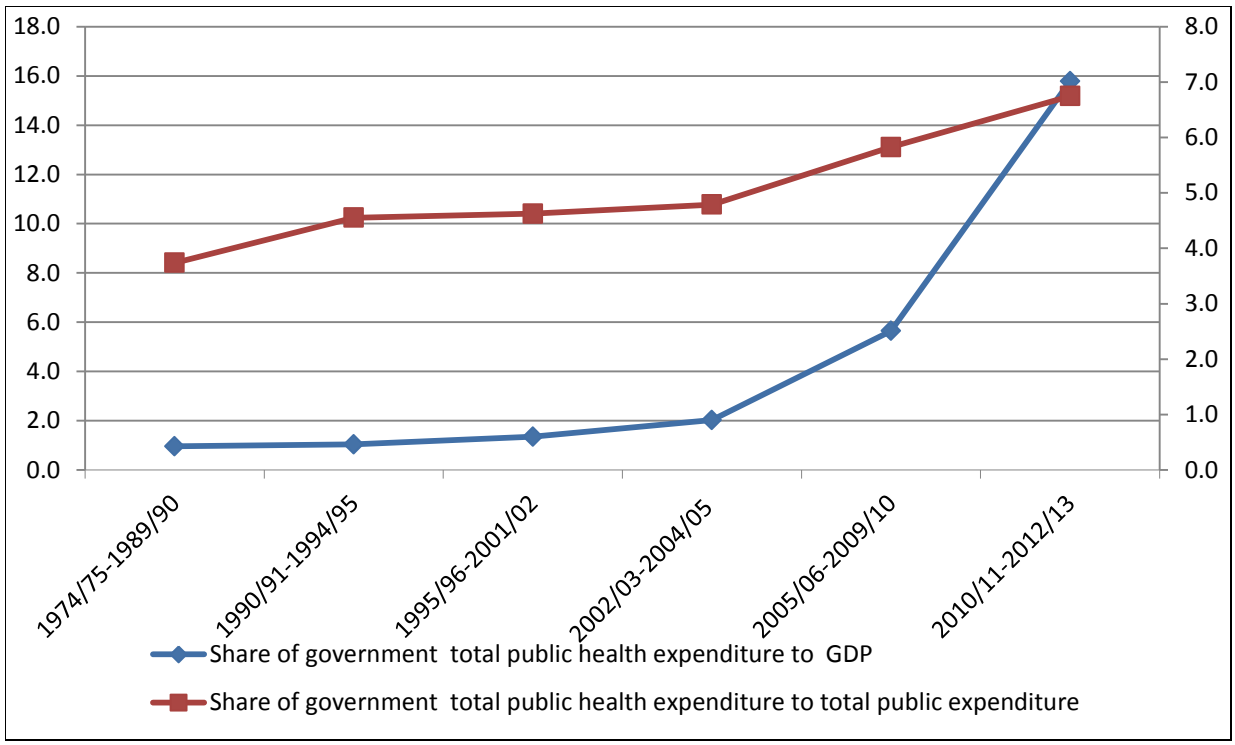
3.3. Health and Health Expenditure

The government of Ethiopia, through its Sustainable Development and Poverty Reduction Plan (SDPRP, 2002/03- 2004/05), Plan for Accelerated and Sustained Development to End Poverty (PASDEP, 2005/06–2009/10), and Growth and Transformation Plan (GTP, 2010/11-2014/15) has recognized the critical role that improved health services play in economic development. This recognition has led to increased investments in the health sector. A core component of the PASDEP was the Health Sector Development Plan (HSDP), which focuses on strengthening Ethiopia's health system, particularly on interventions geared to improving maternal and child health and combating malaria, HIV and TB. The Health Sector Development Plan IV (2010/11–2014/15) builds on previous HSDPs, and is line up to the health-related MDGs.

[3]The government of Ethiopia spent ETB 11331.1 million on public health in 2012/13, an increase from ETB 46.3 million in 1974/75. On average the share of government expenditure to GDP on health was 1% during the derg regime (1974/75-1989/90), which extensively increased to 15.8% in the last three GTP periods (2010/11-2012/13) as depicted in figure 3.

[3]Note: all numbers presented in section 3.3 for descriptive analysis are taken from (MoFED 2013) annual government expenditure report based on own computations

Figure 3: Share of total health expenditure to GDP and total expenditure



3.4. Agriculture and Agricultural expenditure

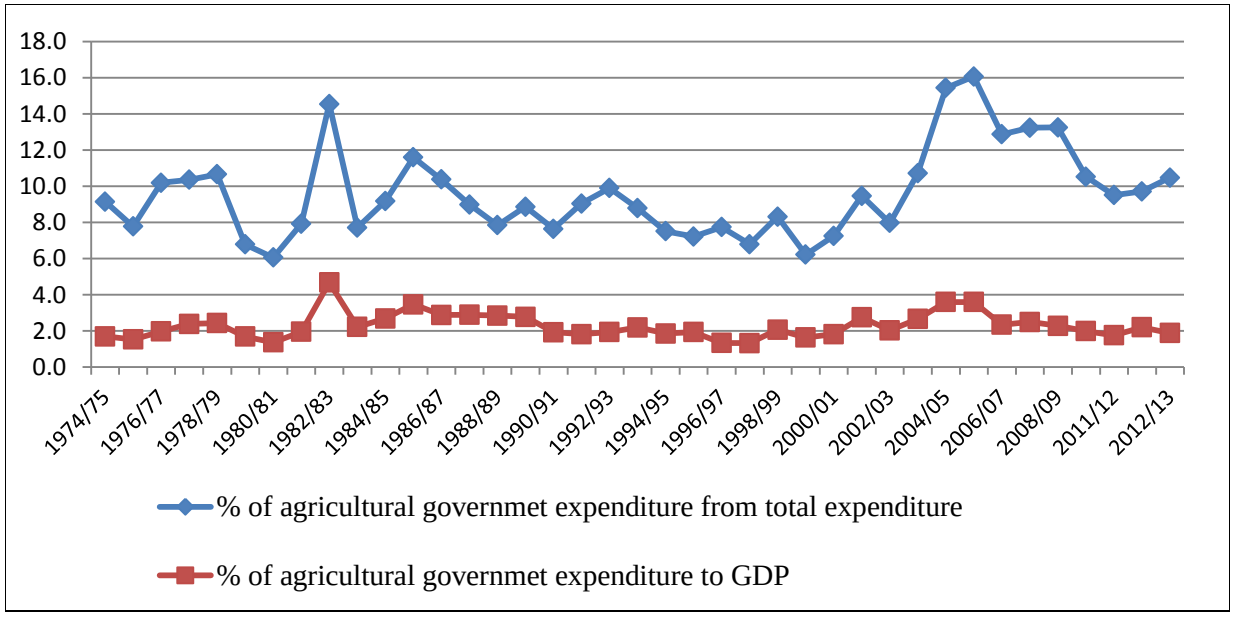
Agriculture in Ethiopia consists mainly of subsistence farming, made up of low-input, low-output rain-fed systems. Droughts periodically reverse performance gains in the sector, with devastating effects on household food security and poverty levels. In addition low agricultural productivity can be attributed to recurrent droughts, limited access by smallholder farmers to agricultural inputs, financial services, improved production technologies, irrigation and agricultural markets and, more importantly, to poor land management practices and that have led to severe land degradation. However, in recent years the government of Ethiopia gives a great emphasis to the role of agriculture for the development of the country by applying Agricultural Development Led Industrialization (ADLI) strategy and incorporating it as one of the pillars of its national development plans since 2002/03.

