ST.MARY UNIVERSITY
SCHOOL OF GRADUATE STUDIES

GOVERNMENT ROAD SECTOR SPENDING AND its EFFECT ON ECONOMIC GROWTH IN ETHIOPIA

CHERE MULATU

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A Thesis Submitted to the School of Graduate Studies of Saint Mary University in Partial Fulfillment of the Requirements for the Degree of Masters of **Art in DEVELOPMENT ECONOMICS**

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DECLARATION

I, undersigned hereby, declare that this thesis is prepared with my own effort that it has not been presented for a diploma or a degree requirement in this or any other University; and all sources of materials used for this thesis work have been duly acknowledged. I have submitted this Thesis to St.mary University as of May 25, 2019 and I agree to accept any responsibility for the scientific and ethical mischief pertaining to this research work as per terms and conditions of Saint Mary University.

Declared by: Chere Mulatu

Signature: ----------

Date: ----------

Place and date of submission ----------

ENDORSEMENT

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

Sisay Debebe (PhD)

Advisor Signature

St. Mary's University, Addis Ababa

APPROVED BY BOARDS OF EXAMINERS

As members of board of examining of the final MA thesis open defense, we certify that we have read and evaluated the thesis prepared by Chere Mulatu under the title ‘***‘Assessment of Government Road Sector Spending And its Effect on Economic Growth in Ethiopia”.*** We recommend that this thesis to be accepted as fulfilling the thesis requirement for the Degree of Masters of Art in Development Economics.

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DEDICATION

I dedicate this thesis to my uncle (Father), Ato Legesse Desta who had strong belief in education, with affection , love, far-reaching persuasion to the beginning of this masters work especially, for his dedicated affiliation in the success of my whole life and gave me a courage till his last breath, May God be with you and Rest in Peace.

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ACRONYMS

AFDB	African Development Bank
CD-ROM	African Development Indicators
CGE	Computable General Equilibrium
EEA	Ethiopian Economic Association
ERA	Ethiopian Road Authority
GDP	Gross Domestic Product
GTP	Growth and Transformation Plan
MOFED	Ministry of Finance and Economic Development
NBE	National Bank Ethiopian
ODA	Official Development Assistance
OECD	Organization of Economic Cooperation and Development
PASDEP	Plan for Accelerated and Sustained Development to End Poverty
RGDP	Real gross domestic product
SSA	Sub Sahara Africa

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ABSTRACT

This study aims to assess status and performances of government road sector spending and its effect on economic growth in Ethiopia using time series data for the period 1975-2018. Both descriptive and econometric analyses were used to analyze the data. The result of the descriptive analysis indicates that the trend of government road sector spending has highly increasing from time to time. Regarding the performance of road sector from 1974- 2018, the road network is by now growing out the rate. However the issue of rural accessibility still remains far from the desired level that the country needs to have. Thus, the country needs to do a lot to graduate to middle income country status in terms of road network expansion and improved accessibility. The Econometrics result, with the help of co integration and vector error correction analysis, the effect of government road spending on economic growth was assessed in the long-run as well as in the short-run. The findings reveal that government spending on road has a significant and positive effect on the economic growth (GDP) in the short-run and in the long-run. therefore, the government need to strengthen its support on road infrastructure through allocate more road financing to expand the road network with the aim of increasing the current rural accessibility, thus, improves the market access of the poor rural Population with the aim of improvement the current economic growth.

***Key words**: Economic growth, Road network, co-integration, ECM*

CHAPTER ONE: INTRODUCTION

1.1. Background of the study

Public expenditure is the leading tool used by governments particularly in emerging countries to encourage economic progress which is an important factor for viable development (Sharma 2012). Furthermore, arrangement of public expenditure has been fascinating the consideration of economists in current times due to its special effects on the level of growth (Sunday and Elizabeth 2012). Government spending is predictable to be a means of decreasing the negative influences of market failure on the economy. Nevertheless, divisions of public spending with absence of attention for the crucial desires of the country may risk greater misrepresentation in the economy which may be dis-advantageous to growth. Economic growth is estimated to carry about an improved standard of living of the people from side to side facility of enhanced infrastructure, health, housing, education services and enlargement in agricultural production and food sanctuary (Loto, 2012).

Since 1993/94, the Ethiopian government has been realizing numerous transformations that have elaborate the progressions of structural adjustment programs side-ways with commercialization of agriculture, private sector development, and a number of associated poverty improvement programs. Successful operation of the programs requires an effective infrastructural system. In particular, road transport is supposed to create a network over a wide collection of infrastructural facilities. Roads are essentially a public investment around 78% of the total budget envelope, with the remaining coming from external assistance. In terms of capital expenditure, Ethiopia has been increasing its spending on road construction. Spending went from approximately $100 million in 2002/03 to $1.6 billion in 2012/13, which was invested in nearly 300 road and bridge projects. Road construction accounts for the largest share of spending, averaging 32% of total capital expenditure since 2002 according to the 2012/13 budget (MOFED, 2016).

In 2017/18, total road network reached 126,773Km, showing a 5.5percent annual expansion. The country's total road network was consisted of 56,732.4 Km (44.8 percent) Woredas road, 35,985 Km (28.4 percent) rural road, 28,699 Km (22.6 percent) federal road and 5,357 Km (4.2 percent) urban road. The Federal road included 15,886 Km (55.4 percent) asphalt and 12, 813Km (44.6 percent) gravel. Asphalt road network accounted for about 12.5 percent of the road network which was lower than 14.5 percent GTPII target set for the fiscal year During the review period,

rural road network, administered by regional authorities, showed a 7.8 percent annual growth and reached 35,985 Km while Woredas road stood at 56,732Km. In 2017/18, total investment in road construction and expansion(excluding urban road) declined by 2.4 percent to Birr 3.1 billion from Birr 3.9 billion a year earlier Investment in the Federal road construction and expansion accounted for 77.6 percent of the total road investment capital and reached at Birr 25.6 billion, while regional roads constituted 11.5 percent followed by Woredas road(11 percent).There was no investment in urban road construction and expansion during the period (NBE, 2017).

The main ODA contributors to the sector are multilateral Organizations, which have been providing more than 80% of total ODA, at an average of around $200 million per year, since 2005 (OECD, 2016). The main traditional financiers have been the World Bank, the AfDB and the EU (in the form of concessional loans with low interest rates). These donors are regarded as having a comparative advantage in infrastructure, including cross-border infrastructure networks (DAG, 2015).

The Ethiopian Road Authority (ERA) examined the relationship between the country's development plan and the road sector policy (ERA, 2008). The study mostly showed that there is a well-established connection between the development plan of the nation "A Plan for Accelerated and Sustained Development to End Poverty, Ethiopia's form of Poverty Reduction Strategy" (PASDEP) and the road sector policy. Because of the authoritative nature of the sector, it is appropriate to commence serious examination of the road transport sector of Ethiopia. Government spending outlines in Ethiopia have improved radically over the last few years. Thus, it is also essential to study the movements in the levels and composition of government spending in the road transport sector, and evaluate the impact of these changes over time. It is even more important to investigate the contribution of such spending in the overall growth goal of the state. The study will also deliver essential information for more efficient targeting and use of inadequate financial resources of the country in designing a well-organized and effective road transport system and developing the road transport plan of the country. Added to this, making such an examination contributes to the stock of understanding regarding to the road transport sector (Ibrahim, 2011).

Therefore this study aims to find out the assessment of government road sector expenditure and its effect on economic growth in Ethiopia. Variables such as: Gross capital formation (Investment),

Education, Health, Agriculture and Road are also employed to determine their impact on economic growth in Ethiopia.

1.2. Statement of the Problem

A report from Organization of Economic Co-operation and Development (OECD, 2012) shows that public social spending has increased, up from 19% in 2007 to 22% of GDP on average across the OECD in 2012. Rising spending-to-GDP ratios are due to a combination of governments increasing expenditure on social supports such as unemployment and income support benefits but also because of GDP stagnating or declining in many countries. Even though Ethiopia is not an OECD member, its government expenditures during this period showed the same trends as OECD countries. Statistics from MOFED and International Financial Statistics of International Monetary Fund (IMF) show that the Ethiopian government expenditure's trend shows almost a consistent increase throughout the period 1970 until 2013. At the same time its real GDP per capita also shows the same trend (OECD, 2012).

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

Over the past 20 years, 37.1% of the total RSDP expenditure was on rehabilitation and upgrading roads, 31.3% was on construction of link roads, 4.3% on maintenance of federal roads, 11.6% on regional road construction and maintenance and 12.2% on Woredas roads and 2.6% was on institutional support projects and other activities at the federal level. The twenty years of the RSDP, physical works have been undertaken on a total of 136,726 km of roads excluding routine maintenance work and community roads (ERA, 2017). The total budget for the planned works

during this period amounted to ETB 289.3 billion. The total amount disbursed in the same period, is ETB 301.6 billion. Physical and financial performance of RSDP over the past 20 years against plan is 79% and 104% respectively (ERA, 2017).

Most of studies undertaken in Ethiopia have only been concerned about the causality between government expenditure and economic growth and their respective findings were mixed, with some conclusions consisting either of unidirectional causality or bidirectional causality between government expenditure and economic growth. Furthermore the causality test was unable to identify the degree of change or effect from one variable to another; for this reason this study has no interest in testing for causality. In line to the above views, there are a few studies that have examined to relate road development and economic growth and poverty reduction in the Ethiopian case, such as Ibrahim (2011), Lofgren and Robinson (2004), Tewodaj et al (2006) and Lofgren et al (2005). Though, the empirical evidence of those studies on the contributions of public road investment on economic growth was mixed in terms of magnitudes and direction of impacts; because the impact of public spending is limited by various factors and constraints such as methodologies employed, Composition of expenditure, and the time duration of the study.

In general, various study attempted to analyze the effect of different components of government spending on economic growth; all these studies come up with widely different conclusions. Thus, this necessitates the current research interest for empirical analyzed the impact of government road sector spending on economic growth in Ethiopia. This study is tried to make some improvement on other studies on economic growth and government expenditure relationship in Ethiopia for two reasons. Firstly, it considers government expenditure on road as an important variable that affects economic growth. Recent most studies like; Ibrahim (2011), Dercon et al (2008) did not include the variable (expenditure on road) in the growth model. Secondly, this study extends the period to 2018.Therefore, the study contributes to yield interesting insights about the debate and to fill the knowledge gap by proving further empirical evidence on the impacts of government road sector expenditure on economic growth. At this point, the attention is given to identify the degree of association between the government expenditure particularly on road sector expenditure and gross capital formation and economic growth. To the best of my knowledge, there are only few studies undertaken on this in Ethiopia and most of them are not recently studied. Thus, this study attempts to investigate the association between government expenditure particularly on road sector and economic growth in Ethiopia from 1975 to 2018.

1.3. Objective Of The Study

1.3.1. General Objective

The general objective of this study is to examine the status and performance of government road spending and its effect on economic growth in Ethiopia.

1.3.2. Specific Objective

- Analyze the trends of government road infrastructure development in Ethiopia.
- Analyze the short, long run relationship between government road spending and economic growth in Ethiopia.

1.4. Research Question

Based on the empirical literature on the interaction between government road spending and economic growth in Ethiopia, the study proposes the following working research question to hold true in my analysis.

- ❖ What kind of trends of road expenditure and performance does the road sector reveal in Ethiopia for the period 1975 to 2018?
- ❖ Is there a positive and strong correlation between level of spending on road sector and economic growth?
- ❖ What will be the short and long term relationship between the growing spending on road sector and economic growth?
- ❖ What are the economic implications of public expenditure on road infrastructure?

1.5. Significance of the Study

This study uses up to date data and employs empirical analysis in order to generate evidence on the effect of road spending on economic growth in Ethiopia. This study, therefore contributes significantly. Firstly, it provides useful information input into policymaking decision by bridging the aforementioned gaps. In addition, it gives literature by providing new and robust facts on government road sector expenditure and economic growth. In addition to this it contributes to other

interested people to undertake further study on the issue is essential. Lastly, it provides recommendations on the basis of the findings of the study, which helps policy makers on allocating government spending and enhancing the efficiency of the resource use.

1.6. Scope and Limitation of the Study

The study pursues analysis of Ethiopian government road sector spending and its effect on its economic Growth. In order to fully capture its effect on the economy, a thorough empirical investigation will be conducted with data covering a period of 44 years i.e. from 1975-2018.

This study is delimited to the investigation of the effect of government road spending on economic growth in Ethiopia; the period ranges from 1975 - 2018. In this study, the government road spending denotes only the Federal budgetary expenditure (which includes recurrent and capital expenditures) at national level, The study doesn't takes into account road spending of regions, since there was no regional level budgeting before the decentralization in 1991. It is no possible to make comparisons of the state of the sector before and after decentralization.

Although this study attempts to investigate the effect of government road spending on economic growth, it suffers from some limitations. One of the main problems in this study has been the inconsistent of data by different institutions. Even data arises from the database set and annual reports of the MOFED, EEA, CSA and NBE shows different figures for the same year.

1.7. Organization of the Thesis

To achieve these objectives the paper is organized with 5 Chapters: Chapter 1 Introduction, Chapter 2 Literature review discusses theoretical and empirical frame work of the study, Chapter 3 Research methodology, Chapter 4 Results and Findings and Chapter 5 conclusions and Recommendations.

CHAPTER TWO: LITERATURE REVIEW

This chapter tries to looking at the studies that have been observed the theoretical and empirical literatures on the assessment of government road sector spending and its effect on economic growth in Ethiopia. It will try to give brief explanation about economic growth theories, public expenditure growth theories, and theoretical and empirical literatures that link government spending and economic growth. In reviewing the correlation between government spending and economic growth, this will deliver better understandings into the basis of the public expenditure in general and road sector spending in particular on economic growth of the nations.

2.1. Review of Basic Concepts and Definitions

The initial point of conservative economic growth theorization is the neoclassical model of Solow (1956). The basic assumptions of the model are: constant returns to scale, diminishing marginal productivity of capital, exogenously determined technical progress and substitutability between capital and labour. As a result the model highlights the savings or investment ratio as important determinant of short-run economic growth. Technological progress, though important in the long-run, is viewed as exogenous to the economic system and therefore, it is not adequately examined by this model. Turning to the issue of convergence/divergence, the model Predicts convergence in growth rates on the basis that poor economies will grow faster compared to rich once.

The role of technological progress as a key driver of long-run economic growth has been put in analysis from more recent studies, which accept constant and increasing returns to capital.

These theories, known as endogenous growth theories, propose that the introduction of new accumulation factors, such as knowledge, innovation, etc..., will induce self-maintained economic growth. Triggered by Romer's (1986) and Lucas' (1988) seminal studies, work within this framework highlighted three significant sources of growth: new knowledge (Romer, 1990, Grossman and Helpman, 1991), innovation (Aghion and Howitt, 1992) and public infrastructure (Barro, 1990).

As a result, in the endogenous growth model, technological advances result from research & development activity, and technological progress and knowledge accumulation are treated as endogenous variables, thus it is also termed the endogenous growth theory. According to the

model, the long-run growth rate depends on a stable business environment: government policies and actions on taxation, law and order, provision of infrastructure services, protection of intellectual property rights, and regulation of international trade, financial markets, and other aspects of the economy.

Investment has a limited role in promoting economic growth and a continuous increase in the factors of production (investment) is unlikely to yield growth. Under endogenous growth theory and despite the law of diminishing returns, marginal factor productivity can be increased. For example, technical progress that is funded by capital investment increases productivity. Similarly, new skills through improved education and training, and better health, tends to increase the productivity of labour. Also, the endogenous growth approach argues that there is a role for government institutions that can overcome any market failures associated with the various types of investment. Hence, investment is crucial to economic development and growth.

Further, endogenous growth theory states that the improved technology accessed by investment

Drives growth; thus, investment may contribute to a long-run rate of economic.

The neoclassical growth model of Solow (1956) or its version in optimal growth formalized by Cass (1965) and Koopmans (1965) following previous evidence in Ramsey (1928), leaves little place for public policy to economic growth interaction. Long-term economic growth is zero (or exogenous), thus government decisions are ineffective in the long-run. Moreover, they at best leave unchanged the short-run growth rate or equilibrium levels of different macroeconomic variables, without any possibility for positive effects.

The Barro (1990) model constitutes without any doubt a breaking point in this evolution. By allowing for productive public spending, *i.e.* public spending that increases private capital marginal productivity, as for example infrastructure or property rights, the author identifies the existence of a positive correlation between government spending and long-run economic growth.

This result represents in fact a necessary condition in order to conduct consistent analysis of government policies. Indeed, most of public policies that are realistic (flat-rate taxes, the use of public deficits, seigniorage financing) imply a certain form of distortion.

2.2. Review of Economic Growth Theory

Economic growth can be well-defined as the increase of a state's ability to produce the goods and services its people want (Peterson, 1988). In considerable the same way (Todaro and Smith, 2003) defined economic growth as the steady process by which the productive capacity of the economy is improved over time to carry about growing levels of nationwide production and revenue.

However, Kuznets (1974) suggests that economic growth should not be scarcely limited to fluctuations in the level of output or income, but it should include main structural changes and consistently large modifications in social and institutional conditions under which the rise in output or income is achieved. In his significant work, he demarcated a country's economic growth as a long-term growth in volume to supply progressively varied economic goods to its population, and this rising capability is constructed on advancing technology and the institutional and ideological adjustments that it demands.

