ST. MARY'S UNIVERSITY

SCHOOL OF GRADTUATE STUDIES

IMPACT OF GOVERNMENT SECTORAL EXPENDITURE ON ECONOMIC GROWTH IN ETHIOPIA

BY:

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DECLARATION

I, the undersigned, declare this thesis is my original work, prepared under the guidance of Gomeraw Adenew. All sources of material used for the thesis have been dully acknowledged. I further confirm that the thesis has not been submitted either in part or in full to any other higher learning institution for the purpose of earning any degree.

_____ _____

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ENDORSEMENT

This thesis has been submitted to St. Mary's University, school of graduate studies for the examination with my approval as a university advisor.

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Advisor Signature & Date

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LIST OF ACRONYMS

ADF-	Augmented Dickey Fuller
CPI -	Consumer Price Index
CSA -	Central Statistical Agency
DF -	Degree of Freedom
ECT -	Error Correction Term
RGDP -	Real Gross Domestic Product Growth rate
GTP -	Growth and Transformation Plan
IMF -	International Monetary Fund
LDCs -	List Developed Countries
MOFED-	Ministry of Finance and Economic Development
NBE -	National Bank of Ethiopia
PP -	Phillip-Perron
SDPRP -	Sustainable Development and Poverty Reduction Plan
SSA-	Sub-Saharan Africa
VAR -	Vector Autoregressive
VECM -	Vector Error Correction Model
WDI -	World Development Indicator

ABSTRACT

This study investigates the impact of government sectoral expenditure on economic growth in Ethiopia over the period from 1992 to 2017, with a particular focus on sectoral expenditures on education, health, agriculture, growth capital formation (infrastructure) and defense, by using Vector Autoregressive Model and Vector Error Correction Model to investigate the marginal effect of expenditure on each sector on economic growth. The study finds that in the long run expenditure on health and expenditure on education have positive coefficient and are statically significant at 1% significant level. But inflation rate has negative relationship with Real GDP Growth rate of Ethiopia and statistically significant at 1 % significant level. From a policy point of view, the results suggest that, to bring sustainable real GDP Growth rate, Ethiopia should develop and introduce policies that increase the level of expenditure on education and expenditure on health.

Key Words: Economic Growth, Expenditure on Agriculture, Expenditure on Defense, Expenditure on Health, Expenditure on Education, Expenditure on Infrastructure, and Inflation rate.

CHAPTER ONE
INTRODUCTION

1.1 Background of the Study

Early development theories stressed the need for the state to create adequate physical infrastructure as well as institutions and social conditions for development. Some called for implementing large-scale public investment programs, economic planning and the formulation of policies to accelerate economic growth and development (Onimode, B., 1995).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)

Likewise, 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).

The impact of public investment and public capital on growth has been the subject of much attention in recent academic research and policy debates. Much academic research (both empirical and analytical) has focused, in particular, on the effects of public infrastructure. It is now increasingly recognized that infrastructure generates externalities that go much beyond those typically emphasized in the early literature—notably with respect to education and health outcomes(Pierre-RichardAgénorandPeterJ.Montiel2008).

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 91.2 million in 2015/2016 (MoFED, 2017).It has recorded annual average GDP growth of about ten percent in the last decade, driven by public investments in agriculture and infrastructure. The poverty rate has fallen from 44 percent in 2000 to 23.5 percent in 2015/16. In 2016/17 GDP growth is estimated at 9 percent, as agriculture rebounded from severe drought conditions in 2015/16. Industrial activity expanded, with continued investments in infrastructure and manufacturing. The current account deficit declined in 2016/17 to 8.2 percent of GDP from 9.1 percent the previous year, reflecting lower drought-related imports and lower public sector capital goods imports. However, export revenues were largely unchanged despite significant volume growth, as global agricultural commodity prices remained low. Foreign direct investment (FDI) growth was 27.6 percent due to investments in the new industrial parks and privatization inflows. International reserves at end-2016/17 stood at US$3.2 billion (1.8 months of prospective imports cover). (IMF, 2018).

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 current Ethiopian Growth and Transformation Plan (GTP 2) in 2015/16 total government expenditure is expected to reach ETB 280,892.7 million (MOFED,2016).

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 spectral 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 spectral 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, government expenditure on such infrastructure as roads and communications would also boost the rate of private domestic investment, which in turn brings up economic growth. 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 infrastructure boosts 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 to Sunday 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 the growth 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 spectral expenditure and economic growth. While in the long run expenditure on agriculture and defense has 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.

Moreover, this study attempts to examine the impacts of recently growing government spectral spending on economic growth and their long run relationship by using recent data sets and would set out to investigate and fill the gap in the literature on the 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.

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.

1.4. Research Hypothesis

The following hypothesis would be stated and tested in this study.

H0: There is no significant effect of government sector expenditure on GDP growth

Ha: There is significant effect of government sector expenditure on GDP growth

1.5. Significance of the Study

Most of the previous studies on impact of government spectral 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 spectral 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 spectral 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.

1.6. Scope of the study

The study would be conducted macro variables at national level and the data would be collected from national bank of Ethiopia and ministry of finance and economy of Ethiopia .This paper would focus on the growth impacts of only agriculture, defense, education, health ,transport and communication of government sectored expenditure of Ethiopia during the period 1992-2017.

1.7 Limitations of the Study

Shortcomings of this study include absence of disaggregated data (capital and recurrent) over the same time period and variables even. if data is available of same variable from different source may not reconciled and the time constrained, And the paper uses only sector expenditures on agriculture, defense, education, health and social welfare GDP time-series data from the period 1992-2017, keeping other sectors and time constant.

1.8. Organization of the Study

This paper contains five 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, data and methodology used in the study are discussed in detail and estimation techniques used, and data type and sources are described. In the fourth chapter, empirical results are discussed. In the final chapter, conclusion and recommendations are presented.

CHAPTER TWO

REVIEW OF LITERATURE

In this chapter theoretical and empirical literature on sector government expenditure and economic growth are briefly reviewed. The chapter is divided into two sections. The first section (2.1) looks at theoretical literature relevant to the current study while section (2.2) looks into empirical literature or empirical findings which are relevant for the current study.

2.1 Theoretical Literature

Economic theory has shown how government spending may either be beneficial or detrimental to economic growth. In traditional Keynesian macroeconomics, many kinds of public expenditures, can contribute positively to economic growth through multiplier effects on aggregate demand. On the other hand, government consumption may crowd out private investment, dampen economic stimulus in the short run and reduce capital accumulation in the long run. Studies based on endogenous growth models distinguish between dis-tortionary or non-distortionary taxation and productive or unproductive expenditures. Expenditures are categorized as productive if they are included as arguments in private production functions and unproductive.

2.1.1. A German economist, Adolph Wagner

He propounds the law of increasing state activities. The law predicts that the development of an industrial economy will be accompanied by an increased share of public expenditure in gross national product. He argued that government growth is a function of increased industrialization and economic development. Wagner stated that during the industrialization process, as the real income per capita of a nation increases, the share of public expenditures in total expenditures increases. The law cited that "The advent of modern industrial society will result in increasing political pressure for social progress and increased allowance for social consideration by industry."