In order to accelerate and expand industrial development and increase overall economic growth, it is essential to develop the agricultural sector which is crucial to ensure the

provisions of inputs for industries as well as to fulfill food requirements. [4]Accordingly, the agriculture sector is the leading contributor to growth in Ethiopia, despite its decreasing share of GDP.

Agricultural growth in 2010/11 was 9% which is above the GTP annual target of 8.5% while expenditure on agriculture as a proportion of total government expenditure was 12% on average for the last eight years (PASDEP and GTP periods). Both government spending and funds from official development assistance to the agriculture sector goes largely towards agricultural inputs, agricultural development, land, and water resources. This allocation is aligned to government priorities for the agriculture sector, which include increasing production and productivity, as well as commercialization and development of agro-based industries.

Figure 4: Percentage of agricultural expenditure to GDP and total expenditure



Source: MoFED

3.5. Defense and Defense Expenditure

"Military spending is an important issue for developing countries. It is an expenditure by governments that has influence beyond the resources it takes up, especially when it leads to or facilitates conflicts" (Dunne 2010). While most countries need some level of security to deal

[4]Note: all numbers presented in section 3.4 used for descriptive analysis are taken from (MoFED 2013) annual government expenditure report based on own computations

with internal and external threats, there are opportunity costs as the money could be used for other purposes that might improve the pace of development, but in more recent years the declining trend has bottomed out and military expenditures are increasing (Dunne 2010).

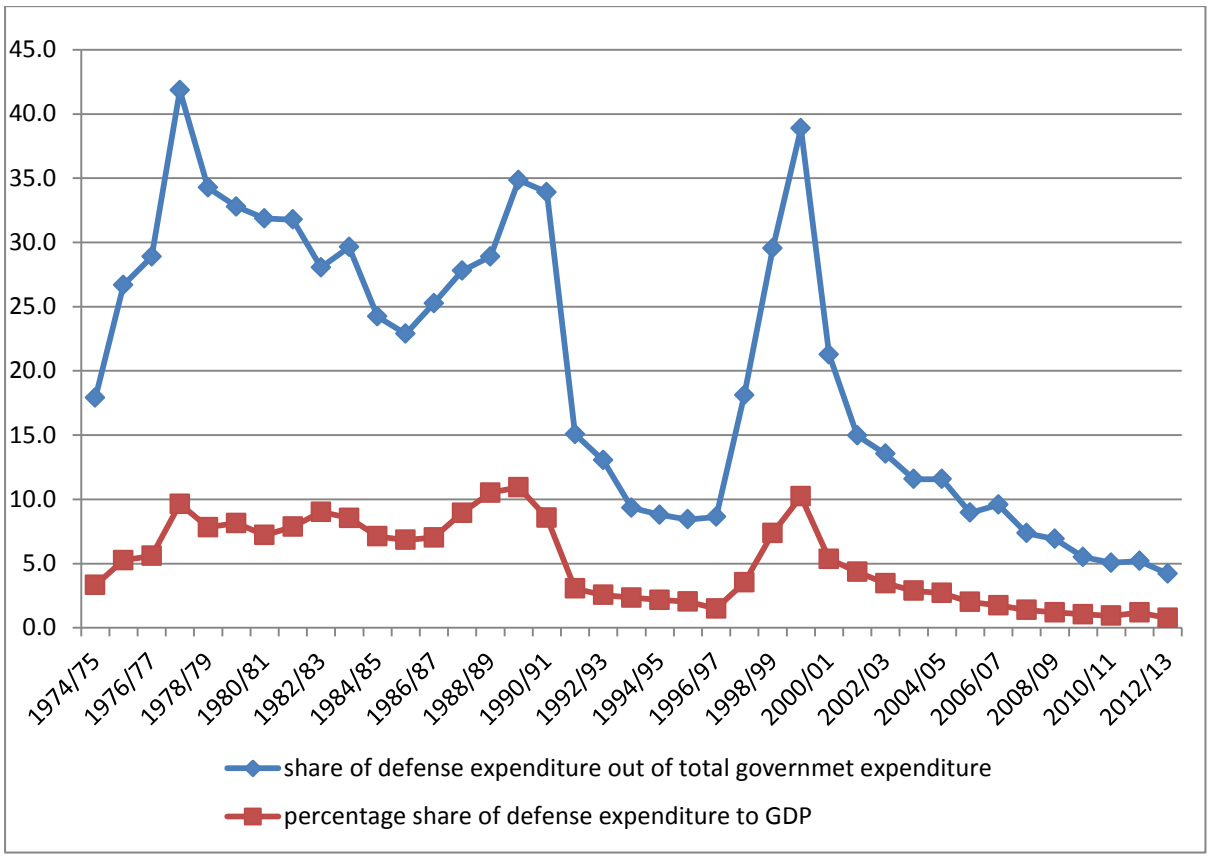
"The Ethiopian National Defense Force (ENDF) is the military of Ethiopia. Civil direction of the military is carried out through the Ministry of Defense, which oversees the ground forces, air force, as well as the Defense Industry Sector. The size of the ENDF has fluctuated significantly since the end of the Ethiopia-Eritrea war in 2000. In 2002 the Ethiopian Defense Forces had approximately 400,000 troops. This was roughly the same number maintained during the derg regime that fell to the rebel forces in 1991.However, this number was later reduced"(http//en.wikipedia.org/wiki/Ethiopian National Defense force).

According to (Said and Mesfin et al2006)"dramatic shifts occurred in the nature and size, and consequent cost, of the Ethiopian military from the 1970s onwards, coinciding with the establishment of the socialist regime of Mengistu in 1974". Various factors accounted for this. The first was the political ideology of Marxism-Leninism adopted by the government in which the economy and polity were centrally controlled and public expenditure rose significantly.

[5]As depicted in the figure 5 the share of military spending in GDP and total government expenditure increased from 3.3 % and 18.6% in 1974/75 to 8.2% and 24.9% in 1979/80 respectively. And then it declines from (1991 -1997) and it reaches in its pickfrom(1999-2000). But after the Ethio-Eretria war defense expenditure shows a decreasing trend up to 2001/02. And since 2000/01 defense expenditure follows approximately a constant trend up to now, because Ethiopia is more stable both internally and externally after the Ethio-Eritrea war as compared to East African regions.