Basically, economic growth for any country as stated by Bowden (1992), centers on the organization and improvement of an improved labour force, better utilization of labour, education, attitudes, and skills etc. Conventionally, there are three key constituents of economic growth. These constituents include capital buildup, growing in the labour force and improved technology. Capital buildup is raising the stock of capital in an economy while growth in labour force generally occurs as the level of the population in the economy increases. Improved technology on the other hand is seen as an enlarged application or new scientific awareness in the form of creations and originations with respect to both physical and human capital.

In the literature, the terms economic growth and economic development are narrowly correlated and are frequently used interchangeably, but it is important to focus the difference between them because both terms are often unclear. While economic growth in simple terms states to an increase in productivity, economic development demands more. Economic development incorporates a multidimensional process linking major fluctuations in social structures, popular attitudes and national institutions, as well as the speeding up of economic growth, the reduction of inequality and the eradication of absolute poverty (Todaro, 1992). Therefore economic growth can be seen as a component of economic development.

2.2.1. Determinants of Economic Performance

A widespread variety of studies has examined the factors underlying economic growth. Using different theoretical and procedural perspectives, these studies have employed prominence on a diverse set of explanatory parameters and offered numerous intuitions to the sources of economic growth. Investment is the most major factor of economic growth identified by both neoclassical and endogenous growth models. Nevertheless, in the neoclassical model investment has influence on the intermediate period, whereas the endogenous growth models debate for more permanent effects. The significance devoted to investment by these theories has directed to a massive amount of empirical studies examining the association between investment and economic growth (Mankiw, 1992; Barro and Sala-I- Martin, 1995; Easterly, 1993). However, findings are not convincing.

Economic policies and macroeconomic situations have also fascinated much consideration as factors of economic performance (Barro, 1997; Fischer, 1995; Easterly and Rebelo, 1993) subsequently they can establish the framework within which economic growth take place. Economic policies can impact numerous features of an economy through investment in human capital and infrastructure, enhancement of political and legal institutes and so on (although there is discrepancy in terms of which policies are more conductive to growth). Macroeconomic conditions are considered as necessary but not sufficient conditions for economic growth (Fischer, 1995).

Overall, a stable macroeconomic atmosphere may favors growth, particularly, over reduction of uncertainty, while macroeconomic instability may have an undesirable influence on growth over its effects on productivity and investment. Numerous macroeconomic factors with impact on growth have been acknowledged in the literature, but significant attention has been sited on inflation, fiscal policy, budget deficits and tax burdens. Public expenditure represents one of the most key policy instruments for governments. Subsequently, they are anticipated to inspire large possessions on economic growth (Fischer, 1995).

2.2.2. Theories of Government Expenditure

2.2.3. Peacock and Wiseman's Theory of Expenditure

Wiseman-Peacock (1961) grounded their hypothesis on the examination of public spending in U.K for a period of 65 years from 1890 to 1955. They suggested that “Public spending inclines to rise

by sharp shakes in a step-wise manner rather than continuously and smoothly". When revenue restraints dominate, the growth of expenditure is constrained. The public spending increases and makes the insufficiency of the present revenue quite clear to everyone. The movement from the older level of spending and taxation to a new and high level is the "Displacement Effect". The insufficiency of the revenue as compared with the required public spending position and the need to find a solution of an important problem that have come up and agreed to the required adjustments to finance the increased expenditure. They achieve a new level of tax tolerance. They are now ready to accept a great burden of taxation and as a result the overall level of spending and revenue goes up. In this way, the public spending and revenue get stabilized at new level till another disruption occurs to cause a 'Displacement Effect 'creates an "Inspection Effect". The government and the people review the revenue in addition to the displacement and inspection effects, Peacock and Wiseman also describe a 'concentration effect'. Each major disruption leads to the government assuming a large proportion of the total national economic action, the net result is the 'concentration effect'. The concentration effect also refers to the apparent tendency for central government economic movement to grow faster than that of the state and local level governments. Therefore Peacock-Wiseman approach to government spending trends is much more uncertain in what it significances to explain than in Wagner's hypothesis.

2.2.4. Ernest Engel's Theory of Public Expenditure

Ernest Engel was also a German economist writing almost the same time as Adolph Wagner in the 19th century. Engel pointed out over a century ago that the composition of the consumer budget deviations as family income rises. A slighter portion comes to be expended on certain goods such as work clothing and a larger portion on others, such as for coasts, expensive Jewelry. As average income rise, slighter deviations in the consumption pattern for the economy may occur. At the earlier stages of nationwide development, there is need for upstairs capital such as roads, harbors, power installations, and pipe-borne water. But as the economy developed, one would anticipate the public share in capital creation to weakening over time. Individual spending pattern is thus related to countrywide spending and Engel's finding is stated to as the diminishing portion of outlays on foods (Taiwo and Abayomi, 2011).

2.3. Review of Theoretical Literature

Economic theory is important in providing a framework for understanding how the world works, and it helps to determine which economic theory is most accurate. This section reviews global theories that link government spending and economic growth, to determine whether government

Spending helps or hinders economic performance.

Classical economists of the 18th century such as Adam Smith subscribed the doctrine of laissez-faire in the workings of the economy. They argued that governments are always and without exception the greatest spend thrifts of society as they spend other people's money. He believed that individuals acting in self-interest will promote public good under the guidance of the invisible hand. Supporters of laissez-faire maintained that people should be left unhindered to pursue their best interests and in the process they would benefit the society. The implication of this is that there is a need for minimal level of government expenditure for accelerated economic growth.

In the 1930's, John Maynard Keynes argued that government spending particularly increases in government spending boosted growth by injecting purchasing power into the economy. According to Keynes, increased government spending is thought to raise aggregate demand and increase consumption, which in turn leads to increased production, government could reverse economic down turns by borrowing money from the private sector and then returning the money to the private sector through various spending programs. This "pump priming" concept did not necessarily mean that government should be big. Instead, Keynesian theory asserted that government spending especially deficit spending could provide short-term stimulus to help end a recession or depression. The Keynesians even argued that policymakers should be prepared to reduce government spending once the economy recovered in order to prevent inflation, which they believed would result from too much economic growth.

In line with this school of thought, some scholars argue that increase in government expenditure on socio-economic and physical infrastructures encourages economic growth. For example, government expenditure on education and health raises the productivity of labor and increase the growth of national output. Similarly, expenditure in infrastructure such as roads, Communications, power ... etc., reduces production costs, increase private sector investment and profitability of firms; thus fostering economic growth.

During 1950's and 1960's many economist believed that government intervention was one of the best way to achieve different development goals such as economic growth and poverty reduction in a given country though yet the direct and indirect impacts of public spending on economic growth and poverty reduction remained inconclusive. But, in 1980's there was a growing debate on the importance of government intervention. Indeed, government expenditure policies are one of the major components of fiscal policies. The major government instruments constitute government consumption and investment. The consumption aspects constitute mainly wage and non-wage consumption of the government expenditures whereas investment aspect represents allocation of government funds mainly to the provision of public goods such as infrastructure, health and education (Cavallo, 2005).

The broad principles for guiding public expenditure allocations are based on the need to address market failure (public goods, externalities) to promote growth, and improve distribution and reduce poverty through public interventions. The sources of market failure commonly identified in the literature are: the absence of competitive markets, the existence of positive or negative externalities in consumption and production, the undersupply of public goods by the market, imperfect information on production and consumption opportunities and coordination failures (Fiestas, 2005).

Public investment can be defined as public expenditure that adds to the public physical capital stock which includes building of roads, schools, hospitals, electric power, etc. This corresponds to the definition of public investment, in national income account data, capital expenditure (Lofgren and Robinson, 2004). The IMF and WB often divide total spending in to three broad categories: economic spending (agriculture and infrastructure), social spending (education, health, nutrition and safety nets) and public administration and defense spending. Government spending can also divided into those expenditures whose welfare goals are meant to be realized in the long-term or short-term (Fan, 2007).

The long-term expenditures include investment on human and physical capital (infrastructure, education, health, and technology) while the short-term expenditures are social safety nets/welfare spending. Public expenditure diverts economic resources in to channels determined by the government in accordance with national objectives and public policy. As a consequence, the scale

and direction of public expenditure may affect the pattern and levels of consumption, volume of production, allocation of resource, distribution of income, levels of prices and employment.

The new theory, called the endogenous growth theory, integrates two fundamental hypotheses, namely that private capital productivity should not be decreasing and the externality concept. In a few years, several seminal models made their way. The first one, Romer (1986), assimilates to capital the stock of knowledge created by a learning-by-doing process, in the spirit of Haavelmo (1956) and Arrow (1962). This article was promoted by the architect of the neoclassical economy, Lucas, in 1988, who proposed his own endogenous growth model with human capital as the engine of perpetual growth.

To resume, Aschauer (1989) considered that productive public spending is a fundamental variable in order to explain economic growth rates heterogeneity among countries. Furthermore, these studies reinforce the importance of the existent contributions and generate an outbreak of empirical papers analyzing the correlation between productive public spending and economic growth. In 1990, Robert Barro published "Government Spending in a Simple Model of Endogenous Growth", article that was to reassess economists' view over the relationship between fiscal policy and economic growth. This model was also based on a consumer-producer representative agent set-up, with production function.

Following the influential work of Barro (1990) a number of researchers for instance, (Barro and

Sala-i-Martin, 1992, and Fisher, 1995) have developed models in which governmental activities. In the form of provision of infrastructural services, affect the long-run growth rate of the economy through the production function, as a factor along with private capital. The main theoretical prediction of this literature is that increases in government spending on infrastructure are associated with higher long-run growth rates; however, this rise in the growth rate is reversed after a point.

In a strictly economic growth vision, the Barro (1990) model allows to obtain long-term growth. Indeed, as compared to the Solow model or its version in optimal growth by Cass-Koopmans-Ramsey, in the Barro (1990) model the per capita production function yields constant returns to scale. Consequently, there exists a positive long-run growth rate that is model-generated or endogenous, whereas in exogenous growth models this rate comes at best from outside the model. Due to the presence of long-run growth, the model implicitly opens the way to the analysis of

government policies impact on long-run economic growth. However, in any model with long-term economic growth (selection of endogenous growth models), one can study the effect of different public policies on economic growth.

Finally, the relationship between public spending and economic growth, for a long period of time, was found to be absent as in the neoclassical models of Solow (1956) and Ramsey (1928).Consequently, most studies focused on the effects of public spending on the steady-state values of different macroeconomic variables, as well as on the transition period from equilibrium to another. Results were however highly disappointing, since all government actions could at best be neutral, if not harmful.

The theoretical model of Romer (1986) seemed to bring some enlightenment, because it emphasized the existence of an endogenous economic growth rate in the long-term. Therefore, numerous contributions tried to outline the effect public policy may have on long-run growth. However, once again results were deceiving, which was even more frustrating as the empirical literature was providing strong evidence on the existence of a positive correlation between public Spending and economic growth, as in Aschauer (1989).

Things radically changed since the Barro (1990) model with productive public spending. In his model, raising public spending is long-run increasing, and it is even optimal to set a strictly positive value for the distortionary (on the revenue) tax rate, in terms of long-run economic growth (and welfare). Based on some examples, we aim to suggest that this set-up allows for a coherent and consistent analysis of some key problems, as for example the long-run growth effects of deficits.

Additionally, Dercon (2005) make two important points. First, some factors cause levels of household consumption to diverge across time or space. For example, exploiting insights from endogenous growth theory, it is possible to allow for growth rates to be increasing functions in some endowments of factors of production, while decreasing in other factors. For example, if infrastructure variables have positive growth effects, this would be a sign of external effects in infrastructure. Second, several critical reviews of this framework, such as those by Temple (1999) and Easterly and Levine (2002), highlight the importance of applying this framework with care in either a macro or micro context, given the theoretical and empirical assumptions implied by this model and a range of potential econometric concerns.

2.4. Review of Empirical Studies

2.4.1. Empirical Studies Done in Other Countries

Numerous empirical studies Nworji, (2012); Wendwesen, (2012); Ibrahim, (2011); Dorosh et al, (2009); Olugbenga and Owoeya, (2007); Teshome, 2006; Canning and Pedroni, (2004); Fan and Rao, (2003); Yousify and Abdullah, (2000); Nketia and Amphosah, (2009), and Kweka and Morrisey,(2000);Aschauer,(1989); Barro,(1990) and Tanzi and Zee,(1997), use different econometric method of analyses and investigated the relationship between different government sectoral spending and economic growth. The empirical literatures on the relationship between government spending and economic growth remained controversial. There is no consistent evidence or a significant relationship that exists between public spending and economic growth, in positive or negative direction. The results and evidence about the effect of government spending on economic growth differ by country, the range of analytical methodologies employed in the types of economic studies, the relative sectoral emphases of different studies and categorization of public expenditures. Thus researches and estimations are difficult to generalize because of the above main reasons. In this regard, this study is tried to look at the relevant empirical literature on the impact of public expenditure in general and road sector spending in particular on economic growth of Ethiopia.

(Loto, 2011) applied co-integration and error correction model and he concluded that in the short run, expenditure on agriculture and educations were negatively related to economic growth. However, expenditure on health, national security, transportation, and communication were positively related to economic growth.

(Amasoma et at, 2011) also investigated the relationship between the components of government expenditure (that is education, agriculture, health and transport and communication) on economic growth in Nigeria for the period spinning 1970 to 2010 using an Error Correction Model. The authors find out that expenditure on agriculture was the most significant component of government expenditure which impacted on economic growth. While the other components education, health, transport and communication was observed to be insignificant in both the short run and long run. Based on the study the author suggested that government educational spending

Has been relatively low which is expected to affect the nation's level of human capital in the long Run.

Abu and Nuredin, (2010) studied the effects of government spending on economic growth by employing a disaggregated analysis. The paper uses the co integration and error correction methods to analyze the relationship. The result was that total government expenditure and expenditure on education have negative effect on economic growth and on the contrary, rising expenditure on transport and communication and health results to an increase III economic growth.

Nketia-Amphosah, (2009) in Ghana showed that aggregated government expenditure retarded economic growth, but expenditures on health and infrastructure promoted economic growth while expenditure on education had no significant impact in the short run. This result obtained because of its return is long term and the analysis is should also require many years data, on other hand, the way it was measured and the level of education as well as the type must have varied results. Thus, it is not easy to conclude the effect of education on economic growth in the short run. (Kweka and Morrissey, 2000) in Tanzania found that increased productive expenditure (physical investment) has a negative impact on growth but consumption expenditure has a positive impact.

Olugbenga and Owoye, (2007) investigated the relationships between government expenditure and economic growth for a group of 30 OECD countries, using annual data during the period 1970-2005. The variables of interest were total government expenditure (TGE) and gross domestic product (GDP) with the use of cointegration and Granger causality tests. The results showed that the existence of a long-run relationship between government expenditure and economic growth.

Fan and Rao, (2003) analyzed the impact of different types of government spending on overall GDP growth across 43 developing countries between 1980 and 1998 using OLS method and found mixed result. In Africa, government spending on agriculture and health was particularly strong on promoting economic growth. Among all types of government expenditures, agriculture, education, and defense contributed positively to economic growth in Asia. In Latin America, health spending had a positive growth-promoting effect. Structural adjustment programs had a positive growth-promoting effect in Asia and Latin America, but not in Africa. In fact, structural adjustment programs hurt economic development in Africa.

(Dorosh et at, 2009) analyzed the importance of road connectivity to agricultural productivity in

Africa. Their findings indicate that lower return from having high density is exhibited to be low for West Africa. Whereas, longer travel time decreases total crop production, and reducing travel time significantly increases adoption of high-input/high-yield technology in East Africa. Their findings showed the importance of increased road connectivity in East Africa.

(Fan and Rao, 2004) estimated the effect of quality of roads on growth and poverty reduction in China by using provincial level data for 1982-1999. Contrary to usual findings, the study finds that the impact of investment in lower quality roads is 4 times higher than of higher quality roads both in rural and urban areas. In terms of poverty reduction the impact from low quality roads is larger than the corresponding impact from high quality roads in both rural and urban areas.

2.4.2. Empirical Studies Done in Ethiopia

In Ethiopia, very few empirical studies were conducted at the country level to examine the relationship between government expenditure and economic. For example, (Wendwesen, 2012) studied the effects of government sectoral spending- human capital and agriculture on economic growth; using annual data set on GDP and government expenditure for the period 1960/61- 20 10/11, employed a co-integration and error correction methods to analyze the relationship. The results indicated that education sector expenditure has both short-run and long-run statistically positive-significant effect on growth while health sector spending has negative insignificant relation. In the case of agriculture, the result shows that the sectoral spending has negative relationship on growth both in the short run and in the long run.

Teshome ,(2006) examined the impact of various components of government spending(investment, consumption and human capital expenditures) on overall GDP growth in Ethiopia for the period 1960/61-2003/04 using Johansson Maximum Likelihood Estimation procedure. His results indicated that only expenditure on human capital positive a significant effect on economic growth in the long-run. Investment (productive) government spending displays insignificant impact on growth of real GDP.

A few empirical studies have attempted to examine to relate government road spending and economic growth in the Ethiopian context. For example, (Ibrahim, 2011) investigate the impact of road network on economic growth in Ethiopia for the period 1971-2009, using augmented Cobb-Douglas production function. His findings revealed that the total road network has significant

economic growth-spurring impact. (Dercon et al, 2008) used the standard Cobb-Douglas type production function to analyze the impact of road and agricultural extension on growth and poverty reduction in a panel data set of selected fifteen Ethiopian villages. Their findings indicated that there is strong link between road development, economic growth, and poverty reduction. (Lofgren et al, 2005) use dynamic computable general equilibrium (CGE) model found that focus on human development (sufficiently to achieve human development MDGs) puts the economy on a slower growth track that does not permit the economy to reach MDG 1 (poverty reduction) by 2015 while focus on infrastructure puts the economy on a faster growth that raises household consumption sufficiently to reach poverty reduction, and achieve the other MDGs within a few years after 2015.