And also, postulates inherent tendencies of the activities of government to increase both intensively and extensively. The theory emphasized the functional relation between the economic growth and government activities with the effect that government sector grows

rapidly relative to the economy. According to Wagner the reasons for the increasing tendency for public expenditure are categorized below:

Administrative and protective Obligations: under this function defense became increasingly more expensive. Administrative roles kept increasing in coverage and intensity. Justice, law and order, maintenance of state machinery and social overheads continue to be expansive and expensive.

Welfare and equitable income distribution roles: this covers the activities involve in enrichment of cultural life of the masses and provision of social security to people. Old age pension, subsidies payments direct provision of merit goods items and services feature prominently here with the tendency of expanding and expensive as the economy grows. These above roles bring about distributive justice by mitigating the harsh effects of wealth and income inequalities in the society.

Provision of public goods and services roles: The governments also direct its activities to areas where there are market failures which necessitate the expansion of investment activities of the governments (Bhatia, 2002).

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.

2.1.2. 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 and private 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 labor supply. 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.

2.1.3. 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 would 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. (Ravnet al.2006) introduced "deep habits" instead of increasing returns. "Deep habits" refer to habit formation for a variety of goods in which the individuals 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. (Galiet 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 sending'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).

2.1.4. 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 explain government 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.

2.1.5. Peacock and Wiseman Theory of public expenditure

In 1961, Peacock and Wiseman elicited salient shaft of light about the nature of increase in public expenditure based on their study of public expenditure in England. Peacock and Wiseman (1967) suggested that the growth in public expenditure does not occur in the same way that Wagner theorized. Peacock and Wiseman choose the political propositions instead of the organic state where it is deemed that government like to spend money, people do not like increasing taxation and the population voting for ever-increasing social services.

There may be divergence of ideas about desirable public spending and limits of taxation but these can be narrowed by large-scale disturbances, such as major wars. According to Peacock and Wiseman, these disturbances will cause displacement effect, shifting public revenue and public expenditure to new levels. Government will fall short of revenue and there will be an upward revision of taxation. Initially, citizens will engender displeasure but later on, will

accept the verdict in times of crisis. There will be a new level of "tax tolerance". Individuals will now accept new taxation levels, previously thought to be intolerable. Furthermore, the public expect the state to heal up the economy and adjust to the new social ideas, or otherwise, there will be the inspection effect.

Peacock and Wiseman viewed the period of displacement as reducing barriers that protect local autonomy and increasing the concentration power over public expenditure to the Central government. During the process of public expenditure centralization, the role of state activities tend to grew larger and larger. This can be referred to the concentration process of increasing public sector activities.

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 the citizens, 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.

2.1.6. Musgrave's Theory of Public Expenditure Growth

The Musgrave's theory of public expenditure and growth explained that, at low level of per capita income, the demand for public services tend to be very low, arguing that such income is devoted to satisfying primary needs and it is only when the per capita income starts to rise above these level of low income that the demand for services provided by the public sector such as education, health, and transports starts to rise, thereby forcing government to increase expenditure on them. The theory observed that with high per capita income typical in the developed nations, the rate of public spending falls as most basic wants are being satisfied. Therefore the theory suggested in connection to Wagner that as progressive nations become more industrialized, the share of public sector in the national economy grows continually (Musgrave, 1988).

Iyoha stated five stages of expenditure growth; "Traditional society, preconditions for take-off, the take-off; the drive to maturity and the eye of high mass consumption." What determines the accepted expenditure-growth depends critically on the assumption of the type of economy, i.e. whether it is a free market economy, a mixed economy or a command economy (Iyoha, 2002).

2.2. 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.

Recently the study by Bazezew (2014) employed co-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. He fined that in the short-run the main determinant of 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.

2.2.1. 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 propoor sectors of agriculture development, food security, water and sanitation, education, health, road, and rural electrification programs (MoFED, 2014). 1Accordingly, 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 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)

❖ 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.

2The 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.

❖ 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.

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).

- **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. 4Accordingly, 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.

- **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 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.

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(19992000). 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.

2.2.2. Overview of Economic Growth in Ethiopia

Ethiopia has recorded annual average GDP growth of about ten percent in the last decade, driven by public investments in agriculture and infrastructure. The poverty rate has fallen from 44 percent in 2000 to 23.5 percent in 2015/16. In 2016/17 GDP growth is estimated at 9 percent, as agriculture rebounded from severe drought conditions in 2015/16. Industrial activity expanded, with continued investments in infrastructure and manufacturing. The current account deficit declined in 2016/17 to 8.2 percent of GDP from 9.1 percent the previous year, reflecting lower drought-related imports and lower public sector capital goods imports. However, export revenues were largely unchanged despite significant volume growth, as global agricultural commodity prices remained low. Foreign direct investment (FDI) growth was 27.6 percent due to investments in the new industrial parks and privatization inflows. International reserves at end-2016/17 stood at US$3.2 billion (1.8 months of prospective imports cover).

In October 2017, the National Bank of Ethiopia (NBE) devalued the birr by 15 percent relative to the U.S. dollar, thereby reducing overvaluation and enhancing competitiveness. Simultaneously, the NBE increased interest rates and adopted a restrictive stance to minimize adverse effects on inflation—which was 13.6 percent in November 2017. Since October 2016, the Ministry of Finance and Economic Cooperation (MOFEC) implemented further cuts in external borrowing by the government and public enterprises (SOEs), and reduced outstanding non-concessional commercial debt. The general government deficit outturn in 2016/17 was 3.4 percent of GDP (including privatization) and the 2017/18 budget speech announced additional consolidation policies, with the budget deficit projected at 2.5 percent of GDP.

Growth is expected to stay high in 2017/18, at 8.5 percent, supported by continued recovery from droughts and export expansion as new manufacturing facilities and infrastructure come online—offsetting the potentially dampening impact of restrictive macroeconomic policies. Over the medium term, growth is expected to remain around 8 percent, supported by sustained expansion in exports and investment. The authorities' policies envisaged under the second Growth and Transformation Plan (GTP II) are expected to underpin domestic private sector development and FDI. The GTP II also envisages allocating significant resources to poverty alleviation and the social safety net, while efforts to strengthen financial inclusion are underway.

There was agreement that after more than a decade of sustained public sector-led growth, the lead needs to be transferred now to the private sector—as envisaged in the authorities' GTP II strategy. Should the public sector continue undertaking on its own a broad array of public projects, even if highly productive in the long term, it would risk aggravating external imbalances in the short term. These imbalances in turn would undermine the very objective of the public projects: the development of a vibrant private sector and dynamic markets able to lead the economy into its next growth phase. Thus, the timing and sequence of public investment and other public sector activities needs to be reprofiled to a pace commensurate with actual export revenue increases, and with progress in mobilizing domestic savings. In 2016/17, the authorities appropriately curbed accumulation of external debt, but the protracted export supply response to past investment requires additional actions. Thus, the more restrictive macroeconomic policy stance adopted by the authorities, including after the birr devaluation, is appropriate. Staff also supports the reforms in tax administration and financial management of SOEs—which will enhance domestic resources and their effective use. The envisaged private sector development reforms, such as the roll-out of a financial market and improvements in the business climate should be accelerated. Use of PPPs (with adequate safeguards), private concessions, and privatizations, as envisaged by the authorities, will preserve public resources while helping private sector development.