[5]Note: all numbers presented in section 3.5 used for descriptive analysis are taken from (MoFED 2013) annual government expenditure report based on own computations

Figure 5: The share of defense expenditure to GDP and total expenditure



Source: MoFED

3.6. Overview of Economic Growth in Ethiopia (1975-2013)

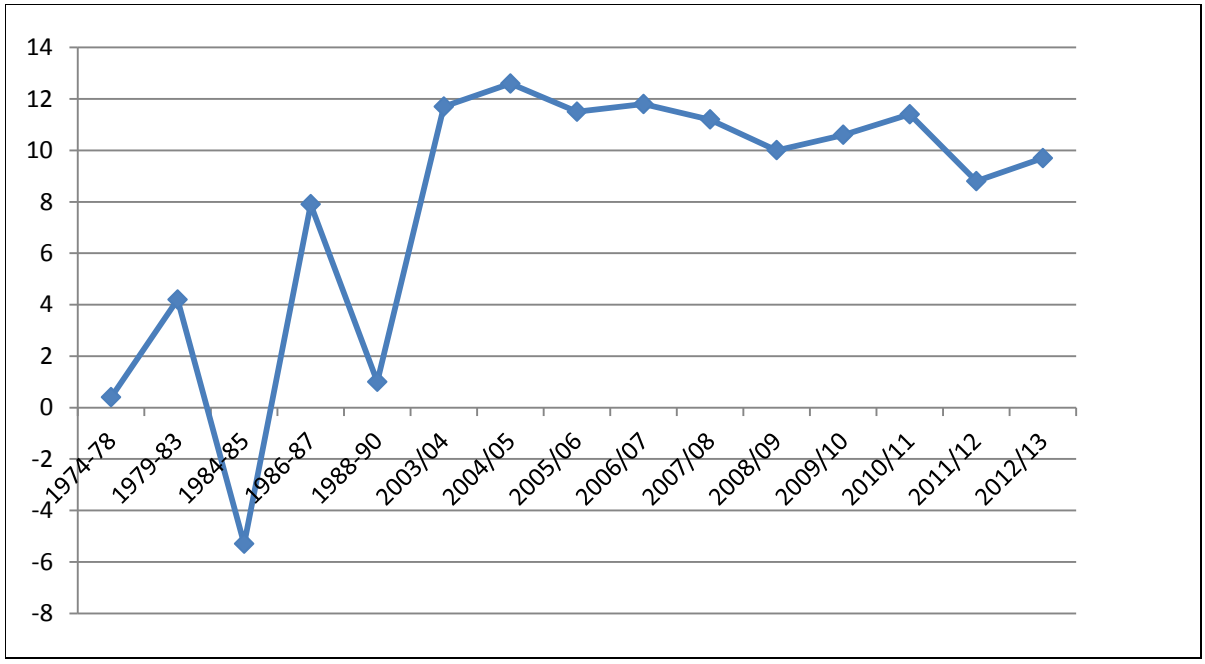
Ethiopia is the second-most populous country in Sub-Saharan Africa with a population of about84.8 million (MoFED, 2012). One of the world's oldest civilizations, Ethiopia is also one of the world's poorest countries. The country passes different ruling systems and economic strategies but thisoverview focuses in the period since 1974/75.

During 1974-1990 the rate of growth of GDP averaged 1.9 percent per annum, while population growth rate was less than a 2.7 % per annum. This leads to a decline in per capita income of about 0.8 percent. Due to different reasons Ethiopia was one of the lowest in the world in terms of standard of living and political stability (Eshetu 2004). The country's economy showed a remarkable change since the SDPRP (2002/03). Despite some ups and downs the economy grew on average by 10.9% per annum during 2003/04 -2012/13 (MoFED 2013). It is 6 times bigger as compared to the average economic growth in the derg regime (1975-1990). As a result Ethiopia is becoming one of the fastest-growing non-oil-producing

economies in Africa (African Economic Outlook 2012), and among the top-performing countries in sub-Saharan Africa (AFDB, 2010).

But the country's per capita income of $550(MoFED, 2013) is substantially lower than the regional average (Gross National Income Atlas Method). This may imply that GDP growth may not necessarily result in per capita growth that is economic growth does not necessarily result in poverty reduction at a household level.

Figure 6: GDP growth rate over 1974-2013



Source: MoFED

Chapter Four
Model Specification and Methodology

4.1. Introduction

This chapter starts by specifying the model and the methodology used to examine the relationship between public expenditure components and economic growth in Ethiopia. It is followed by an explanation of variables used, sources of the data and the diagnostic tests employed in the study.

4.2. Data Description and Source

The study aims at establishing the impact of public expenditure components on economic growth in Ethiopia. The study also intends to use secondary time series data collected from two sources for the period from 1975 to 2013. The reason for the use of 1975 as a cutoff point is because it is only starting from this year that consistent data could be found in the National Bank of Ethiopia (NBE) and Ministry of Finance and Economic development (MoFED) for most variables used in this particular study. Hence, the data for total government expenditures on agriculture, education, defense and health sectors were obtained from Ministry of Finance and Economic Development (MoFED) and the data for consumer price index (CPI) was collected from National Bank of Ethiopia (NBE).

4.3. Theoretical Framework

The theoretical framework that the study is based on is an Augmented Solow Growth Model. Such a model is basically a log transformation of the Cobb-Douglas production function. The log form of this model allows including any relevant variable which affects economic growth. In this study the researcher specified an Augmented Solow Growth Model where the production function of the economy is given by:

$Y_t = Af(L_t, K_t, G_t, X_t)$

In the model, the level of output (Y) is assumed to be a function of two factors of production, capital (K) and labor (L) and components of government expenditure (G). A represents level of technology; t represents time dimension and X_t represents a vector including other factors

affecting economic growth. Moreover, some authors focused on the components of government expenditure that are productive or unproductive, while others submitted that composition of government expenditure might exert more influence compared to the level of government expenditure.

4.4. Model Specification

This section develops an econometric model for the relationship between government expenditure and economic growth in Ethiopia with a particular focus on sectoral expenditures.

The model for this study follows the works of Wendwesen (2012) and Fitsum (2013) because of theirrelevance to this study. In the current study I have used additional one relevant variable government expenditure on defense and consumer price index as a control variable. Moreover, this study extends the study period to 2013.

The empirical framework of this study is focused on evaluating the relationship between government expenditure on agriculture, defense, education and health sectorson the one hand and economic growth on the other hand usingthe VAR approach in Ethiopia. The reason for using VAR approach is due to the presence of two way relationships between government expenditure and economic growth. The evidence remains whether the supply of public goods and services leads to economic growth or economic growth drives the demand for goods and services.

From the foregoing discussion, the composition of government expenditure is an important determinant of growth. Thus, the model expresses economic growth (GDP) as a function of various components of government expenditure that include total agriculture, defense, education and health sectors, and inaddition, I have included consumer price index(CPI)since it can have a lasting impact on economic growth.

Thus, the growth model is specified as below:

$$RGDP = f(TEXPEDU, TEXPHE, TEXPAGRI, EXPDEF, CPI, U)_t \quad \ldots\ldots(1).$$

Where: RGDP-Real Gross Domestic Product, EXPDEF-Expenditure on Defense, TEXPHE-Total Expenditure on Health, TEXPEDU-Total Expenditure on Education, TEXPAGRI-Total

Expenditure on Agriculture and CPI-Consumer price index. All model variables are in real terms which are captured by dividing each nominal quantity by general consumer price index (CPI). Expressing the dependent variable in logarithm form, an attempt has been made to examine the impact of each explanatory variable on economic growth.