Agénor &Aynaoui, (2004) conducted an experiment on the effect of change in the composition of public expenditure on selected sectors of Ethiopia. The experiment is intended to illustrate the outcome of public expenditure strategy that promotes the expansion of public infrastructure considering its role as engine of growth and its effect on the productivity of public and private sectors. The experiment involved a 7 percent reduction in public spending of certain sectors and reallocation of the reduced expenditure on infrastructure, health and education. In the experiment, the reallocation to infrastructure is twice higher than that of education and health expenditures.

The results of the experiment reveal that, increased health and education expenditures improve the level of public capital in health and the stock of skilled labor creating effective quantity of labor in the country. The increase in the level of effective labor quantity directly affects supply side hence it will affect economic growth of the country. According to the paper, public expenditure on infrastructure also affects the supply side and therefore affects economic growth. The study also found that all the three sectors, infrastructure, education and health affect production but in different ways. Increased expenditure on health and education result in an increase in the stock of effective labor whereas expenditure in public infrastructure enhance the marginal productivity of all inputs used in both public and private production process. However, the effect of the expenditure directed towards these sectors on economic growth depends on the performance of the sectors. According to Agenor et al., among other things, the nature of the production process, the quality of education and the efficiency of the health system determine the performance of the three sectors.

Tsadiku (2012) also examined the relationship between expenditure and GDP in Ethiopia using time serious data for the period 1960 to 2011. The main objective of the paper was measuring the impact of sectoral public spending focusing on human capital and agriculture, on economic growth. In doing so the study employed co-integration and error correction models in order to be able to examine the short and long run relationships between GDP and sectoral public spending on human capital and agriculture. From the two sectors that enhance the development of human capital, that study found public spending on education sector has both short-run and long-run statistically significant effect on economic growth, Whereas health sector spending have negative effect on economic growth, though it is insignificant. The econometric analysis of the study found that in the short run, for a 1% increase in public expenditure on education and road construction, elasticity of GDP increases by 43% and 3% respectively. However, a percentage increase in health expenditure in short run will affect short run economic growth by 22%.

Regarding agricultural spending, the study found the existence of negative relationship both in short-run and long-run. Statistically, in short -run for one percent increase on agricultural spending by the government, GDP will deteriorate by 8%. Generally the study found that government sectoral spending on human capital and road construction has positive effect on economic growth both in short-run and long run whereas agricultural sector spending has an opposite effect on growth.

Ketema (2006) also analyzed the impact of public expenditure on economic growth for the period 1960/61-2003/04. The study applied both descriptive and econometric methods to investigate the relationship between public expenditure and real GDP on the three regimes (Imperial, the Derg and EPRDF). The descriptive analysis shows that there is public expenditure discrepancy on the three regimes that limited the impact of public expenditure in stimulating economic growth. The reasons for the inconsistence of public spending mentioned in the study are the existence of limited revenue buoyancy, unreliable source of finance, unwise fiscal policy especially in the Derg regime and capacity deficiency. The econometric analysis applied Johansson Maximum Likelihood Estimation procedure to examine the relationship between sectoral public expenditures and real GDP. The econometric analysis found that investment on human capital has significant positive effect on real GDP in the long-run. On the other hand, government spending on investment (productive) has negative but insignificant effect on growth of real GDP. According to the study

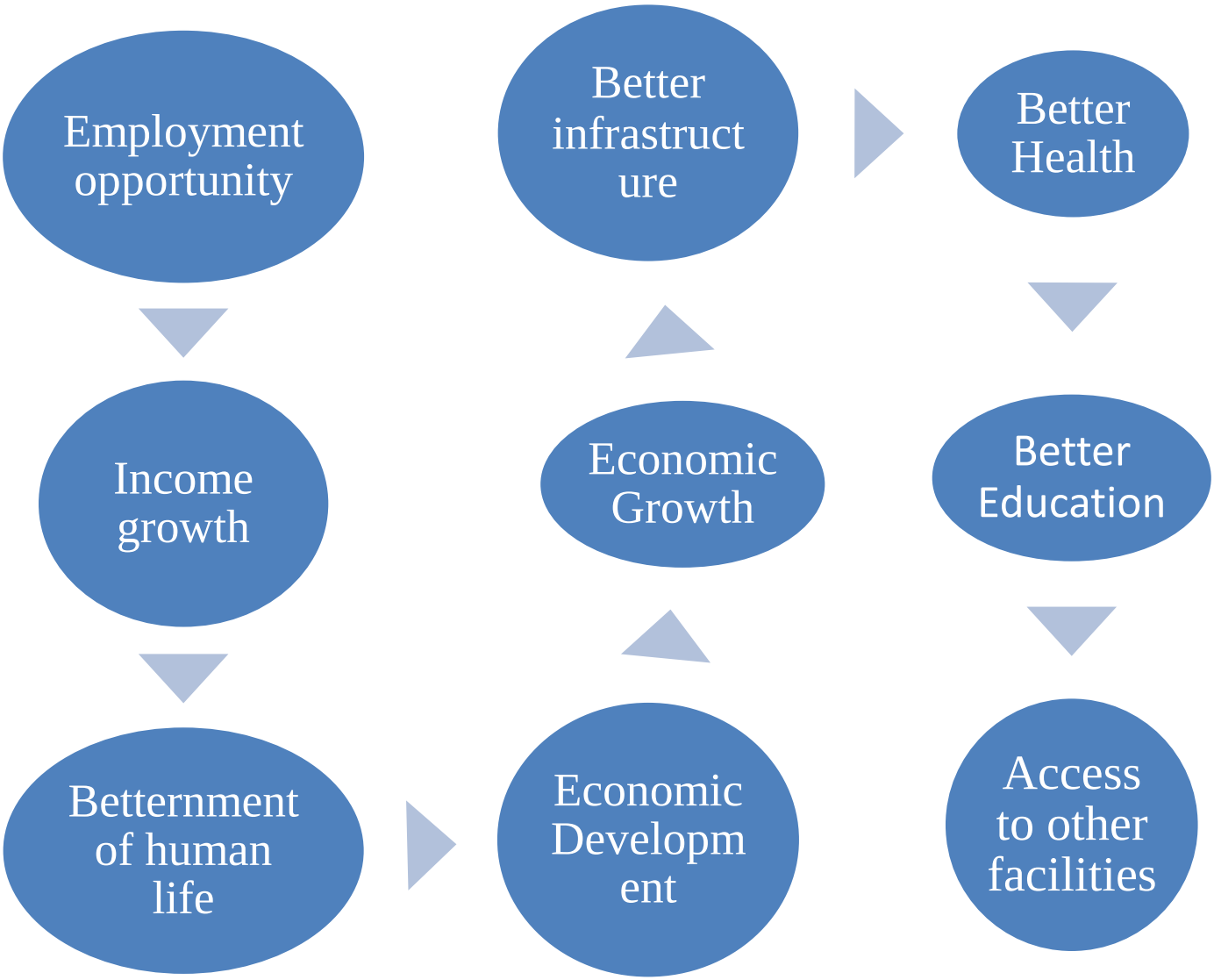
this revealed the existence of inefficiency in public investment. Also, the paper found that all components of government expenditure have insignificant effect on economic growth.

Other researchers, Geda and Birhanu (2011) studied the reason behind the low performance of agricultural sector in Ethiopia despite the high level of public spending compared with sub Saharan countries towards the sector as evidenced by prior studies of WB and IFPRI. Focus was given on the existing budgetary and planning system of Ethiopia at macro level by the researchers. The study revealed the fact that the planning and budgeting system in Ethiopia is at infant stage and needs to be reformed in order to maximize the effect of public spending and establish sustained economic growth. Based on their finding, Geda and Birhanu suggested appropriate planning and design that clearly defines objectives, outputs, outcomes and impacts is essential on public programs and projects so as to be able to achieve efficient resource allocation across public sectors.

In general, both theoretical and empirical literatures indicate that public spending has both significant positive and significant negative effect on growth. Some of the empirical studies give mixed results. In sum, the expected effect of public spending on growth differs in the context of countries, methodology used and it is also considered different types of expenditures have divergent effects.

This study is an improvement on other studies on economic growth and government expenditure relationship in Ethiopia for two reasons. Firstly, it considers government expenditure on road as an important variable that affects economic growth. Recent most studies like (Ibrahim, 2011), (Dercon et al, 2008) did not include the variable (expenditure on road) in the growth model. Secondly, as departure from previous studies, this paper extends the study period to 2018.

2.5. Conceptual Framework of the Study



CHAPTER THREE: RESEARCH METHODOLOGY

This chapter highlights the research methodology to be employed for the study .The methodology of the study contains research design, data type, source, methods of collection, methods of data analysis and the models to be used. Since the study is about the impact of government road sector spending on economic growth in Ethiopia time series data is employed. It is followed by an explanation of variables used the diagnostic tests employed in the study.

3.1. Research Design

The research design employed in this study is longitudinal research design due to its convenience for secondary data using time series quantitative data are used to examine the relationship between variables through applying appropriate statistical and econometrics analysis techniques.

3.2. Data type, sources and Methods of Collection

This Study uses secondary quantitative data. Data were collected from annual reports and publication. Specifically, the sources are obtained from MoFED, EEA, ERA, and NBE. The data regarding Real GDP growth rate and the overall sectoral spending in the country is collected from national bank of Ethiopia (NBE) and Ministry of finance and economic development (MOFED). The data for Road as a share of GDP is obtained from Ethiopian Road Authority (ERA), while data for Investment expenditure as a share of GDP is obtained from Ethiopian Investment commission (EIC).Other relevant variables are also collected from IMF, WB and African Development Indicators CD-ROMs. All the variables that used in the study are aggregated to national level datasets and summaries.

3.3.1. Methods of Data Analysis

Descriptive as well as econometric methods are employed to discuss and analyze different issues in this study. In the descriptive technique, is used to analyze the trending of government road expenditure and the performance of the road infrastructure development in Ethiopia. In the Econometric method part, emphasis is placed on investigating the impact of government road

spending on economic growth and the relationship between government spending on road infrastructure and economic growth both in the short-run and in the long-run. The data are analyzed using STATA14.0 versions' are used as statistical software package for the entire analysis of the study. The nature of the model is given in logarithmic form to make the analysis and interpretation of the explanatory variables easier in terms of percentage and growth rate.

The data will be collected and checked, edited and organized so that it will be ready for second stage of pre analysis, the variables to use in the analysis are, Real GDP, Health, Education, gross capital formation, Road and Agriculture. Dickey-Fuller stationerity test, Durbin-Watson and Breush-Godfrey are used to test for serial correlation. And the presence of long run relationship will be tested using two steps Engle –granger causality approach, Johansson for co-integration and Error Correction Model used to determine both the short run and long run dynamics.

3.3.2. Econometric Analysis

There are no merely generally accepted models of the growth process and no standard analytical frameworks that are appropriate for such studies. Many studies adopted augmented Solow growth model and augmented endogenous model so as to analyze the economic impact of road Sector spending on the economic growth of a country.

Studies, for instance, Canning and Bennathan ,(2000); Canning and Pedroni ,(2004) used the standard Cobb-Douglas type production function to analyze the effect of infrastructure on the overall GDP growth, which per sector is assumed to be a measure of overall economic growth. (Ibrahim, 2011) used the augmented Cobb-Douglas production function to investigate the effect of roads spending on economic growth. (Dercon et al, 2008) also used a similar type of specification to see the impact of road and agricultural extension on growth and poverty reduction in a panel data set of selected fifteen Ethiopian villages.

The study also considered the effect of road network on sectorial GDP. For instance, (Dorosh el at, 2009) analyzed the importance of road connectivity to agricultural productivity in Africa. The findings indicate that lower return from having high density is exhibited to be low for West Africa. Whereas, longer travel time decreases total crop production, and reducing travel time significantly

increases adoption of high-input/high-yield technology in East Africa. The findings showed the importance of increased road connectivity in East Africa.

Following the aforementioned studies, this current study utilizes similar specifications of (Ibrahim, 2011); Zelalem (2013); Canning and Bennathan, (2000); Canning and Pedroni, (2004); (Dercon *et at, 2008*) to investigate the impact of government road spending on economic growth in Ethiopia. The general specification of the model is based on the augmented Solow growth model and augmented endogenous growth model in which the model are basically derived from a log transformation of the Cobb-Douglas production function. The logarithmic form of this production function allows incorporating physical capital (road) and other relevant variables which affects the growth of GDP.

Existing empirical studies on the impact of public road investment on economic growth are essentially based on the production function framework. Assuming a generalized Cobb-Douglas production and extending the augmented Solow growth model to include physical capital (road infrastructure) as additional input to enter the production function. According to Solow's formulation, economic growth is a function of capital accumulation, an expansion of labor force and exogenous factor, technological progress which makes physical capital and labor more productive, the production function is written as follows.

$$\mathbf{Y_t = (K_t, L_t, A_t,)} \text{ ---------- (1)}$$

Where Y_t= real GDP

K_t = capital stock

L_t=labor

A_t = Technological progress

t = time dimension

The above general Cobb-Douglas type functional specification is augmented with road infrastructures so as to identify its effect on economic growth. Accordingly, the above functional specification is reformulated as:

$$\mathbf{Y_t = f (K_t, L_t, R_t, A_t,)} \text{ ---------- (2)}$$

Where, **R** is road

This generalized form of equation (2) is open to the possibility of constant return to scale as suggested by Solow type model (Solow, 1956). On the other hand, the model also admits the possibility of increasing returns of physical capital suggested by endogenous growth theories (Romer, 1990).

According to Endogenous growth theory argues that the growth model should be include all variables, which are crucial for growth of GDP, in particular saving, investment, and technical knowledge are the outcome of rational decision.

In this context, Investment is an important determinant in the endogenous growth theory model, allowing improvement in productive capacity, and increasing profits that lead to growth. As noted, neoclassical growth theory assumes that, following the law of diminishing returns, Investment has a limited role in promoting economic growth and a continuous increase in the factors of production (investment) is unlikely to yield growth.

Under endogenous growth theory and despite the law of diminishing returns, marginal factor productivity can be increased. For example, technical progress that is funded by capital investment increases productivity. Hence, investment is crucial to economic development and growth. Further, endogenous growth theory states that the improved technology accessed by investment drives growth; thus, investment may contribute to a long-run rate of economic growth.

This growth model simply extends the basic production function framework to allow an additional input to enter the production function; i.e. physical capital (road infrastructure). The endogenous growth model or approach argues that there should be an additional effect of physical capital (road) on the level of output (GDP). This indicates that the endogenous models explain growth promote with road infrastructure investment, which is the growth rate also depends on the rate of return to physical capital. Road infrastructure influences economic growth and hence the model can be modified by including physical capital (road) in one aggregate function.

Accordingly, the aggregate Cobb-Douglas production function along with the road component as (physical capital), which could be estimable, can be reached through the following procedure.

$$\mathbf{Y=K_t^{\alpha}\, HK_t^{\beta}\, (A_t\, L_t)^{1-\alpha-\beta}} \quad \textbf{(3)}$$

Where **Y** represents output, A is the level of technology progress that is exogenously determined the level of aggregate productivity. K, **H**and **L** is physical capital, human capital and labor respectively.

The model is then transformed to the logarithmic form whereby the resulting equation is set as Follows,

$$Log\ Y_t = \beta 0 + \beta 1 log\ K_t + \beta 2 logL_t + \beta 3 logHK_t + \varepsilon_t \text{ ---------- (4)}$$

Where Log Y_t = log of real output peroxided as log of real GDP

Log K_t= log of physical capital at time t (as government road spending)

Log HK_t= log of Human capital at time t

Log L_t= log of labor force at time t

Based on the above formulations, the road sector is entered in the functional specification on the aggregate production function. Thus, the specification will be stated as follows:

GDP = f (L, K, HK, R)

The model then transformed to the logarithmic form as follows,

$$LogGDP_t = \beta 0 + \beta 1 logK_t + \beta 2 logL_t + \beta 3 logHK_t + \beta 4 logR_t + \varepsilon_t \text{ ---------- (5)}$$

The prior economic expectations are: **β0, β1, β2, β3 and β4 >O.**

The framework for the study has its basis on the Keynesian and endogenous growth models. The Keynesian model argues that expansion of government expenditure accelerates economic growth. The endogenous growth model supports the role of government in the growth process, however, Barro (1990) emphasized the importance of government policy in economic growth and that we have some expenditure that are productive (in principle including State-owned production) should contribute positively to growth, whereas others that are not productive (government consumption spending) is anticipated to be growth retarding (Barro & Sala-i-Matin, 1992).Others argue that composition of government expenditure might exert more influence compared to the level of government expenditure on economic growth. This discussion suggests that the level of government expenditure and composition of government expenditure are important determinants of economic growth.

The growth model is thus a function of public expenditure, but the main objective of the study is empirically investigated the effect of Public road Spending on economic growth. The study is considered public expenditure on road. Thus, in order to estimate the impact of road infrastructure on growth, the study is taking into account other relevant sectors expenditure to capable of

detaching light to link between government road expenditure and economic growth, the model in this study is built upon the following augmented function:

$$\mathbf{Y_t = f\ (R_{OAD}, H_E, E_{DU}, A_{GRI}, G_{CF})} \text{ ---------- (6)}$$

Where $\mathbf{Y_t}$ is real GDP, **ROAD** is real public spending on road; **HE** is real public spending on health sector, **Edu** is real public spending on Education sector, **AGRI** is real public spending on agriculture and $\mathbf{I_N}$ is real public total money invested in birr in the territory with resident companies.