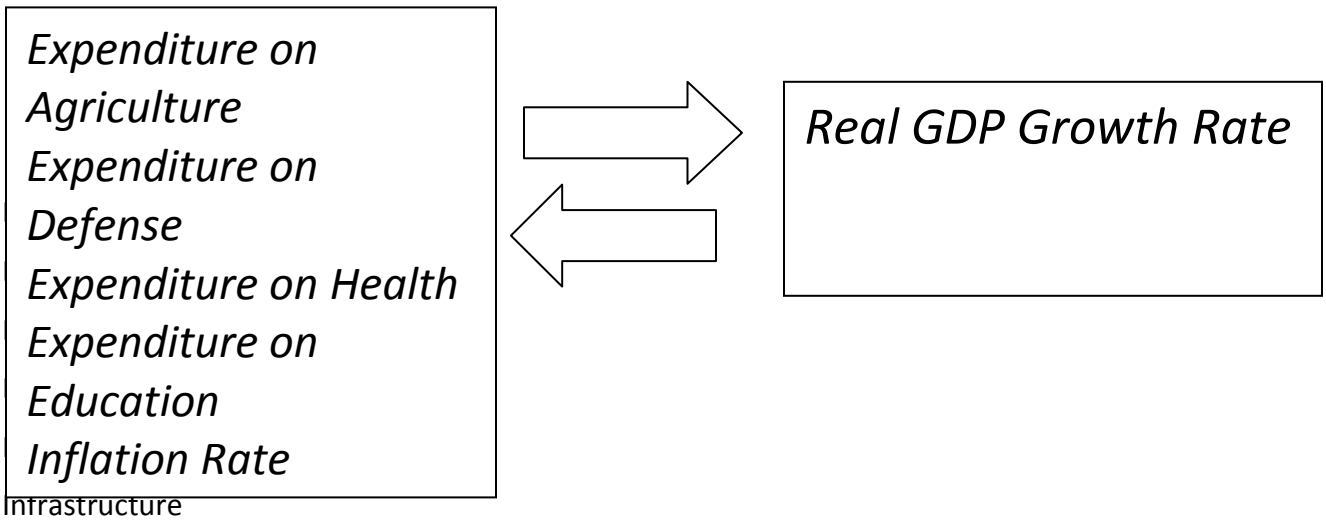
Budget implementation in 2017/18 is expected to remain appropriately restrictive. Staff projects a below-budget government deficit outturn of 2.5 percent of GDP (Table 3b), based on the strict borrowing policies announced in the budget speech, particularly on capital projects financed by external loans. That said, social needs remain large, and staff supports the authorities' intention to protect pro-poor spending. In this area, the social safety net is well-designed and has proven effective in delivering timely assistance to drought victims (Box 1). Continued progress on investment efficiency would also create fiscal room—staff encouraged participation in a Fund-WB Public Investment Management Assessment (PIMA).

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.

Figure2.1 Conceptual frame work of independent and dependent variables



Source: own construction

Figure 2.1 shows that Expenditure on Agriculture, Expenditure on Defense, Expenditure on Health, Expenditure on Education and Inflation Rate affect Real GDP Growth rate of Ethiopia. Real GDP Growth rate also affects all these variables.

CHAPTER THREE
RESEARCH METHODOLOGY

3.1 Data Set and source of data

3.1.1 Data Set

There are many empirical and theoretical literatures that suggest ways to enhance the growth of GDP and among them this study try to test which macroeconomic variable has high capacity to influence the growth of GDP. In doing so, this study takes time series data on a number of macroeconomic variables that determine the growth of GDP in Ethiopia.

3.1.2 Data Type and Sources

The study aims at establishing the impact of public expenditure components on economic growth in Ethiopia. Annual data over the period of 1992-2017, which is the period for which data are available, have been used .This paper was entirely dependent on secondary data. The major data sources are Ministry of Finance and Economic Cooperation (MoFEC), Central Statistics Authority (CSA), National Bank of Ethiopia (NBE) and The World Bank development Indicator.

3.2 Specification of the Model

This model analyzes the effect of number of variables on Rea; GDP growth of Ethiopia and is presented as follows.

RGDPGR = F (X),

Where, X includes expenditure on agriculture, expenditure on defense, inflation rate, expenditure on health, and expenditure on Gross fixed capital formation and expenditure on education.

RGDPGR= F (TEXA, TEXD, TEXH, TXGCF, INFR, and TEXE)…..... (1)

$RGDPGR_t=\alpha+\beta 1TEXA_t-\beta 2TEXD_t+\beta 3TEXH_t+\beta 4TXGCF_t-\beta 5INFR_t+\beta 6TEXE_t+\varepsilon t$…… (2)

The stationary and co-integration tests that have been conducted suggest that model (3) should be estimated using the first difference variables. The final short run model estimated therefore has the following form:

$$\Delta lnRGDPGR_t=\alpha+\beta1\Delta TEXA_t-\beta2\Delta TEXD_t+\beta3\Delta TEXH_t+\beta4\Delta TEXGCF_t-\beta5\Delta INFR_t+\beta6\Delta TEXE+\varepsilon t \ldots (3)$$

Where, RGDPGR is the Real GDP growth rate.

TEXAt. = Total expenditure on agriculture

TEXDt = Total Expenditure on defense

TEXH= Total Expenditure on Health

TEXGCFt = Total expenditure on Gross capital formation (percentage of GDP) (measure of infrastructure)

INFRt = Annual rate of inflation based on consumer price index (measure of inflation)

TEXEt= Total Expenditure on education

The relation between the dependent and explanatory variable in equation (1) can be re written explicitly in the following log (L) linear form to reduce the skewness in data distribution and allowing the coefficient estimates to be interpreted as elasticity.

$$lnRGDPGR_t=\beta0-\beta1(lnTEXA_t)-\beta2(lnTEXD_t)+\beta3(lnTEXH)+\beta4(lnTEXGCF_t)-\beta5(lnINFR_t)+B6(lnTEXE_t)\varepsilon t \ldots (4)$$

The coefficients β0, β1, β2, β3, β4 and β5 are the parameters of the econometric model, and they describe the directions and strengths of the relationship between GDPGR and the factors that used to determine GDPGR in the model (called Explanatory Variables). For instance, β1 is the major coefficient of interest that tells the percentage response in GDP growth for a percentage change in TEXA and ε is error term.

3.3 Description of Variables

Generally, the following variables are selected and included in the model which may influence the growth of GDP in Ethiopia.