In log-linear form the model is specified as follow:

$$LogRGDP=\beta_0+\beta_1 LogTEXPEDU+\beta_2 LogTEXPHE+\beta_3 LogTEXPAGRI+\beta_4 LogEXPDEF+\beta_5 LogCPI+U_t \ldots\ldots\ldots (2)$$

Where: Log (RGDP) is the logarithm of real GDP, Log (TEXPEDU) is logarithm of total government expenditure on education, Log (TEXPHE) is logarithm of government expenditure on health, Log (EXPDEF) is logarithm of government expenditure on defense, Log (TEXPAGRI) is logarithm ofgovernment expenditure on agriculture, and Log (CPI) is logarithm of consumer price index. Prior to estimation of the growth model above, standard econometric tests like stationairity and co-integration tests were conducted in order to avoid the generation of spurious regression results. We also employ Vector Error Correction Model (VECM) to analyze both the short and long run impact of government sectoral expenditure on agriculture, defense, education and health on economic growth.

4.5. Definition and Measurement of Variables

Economic Growth (RGDP): This is the percentage rate of increase in gross domestic product. It captures the change in value of goods and services produced in a given economy for a specified period of time. It will be calculated as a percentage rate of change of the GDP.

Public Expenditure on Education (gexpedu): This is the share of expenditure in education to total government expenditure. It includes the expenditure the government incurs to fund basic up to higher education, by paying teachers and lecturers, construction of learning infrastructure such as classrooms, lecture halls, offices and purchase of learning equipment. It also includes expenses on scholarships whether local or abroad.

Public Expenditure on Health (gexphe): This is the share of public expenditure on health to total government expenditure. It contains the amount that the government spends in construction of hospitals building structures, equipping the hospital institution with equipment and drugs, training of doctors and nurses and paying their salaries.

Public Expenditure on Agriculture (gexpagri): This is the share of total government expenditure on agriculture. It includes expenses such as buying modern agricultural equipment, agricultural inputs such as improved seeds, trained and hiring a number of agricultural development agents and so on.

Public Expenditure on Defense (gexpdef): This is the fraction of expenditure on defense against the gross government expenditure. It includes expenses such as buying military gadgets and equipment, salaries, training the defense force, supporting missions and operations and expense for facilitating wars.

4.6. Time Series Properties of the Data

In view of the fact that this study used time series data and inherently it might exhibit some strong trends, the non- random disposition of the series might undermine the use of some of the econometric tests such as F and t tests. This is because they can cause rejection of a hypothesis which would have otherwise not been rejected. This study intends to conduct stationarity and co-integration tests to mitigate such situations.

4.6.1 Unit Root Tests

The first step for Johansen procedure is to determine the order of integration of non-stationary variables. A series is said to be integrated of order (d) if it becomes stationary after differencing d times, which is denoted as I(d). Establishing the order of integration between sectoral expenditure and economic growth (GDP) is the first step that enables us to determine the next step of estimation. If all the variables under the study are found to be stationary, then the application of regression is possible. However most macro time series data have not been stationary over time, so, the alternative is to difference the variables till they become stationary and run regression on their differences (Bo SjO 2008).

The most commonly used test for order of integration is the DF (Dickey Fuller) and ADF (Augmented Dickey Fuller) tests. The Dickey Fuller approach states the null hypothesis as the series is non-stationary, against the alternative of stationary. Based on DF test, the series y_t becomes stationary if the absolute value ofδ in equation (3) is less than 1. It will not be stationary when the absolute value of δ is greater than or equal to 1.

$y_t = \delta y_{t-1} + e_t$..... (3)

$\Delta y_t = r y_{t-1} + e_t$..... (4)

Equation (3) can be transformed to equation (4) to make it more sensible for econometric hypothesis testing. Hence equation (3) is subtracted by y_{t-1} to generate the second equation indicated in (4). In this case, r =1-δ. The Dickey Fuller test then states the null hypothesis, as r is statistically equal to zero against the alternative of r<0. Rejection of r=0 in favor of the alternative r<0 indicates that $y_t$is integrated of order zero. But, if the null r=0 is not rejected, then the process is not stationary and one needs to test for higher order of integration.

However, if the error term in the above equation is not white noise that is doesn't have a zero mean and constant variance; the DF test will not be valid. This is the major weakness of DF test. In other words, the disturbance term e_t is assumed to be independently and identically distributed *(IID).* If this assumption is incorrect, then the limiting distributions and critical values obtained by DF test cannot hold. The augmented Dickey Fuller (ADF) test, however, takes care of this problem by including the lagged left hand side variables as additional explanatory variables to approximate the autocorrelation. The ADF test procedure is identical to the standard DF test procedure (Harris 1995). It is constructed within a regression model of the form presented as follows.

$\Delta y_t = \delta_1 y_{t-1} + \Sigma\beta_1 \Delta y_{t-1} + e_t$..... (5)

$\Delta y_t = \delta_0 + \delta_1 y_{t-1} + \Sigma\beta_1 \Delta y_{t-1} + e_t$..... (6)

$\Delta y_t = \delta_0 + \delta_1 y_{t-1} + \Sigma\beta_1 \Delta y_{t-1} + \alpha_t + e_t$..... (7)

Testing for unit root equation (5) assumes that the data generating system of y_t is a simple first order autoregressive process with zero mean and no trend. Since the process is not known whether it has a trend or not, equation (7) has to be estimated by adding trend term a_t and a constant term δ_0. Equation (6) adds only a constant term δ_0(Harris 1995). Therefore, ifδ_1=0, the y_t sequence contains a unit root. So, after estimating the above three equations by OLS, the resulting t-statistics are compared with the critical values given by the ADF table. If the t-statistics computed is less than the critical value, then the series can be said non-stationary (Enders 1995). Although DF and ADF unit root tests are widely known and used in the literature, there are other unit root tests which can substitute those widely used stationary

tests such as Philips-Peron test has serious “size distortion” problem in finite sample size when the data generating process has a predominance of negative autocorrelation in first difference (De Jong et al 1992) as quoted in (Maddala et al 1999). This has often been taken to suggest that the Philips- Peron test may be less reliable than the ADF tests where there is pre-dominance of negative correlation in first difference (Maddala et al 1999).

Moreover, ADF and Philips-Peron tests have been suffering from the problem of “size, distortion and lack of power of unit root tests” (Maddala et al 1999). They argued that the ADF and Phillips- Peron tests displays size distribution in the presence of negatively correlated moving average error with Phillips-Peron testhaving a low power of 0.10 against the trend stationary alternatives. In contrast, the ADF test has the power of approaching 0.33 and thus likely to be more useful in practice. They suggested for the need to develop high powered tests (Maddala et al 1999). In this paper, as discussed above, stationarity test is undertaken by ADF because it is better than DF and Phillips Peron test and it is widely practiced in most literature.

4.6.1. Co-integration Tests

A substantial part of economic theory generally deals with long-run equilibriumrelationships generated by market forces and behavioral rules. Correspondingly, most empirical econometric studies entailing time series can be interpreted as attempts to evaluate such relationships in a dynamic framework. (Engle and Granger 1987) were the first to formalize the idea of integrated variables sharing an equilibrium relation,which turned out to be either stationary or have a lower degree of integration than the original series. They denoted this property by co-integration, signifying co-movements among trending variables which could be exploited to test for the existence of long run equilibrium relationships, within a fully dynamic specification framework.