Based on the above formulations, the public expenditure is entered in the functional specification on the aggregate production function. Thus, taking into account for the analysis purpose equation (6) The model can be represented as the following natural logarithmic reduced form equation;

$$\mathbf{InRGDPt = \beta 0 + \beta 1 InRROAD_t + \beta 2 InRHE_t + \beta 3 InREDU_t + \beta 4 InRAGRI_t + \beta 5 InRGCF_t + \varepsilon_t} \text{ ---------- (7)}$$

Where $\mathbf{InRGDP_t}$= the natural logarithm of real GDP peroxide as Economic growth at time t

$\mathbf{InRROAD_t}$= the natural logarithm of real road sector spending at time t

$\mathbf{InRHE_t}$= the natural logarithm of real health sector spending at time t

$\mathbf{InREdU_t}$= the natural logarithm of real Education sector spending at time t

$\mathbf{InRAGRI_t}$= the natural logarithm of real Agriculture sector spending at time t

$\mathbf{InRGCF_t}$= the natural logarithm of real Investment spending at time t

$\mathbf{£_t}$= the error term that is white noise.

The variables are measured as follows; Economic growth refers to the growth rate in real GDP, Real GDP in turn is obtained by dividing GDP at current market price by the GDP deflator (1999/2000 base year). RRD is measured as total Road expenditure divided by the GDP deflator.

RHE is captured by the total Health expenditure divided by the GDP deflator. REdU is measured as total government expenditure on Education divided by GDP deflator. RAGRI is captured by government expenditure on agriculture divided by GDP deflator. RGCF is measured as government expenditure on Investment divided by GDP deflator. E- Refers to the error term. The various expenditure items used are defined as payments for transactions within one year. Thus, we assumed the expenditure items to be actual expenditures.

Based on the Model, Real GDP in log form (RGDP) is used as dependent variable in the regression model and real expenditure in log form of road sector is incorporated as explanatory variables.

Besides, other relevant conditioning variables like others pro-poor sectors spending on agriculture, health, and Education, and expenditure on non-poverty such as (general service sectors, defense, industry, tourism, hotels, transport and communication and mining and energy Etc) are also included as control variables which are designed to capture the influences of the size of the components of government spending on economic growth. This study uses cointegration and error correction methods to analyze the relationship between government road Sector expenditure and economic growth.

Where β0= Intercept of the regression line. It represents any level of economic growth that at zero government expenditure level. βi (i = 1, 2...5) are coefficients of the components of government expenditure. It is a measure of the effects of the respective components of government expenditure on economic growth. £ is stochastic variable to hold the influence of other determinants of economic growth not included in the model. On estimation, the intercept *(*β0*)* and slope coefficients (βis) are expected, *a* priority have positive sign, βi (i = 1, 2, ---, 5) >0, implying that each component expenditure of the government will be expected to correlate positively with economic growth.

The main propose of the study is to investigate the impact of government road spending on economic growth in Ethiopia; it has also examines the long run and short run relationship between government road expenditure and economic growth. To achieve the above objectives, this study has employed co-integration and error correction modeling. In order to estimate the short run relationship among the variables, the corresponding Vector Autoregressive (VAR) error correction model for ▲InRGDPt is estimated as;

$\blacktriangle InRGDP_t = \beta 0 + \beta 1 \blacktriangle InRRD_t + \beta 2 \blacktriangle InRHE_t + \beta 3 \blacktriangle InREDU_t + \beta 4 \blacktriangle InRAGRI_t + \beta 5 \blacktriangle InRGCF_t + \beta 6 \varepsilon_t\text{-}1$ ---------- (8)

Where ▲ stands for the first difference operator &ε-1is the error correction term and the coefficient of (β4) measures the speed of adjustment towards the long run equilibrium and the ECM test is essential to see whether an economy is converging towards equilibrium in the long run or not; and also shows short run deviations.

3.3.3. Techniques of Estimation and Econometric Tests

This section tried to examine the techniques of estimation that are commonly used in growth regressions and come up with a preferred technique. Over all stationerity tests of time series variables and Johansson's Approaches of Testing Co- integration are incorporated

3.2.1. Test for Unit Roots

Empirical work based on time series data assumes that the underlying time series is stationary; this 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. A time series is strictly stationary if all 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 (Gujarati, 2003).

However, in practice most econometric time series are non-stationary in the sense that the mean and variance depend on time and thus there are no tendencies for them to hold back to a given value. Non-stationerity is a very series matter in that regression of one non-stationary variable on another is very likely to yield impressive-seeming regression results which are wholly spurious.

In a spurious regression, the results suggest that there are statistically significant long-run relationships between the variables in the regression model (very high R^2 value and significant ratios).

The first task in analyzing econometric time series data should be testing for the presence of unit roots. In this case, it is important to test the order of integration of each variable to know how many times the variable needs to be differenced to result in a stationary series. The absence of co-integration leads back to the problem of spurious regression. Hence, the concept of integration mimics the existence of a long-run equilibrium to which an economic system converges over time.

There are different ways of testing stationerity. In this study, the most widely applicable test of unit root, namely Augmented Dickey -Fuller (ADF) are used. It is a modification of the DF test and involves augmenting the Dickey-Fuller equation by lagged values of the dependent variable.

This is done to ensure that the error process in the estimating equation is residually uncorrelated but also captures the possibility that Y_t is characterized by a higher order autoregressive process.

A failure to introduce variables designed to capture omitted dynamics leads to a biased standard errors, hence the importance of introducing the lagged terms. The ADF test solves this problem by considering a higher order and augmenting the random walk equation with some more lags. It's suggested allowing both an intercept and timing trend in the regression model used to test the presence of unit root. In both tests the null hypothesis is that the variable is non-stationary against the alternative stationary. The null hypothesis is rejected only when there is strong evidence against it at the conventional levels of significant. The following specifies the type of equation used to compute an ADF.

$\blacktriangle Yt = \mu + \gamma Yt\text{-}l + \gamma^{t} + \sum_{j=1}^{k} \delta j \blacktriangle Yt\text{-}j + et$

Taking the variables in first difference form presents only the dynamic interaction among the variables with no information about the long run relationship. However, if the variables that are non-stationary separately have the same stochastic trend then it points that the variables have a stationary linear combination. This in turn implies that the variables are co-integrated; therefore, there exists long run equilibrium among the variables (Endrias, (1996).

3.2.2. Cointegration and Testing for Cointegration

Cointegration among the variables reflects the presence of long run relationship in the system. We need to test for cointegration because differencing the variables to attain stationerity generates a model that does not show the long run behavior of the variables. Hence, testing for cointegration is the same as testing for long-run relationship. In general, if variables that are integrated of order 'd' produce a linear combination which is integrated of order less than 'd'(say 'b') then the variables are co-integrated and hence have long run relationship (Gujarati, 1995).The two widely employed approaches for testing cointegration relationships are the Engle- Granger (1987) two-step procedure and Johansen (1988) maximum likelihood approach.

In the Engle-Granger approach the first step is to estimate the co-integrating regressions and then to test whether the residual obtained from the co-integrating regressions is stationary or not; if the residual is stationary, then the independent and dependent variables have long run relationships (Rao, 1994). The drawback of this procedure is that it is difficult to determine the number of equilibrium relationships if the variables are more than two. In addition to this, it needs priori information that the dependent variables are endogenous and the independent variables are weakly exogenous. In cointegration relationship estimating a single equation is potentially inefficient since

information is lost unless each endogenous and weakly exogenous variable is clearly identified (Harris, 1995). In this paper, the Johansen Maximum likelihood procedure is used in testing for cointegration since it offers solutions for the above problems.

The Johansen (1988) procedure allows testing the presence of more than one cointegration vector. Moreover, it permits to estimate the model without priory restricting the variables as endogenous and exogenous. The starting point in this procedure is formulation of VAR model in the following form. Considering K-Iags of Zt,

$$Zt = A1, Zt\text{-}l + AK\ Zt\text{-}k + \mu$$

Where Z, is a (n x 1) vector of stochastic I (1) variables, Ai (i= l. ..... k) is nxn matrix of parameters,

μ is a vector of deterministic component (i.e., a constant and trend), and t=1….T (T is the number of observation).

The long run relationship among the variables is captured by the term Zt-k. In the Johansen (1988) procedure, determining the rank of π (i.e., the maximum number of linearly independent stationery columns in π) provides the number of co integrating vector between the elements in z.

In this connection, there are three cases worth mentioning. (i) If the rank of $\pi$is zero it points that the matrix is null which means that the variables are not co-integrated. In such case the above model is used in first difference, void of long run information. ii) If the rank of πequals the number of variables in the system (say n) then π has full rank which implies that the vector process is stationary. Therefore, the VAR can be tested in levels. (iii) If πhas a reduced rank [i.e.1<r (π) < n] it suggests that there exists < (n-l) co-integrating vector where r is the number of cointegration in the system. Therefore, the matrix π equals to -aβ' where a and β are n x r matrices, β represents the cointegration parameters with a showing their corresponding feedback or adjustment mechanism to equilibrium (i.e., it shows the speed with which disequilibrium from the long run path is adjusted).

In identifying the number of co-integrating vectors, the Johansen procedure provides n eigenvalues denoted by λ (also called characteristics roots) whose magnitude measures the extent of correlation of the cointegration relations with the stationery elements in the model.

In general, to identify the number of co-integrating vectors in the system, the Lambda max (λ Max) and Lambda trace (λ trace) statistics are used. They are obtained from the following formulas.

$$\Lambda \max = -T\text{Log}\,(1-\lambda r+1), \quad r= 0, 1, 2\ldots n-1$$

Λ trace = -T $\sum_{i=r+1}^{n}$ log $(1-\lambda i)$, r = 0, 1, 2… n-1

Amax statistic tests the null hypothesis that there are 'r' co-integrating vectors against the alternative of 'r+ 1. The trace statistics, on the other hand, tests the hypothesis of less than or equal to 'r' co integrating vectors against the alternative of 'r+ 1. The distribution of both test statistics follows Chi-square distributions (Enders, 1995). Reimers (1992) points out that the Johansen approach tends to over reject the null hypothesis when the sample size is small. While testing for cointegration, therefore, he suggests adjustment to be made for the degrees of freedom. This is done by substituting 'T-nk' in place of T, where n is the number of variables and K is the lag length set in the test for cointegration.

The other important thing in the cointegration analysis is the issue of identifying endogenous and exogenous variables in the system. This is required because the Johansen procedure do not restrict the variables behavior a priori. If a variable is weakly exogenous, it implies that its error correction term (i.e., the corresponding a coefficient) does not enter in the error correction model. This implies that the dynamic equation for that variable contains no information concerning the long run relationship in the system. Hence, variables that are weekly exogenous should appear in the right hand side of the VECM. This restricts the exogenous variables to be contemporaneous with the dependent variable (Harris, 1995). The first step in the test is formulation of the null hypothesis which states that the variable is weakly exogenous against the general alternate. That is:

Ho= aij = 0for j = 1… r (r being the number of co-integrating vectors)

H1 =αij≠0

The test (for weak exogeneity) IS conducted using the following formula.

$$-2LOG(Q) = \mathrm{T}\sum_{i=1}^{r} log\left(.\frac{1-}{1-}.\frac{\lambda *}{\lambda i}\right)$$

Where Q = (restricted maximized likelihood)

(Unrestricted maximized likelihood

T = the number of observations, r = the number of rank, and λi and λ* represents Eigen values for unrestricted and restricted models respectively. If the result obtained from the above formula is

less than the Chi-squared distribution, then we cannot reject the null hypothesis. This implies that the variable is weakly exogenous.

3.2.3. Vector Error Correction Model (VECM)

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. It means the presence of error correcting representation. That is, any deviation from the equilibrium point will 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) defined ECM as "a particular representation of a vector auto regression appropriate for co-integrated results." This means it exist a long run relationship (i.e. Cointegration among the variables) we can rewrite equation with the following VECM specification.

$$\Delta Zt = \sum_{t=1}^{k-1} rt\Delta zt - 1 + \alpha(\text{B-t`}_{1zt-1+\beta}{}^{`t`}{}_{2zt-1} + \beta\hat{}^{t}{}_{zt-1}) + \mu + \varphi D_{+\varepsilon t}$$

The figure in the parenthesis represents the error correcting terms (ECT). If there is only one-integrating vector and if the endogenous and exogenous variables are identified in the long run analysis, we can develop the VECM by conditioning on the exogenous variables. In this case, only the error correcting terms of the endogenous variables appear in the error correction model.

Thus, assuming that YI is endogenously determined in the model and Xj represents weakly exogenous variables, we can model for YI. This is performed using the lagged first difference of Yt, the current and lagged first differences of the explanatory variables as well as the error correcting term (designed to capture adjustment speed to the long run equilibrium). That is:-

$$\Delta yt = \alpha + \sum_{i=1}^{k} (\beta t\Delta yt) = 1 + \sum_{i=0}^{k} \theta\Delta xjt - i + \gamma ECT$$

Where ΔXjt-i is a vector of the first differences of the explanatory variables, ECT represents the error correcting term lagged on period. It is derived from the lagged residuals E t of the levels in the regression in levels using the Johansson method.

The Error correction representation shows the short run and long run dynamics. The long run dynamic is contained in the error correction term. The coefficient of the error correction term is a priori expected to be negative. And the magnitude of this coefficient shows the speed of adjustment towards the long run equilibrium. The estimation is performed using Stata software.

3.6. Variable Description

Real Gross Domestic Product growth rate (RGDP): RGDP is the market value of goods and service which are produced in the country's boundary on a given timeframe. As many economists conventionally agreed, economic growth can be measured by the growth in real GDP. Since economic growth is the variable of interest in this study it is treated as the dependent variable.

Gross fixed Capital formation as a share of GDP (K): is defined as Gross capital formation (formerly gross investment) in a country. However, getting such a ready-made time series data in Ethiopia is difficult. Therefore in this study, gross investment was used as proxy of this variable and have been expected a positive impact on economic growth. This represents the total money invested in birr in the territory with resident companies.

Road spending as a share of GDP (RD) is defined as the total amount of money spent by the government to expand the road network and increase the accessibility of road in the country. Meaning it represents the real public spending on road sector.

Education sector spending as a share of GDP (EDU)is defined as the total amount of money spent by the government to increase school accessibility overall the country in all enrollment. Meaning it represents the real public spending on education sector.

Health sector spending as a share of GDP (HE) is defined as the total amount of money goes to the health sector to prevent the people from diseases and to increase the primary health accessibility for all. Meaning it represents real public spending on health sector.

Agriculture sector spending as a share of GDP (AGRI) is defined as the total amount of money budgeted by the government to develop or modernize the sector and prevent the people from food insecurity. It represents real public spending on agriculture sector.

CHAPTER FOUR: RESULT AND DISCUSSIONS

This chapter contains both the descriptive and econometrics analysis. Under the descriptive statistics the trend and overall performances of the variables are presented. The statistical tools such as tables and graphs are used to describe the variables used in the model. The econometric analysis begins by testing the necessary tests such as stationerity test, co-integration, causality and the diagnostic test for serial correlation and normality test. After passed the necessary tests both the long run and short run models are estimated using VAR and Error correction model (ECM) respectively.

4.1. Descriptive Data Analysis Result

4.1.1. Trends in Total Government Spending and RGDP

During the last three decades, the trends of total government spending and real GDP, there is considerably rising in public expenditures proportional to the growth rate of real GDP, Government spending growth relates with rising public sector share. In this case, the path of overall government expenditure is demonstrated by considering the ratio of total government expenditure to GDP, which measures the amount of government spending relative to the size of its economy (GDP).