3.3.1 Dependent Variable

GDPGR: 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 would be calculated as a percentage rate of change of the GDP

3.3.2 Independent Variables

3.3.2.1 Expenditure on agriculture: 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.

3.3.2.2 Expenditure on defense: 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.

3.3.2.3 Inflation rate

As it is defined in world development indicator (World Bank, 2014) the calculation of inflation is measured by the consumer price index which indicates the annual percentage change of the average consumer cost in acquiring a basket of goods and services over the interval time. Inflation rate is one of the variables which measures the given countries macro-economic stability. According to Solomon (2008), through its effect on the cost of inputs and the price of outputs, inflation reduces the real return on investment and firms‟ competitiveness.

3.3.2.4 Infrastructure development

Infrastructure development is one of the well-recognized factors for growth of GDP. The main argument is a well-established infrastructure such as roads, airport, electricity, water supply, telephones, and internet access would reduce the cost of doing business and help maximize the

rate of return. It is suggested that the availability of a good quality infrastructure subsidizes the cost of total investment and increasing efficiency of production and marketing. Studies have indicated the presence of an advanced infrastructure like roads, ports, railways, telecommunications system, and other public institutions are indications that the host country has the platform to manage inflow of FDI. Taking in to account Gross Fixed Capital Formation (GFCF) has been included to proxy infrastructure development. It is expected to be positively correlated with FDI.

3.2.2.5 Expenditure on health: 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.

3.2.2.6 Expenditure on education: 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.

Table 3.1 Summary of Expected sign of Variables used in regression

Variables	Abbreviation	Descriptions	Expected signs
Real Growth Domestic Product Growth Rate	RGDPGR	Increase in Market size	
Expenditure on Agriculture	TEXA	Growth in Agriculture	+
Expenditure on defense	TEXD	Ratio of expenditure on Defense to GDP	-
Inflation rate	INFR	Average annual inflation rate	-
Infrastructure	TEXGCF	Gross capital formation to GDP	+
Expenditure on health	TEXH	Improvement in health status	+
Expenditure on education	TEXE	Improvement in education status	+

Note: own computation

3.4 Estimation Techniques

To examine the relationship between different economic variables and GDP growth rate, the present study has employed ADF technique to check the stationary level of the variables. To find

out long run co-integration between dependent and independent variables, Vector Auto Regressive (VAR) and Vector Error Correction Model (VECM) approach to co-integration has been used.

3.4.1 Stationarity Test

In the analysis of time series data, the notion of stationary plays an important role. Proper estimation of a time series model requires a stationary data. Conducting time series analysis on-non-stationary data would results what is called "spurious" or "nonsense" regression, i.e., a situation where the estimated regression has a high R^2 and significant t-values without any economic relationship between the variables. According to Granger and Newbold (1974), Estimation of parameters and hypothesis testing using time series data requires an investigation of the data generating process of the variable under consideration. This investigation helps to avoid estimating a spurious correlation between variables in a regression, where and what actually exist is correlated time trend rather than a meaningful economic relationship. A combination of variables that contain a time trend or are non-stationarity may lead to spurious correlation. Hence, to avoid the problem of spurious correlation, inappropriate model specification and misleading results due to the presence of non-stationary variables in the regression model, the time series properties of the variables used in the model are investigated.

Stationary on the other hand, implies that the distribution of a process remains unchanged when shifted in time by an arbitrary value. More formally, a stochastic process is said to be weakly stationary if its mean and variance are constant over time and the value of the covariance between the two time periods depends only on the distance or gap between the two time periods and not the actual time at which the covariance is computed (Enders, 1995; and Gujarati, 2003). And according to Gujarati (2003), a time series is strictly stationary if all of the moments of its probability distribution are invariant over time. However, the normal stochastic process is fully specified by its two moments, the mean and the variance.

The stationarity of each series is verified with the standard Augmented Dickey-Fuller (ADF) and the Phillips-Perron (PP) tests. A time series is said to be integrated of order d, denoted I (d), if it becomes stationary after being differenced a minimum of d times (Dickey and Fuller, 1979, and

1981). The stationarity test results may be sensitive to whether a constant and/or a time trend are/is included in the regression. The appropriateness of including a constant and/or a trend is checked by formally testing whether they are statistically significant in the respective stationarity test regression equations.

3.4.2 Testing for unit roots

A test of stationarity (or non stationarity) that has been become popular over the past several years is the unit root test. There are several ways of testing for the presence of a unit root: the Dickey-Fuller (DF) test, the Augmented Dickey-Fuller (ADF) test and the Phillips-Peron test. This study employs the ADF and Phillips-Peron tests to determine the existence of a unit root. A commonly applied formal test for the existence of a unit root in data is the Dickey-Fuller (DF) test and its simple extension, the Augmented Dickey Fuller (ADF) tests (Harris, 1995). The augmentation is the addition of lagged values (p) of first differences of the dependent variable as additional regressors that are required to account for the possible occurrence of autocorrelation.

First requires thing is to evaluate unit root test for each variable whether the variables are stationary or not. For testing the stationary test there is two famous methodology, i.e Augment DF test and Peter Walison test. Dickey and Fuller is widely used to testing the stationary (1979; 81). The DF approach to testing the null hypothesis that the series does contain a unit root that is non-stationary against the alternative of stationary is discussed as study based ADF (augment DF test) statistics.

Table 4.1Thus the augmented dickey and fuller test have three models as flows;

$\Delta X1t = \text{ŗ}Xt\text{-}1 + \sum Bi\Delta Xt\text{-}1 + \varepsilon t$ ……1, without constant
$\Delta X1t = a + \text{ŗ}Xt\text{-}1 + \sum Bi\Delta Xt\text{-}1 + \varepsilon t$……...2, with constant
$\Delta X1t = a + Bt + \text{ŗ}Xt\text{-}1 + \sum Bi\Delta Xt\text{-}1 + \varepsilon t$……..3, with constant and trend

Where, Δ is the difference operation, t is the time and Γ is the number of lag variables and α `s are the Constance parameter

As we can show the above table 4.2 there is three way of calculating the stationery test. The first equation represents ADF stationary test mechanism without constant. Second equation showed how calculating the stationery with constant. The thirds equation is shown how calculating stationary with constant and trend.

3.4.3 Long Run Relationship: Co integration

3.4.3.1 Vector Autoregressive (VAR) Modeling and Co integration analysis

According to Wooldridge (2003) , the notion of co-integration, which was given a formal treatment in Engle and Granger (1987), makes regression involving non stationary time series or what is called an integrated of order one, I (1) variables potentially meaningful. It is a notion that a linear combination of two series, each of which is an integrated of order one; I (1) is integrated of order zero, i.e. Stationary. We are concerned about the concept of co-integration because making a variable stationary by differencing only gives the short run dynamics while we are also interested in knowing the long run relationship. Economically speaking, two variables would be co-integrated if they have long run relationships between them. In VAR models the test for co integration is vital because if there is no co-integration relationship between the variables under consideration then there is no point in estimating VECM.

A simple approach to testing for the existence of co-integration is the Engle-Granger (1987) two step approaches. Though this procedure is easily implemented, it has several important limitations. One crucial limitation of the method is that it has no systematic procedure to identify the existence of multiple co-integrating vectors. An alternative approach which addresses the drawbacks of the two step Engle-Granger approach was proposed by Johansen (1988), who developed the maximum likelihood estimation procedure that also allows one to tests for the number of co-integrating relationship. The Johansen (1988) maximum likelihood estimators overcome problems associated with the use of two step estimators. Most importantly it can detect the presence of multiple co integrating vectors. Moreover, the test allows testing restricted versions of the co-integrating vector(s) and the speed of adjustment parameters (Enders, 1995).