After testing time series data for stationairity, the next task should be testing for co-integration, which enables to checking whether the linear combination of variables is also stationary or not. It requires that the variables of interest have the same order of integration. Variables are said to be co-integrated if a long run equilibrium relationship exists among them. The implication that non-stationary variables can lead to spurious regressions unless there is

at least one co-integration vector is that some form of testing for co-integration is almost mandatory.

In this paper VAR-based co-integration tests using the methodology developed by Johansson is adopted. According to Johansson procedure, the variables of the specified model are represented by defining a vector of potentially endogenous variables Y_t which is modeled as an unrestricted vector autoregressive VAR (p).

$$\Delta Y_t = A_1 Y_{t-1} + A_2 Y_{t-2} + \dots + A_p Y_{t-p} + B X_t + e_t \quad (8)$$

Where, Y_t is an (nx1) vector of non-stationary I(1) variables, Ai and B are matrices of parameters, X_t is a vector of deterministic exogenous variables, and e_t is a vector of innovations which is normally and independently distributed with mean of null vector and vector of unit variance.

4.6.2. Vector Error Correction Model (VECM)

A vector error correction model (VECM) is a modeling technique which adds error correction features to a multi-factor model such as a vector auto regression model. And it is a restricted VAR designed for use with non-stationary series that are known to be co-integrated. The VEC has co-integration relations built into the specification so that it restricts the long-run behavior of the endogenous variables to converge to their co-integrating relationships while allowing for short-run adjustment dynamics.

The co-integration term is known as the error correction term since the deviation from long-run equilibrium is corrected gradually through a series of partial short-run adjustments. When the variables are co-integrated, the corresponding error correction representations must be included in the system. By doing so, one can avoid misspecification and omission of the important constraints. Thus, the VAR in [8] can be re-parameterized as a Vector Error Correction Model (VECM) form (Hamilton, 1994).

Moreover, a vector error correction model (VECM) can lead to a better understanding of the nature of any non-stationairity among the different component series and can also improve longer term forecasting over an unconstrained model. In addition, according to Engel and Granger (1987), if two series are co-integrated of order one I (1), then there must be a vector

error correction mechanism to capture the long and short run responses. In this study VECM specification will be used for short run as well as long run adjustments. The VECM also provides clear information about the instantaneous adjustment of the actual economic growth to its desired level.

The VECM for specification related to the determinants of economic growth is specified as:

$\Delta y_t = \psi' \Omega + \Pi y_{t-1} + \theta_1 \Delta y_{t-1} + \ldots\ldots\ldots + \theta_p \Delta y_{t-p-1} + \varepsilon_t$

Where, Δy_t represents the first difference of the Variables;

$\theta_j = -\sum_{j=1}^{P} Aj$, is an nxn coefficient matrix in the error correction term, which is parameters of a short-run adjustments to changes in y_t.

$\Pi = \sum_{i=1}^{P} (Ai - I)$, is an nxn coefficient matrix in the error correction term, which is parameters of long-run adjustments to change in y_t.

Chapter Five
Results and Discussion

5.1. Descriptive Analysis

In this study annual time series data covering the period from 1975 to 2013 is used. The variables under consideration are gross domestic product and total government expenditure on defense, education, health and agriculture. In addition, CPI was considered as a control variable. Gross Domestic Product (GDP) is a dependent variable, whereas, the other variables are determinant factors of GDP. All variables are measured in real terms, deflated using the consumer price index, CPI (2011=100). They are all expressed in logarithm form for the sake of econometric analysis.

Table1: Descriptive Statistics of the Economic Variables in Nominal Terms(1975-2013, in millions of ETB).

Measurement	GDP	EDUCA	HEALTH	AGRI	DEFENSE	CPI
Mean	106636.2	2117.072	2304.107	2304.107	1297.685	25.36872
Median	28328.90	1340.000	623.4350	623.4350	349.3000	21.35000
Max.	852739.9	6816.258	16123.32	16123.32	11331.10	111.3500
Min.	5551.000	184.9000	92.01000	92.0100	46.30000	4.090000
Std. Dev.	182336.4	1814.431	3659.764	3659.764	2409.805	23.52744

Source: Author's own calculation using Eviews 7

Table1 depicted the description of variables used in the estimation. They are all expressed in millions of local currency (Ethiopian Birr). The GDP averages 106636.2 million ETB and varies from 5551.000 to 852739.9 million ETB with a standard deviation of 182336.4 million. Defense expenditure averages 1297.685 million ETB and goes from 46.3 to 11331.10 million ETB. Similarly, Education expenditure averages 2117.072 million ETB and ranges from 184.9 to 6816.258 million ETB. Health expenditure, with a mean of 2304.107 million ETB, also varies from a minimum of 92.01 to a maximum of 16123.32 million ETB and consumer price index averages 25.36872 goes from 4.090 to 111.350 in 2012/13. Finally the mean of the agriculture spending is 2304.107 million ETB. It varies from its minimum value 92 million to 16123.32 million ETB with standard deviation of 3659.764.

5.2. Unit Root Tests

The time series under consideration should be checked for stationarity before one can attempt to fit a suitable model. That is, variables have to be tested for the presence of unit root(s) thereby the order of integration of each series is determined. The non-stationarity of the series can be tested by using an Augmented Dickey-Fuller test. The hypothesis to be tested is: H_0: the series is non-stationary or has a unit root against the alternative hypothesis; H_1: the series is stationary or has no unit root.

The results of ADF test of unit root with intercept but no trend and with intercept and trend both at level and first difference for each series are presented in Table 2 and the critical values used for thetests are the McKinnon (1991) critical values. The test results presented in Table 2 indicate that the null hypothesis, that the series in levels contain unit root, could not be rejected for all the six time series data sets because, all the three critical value resultsare less than their respective ADF test statistic and also their respective p-values are greater than the conventional significance level of α =0.05 in level. Since, the null hypothesis cannot be rejected, in order to determine the order of integration of the non- stationary time series.

The same tests were applied to their first differences as indicated in Table 2. The order of integration is the number of unit roots that should be contained in the series so as to be stationary. So, Table 2 suggests that the series of the endogenous variables display a stationary behavior at first difference and all model variables are integrated of order one I(1) with intercept but without trend and with intercept and trend.

Table2: Augmented Dickey Fuller Unit root test results at level and First difference

Series	***With intercept no trend***		***with intercept and trend***	
	At level	***First difference***	***At level***	***First difference***
logRGDP	1.306554	-8.125431***	-2.424283	-9.104949***
logTEXPEDU	0.712955	-5.590640***	-2.842627	-5.932279***
logTEXPHE	0.691815	*-7.920546****	-2.527508	-8.297163***
logTEXPAGRI	-0.870267	*-6.708832 ****	-2.193065	-6.667062***
logEXPDEF	0.457630	-5.989760***	-1.986152	-6.147886***
logCPI	0.404602	-5.342208***	-1.023652	-5.317914***

Notes: Null hypothesis: series has unit root. *Rejection at 5% level. ** Rejection at 1%&5 % and *** Rejection at (1%, 5% & 10%) level. Source: Author's own calculation using Eviews 7

5.3. Estimating for Order of the VAR

Before estimating the VAR model, it is critical to choose the order of the model that yields a good model and hence precise forecast. The order of the VAR model refers to the optimal number of lags that should be included in the model. Lütkepohl (2005) indicates that over-fitting or selecting a higher order lag lengththan the true lag length causes an increase in the mean-square forecast errors of the VAR and that under-fitting the lag length often generates residual autocorrelation.