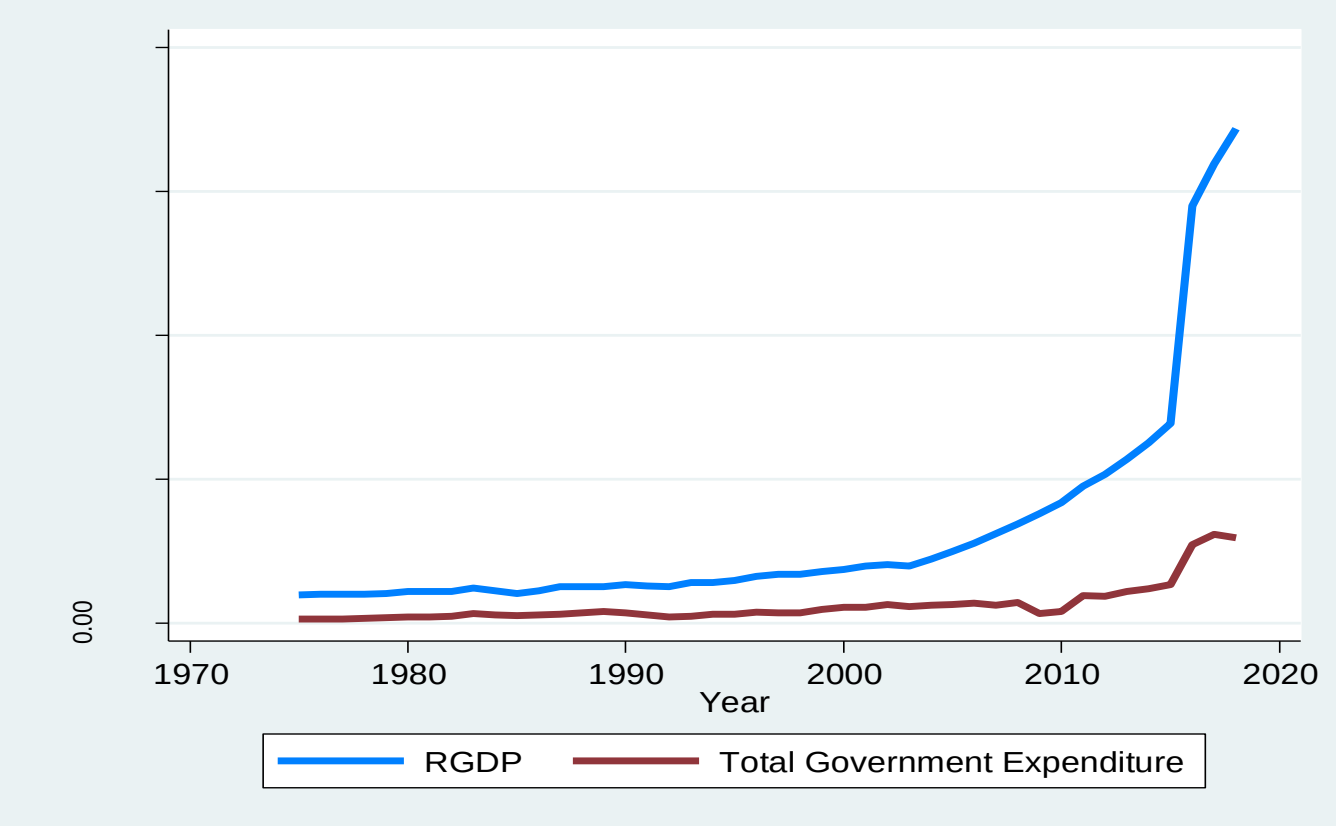


Figure 1**:** Trends in Real GDP and Total Government Spending

Source NBE (2019) Data and own computation

As shown in figure 1, the ratio of government expenditure to GDP rose from average of 13.58 in years 1975 to 31.14% of GDP in 1989 during the Derg era. The fact that the Derg regime had adopted socialism ideology which was high state involvement in the economy attributed to high Share of government expenditure has shown overpowering expansion and reached the maximum in the economy. Government's commitments to provide every infrastructural facilities and social services to the 'mass' while at the same time engaging in the production and distribution of basic goods led to the establishment of many new ministries, institutes, corporations and departments which in turn led to phenomenal expansion of the public sector in the economy (Teshome, 1993). After the fall down of the Derg regime, the EPRDF has taken the power to implement policy measures on the expenditure side which mainly focuses on controlling the growth and rationalizing its use. In controlling the growth of expenditure, the government takes measure to leave from direct involvement in production and service delivery while opening the gate for private sector

participation. Because of this, there was a sharp decline in the relative size of government spending during the early post-1991 periods. Up to 1998/99, the share of government expenditure in economy (as measured by % of GDP) was generally found to be lesser compared to last decade of the Derg regime. However, since 1998, the share has been rising steadily in which 31.8% was registered in 2002. On the other hand, in rationalizing expenditure, the government needs to reorient its capital and recurrent expenditure (reduce recurrent expenditure) in order to reallocate resources to basic social services (education and health) and economic infrastructure (Agriculture, Road) at the larger scale.

Real GDP grew on average by 4.28 percent from 1992 to 2002 while population growth was about 2.7 percent over the same period. The Ethiopian-Eritrean Border conflict and the Ethiopian election affected GDP growth rates in 1998-2000 and in 2010 respectively. The economy faced a sharp decline and a negative growth rate as a result of the drought in 2002/03 fiscal year.

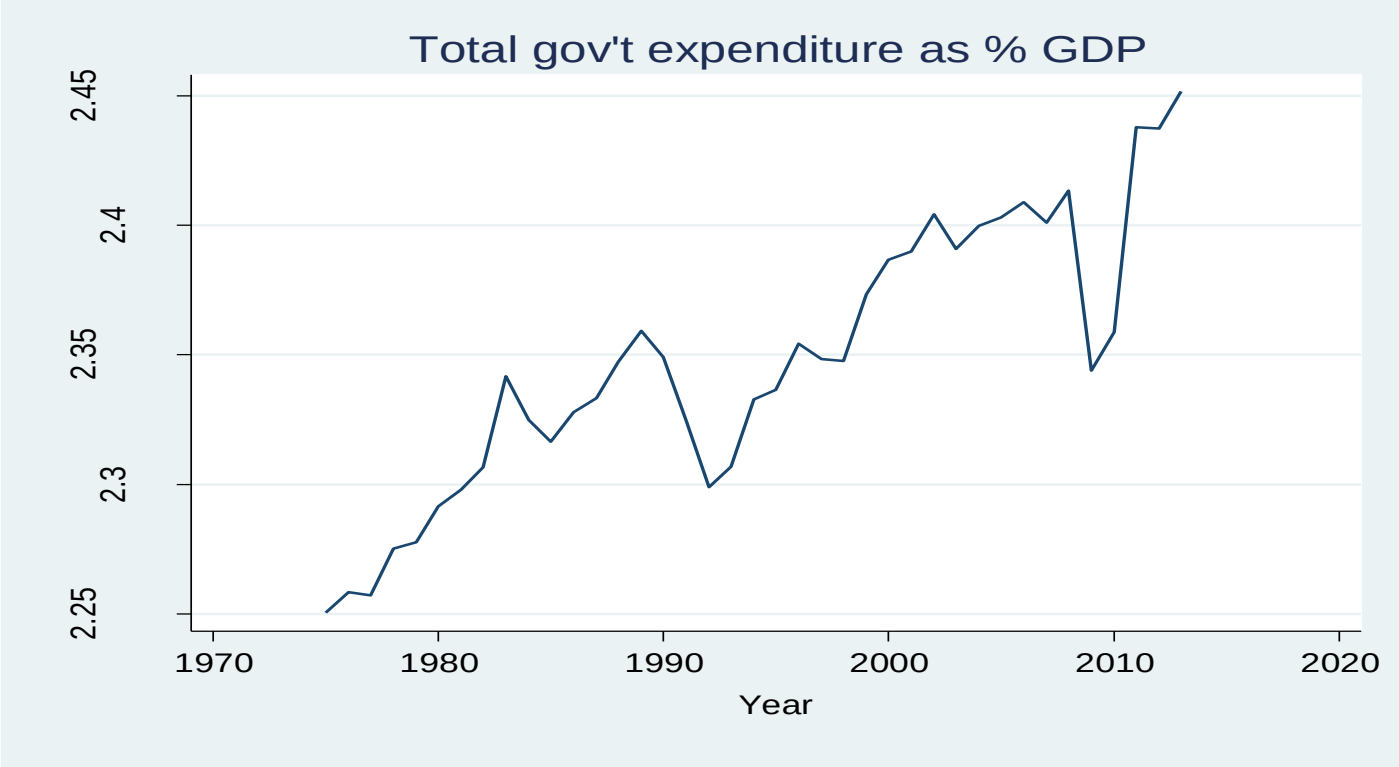


Figure 2: Trends in Total Government spending as the share of GDP

Source: MOFED (2010) Data and own computation

Total government expenditure as a percentage of GDP measures the amount a country spends relative to the size of its economy. In the Derg regime government spending show a tremendous fluctuation ranging from a high of 29.31% in 1989 and a low of 14.32% of GDP in 1975. On average, government spending was 22.76% of GDP over the seventeen years of the regime. The share of government spending on average reached 26.45% of GDP between the year 2000-2004 and the share decreased by about 13.77% for the last fourteen years average (12.68%).

Regarding trends in the real GDP generally it has upward but fluctuation trend as shown in figure 3. The annual average growth rate of Real GDP for the whole period under consideration (1975-2004) is 3.31%. During the Derg era, the economy experienced tremendous growth fluctuations. Agricultural sector is the predominant sector in the economy and hence its performance significantly affects the growth in GDP. The performance of agricultural sector in turn is highly dependent up on the weather condition (rain fall). Thus, GDP registers the highest figure when there is timely and sufficient rainfall as well as during recovery from a very low base and the lowest when this is not the case. That is why we see erratic nature of growth. There was a mere 1.65 percent annual average growth in real GDP for the entire Derg period. Under the current regime (1992 –2017/18*)*, on the average the economy has been growing at about 7.93 percent per annum in real terms.

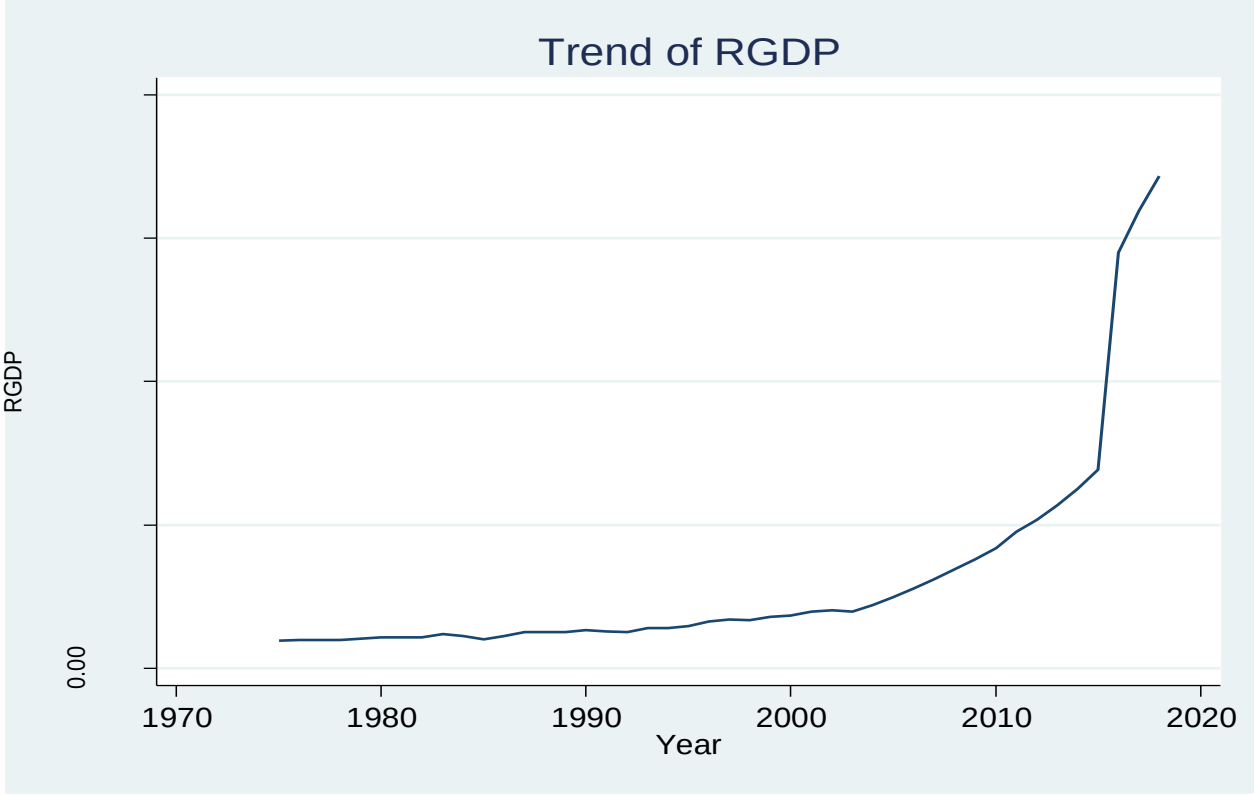


Figure 3: Trends in Real GDP

Source: NBE (2019) Data and own computation

The Ethiopian economic growth has shown various changes in different political regimes. The changes in government structure created a problem of inconsistency in implementing the policies by the previous regimes including external and internal wars as well as natural disaster like famine and drought had a depressing effect on the history of economic growth of the country (Tewodros, 2015).

4.1.2. Composition of Government Expenditure

Public expenditure is categorized into two broad areas. These are capital and recurrent expenditure. Recurrent expenditure refers to expenditure outlays necessary for the day-to-day running of government business. Wage, subsidies, operation and maintenance, pension and debt servicing are among the major components of recurrent expenditure. It is regarded as final government consumption expenditure. Capital expenditure of government implies investment outlays that

increase the capital stock of the nation, such outlays includes spending on land development, construction of power plants, buildings, dams, roads and purchase of machinery and equipment.

During the two regimes, spending pattern as shown on the figure (4) below, the percentage share of recurrent expenditure to GDP was higher than that of capital expenditure. The share of recurrent expenditure to Total Government Expenditure (TGE) is decreasing sharply from the Military regime (72.89%) to the EPRDF regime (61.02%) but the percentage share of capital expenditure to TGE is increasing at an increasing rate. On average, the share of capital expenditure increased from 26.10% in Derg regime of TGE to 48.63% in EPRDF regimes.

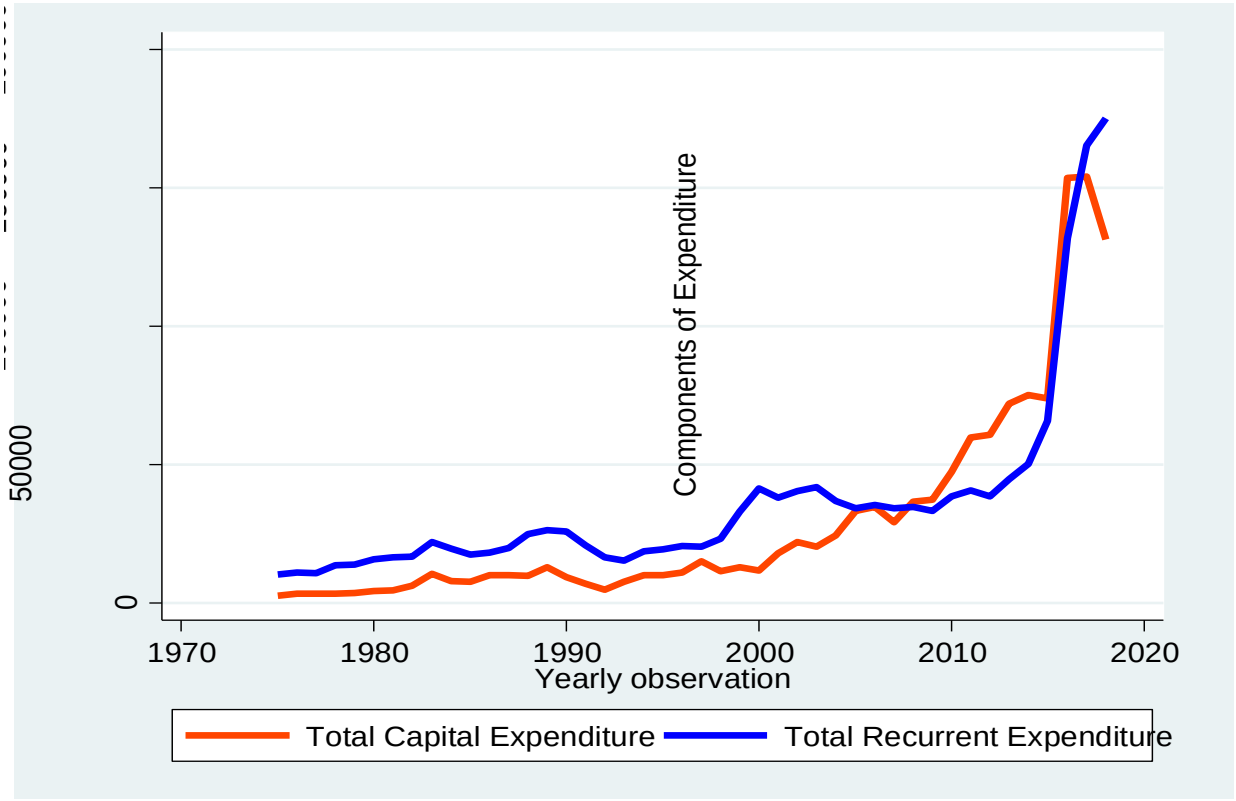


Figure 4: Trends of Components of expenditure

Source: NBE (2019) Data and own computation

During the period 1974/75-1990/91, remarkable change occurred in government expenditure since the down fall of the imperial regime in the year 1974/75. At the end of the military regime's period (1990/91) government expenditure constitutes 77.4% was recurrent which shows government increased expenditure on General services such as defense.

In general, during the period 1974/75-1990/91, the increment in recurrent expenditure was very fast as compared to capital expenditure and this can be attributed to the case of Somalia and civil war.

During EPRDF regime, expenditure follows four patterns; for the period 1992/93- 1997/98 which the share of recurrent and capital expenditure is nearly the same, in 1991/92, 77.36% of the TGE was recurrent expenditure. The trend increases at a decreasing rate and in 1997/98 reached 65.97% of the total expenditure of the year. The second pattern, during the Ethiopian-Eritrea war (1998/99 and 1999/00) the share of recurrent expenditure took the highest share (74% of the TGE) showing that most of the government budget was allocated for defense. Again during 2000/01-2003/04 the share of recurrent expenditure was 66.94% of the TGE. Thirdly, during 2004/05-2006/07 the share of recurrent and capital expenditure from the total spending was nearly equal. On the last pattern, at the end of the year 2007/08 there was dynamic change in budget allocation that is capital budget allocation (52% of TGE) was greater than recurrent expenditure and reached about 65.5% at the end of the year 2013/14. This was a new history for budget allocation during the two regimes and indicates government policy shift of budget allocation for investment to reduce poverty and promotes growth.

4.1.3. Public expenditure on pro-poor sectors

In fact, the top four pro-poor expenditures for Ethiopia between 1973/74 and 2010/11were education, agriculture health and road; those have an important impact on the livelihood improvement of people. It is believed that Pro-poor growth must be focused on rural areas, improve incomes in agriculture and make intensive use of labor, in order to have an immediate impact on poverty. Analytically there are two ways in which economic growth can be pro-poor. First, the pattern of growth is one which directly raises the incomes of the poor, and second, poor sections of the population can benefit from growth indirectly through public redistributive policies, such as taxes, transfers and other government spending. It is generally agreed that the vast majority of the poor are in rural areas, a majority depend directly or indirectly on agriculture for their livelihood, and the factor of production the poor possess and use most is labor. This second way of understanding pro poor growth in principle means that any kind of high growth could be made pro-poor if it involved progressive taxation and targeted government spending on the poor.