The procedure used for co-integration testing and estimation of the VAR in this study follows the methodology developed and used by Johansen (1988, 1991), and Johansen and Juselius (1990). This method is preferred to the single equation based Engel-Granger two step procedure due to the following reasons. The Johansen (1988) procedure allows testing for the presence of more than one co-integration vector. Moreover, it permits to estimate the model without priority restricting the variables as endogenous and exogenous. It is used to determine how each endogenous variable responds over time to a shock in that variable and in every other endogenous variable.

Johansen (1988, 1991) has shown that the test for co-integration can be expressed as a test of reduced rank of a regression coefficient matrix. The coefficient matrix can be estimated consistently using linear regression techniques and the test statistic can be computed from the solution to aneigen value problem. Moreover, linear restrictions on the co-integrating parameters can be tested by computing the shortcomings of the Engle-Granger method likelihood ratio test statistic which follows a $\chi 2$ distribution (Walls, 1993).

Economic variables have short run behavior that can be captured through dynamic modeling. If there is long run relationship among the variables, an error correction model can be formulated that portray both the dynamic and long run interaction between the variables. In the previous discussion, we show that if two variables that are non-stationary in levels have a stationary linear combination then the two variables are co-integrated. Co-integration means the presence of error correcting representation. That is, any deviation from the equilibrium point would revert back to its long run path. Therefore, an ECM depicts both the short run and long run behavior of a system. Engle and Granger (1987) (cited in Alogoskoufis and Smith, 1995) defined ECM as "a particular representation of a vector auto-regression appropriate for co-integrated results." This means if there exists long run relationship (i.e., co-integration among the variables).

A VAR describes the dynamic evolution of a number of variables from their common history. The use of co integrated VAR model helps account for spurious correlation and exogeneity bias as it is designed for non-stationary time series and requires no endo-exogeneous division of variables. It allows feedback and dynamic interrelationship across all the variables in the system and appears to be highly competitive with the large-scale macro econometric models in

forecasting and policy analysis (Rahman, 2004). The General VAR system of equations can be specified as:

$$\Delta Yt = ao + A_1 yt\text{-}1 + A_2 \Delta Yt\text{-}_2 + \ldots + A_k Yt\text{-}k + \varepsilon t$$

Where Yt is an nx1 vector that contains n variables in the system.αo is an nx1 vector of constants and A1 up to An are nxn vector of white noise process, with mean zero and covariance Σ.

Vector Error Correction Models

Since time-series variables have been widely noted to be non-stationary, the results that are obtained from the level VAR are spurious and misleading (Mukhopadhyay and Pradhan, 2010). Moreover, utilizing properly differenced variables in the VAR may lead to model mis-specification if the level variables share the long run relationship or are co-integrated. In this case the VAR should be written in a VECM (Vector Error Correction Model) form as indicated below.

The formation of the VECM treats all variables as potentially endogenous. Each variable, expressed in its first difference, is specified to respond to changes in other variables as well as to the deviation of the variables under consideration from the long run equilibrium path (Mukhopadhyay&Pradhan, 2010).

In order to capture both the short and long-run relationships in the model the study uses Vector Error Correction Model (VECM) which can be specified as

$$\Delta Yt = ao + \prod yt\text{-}1 + \Gamma_1 \Delta Yt\text{-}1 + \Gamma_2 \Delta Yt\text{-}2 + \ldots \Gamma_{k-1} \Delta Yt\text{-}k + 1 + \varepsilon t$$

Where $\Gamma = -(Aj+1 + \ldots + Ak)$, $j = 1 \ldots k\text{-}1$ and $\pi = -I + A1 + A2 + A3 + \ldots + Ak$

The VEC specification restricts the long-run behavior of the endogenous variables to converge to their co-integrating relationships while allowing a wide range of short-run 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.

Estimation of non-stationary data would cause spurious regression problems in that the least square estimators of the intercept and slope coefficients are not consistent (Wooldridge, 2000).

In order to have non-spurious estimation outcome, we need to apply both unit root test and co-integration analysis as they are the basic components of time series characteristics.

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The VECM describes how variables are adjusted towards the long-run equilibrium state. The coefficients of the error-correction terms indicate the proportion by which the long-run disequilibrium in the dependent variables is corrected in the short-term period.

In this study, different post-estimation diagnostic tests were performed to guarantee that the residuals from the model have a Gaussian distribution. Such as: residual vector serial correlation LM test, residual vector normality test, and residual vector heteroscedasticity test, multicollinearity.

CHAPTER FOUR
RESULTS AND DISCUSSIONS

This portion of the study analyzes the relationship between GDP growth rate (GDPGR) and its determinants using annual time series data. Prior to direct estimation of the model, it is advisable first to conduct the unit root test to check whether the time-series is stationary or not and after identifying the optimal lag length and VAR lag exclusion Wald test, the presence of the co-integrating vectors is tested using the Johansen co-integration method. Further the Vector Error Correction Model (VECM) test is employed to find the direction of causality between GDP growth rate (GDPGR) and its determinants. The long-run and short-run relationship is also identified followed by the post diagnostic test.

4.1 Descriptive Analysis

Descriptive analysis is the first step in this research. It helped to describe relevant aspects of phenomena of GDP growth rate and provide detailed information about each relevant variable. STATA 13 software has been used for analysis of the different variables in this study. Descriptive statistics shows the mean and standard deviation of the different variables used in the study. It also presents the minimum and maximum values of the variables, which help in getting a picture about the maximum and minimum values of a variable.

A national data is collected on the targeted dependent and independent variables that covered for the period of 1992-2017. The descriptive summary of these variables‟ which includes the mean, std. dev., and min/max values of these variables for that period is shown as follows.

Table 4.1 Summary statistics of the data

	GDPGR	TEXA	TEXD	TEXH	TEXE	TEXGCF	INFR
Mean	8.225769	0.8965385	1.166538	.5119231	1.128077	26.11346	9.810385
Maximum	13.57	2.32	3.69	2.12	2.9	39.9	44.39
Minimum	-8.67	0.17	.48	.05	.06	11.76	-8.48
Std. Dev.	6.048095	.6371495	.6734802	.5649284	.9556904	8.01158	11.12893
Observations	26	26	26	26	26	26	26

Source: Author’s Computation using STATA 13 Software

As shown in table 4.1 above, the study had 26 observations from 1992 to 2017 .One dependent variable GDPGR and six independent variables (expenditure on agriculture, expenditure on defense, Gross capital formation, expenditure on health, expenditure on education and Inflation). The annual growth of GDP growth ranges between-8.67 and 13.57indicating the minimum and the maximum growth rate, in 1992 and 2017 respectively. The average growth rate of GDP is 8.225769 and each observation is deviated from this average by the value of6.048095. The expenditure on agriculture as a percentage of GDP ranges between 0.17and 2.32. The average expenditure on agriculture is0.8965385and each observation deviated from this average by the value of 0.6371495. The expenditure on defense as a percentage to GDP ranges between 0.48and 3.69. The average expenditure on defense (as a percentage of GDP) is 1.166538and each observation is deviated from this average by the value .6734802. The expenditure on health (as a percentage of GDP) ranges between .05 and 2.12each observation is deviated from this average by the value 0.5649284. The mean of value Gross capital formation (GCF) as a percentage of GDP)) is 26.11346 and it has 11.76 a minimum and 39.9 maximum value. The standard deviation of this variable is 8.01158which indicate each observation deviated from the average value by the value of 8.01158. The expenditure on education has a minimum value of -0.06and a maximum value of 2.9. The mean value of expenditure on education is1.128077 and each observation is deviated from this mean value by 0.9556904. The annual inflation rate under the study period ranges between -8.48 and 44.39indicating the minimum and the maximum inflows. The inflation rate has the mean value of 9.810385 and each observation is deviated from the average value by 11.12893.