Hence, specifying the lag order has strong implications for subsequent modeling choices. Choosing too few lags could lead to systematic variation in the residuals whereas if too many lags are chosen it comes with the penalty of fewer degrees of freedom as adding another lag, adds pxp variables. For determining the appropriate lag length for the VAR model Akaike information criterion (AIC), Schwarz information criterion (SC), and Hannan-Quin (HQ) information criteria were used. In Table 3, the lag length selection criterion is tabulated. The AIC, SC and HQ test suggest appropriate lag length for the VAR model is one (1).That is, the best fitting model is the one that minimize AIC or SC or HQ where the bolded row in table 3 indicates that the optimal lag length for the VAR model selected by the criterion is equal to one.

Table 3: VAR Lag Order Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	217.9373	NA	3.10e-13	11.77430	11.51038	-11.68218
1	**376.6864**	**255.7624***	**3.49e-16***	**-18.5937***	**-16.74625***	**-17.94888***
2	404.2315	35.19657	6.65e-16	-18.12397	-14.69302	-16.92648
3	438.7403	32.59158	1.20e-15	-18.04113	-13.02665	-16.29094

* indicates lag order selected by the criterion: each test at 5% level Source: Author's own calculation using Eviews

5.4. Lag Exclusion Test

To check whether the chosen lag is optimal, Wald lag exclusion test is used. Given that VAR modeling requires uniform lag length for each variable, the result in Table 4 shows that first lag is significant for all variables at 5 percent level of significance. That is, the value in the square brackets indicates probability value for the corresponding chi-square statistics. Therefore, VAR (1) is found to be suitable for the data set and hence could be adopted.

Table4: VAR Lag Exclusion Wald Tests

Lag	LRGDP	LTEXPEDU	LTEXPHE	LTEXPAGRI	LGDEFEN	LCPI	Joint
Lag1	1072.644	1434.111	722.9319	276.9115	1181.576	1823.652	14397.5
P-val	[0.0000]*	[0.0000]*	[0.0000]*	[0.00000]*	[0.0000]*	[0.0000]*	[0.0000]*
df	6	6	6	6	6	6	36

*denotes rejection at 5% significance level. Chi-squared test statistics for lag exclusion: Numbers in [ ] are p-values

5.5. Residual Stationairity Test

The values in parentheses are t-statistics for the ADFstationairity test for the residual term. As shown in table 5, the null hypothesis stipulates that there is "a random walk" which was rejected at 5 percent level of significance, indicating that economic growth and the various components of government expenditure are co-integrated.

Table 5: Residual Stationairity Test (RST)

Variable	ADF Test	Order of Integration
ECT=RESIDUAL	-2.941145 (-5.438168)	I(0)

Source: own computation using Eviews 7

5.6. Co-integration Analysis

Since the order of integration of each variable in the model is equal to one and the residuals are stationary in level, the variables involved in the model are co-integrated (Engle and Granger, 1987). Then we will apply the co-integration tests developed by Johansen (1988) to investigate whether there is more than a single co-integration relationship. The co-integration tests include GDP (LRGDP), education expenditure (LEDU), health expenditure

(LHE), agriculture expenditure (LAGRI), defense expenditure (LDEF) and CPI (LCPI) over the period 1975-2013.

Accordingly, Johansen co-integration test is applied at the predetermined lag order of one. In these tests, the trace statistic is compared to 5% critical values. The trace test statistic precedes sequentially from the firsthypothesis no co-integration to an increasing number of co-integrating vectors. The results of co-integration tests for model variables are reported in Table 6. The trace test statistic indicates that at least one co-integrating vector ($r \geq 1$) exists in the system at the conventional 5 percent significance level and using p-values<5%.

Table 6: Co-integration Test Results

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None*	0.621877	121.7878	95.75366	0.0003
At most 1*	0.563264	85.80398	69.81889	0.0016
At most 2*	0.512479	55.15218	47.85613	0.0089
At most 3	0.378554	28.57056	29.79707	0.0687
At most 4	0.152901	10.96943	15.49471	0.2134
At most 5*	0.122372	4.829713	3.841466	0.0280

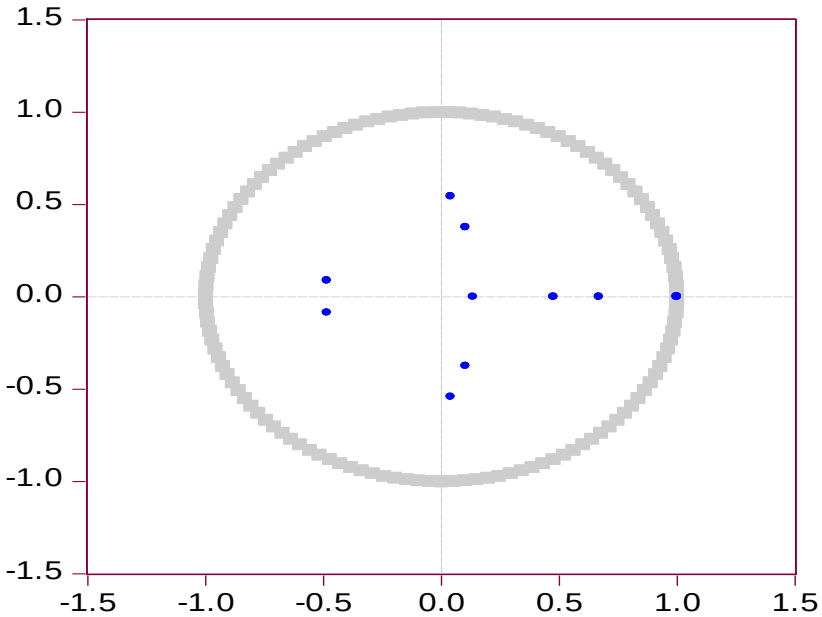
Trace test indicates 3 co-integrating eqn(s) at the 0.05 level,* denotes rejection of the hypothesis at the 0.05 level, **MacKinnon-Haug-Michelis (1999) p-values

After indicating the presence of the long-run co-integration relationship among model variables using the Johansen approach, the short-run dynamics of the long-run economic growth is examined by estimating an error correction model.

5.7. The VEC model Stability Test

The stability of the model and post estimation diagnostics could affect the validity of the estimated model; therefore, it should be tested before preceding it further. Figure 7 presents the companion matrix with all the roots of the characteristics polynomial and their corresponding modulus. The figure indicated that all characteristic roots of the polynomial lie inside the unit circle. As a result the report under figure 7 suggests that the model under consideration satisfies the stability condition.