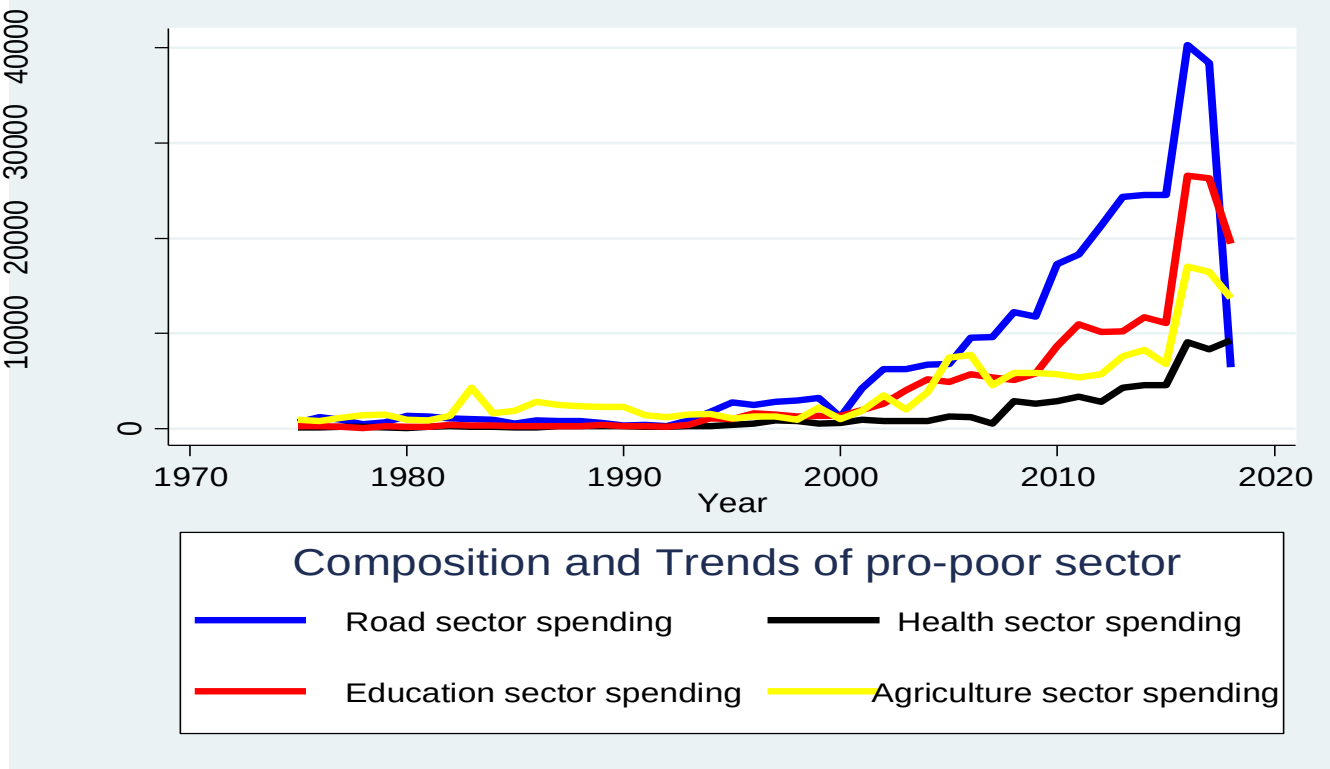


Figure 5: Composition and trends of Pro-poor sectors

Source: NBE (2019) Data and own computation

With regard to the composition of pro-poor sectors, during the military regime, the share of expenditure on pro-poor sectors to total government spending had been decreasing from what it was highest in 1975/76 (40.74%), except a minor growth record in 1985/86 (35.20%) from the preceding year expenditure share decreased to 27.93% of total spending. The military regime as it was a period of war and instability, the pattern (trend) of expenditure observed may not be surprising.

The public expenditure has significantly increased during post reform period (1992-2002). An uprising an interesting change in the pattern of public expenditure began in 1992. As part of the market reform process, the government took important macroeconomics reform including taxation. The participation of the private sector has increased. The end result was increase in government revenue, which partially contributed to increase Government spending. The overall growth in sectoral spending has shown volatility partly because of the war situation with Eritrea.

Nevertheless, towards the beginning of 2000 and onwards, the patterns of overall expenditure, has shown an upshot increasing trend, to meet the growing demand for investment in infrastructure, health, education , transport and communication.

During the EPRDF period, the percentage share of pro-poor sectors to TGE of the period, a major increase and remarkable growth has achieved. For instance, the share of poverty sectors from the TGE was 39.66% in 1992/93, reached 45.14% in 1995/96. Contrary to this encouraging trend of increase in the share of TGE it had been declining and reached 2l.97% in 1998/99 which is the lowest in the two regimes. The decrease in the share of expenditure was due to the Ethiopia-Eritrea conflict and since 2004/05 the share increase more than 55% and reached 66.46 in 2010/11 Based on the expenditure by pro-poor sectors each of the two regimes had had similarities except some less significant variations.

The percentage share of poverty sectors, especially education has a bigger share while health has the smallest as compared to others. It is important to look at the TGE trend in the two regimes with regard to expenditure level. The following figure depicts the government spending for pro-poor sectors and non-pro-poor by the two regimes: This indicates, although it was inconsistent, the pro-poor sectors spending as percent of GDP has achieved significant change.

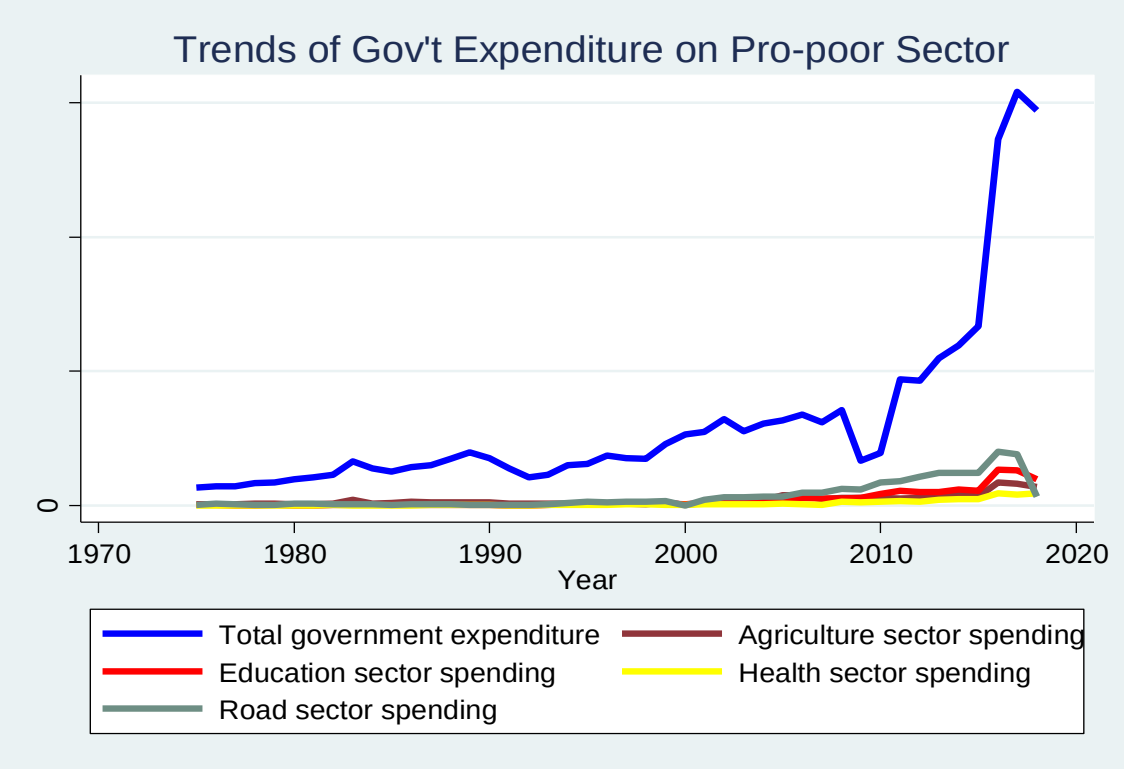


Figure 6: Trends of total expenditure and Pro-poor sector spending

Source: NBE (2019) data and own computation

4.1.4. Trends of Spending in Pro-poor Sectors

Government spending on pro-poor sectors has generally increasing during the period understudy. Expenditure on these sectors as a share of GDP increased from 4.11% in 1974/75 to 12.21% in 2010/11. Spending on education is the highest average spending, 14.1% of the total government spending between 1974/75 and 2010/11(figure 6.) which accounts 36.74% of total government pro-poor spending. The share of spending on Agriculture and natural resource has increased from 4.41% in 1974/75 to 15.12% in 2010/11 averaged 28.27% of total pro-poor spending Government. Similarly, the health sector have got the lowest share as compared to the other sectors, which accounts for average share of 3.19% and 13.07% of the total spending during the period understudy.

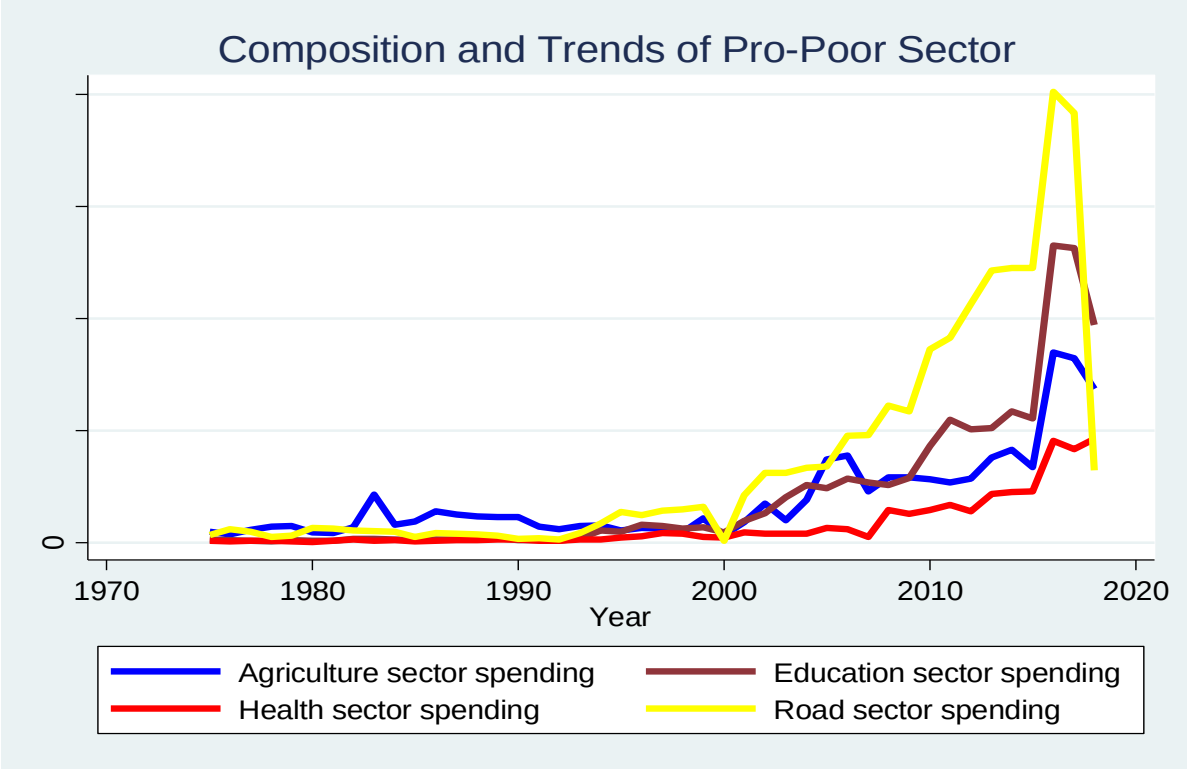


Figure7: Composition and trends of Pro-poor sectors

Source: NBE data and own computation

4.1.5. Spending on Road and Urban Development

Road and Urban Development sector had been the third second most important poverty reduction sector during the Derg and the EPRDF. Expenditure for this sector as percentage of GDP had been significant in the Derg period, though the trend was inconsistent to raise and fall. During the period, 1974/75-1976/77, expenditure on road and Urbanization was registering a share of 9.01%, 11.76% and 10.45% of GDP respectively. But this amount declined and became 5.82% of GDP in 1979/80; and there after it continuously declined till it reached 2.22 in 1989/90.

Generally in the period government expenditure for the sector was inconsistent, and there was of conformity with the plans.

The EPRDF period to assess is the present government period which has two main phases in relation to both road and urban development. The first phase is the period between 1990/91 and

2000/01 while the second is the period since 2001/02. The first phase has demonstrated a focus mainly in rural road construction and connect Cities-zonal and Woreda level. While urban

development initiatives were mostly left to city administrations and private sector. During EPRDF government, expenditure on road and urban development started at 3.16% in 1991/92 grew to 11.45% in 1994/95, and went down to 6.23% of TGE in 1999/00 and 8.12% in 2000/01 at the time of war with Eritrea. These nine years are grouped into a single phase by the researcher. In this period, expenditure was better than the last thirteen years of Derg, but similar in lack of consistency. Until the end of this phase, road and urban development expenditure was 7.9% on average, the third largest among poverty sectors for the period (1991/92-2000/01).

However, since 2001/02 road and urban development becomes the second largest expenditure sectors next to education for the last ten years. In this phase, expenditure grows steadily to 10.6%, 11.44%, 14.38%, 17.85% and 22.51 % of TGE for the years 2001/02, 2003/04, 2005/06, 2007/08 and 2010/11 respectively. The second phase is mainly the period of the planning and deliberation of construction for major Asphalt Roads, Urban housing projects and etc. The construction works has surely contributed to the rise in expenditure on the sector and GDP.

4.1.5.1. Performance of road sector in Ethiopia

In this section, attention is given to the road network, road density and accessibility, which are the main indicators for the sector's performance are described.

4.1.5.2. Road network

In 1951 the total stock of road network was only 6400 km of which 3400 km was asphalt and the remaining 3000 km was gravel road. This entire network was found only in urban areas. When the Imperial regime lost power, the network has reached to 9160 km in 1973. On average, the network has been growing at a rate of 2.05 percent per annum over the period 1951-1973. During the Derg regime, 1974-1991, the stock road increased to 19,017 km with a growth rate of 6.2 percent per annum. With the current EPRDF regime, The country‘s road network has increased from 26550 km in 1997 to 120,171 km in 2017(an increase of 353 percent). Also, substantial improvement has been registered in the condition of the country’s road network. The proportion of road network in good condition increased from 22% in 1997 to 72% in 2017.The development of road network is yet to go far. A large space in the country is networked with only a few roads. Though the development is good, more construction is important for connecting the remote areas. Especially, the rural part of Ethiopia is less networked with roads (ERA, 2017).

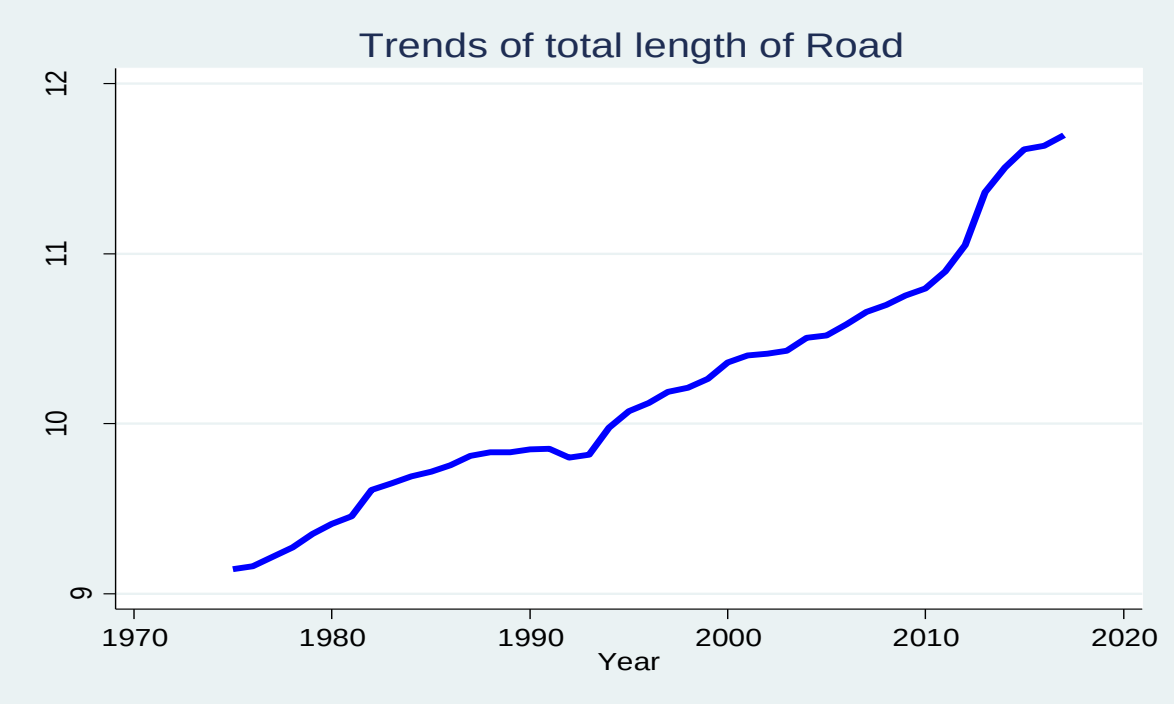


Figure 8: Total length of Road

Source: Computed based on MOFED Data

4.1.5.3. Road density

The proper level of road network is assessed by road density, which is measured by road length per 1000 persons or by road length per 1000 km^2. In the three RSDP periods, there was a plan to increase the road density form 0.43 to 1.5 km per 1000 persons and from 21 to 116 km per 1000 km^2, starting 1997 through 2009. At the end of the first phase the road density has increased achieving the target of the government. In 2002 the road density was exactly at the aimed level. This is 0.49 km per 1000 persons whereas the road length per 1000 km^2 is more than the target level by 30.27 km per 1000 km^2.