4.2 Unit Root Tests

In macro-level data analysis, unit root test is a common practice to accommodate non-stationarity. If this behavior of macro-variables is left uncorrected, it would lead to the problem of spurious regression when there is a need to model relationships among variables. That is, they may indicate a relationship between variables which does not exist. In order to obtain a consistent and reliable result, we must transform the non-stationary data into stationary data by differencing. In contrast to the non-stationary process that has a variable variance and a mean that does not remain near, or returns to a long-run mean over time, the stationary process reverts around a constant long-term mean and has a constant variance independent of time.

Formal testing for stationarity and the order of integration of each variable are primarily undertaken using different methods (mostly ADF and Phillips-Perron). The tests with the ADF and PP methods are performed with different trend assumptions (only intercept, both linear trend and intercept, and no intercept and no trend). Performing the tests under all three alternatives would identify whether only the intercept or both the trend and intercept are significant.

In this study, as it can be seen from table 4.1 the test for stationarity using ADF test shows that all three alternatives are included in all variables such as (lnGDPGr, lnTGEA,lneoh,lngcf, lnexpd, lneedu, and lnINFLR in testing for stationarity. A linear trend is found to be insignificant in all of the test equations. The result shows that all of the variables included in the model are integrated of order 1, i.e., I (1)

NULL HYPOTHESIS: VARIABLES HAVE NO UNIT ROOT

ALTERNATIVE: VARIABLES HAVE UNIT ROO

Table 4.2 unit root test result

Variables	Test Statics under different assumptions			
	Intercept	Trend and Intercept	No Trend No Intercept	Order of integration
GDPGR	-2.730	-2.042	-1.622	1(1)
DGDPGR	-6.056***	-5.907***	-6.069 ***	
TGEA	-0.601	-3.338	0.639	1(1)
DTGEA	-5.256***	-5.074***	-4.702***	
ExpD	-2.383	-2.345	-0.857	1(1)
D**ExpD**	-3.020**	-3.978**	-2.963**	
EOH	-2.581	-2.550	-1.217	1(1)
D**EOH**	-3.380**	-4.327**	-3.204**	
E.EDu	-0.647	-1.802	0.729	1(1)
D**E.EDu**	-3.827**	-3.709**	-3.412**	
GCF	-0.950	-2.318	1.672	1(1)
DGCF	-2.506*	-2.544*	-2.319*	
CPI	-2.046	-2.724	-1.684	1(1)
DINFR	-3.046*	-5.724***	-8.361***	

Source: Own Computation and note that: 'D' before each variable represents "first Difference".

Note: *= at 1%, ** =at 5% and *** = at 10% significance level

As can be seen from table 4.1 the tests show that all the variables are not stationary in their levels at 5% level of significance. Hence, we take the first difference of the variables and see if they become stationary. We can also determine the order of integration of the variables in the process. Looking at the results of ADF test conducted on the first difference of the variables, the null hypothesis of unit root is strongly rejected. Hence we can conclude that all the variables become stationary at their first difference and hence are I (1).The Phillips-Perron test (see appendix 1) gives a result that is consistent with and supports the results of the ADF. Therefore, both the ADF and PP results are consistent with each other and demonstrate that all variables included in the model are integrated of order 1, i.e., I (1).

4.3 Diagnostic Tests

Diagnostics test are usually undertaken to detect model misspecification and as a guide for model improvement. These tests include serial correlation, heteroscedasticity, multicollinearity, and normality tests. The serial correlation test can be done using the Durbin-Watson test or the Lagrange multiplier (LM) test. It helps to identify the relationship that may exist between the current value of the regression residuals and lagged values. The study used the LM test to investigate serial correlation. The null-hypothesis of the LM test that the residuals are not serially correlated is accepted at 5% level of significance (see appendix).

The Jarque-Bera normality test is used to see whether the regression errors are normally distributed. The null-hypothesis that the residuals are normal is rejected in this particular study. However, econometric theory states that the existence of non-normality does not affect and distort the estimator's BLUE and consistency property (Enders 1995). The non-normality of vector in our model doesn't affect the coefficients and t-values (see appendix).

The hetreroscedasticity test helps to identify whether the variance of the errors in the model are constant or not. The null-hypothesis of the test is that the errors are homoscedastic and independent of the regressors' and that there is no problem of misspecification. The null-hypothesis that the residuals are homoscedastic is accepted at 5% significance level (see appendix).

The study conducted different post-estimation diagnostic tests to guarantee that the residuals from the model are Gaussian that the assumptions are not violated and the estimation results and inferences are trustworthy the results are presented in appendix.

4.4. Results for Co-integration Test and Vector Error Correction Model

4.4.1 Co-Integration Test Result

Lag Order Selection for Endogenous Variables

The Johansen co-integration test result is very sensitive to the number of lags included for the endogenous variables in the estimation of the VAR. This necessitates the determination of an optimal lag order prior to the test of co-integration. The optimal lag order is determined with the sequential modified Likelihood Ratio test statistics [LR], the Final Prediction Error [FPE], the Akaiki Information Criterion [AIC], the Schwarz Information Criterion [SC], and the Hannan Quinn Information Criterion [HQ]). LR, FPE, AIC, SC and HQ suggest an optimal lag of one.

Table 4.3 Lag selection-order criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-311.225		2.1e+06	28.7477	28.9956	28.8061
1	-243.567	135.31*	46685.2*	24.8698*	25.2202*	26.3575*
2	-229.128	28.88	185991	25.8298	26.4723	28.5574

Source: Own computation

From the given table above, one can easily observed that all optimal lag order selection criteria suggests that at lag one all criteria's are significance at 5% accept AIC.

The Johansen Co-integration Test Result

The ADF and Philips – Person stationarity test results presented previously indicate that all the variables are not level stationary. This suggests that regression based on the level variables may produce an unreliable outcome. However, the Granger representation theorem states that it is possible for non-stationary variables to produce a stationary relationship if they are co-integrated. This would imply that there is a meaningful long run relationship among the variables. Thus, the presence and the number of such co-integrating relationships are checked using the trace and the maximum- eigen value methods.