Figure 7: The inverse characteristics polynomial



Source: Computed by Author: The VECM specification imposes 3 unit moduli

5.8. Vector Error Correction Model Estimation Results

Vector Error Correction Model is estimated based on the Johansson test of co-integration results and using a predetermined optimal lag order of one (1). That is chosen by the appropriate information criterion results. Accordingly, the VECM has two parts: the long run and short run dynamics with co-integrating and short run coefficients that are used for further analysis including the speed of adjustment (ECTt-1).

The coefficient of the error term (ECTt-1) is used to measure the speed of adjustment towards the long run equilibrium. And (ECTt-1) is considered to be good if the range is between 0 and 1. (ECTt-1) should be negative and significant number and if positive and insignificant value means explosive and not reasonable. For example, if the (ECTt-1) estimated coefficient is -0.87 then, the estimated coefficient indicates that about 87 per cent of this disequilibrium is corrected within one year if the series is annually data. But if the (ECTt-1) are -1.07 as an example then, the estimated coefficient implies that about 107 per cent of this disequilibrium is corrected between one year and this does not make sense. (http://stats.stackexchange.com).

5.8.1. Long Run Analysis

From the co-integration test results presented in table 6 above three co-integrating relationships were obtained using Johansen test of co-integration. However, the main objective of this study is to examine the impact of government expenditure on education, health, agriculture and defense including consumer price index (CPI) on economic growth. The equation is solved through ad-hoc normalization and Johansen test was used to confirm the appropriateness of the selected equation. To investigate the long-run effects in this model, we presented the estimated normalized co-integration coefficient vectors in Table 7.

Table 7: The Estimated Long-run Model for LRGDP

Variable	LOGTEXPEDU	LOGTEXPHE	LOGTEXPAGRI	LOGEXPDEF	LOGCPI
Coefficients	-1.627297*	0.066600	0.621943*	0.078162*	0.297561
T-stat	(5.93969048)	(-0.2908805)	(-5.14044962)	(-3.59808)	(-0.2775738)

Note: Values in parentheses are t-statistics: Source: Author's Computation using Eviews 7: *indicates significant.

With the evidence from the co-integration test, it can be interpreted that economic growth in Ethiopia significantly depends on public expenditure on education, agriculture and defense in the long run. But, the relationship between economic growth and public spending on health and consumer price index are negative and insignificant.The results show that in the long-run, spending on defense has a negative and significant impact on economic growth. This result is similar with previous studies such as Saad and Kalakech(2009); Endale (2007); Alshahrani and Alsadiq (2014) and Dunne (2010) but is against (Ando 2009) who concludes based on the Feder model for 109 countries including 30 OECD countries that defense expenditure has a positive impact on the rate of economic growth in all 109 countries.

However, expenditure on education has a positive and statistically significant impact on economic growth. This is in line with the results found by (Hartshorne, 1985; Wendwesen 2012; Teshome 2006; Fitsum 2013; Saad and Kalakech, 2009; Mudaki and Masaviru, 2012). On the other hand this result is in contradiction with previous findings of negative or insignificant effects of education expenditure on economic growth like (Ditimi, 2011;Sunday and Elizabeth, 2012). Thus, government investment on education sector in Ethiopia helps

promote economic growth in the long-run.This supports on the one hand Keynesianview thatgovernment investments on social sectors are causes of growth, even though the coefficient of health spending is negative and statistically insignificant.

The other factor that affects GDP in Ethiopia is expenditure on agriculture. It has a negative long run impact, aresult similar to(Mudaki and Masaviru2012). The significant and negative long-run effect of agriculture is especially expected. From the perspective of economic theory and policy and strategy of the Ethiopian government, the share of agriculture to GDP in the long run should decline and hence investment on agriculture also should be decreased and probably transformed in to industrial economy. The government of Ethiopia put a strategy that agriculture leads the economy in the short run by creating favorable conditions for industry to play a key role and leading the economy in the long run.

The above result can be shown in equation form as below:

$$LRGDP=2.089+1.627297LTEXPEDU-0.0666LTEXPHE-0.621943LTEXPAGRI-0.078162LEXPDEF-0.297561LCPI+U_t$$

This equation is the long-run equation for economic growth which is explained by logarithm of real gross domestic product, real total public expenditure on education, health, agriculture and defense sectors, consumer price index and finally the error term Ut that the long-run analysis is based on.

From the above long run equation economic growth with respect to government expenditure changes is highly elastic with a 1.0 percent change in public expenditure on education sector leading to an increase in economic growth by 1.63 percent. The positive relationship between economic growth and expenditure on education supports the Keynesian theory that government investments on social sectors are means of economic growth. On the other hand the argument of endogenous growth theories of additional effects of human capital over the static effect on the level of output that explains sustainable economic growth.

But, the relationship between economic growth and real government expenditure on health, agriculture and defense was found to be negative. That is a 1.0 percent increase in real government expenditure on health, agriculture and defense leading to a decline in economic growth on average by 0.67, 0.62 and 0.078 percent in the long run respectively. Though, the

coefficient of public expenditure on health is insignificant. Regarding to consumer price index, we find a negative long run effect on economic growth. This means a 1.0 percent increase in LCPI leads to a 0.298 percent decline in economic growth. However,its coefficient is insignificant.

5.8.2. Short Run Analysis

The model estimates that the short run dynamics which is mainly driven by lagged real GDP, real total government expenditure on education, health, agriculture and defense sectors and lagged consumer price index.

The short run coefficient of individual variables should be examined to determine the relative contribution of each component of government expenditure to economic growth in Ethiopia. As shown in table 8 the co-efficient of the first lagged value of gross domestic product was negative and insignificant. This indicates, in the short run, real gross domestic product in the current period is not sensitive to what it was in the previous period. Similarly, the coefficient of first lagged value of expenditure on health and the effect of consumer price index was observed to be negative and insignificant.

As to defense spending, the coefficient is statistically significant and negative implying thatone percent increase in defense spending leading to a decline in economic growth on average by 0.609 percent in the short run. This may be due to the fact thatEthiopia is net importer of defense equipment and logistics and hence this directly affects the foreign currency accumulation of the country, indirectly it has a negative impact on economic growth or it hampers growth by deteriorating the current account balance. This result conforms the non-Keynesians' theoretical model which states that the rise in government spending acknowledges the possibility of negative multiplier effect.

The growth contribution of agriculture expenditure for overall economic growth in the short run is found to be insignificant. However, the long run contribution of the agriculture expenditure to the overall economic growth is turned to be significantly negative. The primary reason for these contrary responses pushes us to look in to the components of agriculture spending. Salary for the development agents and recurrent expenditure in the sector are very dominant. In such circumstance the spending on the sector may not help the growth of the

economy. Not only that the long run effects of the sector turn to be significantly negative. Which tells the huge spending on agriculture sector doesn't have an encouraging impact for the growth of the economy. Therefore, the government should encourage further investigation towards looking at the real impacts of each spending on the economic growth.

The co-efficient of the first lagged values of expenditure on education was observed to be positive and insignificant; this is consistent with a priori expectation. Because, investments on human capital (education) and infrastructure like road construction has no a significant effect on economic growth in the short run. However, the long-run relationship shows spending on education has positive and significant effect on economic growth that can be interpreted by the fact that investment on human capital has a long run return.