When the second phase of RSDP continued, the government has also targeted for higher levels, i.e. targeted road density of 0.5 km per 1000 persons and 30 km per 1000 square km. At the end of RSDP II, road density has reached 0.55 km per 1000 persons and 38.6 km per 1000 km^2in the year 2007. The accomplishment of the second phase was thus a success.As a result, the road density per 1000 sq. km has increased from 24.1 km in 1997 to 109.2 km in 2017.

4.1.5.4. Road accessibility

Access refers to the opportunity to use or the right to or the ability to reach some destiny. Accessibility is measured as the percentage of population having access to all weather roads. The benefits of having access to a road network is measured in terms of reductions in monetary costs or time needed by beneficiaries to access output markets or key public social services like health and education.

The accepted theory, according to ERA (2008) study, is that accessibility has three elements: 1) the location of the individual; 2) the location of the supply, service, or facility to which the individual needs access; 3) the link to bring the two together. The study used three approaches, namely, the random model approach, the graph theory approach, and the squire grid approach to cover the country's network demand. This demand was estimated as such that all rural population could have access to all weather roads within a 5km distance.

According to the ERA study the country is required to construct 200,000 km of optimum national road network, which is considered as a target road network on the assumption that it will give reasonably good accessibility. Whereas, for the country to be competitive enough and enter into middle income category, the targeted road density which secures the rural population to have access to all weather road is estimated to be 0.3 km/km^2, the average road density of the lower middle countries. In this case the road transport network has to reach 330,000 km.

The same study defined the concept measured in terms of average distance from the road network and proportion of area farther than 5 km from all-weather roads as lack of access, which people from the opportunities to improve their lives. Access is composed of two elements: mobility, reflecting the ease or difficulty in traveling to a service or facility; and proximity of those services and facilities. The study considered access to be one key element in providing the opportunity for both social and economic development, and a key determinant of both poverty itself and opportunities to escape from the poverty trap.

When we look at the recent trend regarding society's access to the all-weather road network, we find a slight improvement over the past seven years, however in 2008 only about 33% of the rural population had access to an all-weather road within a distance of 5 km. Given the fact that around 80 million people are living in rural area, such a low rate exacerbates the problem of poverty.

Improving the current access rate should be a major concern of the country's road sector expansion program.

Similarly, African Development Indicators (ADI) (2008/09) data indicates that the country has made an effort to provide access to all weather roads, though it is not satisfactory. Within a period of seven years (2002 to 2008), an additional seven percent of the rural population is provided with access to all weather roads (from 26% to 33% of the rural population). ERA (2008) study also indicates that with the recent construction of new roads, the average distance from a road has been reduced from 21km in 1997 to 11.7 km in 2009. On the other hand, the proportion of area farther than 5 km from all-weather roads, which was 79% in 1997, has been reduced to 65.3% in 2009. Therefore, the issue of accessibility calls for a kind of "big-push" approach in expanding all weather roads for the destitute rural poor. The problem of accessibility could also be addressed through a well-designed planning process coinciding with the parallel trends towards the decentralization of decision making and the concern to involve the local communities in the decision making process. The effort made so far towards the improvement or main roads and rural roads is a necessary but not sufficient measure to enhance rural accessibility.

Accessibility, measured in terms of average distance from the road network and proportion of area farther than 5km from an all-weather road, shows that substantial progress has been made in expanding the road network. Specifically, due to the construction of new roads, the average distance from a road has been reduced from 21km in 1997 to 4.6 km in 2017. The proportion of area farther than 5km from an all-weather road, which was 79% in 1997, has been reduced to 33.5% in 2017.

4.2. Econometric Model Result

4.2.1. Unit Root Test

Prior to any other type of econometric analysis concerning time series variables, it is mandatory to test the existence of unit root in the variables and establish the order of integration of the variables. A direct application of OLS to trended time series variables whether it is deterministic or stochastic time trend frequently exhibits false correlation rather than the actual one. The most

commonly used solution for the stochastic trends in the time series data is estimating the relationship in the first difference instead of at level as was recommended by Enders (1995).

Many test procedures are available for testing for a unit root in a time series. However, in this study, the analysis is conducted by using the widely applied test procedure, namely Augmented Dickey-Fuller (ADF), and used to determine the order of integration of each series. The variables involved in unit root tests are the natural logarithm of real values of GDP (LRGDP), education expenditure (LREDU), health expenditure (LRHE), agriculture expenditure (LRAGI), road expenditure (LRROAD) and Gross capital formation (LRGCF). The test results of ADF statistics for all the time series variables used in the estimation are presented in Tables 1and 2 below.

Table 1: Unit Root Test Results of Variables at Levels

Variables at level	t-stat (With intercept but no trend)	5% critical value	t-stat (With intercept and trend)	5% critical value
LRGDP	3.218	-2.950	1.526	-3.528
LRAGRI	-0.845	-2.950	-2.289	-3.528
LRROAD	-1.922	-2.950	-2.826	-3.528
LREDU	-0.391	-2.950	-1.985	-3.528
LRHE	1.268	-2.950	-0.378	-3.528
LRGCF	-1.398	-2.950	-1.812	-3.528

Ho: variable is not stationery

Source: model result

Note if t-stat is less than 5% critical value means the model has got unit root (non-stationery) and if the t-stat is greater than 5% critical value indicates that the model is stationery.

Table 2: Unit Root Test Results of Variables at first difference

Variables at 1^{st} difference	t-stat (With intercept but no trend)	5% critical value	t-stat (With intercept and trend)	5% critical value
DRGDP	-3.193	-2.955	-4.036	-3.536
DRAGRI	-6.754	-2.955	-7.423	-3.536
DRROAD	-7.343	-2.955	-9.200	-3.536
DREDU	-6.051	-2.955	-7.006	-3.536

DRHE	-4.745	-2.955	-6.244	-3.536
DRGCF	-5.062	-2.955	-5.324	-3.536

Ho: variable is not stationery

Source: model result

Note if t-stat is less than 5% critical value means the model has got unit root (non-stationery) and if the t-stat is greater than 5% critical value indicates that the model is stationery.

4.2.2. Determination of the Lag Length

Co-integration test is usually preceded by a test of optimal lag length as the result of the test is affected by the number of lags included in the VAR model. In the Johansson maximum likelihood approach, the first step towards the co-integration analysis is the determination of an appropriate lag length that is going to be used in the VAR estimate. There are many tests that can be used to choose a lag length, The Likelihood Ratio test [LR], the Final Prediction Error test[FPE], the Akaike information criteria [AIC] , the Schwarz information criteria [SIC] and the Hannan-Quinn information criteria [HIC] are used to determine the optimal lag length of the VAR model for co-integration test. The test results of the different lag selection methods indicate that the appropriate lag length in this study is 2, at 1% level of significance and presented in Table 3 below.

Table 3: Lag selection for cointegration test

lag	Logl	LR	P	FPE	AIC	SC	HQ
0	-2427.95	NA	NA	1.5e+44	1.1e+43*	118.82	118.98*
1	-2373.38	109.13	0.000	6.1e+43	117.823	118.463	119.579
2	-2299.02	148.72*	0.000	1.1e+43*	115.952*	117.139*	119.212

* indicates lag order selected by the criterion.

4.2.3. Cointegration Test

As Engle and Granger (1987) pointed out that linear combination of two or more non stationary series may be stationary. If such a stationary linear combination exists, the non-stationary time series are said to be co-integrated. The stationary linear combination is called the co-integrating equation and may be interpreted as a long-run equilibrium relationship among the variables. In this study the Johansen maximum likelihood testing procedure was applied to determine the number of co-integrating relations, which also includes testing procedures for linear restrictions on the co-

integrating parameters for any set of variables that were used. Therefore, the numbers of co-integrating vectors are determined with the trace statistics: the trace statistics and the maximum rank. 'r', we proceeded sequentially from 'r = 0' to 'r = k-1' until we fail to reject, where k is the number of endogenous variables. The trace statistic tests the null hypothesis of' 'r' co-integrating relations against the alternative of 'k' co-integrating relations, for r = 0, 1... K-1...The alternative of k co-integrating relations corresponds to the case where none of the series has a unit-root and a stationary VAR may be specified in terms of the levels of the series. The result of Johansen Co integration test presented in the Tables 4 below.

Table 4: Cointegration Rank Test

maximum rank	Null	Alternative	Trace statistic	5% CV	Hypothesized No. of CE(s)
0	r<0	r>0	244.0	94.15	None*
1	r<1	r>1	139.7	68.52	At most 1
2	r<2	r>2	80.5	47.21	At most 2
3	r<3	r>3	37.8	29.68	At most 3
4	r<4	r>4	15.7	15.41	At most 4
5	r<5	r>5	0.04*	3.76	At most 5

* *denotes* rejection of the null hypothesis at 5% significance level.

H0: There is no cointegration if the Rank is at zero

Source: Model result

Based on the trace statistics test results shows from the above Table 4, confirms that there is one co-integration relationship, which means that the existence of a long run equilibrium relationship between real government spending and real GDP growth, and the null of no co integrating vector is rejected at 5% level of significant in favor of at least one co integrating vector for equation. Therefore there is one co integrating vector in this model.

Based on the trace statistics likelihood ratio test results shows from the above Table 4, confirms that there is one co-integration relationship, which means that the existence of a long run equilibrium relationship between real government spending and real GDP growth, and the null of no co integrating vector is rejected at 5% level of significant in favor of at least one co integrating vector for equation. Therefore there is one co integrating vector in this model.

4.2.4. Causality Analysis

According to Granger (1969) the idea of Granger causality is based on the principle that a cause cannot come after its effect. A test for causality is performed on variables of interest to detect the presence and direction of causality between pairs of variables. Following the VAR, causality test is made to identify the presence and direction of causality. The null hypothesis to be tested is that there is no causality between the variables in each equation whereas rejecting the null implies the presence of causality between the variables. This study is interested to identify the causality between government spending and RGDP.

The result of Granger causality test is presented in the table 5 below to identify the overall effect of independent variables on their lag.

Table 5: Overall Granger Causality Wald Test result

Equation	Exclude	Prob>chi2
DRGDP	DRAGRI	0.029
DRGDP	DRROAD	0.017
DRGDP	DREDU	0.000
DRGDP	DRHE	0.000
DRGDP	DRGCF	0.005
DRGDP	ALL	0.000

H0: all the independent variables lagged don't cause GDP. Meaning they are =0, prob>chi2>5%

Source: Model result

Road sector spending, Education sector spending, Health sector spending and spending on gross capital formation have significant effect on the economic growth. The above table shows the prob>chi2 is less than 5% critical value. Meaning all the independent variables such as road, education, health and gross capital formation can cause GDP, it indicates that the rejection of the null hypothesis. This implies that uni-directional relationship between the variables.

4.2.5. Estimation of the Long-Run Relationship

The cointegration rank test in the previous section suggests that existence of single long run equilibrium equation or one co-integrating vector. For the purpose of analysis table 6 is used to present the resulting long-run normalized α and β adjustment parameters for the real GDP growth equation.

Table 6: Normalized long-run β and α Adjustment coefficient

Variables	DRGDP	DRAGRI	DRROAD	DREDU	DRHE	DRGCF
Estimate β coefficient	1.90	-27.62	23.05	-74.5	-60.43	-0.16
α adjustment coefficient	-1.32	-0.025	-0.10	-0.04	-0.006	-1.09

Table 7: Test of the Long - run Parameters

Variables	β- Coefficient	P- value
RAGRI	-3.31	0.57
RROAD	12.96	0.000***
REDU	39.68	0.000***
RHE	92.92	0.000***
RGCF	0.287	0.019**
Constant	47098.8	0.025

*, **, ***, represents level of significance at 10%, 5% and 1% respectively

The variable agriculture (AGRI) is insignificant. The variables road (RROAD), education (REDU) and health (RHE) are statistically significant at 1% level of significance. And the variable gross capital formation (RGCF) is significant at 5% level of significance in explaining the long run relationship between real GDP and real Government Expenditure. It is clear that all the coefficients show the expected sign, and α11 representing the speed of adjustment towards long run disequilibrium in the previous period, and the long run equation with their respective diagnostic test is depicted as follow.

The long run real GDP growth equation is given by:

LRGDP= 47098.8 + 12.96 LRROAD + 39.68 9 LREDU + 92.92 LRHE + 0.287 LRGCF

0.025	0.000***	0.000***	0.000***	0.019**

Note: ***, ** and * represents 1%, 5% and 10% levels of significance

All variables used in the regression are inflation adjusted; the estimated coefficients can directly be interpreted as long term elasticity. The regression result in the above long run equation shows that government expenditure on road (RROAD), education (REDU), health (RHE) and gross capital formation are significant and positive impact the real GDP growth in the long run.

Government road expenditure is found to be positive and significant effects on economic growth

(GDP) in the long-run, according to the result a one percent increment in expenditure on road infrastructure in one year leads to about 12.96 percentage increments in real GDP in the long run.

This shows that public spending can be used as a main engine of growth in Ethiopia. Nowadays, the construction of roads [seasonal and all weathered] has made the supply of commodities easy and quick. This has improved the marketability of the commodities and the income of the farmers. This has, the researcher believed, contributed to the current sustained economic growth in Ethiopia.

The recent trend of government spending shows that the government is showing strong commitment to expand and improve the current performance of road sector through financing on road project from as low level of 0.4 Billion in 1993/94 to 19.4 Billion in 2009/1 0 with increased outcome as measured by road constructed (MOFED, 2010).

The road sector plays a role of outstanding importance in any national economy, both through its own direct contribution to GDP and employment as well as through the provision of services which are indispensable for the development of all other economic sectors, modernization of agriculture requires supplying tools, machinery and fertilizers to rural farms, and moving food and

other products to consumers. Increasing industrial production means bringing together greater volume of finished goods to consumers. Expanding output may be accompanied by an extension of the area from which materials are assembled as well as the area from which the increasing is marketed, and the total international trade to and from Ethiopia is also growing.

In Ethiopia, road infrastructure deficit has remained one of the major structural bottlenecks to economic growth. Increased public investment on road infrastructure has therefore been instrumental in enhancing the private sector competitiveness and encouraging further investment, which leads to increase in economic growth. The demand for road infrastructure is estimated to increase notably in the future. Better roads enlarging the market and making it more competitive will attract private investment and enhance service efficiency.

Government expenditure on education and health positively and significantly affects economic growth (GDP) in the long-run, According to the result a one percent increment in expenditure on health and education in one year leads to approximately 0.020 and 0.046 percentage increments in real GDP in the long run respectively. Currently the Ethiopian government has been raising public spending particularly pro-poor expenditure. This expansion of public expenditure, especially human capital (education and health) spending can significantly contributed to economic growth through improving productivity of the people, promotes economic growth of the country in general.

The above findings are in line with the study results obtained by Loto (2011), Fan & Rao (2003), Nketia and Amphonsah (2009), Barro (1990), Calvo and Dercon (2007), Bakare and Olubokun (2011), Jacob and Walid (2004) These studies concludes that government spending on education sector contributes to economic growth. The studies by Kweka and Morrissey (2000) conclude that spending on education sector has negative effect on growth. Spending on health has positive significant effect on the long run and negative and insignificant in the short run, this was found by Wendwesen (2012) and Teshome (2006) studies, they conclude that government expenditure on Human capital particularly health sector has positive and significant long-run effect on real GDP. According to their finding, the possible reason was that government expenditure on human capital (H) has possibly improved human development outcomes thereby boosting long-run growth. The narrow base of health sectors and the highest priority given to basic preventive health care by government could probably explain the effect. The above findings are not consistent with the

results and conclusion made by Amasoma et al (2011) and it shows that spending in health sector significantly effect on the economy growth.

The agriculture sector spending is insignificant in this study and this agriculture sector spending was insignificant in the case of Teshome (2006) and Wendwesen (2012) findings.

4.3. Diagnostic test for the model

Once the VAR models are estimated, diagnostic tests must be conducted that are important in order to make sure that the results obtained from VAR estimation can be used for forecasting or policy purposes. These post estimation tests are mostly performed on the residual of the VAR. this study has checked the LM test for residual autocorrelation and Jarque-Bera test for residual multivariate normality and the Var stability analysis.

4.3.1. Autocorrelation

Testing for autocorrelation helps to identify any relationships that may exist between the current values of the regression residuals and any of its lagged values (Brooks, 2002). The null hypothesis of the LM test for autocorrelation is that the residuals are not serially correlated, while the alternative is that the residuals are serially correlated. If the P-value is less than 0.05 then we reject the null hypothesis (Harris, 1995). Since results p-value is above 5%, the researcher accepted the null hypothesis that there is no autocorrelation. Table 8 depicts the LM test result about the absence of autocorrelation.