The Johansen method of co-integration rank test result is very much dependent on the deterministic trend assumption in the underlying VAR structure, in addition to the number of lags of the endogenous variables. Hence, since the results may differ with the alternatives, a decision must be made as to which one to choose for the purpose of further analysis. So referring to the guide provided by STATA 13. The guide line is when the trace statistics and maximum eigen value is more than 5% critical value there is long run relationships among variables. Hence it is possible to run Vector Error Correction Model (VECM).

Table 4.4 Johansen Co-integration Rank Test

Test	Null Hypothesis	Alternative Hypothesis	Eigen value	Trace test statistics	Critical Value (5%)
Trace test statistics	Ho=0	Ho≠0		143.6954	124.24
	Ho=0	Ho≠0	0.88453	94.0436*	94.15
	Ho=0	Ho≠0	0.78833	58.3314	68.52
	Ho=0	Ho≠0	0.56226	39.3305	47.21
	Ho=0	Ho≠0	0.46625	24.8906	29.68
	Ho=0	Ho≠0	0.43768	11.6500	15.41

	Ho=0	Ho≠0	0.39717	0.0093	3.76
Test	**Null Hypothesis**	**Alternative Hypothesis**	**Eigen value**	**Max-Eigen statistics**	**Critical Value (5%)**
Max statistic	Ho=0	Ho≠0		49.6518	45.28
	Ho=0	Ho≠0	0.88453	35.7122	39.37
	Ho=0	Ho≠0	0.78833	19.0009	33.46
	Ho=0	Ho≠0	0.56226	14.4398	27.07
	Ho=0	Ho≠0	0.46625	13.2406	20.97
	Ho=0	Ho≠0	0.43768	11.6407	14.07
	Ho=0	Ho≠0	0.39717	0.0093	3.76

Note: * denotes rejection of null hypothesis at 5 percent level.

Both the trace and the maximal Eigen value tests identified that at least one co-integrating relationships at 5% significance level are existed (see Table 4.3). Such that, GDP Growth rate has significant long-run relationship with expenditure on Agriculture, expenditure on education, expenditure on health, expenditure on infrastructure, expenditure on defense and consumer price index.

4.5 Long-run Relationship

As explained above, there is one co-integrating relationship based on the Johansen co-integration test. This study aimed to examine the determinants of GDP growth rate in Ethiopia: expenditure on agriculture, expenditure on education sector, infrastructure, and expenditure on defense, expenditure on health and inflation rate. The equation is solved through Johansen normalization restriction imposed or ad-hoc normalization. And the Johansen trace test was used to confirm the appropriateness of the selected equation.

4.6 Vector Error Corrección Medel (VECM)

In the previous analysis, it was found that the data has one co-integrating relationship based on the Johansen co-integration test. Hence, VECM is performed by choosing the optimal lag that is chosen based on the information criterion seen in the previous section and by using the result of the Johansen co-integration test. The VECM consists of two parts: the matrix of long-run co-integrating coefficients that is used to derive the long-run co-integrating relationship, and the short-run coefficients which is for the short-run analysis.

Table 4.5 Estimates of β coefficients normalized to LRGDPGR

Table 4.5 Estimates of β coefficients normalized to LRGDPGR

	TGEA	EXPD	EOH	EEDU	GCF	INFR
Coefficient	18.12226	-0.464349	21.4241	4.978296	0.1876272	-0.2988472
Std. Err.	12.85266	0.1687345	1.020459	0.3420104	0.123439	0.0223538
t-statistics	1.41	-2.75	20.99	14.56	1.52	-13.37

Source: Own computation

The estimation shows that, in the long run, RGDPGR can be explained by TGEA, EXPD, EOH, EEDU, GCF and INFR. To understand and interpret the above result more easily we can rewrite the long run equilibrium relationship normalized on GDPGR as

LRGDPGR= -9.873048 +18.12226TEXA -
0.464349TEXD+21.4241TEXH+4.978296TEXE+0.1876272TEXGCF -0.2988472CINFR

The above equation shows that, in the long run lnRGDPGR can be explained by Gross Fixed Capital Formation, inflation rate, Expenditure on agriculture, expenditure on defense, expenditure on health, expenditure on education.

A one percent increase change in the level of education sector development causes a 4.97% increase change in GDP growth rate in Ethiopia and statistically significant at 5% level of

confidence assuming other variables are constant. A one percent increase change in the level of health sector development causes a 21.4% increase change in GDP growth rate in Ethiopia and statistically significant at 1% level of confidence assuming other variables are constant.

The inflation rate is found statistically significant at 1% level of confidence and has negative relationship as expected. A one percent increase change in the level of expenditure on defense causes a 0.46% decrease change in GDP growth rate in Ethiopia assuming other variables are constant.

Short – run Relationship

This part of the study discusses the result of the D (lnGDP) equation in the error-correction model from which the short run impact of Expenditure on agriculture, expenditure on defense, expenditure on health, and expenditure on education, expenditure on infrastructure and inflation rate on GDP growth rate (GDPGR) can be analyzed.

Table 4.6 Short run coefficient with dependent variable: ln RGDPGR

	COFFICIENT	STD. ERROR	T-VALUE	P-VALUE
CointEq1	-0.2282744	0.3459345	-3.21	0.001
LD.TEXA	0.11087	6.800271	0.10	0.202
LD.TEXD	-1.865232	1.912616	-0.98	0.329
LD. TEXH	-3.58144	4.079341	-1.08	0.162
LD. TEXGCF	-.3178557	.4909283	-0.65	0.517
LD. INFR	-.0384974	.1118212	-0.13	0.133
CONSTANT	.7840283	1.118587	0.70	0.483

Source:Own computation

As it can be seen from table 4.5, the coefficient of the error correction term for the equation is negative and significant at 1% significant level as expected. This tells us that there is a reasonable adjustment towards the long run steady state. This guarantees that although our

dependent variable GDPGR may temporarily deviate from its long-run equilibrium value, it would gradually converge to its equilibrium. The error correction term of -0.2282744 shows that about 22.8 percent of the deviation of the GDP from its equilibrium value is eliminated every year. Or ECT is 22.8%, negative, and statistically significant at 1%. -0.2282744 shows that short run values of FDI converge to its long run equilibrium level by 22.8% speed of adjustment every year by the contribution of TGEA, GCF, EOH, EXPD, EEDU, and INFR. Since error term is negative and significant, therefore there exists a long-run causality running from expenditure on agriculture, expenditure on defense, expenditure on health, expenditure on education, gross capital formation and inflation rate to GDP growth rate (GDPGR) of Ethiopia. The error correction term of -0.2282744 shows that about 22.8 percent of the deviation of the (GDPGR) from its equilibrium value is eliminated every year; hence, full adjustment would require a period of less than five years.

As can be seen from the above result in the short run, expenditure on agriculture, expenditure on defense, Gross fixed capital formation, expenditure on health, expenditure on education and inflation rate is insignificant indicating that it doesn't have a major impact on GDP in the short run.