The coefficient of the error correction term (ECT_{t-1}) for the economic growth equation is significant and negative that is correctly signed and indicating the existence of long-run relationship amongst the growth model variables. This guarantees that although economic growth may temporarily deviate from its long run equilibrium value, it would gradually reach to its equilibrium after a shock. This implies that in the event of a deviation between actual and long-run equilibrium level, there would be an adjustment back to the long-run relationship in subsequent periods to eliminate this discrepancy.

The coefficient of the error term and/or the speed of adjustment towards equilibrium value is (-0.719) which implies that there is relatively high speed of adjustment towards long-run equilibrium. This indicates that whenever there was a disturbance and/or a shock in the system, 72 percent of the deviation or the discrepancy of the actual economic growth from its equilibrium value is eliminated within a year and/or if there is a one percent disequilibrium or shock in the preceding period, the impact of a shock to change in real GDP is corrected by 72percent per annum.

Table 8: Short Run Dynamics of the VECM

D(LRGDP)							
Con	$D(LRGDP)_{t-1}$	$D(LEXPEDU)_{t-1}$	$D(LEXPHE)_{t-1}$	$D(LEXPAGRI)_{t-1}$	$D(LEXPDEF)_{t-1}$	$D(LCPI)_{t-1}$	$ECT_{(t-1)}$
.035*(.039)	-.361 (.137)	.0743 (.768)	.0760 (.681)	-.0496 (.522)	-.609* (.0471)	-.0354 (.836)	-.719* (.0168)

Source: Author's Computation using Eviews 7: Note: numbers in parentheses are p-values: *indicates significant at 5%

5.9. Post-Estimation Diagnostics Test

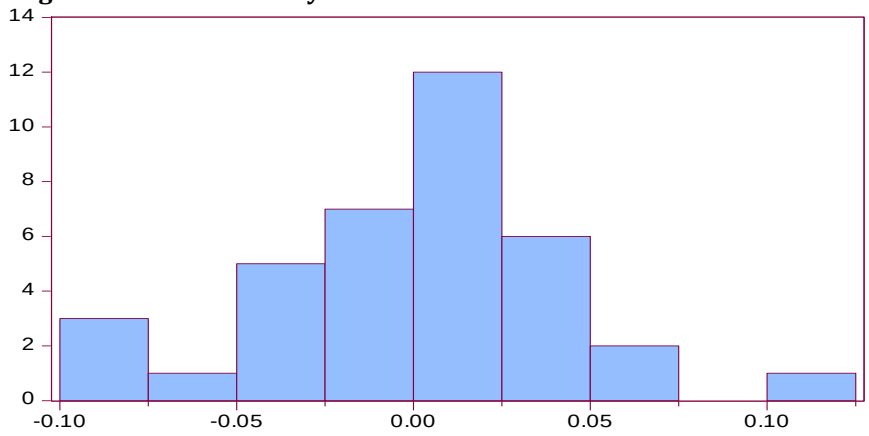
In order to ascertain whether the VECM model provides an appropriate representation, a test for misspecification should be performed.

Table 10 presents the results of the Lagrange Multiplier (LM) test for residual serial correlation implies that, there is no problem of autocorrelation in the estimated model. This decision is based on the probability values derived from the test, which is greater than 5% level of significance. Thus, we accept the null hypothesis of no autocorrelation among residuals. The histogram VEC Normality test also indicates that residuals are normally distributed since the null of multivariate normal residuals cannot be rejected using Jarque-Bera test. And the Heteroscedasticity test of the VEC model using the Breusch-Pagan-Godfrey test and the result indicates that variables of the model are homoscedastic, since the p-value is larger than the conventionally accepted 5% level of significance. Thus, the VECM is suitable for this data.

Table 9: Diagnostic Test Results

Breusch-Godfrey Serial Correlation LM Test			
F-statistic	1.796085	Prob. F(3,24)	0.1748
Obs*R-squared	6.783846	Prob. Chi-Square(3)	0.0791
Heteroskedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	1.395876	Prob. F(12,24)	0.2344
Obs*R-squared	15.20886	Prob. Chi-Square(12)	0.2302
Scaled explained SS	8.598556	Prob. Chi-Square(12)	0.7368

Histogram Test of Normality



Series: Residuals
Sample 1969 2005
Observations 37

Mean	1.72e-17
Median	0.001154
Maximum	0.104695
Minimum	-0.091314
Std. Dev.	0.042159
Skewness	-0.094722
Kurtosis	3.123414
Jarque-Bera	0.078810
Probability	0.961361

Source: Author's Computation using Eviews7

Chapter Six
Conclusion and Recommendation

6.1. Conclusion

The main objective of this study is to investigate the impacts of government expenditure on economic growth in Ethiopia over the period 1975 to 2013, with a particular focus on sectoral expenditures onagriculture, defense, health, and education sectors.

The study employedco-integration and VECM techniques in order to identify short run and long-run impacts. To this end, time series data for Ethiopia over 1975-2013 was used. We find that in the short-run the main determinantof economic growth is only spending on defense during the study period. The co-integration analysis, on the other hand, indicated that the main driving forces behind long-run growth are spending on agriculture, education and defense, while spending on health and consumer price index are insignificant both in the short and long run.

In the long-run, expenditure on education is found to be positively significant whereas,expenditures on defense and agriculture show a negative relationship with economic growth. However, expenditures on health and consumer price index are not significant. And in the short-run, the results reveal negative relationships between defense spending and economic growth. Whereas, spending on agriculture, education, health and CPI is found to be statistically insignificant.

Our disaggregated analysis is valuable from the policy perspective. Our findings for the effect of public expenditure by individual sector on economic growth give rise to information that isparticularly useful for developing country like Ethiopia. In such countries, the allocation of limited public resources between the sectors is an issue of principal importance. In this regard, our main finding is that education is the key sector to which public expenditure should be directed in order to foster economic growth in the long-run.

Overall, the analysis shows that,on average public expenditure and economic growth are linked by a long-run relationship. However, the results suggest that, the impact of government sectoral expenditure on economic growth wouldquite differ across sectors.

6.2. Recommendation

On the basis of the study findings the following policy recommendations can be made:

The study depicts that government expenditure on education is positively related to economic growth and it brings a significant effect in the long run. Based on this, investing in more and better-distributed education in the labor force would help to create conditions that could lead to higher productivity and hence higher economic growth.

Based on the findings, higher spending on agriculture, defense and health do not necessarily lead to rapid economic growth; in contrast, spending on these sectors negatively affects economic growth by reducing the budget share of the productive sectors such as education, infrastructure etc.

Generally, the government should optimize its spending more on human capital (education), while reducing its level and share of spending on agriculture and defense, because the study resultssuggest expenditure on these two sectors negatively affect economic growth.

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Declaration

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

Declared by:

Name: Bazezew Berihun

Signature: _____

Date: _____

Confirmed by Advisor:

Name: Alemu Mekonnen (PhD)

Signature: _____

Date: _____

Place and date of Submission: Addis Ababa University, Department of Economics_____