Table 4.7 Post – Estimation Diagnostics

Null hypothesis	**Variables**	**Chi2**	**Prob> chi2**
(1) [D_GDPGR] LD.TEXA = 0	LD.TGEA	0.08	0.7783
(2) [D_GDPR]LD.TEXGCF= 0	LD.Gcf	0.77	0.3789
(3) [D_GDPRLD.TEXD= 0	LD.EXPD	2.64	0.1041
(4) [D_GDPGR]LD.INFR = 0	LD. INFR	0.56	0.4550
(5) [D_GDPR]LD.TEXE= 0	LD.EEDU	0.32	0.5739
(6) [D_GDPR]LD.TEXH = 0	LD.EOH	2.32	0.1739

Source: Own computation

As shown from the above table, probability of all independent variables is greater than 5% critical value and not equal to zero. That means there is no short run causality running from expenditure on agriculture, expenditure on defense, gross fixed capital formation, and expenditure on health, expenditure on education and inflation rate to GDP growth rate of Ethiopia. But there is a long run causality running from expenditure on agriculture, expenditure on defense, expenditure on health, expenditure on education expenditure on gross fixed capital formation and inflation rate to GDP growth rate (GDPGR) of Ethiopia as shown in table 4.5 on page 44.

Table 4.8 Granger causality Wald tests

Equation	Excluded	chi2	df	Prob> chi2
gdpr	TEXA	2.127	1	0.145
gdpr	TEXD	1.3761	1	0.241
gdpr	TEXH	.12231	1	0.727
gdpr	TEXE	.04143	1	0.839
gdpr	TEXGCF	.07971	1	0.778
gdpr	CPI	.43529	1	0.509
gdpr	ALL	1.43	6	0.105

Source: Own computation

As shown in table 4.8 all variables do not affect Real GDP Growth rate in the short run. The probability value of all variables is greater than 5% critical value. So total expenditure on agriculture, total expenditure on defense, total expenditure on health sector, total expenditure on education sector, total expenditure on infrastructure and inflation rate do not granger real GDP Growth rate in the short run

CHAPTER FIVE
CONCLUSIONS AND POLICY RECOMMENDATIONS

5.1 Conclusions

This study empirically investigates the possible factors that determine the GDP growth rate in Ethiopia during 1992-2017 by using Vector Autoregressive Model (VAR) and Vector Error Correction Model (VECM). Based on review of previous researches, six variables have been identified that generally determine the GDP growth of Ethiopia. They are expenditure on agriculture, expenditure on defense, expenditure on health, expenditure on education, expenditure on capital formation and inflation rate. After the selection of variables the study proceed to unit root testing and Johansen co integration approach and then to vector error correction approach.

In estimating the result it is found that in the long run all variables except expenditure on defense and inflation rate such as expenditure on agriculture, expenditure on health, expenditure on education and expenditure on capital formation have positive coefficient and are statically significant. As can be seen from the above result in the short run, expenditure on gross fixed capital formation, inflation rate are insignificant indicating that they don't have a major impact on GDP growth in the short run.

The other objectives of this paper is to test the existence of long term relationship between the GDP and the six explanatory variables using a Johansen co-integration approach to co-integration on time series data of Ethiopia from 1992-2017. The result shows that there is co-integration between GDP and the six selected variables.

Finally, it can be concluded that the results of this study can be a guideline and provide insight to policymaker's to identify key factors that determine the GDP growth rate of Ethiopia.

5.2 Policy recommendations

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 as shown in table 4.5. 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 growth capital formation do not necessarily lead to rapid economic growth; in contrast, spending on these sectors insignificantly affects economic growth by reducing the budget share of the productive sectors such as education, health etc.

Public investment in these sectors could generate more growth than focusing only on one sector; Ethiopia cannot afford an infrastructure (growth capital formation) sector that is not contributing to economic growth. Deliberate efforts are, therefore, commanded so as to make the infrastructure sector relevant in the Ethiopia economy.

Generally, the government should optimize its spending more on human capital (education) and health

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APPENDIX

Johansen tests for cointegration

Trend: constant — Number of obs = 25

Sample: 1993 - 2017 — Lags = 1

maximum rank	parms	LL	eigenvalue	trace statistic	5% critical value
0	7	-279.11074	.	139.9759	124.24
1	20	-253.21283	0.87405	88.1801*	94.15
2	31	-235.83956	0.75089	53.4335	68.52
3	40	-223.39887	0.63037	28.5522	47.21
4	47	-216.05335	0.44436	13.8611	29.68
5	52	-211.04895	0.32992	3.8523	15.41
6	55	-209.2829	0.13176	0.3202	3.76
7	56	-209.12279	0.01273		

maximum rank	parms	LL	eigenvalue	max statistic	5% critical value
0	7	-279.11074	.	51.7958	45.28
1	20	-253.21283	0.87405	34.7465	39.37
2	31	-235.83956	0.75089	24.8814	33.46
3	40	-223.39887	0.63037	14.6910	27.07
4	47	-216.05335	0.44436	10.0088	20.97
5	52	-211.04895	0.32992	3.5321	14.07
6	55	-209.2829	0.13176	0.3202	3.76

Selection-order criteria

Sample: 1994 - 2015 — Number of obs = 22

lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	-311.225				2.1e+06	28.7477	28.8061	28.9956
1	-243.567	135.31*	25	0.000	46685.2*	24.8698*	25.2202*	26.3575*
2	-229.128	28.88	25	0.269	185991	25.8298	26.4723	28.5574

Shapiro-Wilk W test for normal data

Variable	Obs	W	V	z	Prob>z
U	26	0.94918	1.453	0.766	0.22190

Shapiro-Wilk W test for normal data

Variable	Obs	W	V	z	Prob>z
U	26	0.94918	1.453	0.766	0.22190

Durbin's alternative test for autocorrelation

lags(p)	chi2	df	Prob > chi2
1	0.390	1	0.5323

H0: no serial correlation

Shapiro-Wilk W test for normal data

Variable	Obs	W	V	z	Prob>z
U	26	0.94918	1.453	0.766	0.22190

```
. estat hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of gdpr

         chi2(1)      =     6.12
         Prob > chi2  =   0.0134
```

```
. estat vif
```

Variable	VIF	1/VIF
tgea	13.46	0.074296
eedu	6.77	0.147683
eoh	3.91	0.255682
gcf	3.51	0.284761
cpi	2.06	0.484816
expd	1.04	0.962741
Mean VIF	5.13	

```
. estat durbinalt
time variable not set, use -tsset varname ...-
r(111);

. tsset year, yearly
        time variable:  year, 1992 to 2017
                delta:  1 year

. estat durbinalt

Durbin's alternative test for autocorrelation
```

lags(*p*)	chi2	df	Prob > chi2
1	0.390	1	0.5323

H0: no serial correlation

```
. estat dwatson

Durbin-Watson d-statistic(  7,    26) =  1.975263

. estat bgodfrey

Breusch-Godfrey LM test for autocorrelation
```

lags(*p*)	chi2	df	Prob > chi2
1	0.551	1	0.4577

H0: no serial correlation

Durbin's alternative test for autocorrelation

lags(p)	chi2	df	Prob > chi2
1	0.390	1	0.5323

H0: no serial correlation