Table 8: LM test

Lag	Prob>chi2
1	0.600
2	0.590

H0: no autocorrelation at lag order if prob> chi^2>5%

Source: Model result

4.3.2. Residual Normality Test

The Jarque-Bera normality test is used to determine whether the regression errors are normally distributed or not normally distributed. The guide line is the p-value must be greater than 5%. So the test result indicates that residuals are normally distributed.

Table 9: Residual Normality Test

Equation	Prob>chi2
D_DRGDP	0.967
D_DAGRI	0.021
D_DRROAD	0.600
D_DREDU	0.204
D_DRHE	0.441
D_DRGCF	0.026
ALL	0.054

H0: residuals are normally distributed if prob>chi2>5%.

Source: Model result

4.4. Estimation of the Error-Correction Model

Having established that the variables of concern are of the same order of integration, an OLS regression was run for relevant variables and test for co-integration by testing the residual is I (0). After indicating the presence of long-run co-integration relationships by using the Johansen approach, the existence of co-integration allows analysis of the short-run dynamic model that identifies adjustments to the long run equilibrium relationship through the Error Correction Model (ECM) representations.

ECM enables to capture the short run dynamics of the model and formulated based on the identified long run relationships. The ECM has co-integration relation built into the specification, so that it restricts the long run behavior of the endogenous variable to converge to their co-integrating relationships while allowing for short run adjustment dynamics. The co-integrating 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. Thus co-integration implies the presence of error correcting representation and any deviation from equilibrium will revert back to its long run path. As one long run co-integrating vector is determined, the VECM is formulated as follows:

ΔLRGDP = β0 +β1Δ LRAGRI + β2ΔLRROAD + β3Δ□REDU + β4ΔLRHE + β5ΔLRGCF +β6ΔECT-1

The short run equation is regressed with difference of log of real GDP at time t as the dependent variable against the lagged differences of log of all explanatory variables are lagged one times to capture the short run change in the corresponding level, and ECTt-l in the lagged period represents the error correcting term-which is designed to capture the speed of adjustment to the long run equilibrium.

Table 10: Short Run Dynamic Model

Coefficient and levels of significance				
variables	Coefficient	Std.error	Z	P/Z/
DLRGDP_1	-1.32	0.34	-3.81	0.000***
DLRGDP	1.903	0.646	2.94	0.003***
DLRAGRI_1	-0.025	0.0075	-3.40	0.001***
DLRAGRI	-27.62	10.69	-2.58	0.010***
DLRROAD_1	-0.107	0.0099	-10.77	0.000***
DLRROAD	23.05	9.90	2.33	0.020**
DLREDU_1	-0.006	0.0026	-5.76	0.019**
DLREDU	-74.51	21.64	-3.44	0.001***
DLRHE_1	-0.006	0.0026	-2.35	0.019**
DLRHE	-60.43	21.64	-1.90	0.058*
DLRGCF_1	-1.098	0.268	-4.09	0.000***
DLRGCF	-0.163	0.296	-0.55	0.58
Constant	1707	1728	0.10	0.921
Prob > F = 0.0000		R-squared = 0.8897		

*, **, ***, indicate *level of significance at 10%, 5% and* 1% *respectively.*

The estimation results of using the Error correcting model is reported in the above Table 10. The overall significance/validity of the model of the short run which is tested using the F statistics, it confirms the fitness of the model to the required level, the short run equation model is jointly significant at 1% critical value, and no problem is identified in this regard. The other test that is commonly used for testing the appropriateness of the explanatory variables in terms of explaining

the dependent variable is R^2 in the case of short run shows that 88.9 percent of the dependent (real GDP) variable is explained by explanatory variables in the model.

The speed of adjustment coefficient (ECT-l) included in the model to capture the long run dynamics is statically significant at 1% critical value with the correct (negative) sign and as the theory predicts. It has important implication in linking the short- run periods to the long-run period. According to the estimate of coefficient indicates that, any short-run deviation or the real

GDP growth from the long-run value this period will be adjusted (corrected) at speed itself by 132 percent per year towards the dynamic equilibrium long run co-integrating relationship.

The results of the short-run model reveals that the change in real GDP before one period (lagged one period) has a positive and significant effect on the current change in real GDP at 1% level of significant. A one percent change in the lag real GDP leads to per 190.3percent change on the current change in real GDP, the result indicates that the past real GDP performance of country plays a great role in improving the current economic growth (real GDP).

In the short run only the variable road (DRROAD) has significant and positively affects real GDP. The other variables such as agriculture (DRAGRI), education (DREDU), health (DRHE) have a negative significant impact on real GDP. The variable gross capital formation has no short run effect on real GDP.

Government expenditure on road sectors has a positive and significant effect on the current change in real GDP at 1% level of significance. According to the result, a one (1) percentage change in government expenditure on road sector in the previous one period leads to 23.05 percent change in real GDP.

Based on the findings, a positive effect on economic growth in the short-run, this is happened due to some reasons; the study conducted by ERA (2008) reveals that the economic impacts of road infrastructure are typically in terms of the change in local business activity occurring as a direct consequence of road project has brought to economy of the area, road projects takes account the direct purchases made within the region by the project, the number of people employed, and the effect of household incomes of those people, this leads to an increase in household expenditure. The indirect economic effect of road projects takes into account the fact that the supplying industries will also have to purchase more inputs, employ more labour and pay more wages. The

supplying industries are those industries that supply building material and other resources to the construction companies and those firms involved in the road investment project.

Hence, road construction projects create a demand for stone, cement, and other construction materials. These items may be imported from other regions, but if the demand is sufficient, local business will acquire such materials, hence stimulating local sales.

This study finding also supported by economic theory and empirical research suggest that investment in road infrastructure spurs economic growth. It is also expected to generate employment directly through the actual construction, operation and maintenance requirements but also through indirect multiplier effects across the economy. Economic theory identifies three channels through which road infrastructure can positively impact on economic growth: (i) as a direct input into the production process and hence as a factor of production; (ii) stimulating factor accumulation through, for example, providing facilities for human capital development; and finally, (iii) boosting aggregate demand through increased expenditure during construction, and possibly during maintenance operations.

In addition, this study finding is comparable to pervious findings of Fan & Rao (2003), Nworji and Oluwalaiye O. B (2012), Ibrahim (2011), Dercon et al. (2008), Lofgren et al (2005), which concludes that government spending on road sector contributes to growth and it would be better to allocate more resources to develop road infrastructure, and this finding against with pervious findings of Wendwesen (2012), he concludes that government spending on road construction have insignificant effect on GDP. One of the biggest causes of different findings was the type of model used to estimate the effect of public investment.

In general, the government may play its major role in investing in road infrastructure that complements private investments. In the absence of significant private investment in a developing country like Ethiopia, public investments may be used as engine of growth. When we compare this with the one obtained from the long run analysis, we learn that the contribution of growth of road expenditure to GDP is only a short period phenomenon. Thus, all studies have done in Africa countries including Ethiopia argue that increase in government expenditure on socio-economic and physical infrastructures encourages economic growth, which is supporting the Keynesian theorist have generally assumed that, increase in government expenditure on physical capital (road infrastructures) leads to higher Economic growth. In most cases, good road infrastructure helps to

raise productivity and lower cost of production of the economy. Thus, the government has to be expanding fast enough to meet the demand for road infrastructure in the early stage of development because of Construction expense for road sector is huge during construction period.

Government education expenditure negatively and significantly affects economic growth in Ethiopia. The finding shows that a one (1) percentage increment in government expenditure on education sector in the previous one period leads to 74.5% percentage decrement in real GDP. These empirical findings are in line with the previous studies by Kweka and Morrissey (2000), Nketia and Amphonsah (2009) and Loto (2011) who concludes that spending on education sector has negative effect on growth. The reason for these findings could be differs in the context of countries, methodology used and it is also considered different types of expenditures have divergent effects.

The study found that education sector expenditure has both short-run and long-run statistically Negative and positive significant effect on growth respectively. In this regard, the government has been increasing public expenditures on education in the past few years. Thus, the government is found to be the main factor that may generate economic growth in Ethiopia. This supports on the one hand Keynesian view that government investments on social sectors are causes of growth and on the other hand the argument of endogenous growth theories of the additional effects of human capital over the static (fixed) effect on the level of output that explains sustainable growth.

The short run model results shows that the government expenditure on health sectors has found statistically negative significant effect on real GDP. However, government is giving special focus on health sector in recent years, health appear negative significant impact on the growth of real GDP growth in the short run, This has happened most probably due to the fact that benefits from health is not realized in the short period of time, usually have long growth period whose growth impact not be seen in the short run even with good policy environment. These findings is also in line with a conclusion by Wendwesen (2012) and Amasoma et al (2011) who concludes that health sector spending negative significant effect on real GDP in the short- run.

In the case of Agriculture, the government spending on agriculture sector has negatively and significantly affected the current change in real GDP, at 1 percent level of significance. The estimation shows that, a 1 percentage increment in government expenditure on agriculture sector in the previous one period leads to 27.62 declines in real GDP. These findings have confirmed with

the findings of Wendwesen (2012), Loto (2011), kweke and Morrissey (2000), Abu and Abdullahi (2010), Barro (1991). They conclude that in the short run government expenditure on agriculture sector was negatively related to economic growth.

The short run model results shows that the government expenditure on gross capital formation (investment) has found statistically insignificant effect on real GDP. However, government is giving special focus on investment sector in recent years, investment appear insignificant impact on the growth of real GDP in the short run, The researcher believed that, this happened most probably due to the fact that benefits from investment is not realized in the short period of time, usually have long growth period whose growth impact not be seen in the short run even with good policy environment.

In general, the result of estimated ECM equation above shows that the short run changes in RROAD has a positive significant impact on the short run changes in real GDP. The remaining variables such as RAGRI, REDU and RHE have negative impact on the short-run changes in RGDP.

Government spending trend in Ethiopia has changed dramatically within the last ten years. Thus, it is important to monitor trends in the levels and composition of government expenditures, and to assess the impacts of the change over time. It is even more important to analyze the relative contribution of various types of government spending have differential impacts on economic growth sectors expenditures to GDP, as this will provide important information for more efficient targeting of these limited financial resources. Government spending on pro-poor sectors has generally increasing during the period under study. Expenditure on these sectors as a share of GDP increased from 4.02% in 1975 to 16.5% in 2017.

CHAPTER FIVE: CONCLUSIONS AND RECOMMENDATIONS

5.1. Conclusions

This study investigated the impact of government road spending on economic growth in Ethiopia, during the period 1975- 2018. The general specification of the model is an augmented Solow growth model and endogenous growth model. The model specification used in this study is to investigate the impact of specific government road sector spending. And, hence the growth model is a function of government expenditure. However, spending on health, education, agriculture, and spending on gross capital formation are also included to capture growth in the size of the components of government spending. The study reviewed theoretical and empirical researches related to the link between government spending and economic growth in general, road spending, in particular, in the context of Ethiopia, and some other countries experiences. It was found that government expenditure does cause the growth of GDP, which is compatible with the Keynesian's theory.

The econometric analysis of this study using VECM model, real GDP is taken as dependent variable, while the share of government expenditure on road, agriculture, education, health, and gross capital formation are taken as explanatory variables. Each variables was tested for their time series property using Augmented Dickey-fuller (ADF) test of stationary and all variables are identified as 1(1). The test for cointegration is performed using the Johansson Maximum Likelihood Estimation procedure, and the result confirmed the existence of long run relationship among the variables in the model. To estimate the model, cointegration and vector error correction analysis was conducted and the test result used to analyze the long-run as well as the short-run relationship. The short run dynamics of the long run economic growth was examined by estimating an error correction model.

In the long-run, the econometric result showed that government road expenditure is found to be the most significant and positive impact on economic growth. This shows that public spending can be used as a main engine of growth in Ethiopia. Nowadays, the construction of roads [seasonal and all weathered] has made the supply of commodities easy and quick. This has improved the marketability of the commodities and the income of the farmers. This has, the researcher believed, contributed to the sustained economic growth in Ethiopia. The government expenditure on

education, health and gross capital formation also have significant and positively influences on real GDP growth in the long run.

The regression result of the short run showed that the change of government spending on road has significantly and positively affect real GDP. The remaining variables such as agriculture, education and health sectors have significantly and negatively affect the current real GDP growth in the short run. The study has found that road sector expenditure has both positive significant effects on the growth of real GDP in the short run and long-run.

More generally, the major finding of the study found that public spending on road sector has significantly and positively impact on economic growth in the short-run as well as long-run. The study also found that the government is the key factor that promotes economic growth in Ethiopia and may stay to play its major role in the future.

On the basis of the above conclusions, the researcher recommends the following measures for policy makers,

5.2. Recommendations

Based on the findings obtained, the following recommendations are required necessary:

Firstly, the finding shows that government road expenditure positively and significantly affects economic growth in the short-term as well as in the long-term. This shows that the government of Ethiopia increase economic growth significantly by increasing its expenditure on road infrastructure. The government is found to be the main factor that may generate economic growth in Ethiopia. The Ethiopian road authority plays its major role in investing in road infrastructure that complements private investments.

The finding shows that in developing country like Ethiopia, public investments used as engine of economic growth. Thus, government should prioritized and further increase its investment in road sector by allocating its funds to Ethiopian road authority and by studying the feasibility of the project at right time.

Secondly, Ethiopia has a good growth performance in the post-1991 period. In particular, over the period 2004-2011, the economy averaged 11.6 percent growth rate of GDP, which signals the

country's future economic prospects and lays down promising motion for additional economic growth. Keeping up the growth motion and continuing its sustainability.

Currently the government has been rising public spending particularly on pro-poor expenditure such as road, education, health and gross capital formation. This expansion of public expenditure has significantly contributed to economic growth through improving productivity of factor in the country. Therefore, the policy makers have to strengthen such policy so as to ensure the sustainability of economic growth and ensure that expenditure are properly managed in a manner that it will raise the nation's production capacity and accelerate economic growth.

Thirdly, the findings from the descriptive analysis indicate that the Ethiopian road authority in the recent decade is making a relentless effort towards expanding the road network of the country and improve the current performance. However, the country's overall accessibility is far below from sub -Sahara African (SSA) countries. Therefore, in order to improve the benefits of the accessibility of road or provision of public utilities, expanding the road network by the federal or regional government in rural areas should be encouraged.

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APPENDEX

Appendix A: Descriptive summery statistics of the variables used in the model

Variables	Obs	Mean	Std. Dev.	Min	Max
RGDP	44	312858.9	381635	97651.09	1717795
RROAD	44	7283.9	10120.5	160.8	40253.8
RAGRI	44	7283.9	10120.5	160.8	40253.8
REDU	44	4314.4	6524.01	105.2	26543.2
RHE	44	1570	2378.1	84.9	9256.8
RGCF	44	194454.1	110975	84555.6	617728.5

Appendix B: Augmented dickey fuller unit root test result

Table 1: Unit Root Test Results of Variables at Levels

Variables at level	t-stat (With intercept but no trend)	5% critical value	t-stat (With intercept and trend)	5% critical value
LRGDP	3.218	-2.950	1.526	-3.528
LRAGRI	-0.845	-2.950	-2.289	-3.528
LRROAD	-1.922	-2.950	-2.826	-3.528
LREDU	-0.391	-2.950	-1.985	-3.528
LRHE	1.268	-2.950	-0.378	-3.528
LRGCF	-1.398	-2.950	-1.812	-3.528

Source: model result H0: no unit root

Guideline: trace statics greater than 5% CV accept the Ho. ALT: trace statics Less than 5% CV accept the H1.

Appendix C: Real data entered to the regression (all variables are measured in millions of birr)

Year	RGDP	RAGRI	ROAD	REDU	RHE	RGCF
1975	97,651.09	971.3	708.79	299.74	160.8	246,264.50
1976	98,834.99	784.46	1,209.88	253.13	138.52	191,816.78
1977	99,589.38	1,158.72	971.26	205.43	176.21	164,302.56
1978	99,233.13	1,437.48	501.38	105.2	186.63	141,838.10
1979	102,858.57	1,494.07	667.43	256.92	112.45	159,769.55
1980	108,023.09	957.96	1,336.91	195.77	84.92	190,168.14
1981	108,920.05	880.17	1,264.98	209.18	179.79	201,629.37
1982	109,170.34	1,382.40	1,102.87	382.92	294.12	192,587.55
1983	120,201.80	4,281.95	1,041.65	372.35	188.47	187,627.04
1984	111,615.52	1,592.47	970.39	322.84	219.31	243,906.65
1985	101,802.62	1,885.74	536.08	273.64	135.98	106,599.67
1986	111,910.16	2,813.02	849.7	277.84	167.89	189,283.26
1987	126,610.94	2,522.64	841.04	297.92	271.24	220,912.19
1988	125,935.92	2,359.68	782.99	302.66	267.83	278,043.31
1989	126,867.76	2,287.37	639.26	407.65	301.64	187,716.37
1990	132,336.16	2,277.80	371.44	264.51	280.96	164,720.33
1991	128,347.23	1,417.19	420.06	241.77	182.1	111,727.94
1992	125,406.28	1,237.67	308.66	192.7	188.7	84,555.65
1993	139,411.50	1,513.59	864.51	389.49	293.33	127,902.18
1994	139,480.18	1,574.80	1,748.88	1,079.99	289.17	132,768.54
1995	147,454.54	1,086.43	2,786.10	1,000.69	445.88	133,650.35
1996	162,373.14	1,313.45	2,484.72	1,622.68	565.13	150,040.22
1997	169,246.88	1,253.66	2,852.04	1,477.44	855.65	151,454.18
1998	167,917.47	939.17	2,993.18	1,267.38	806.37	137,251.32
1999	178,512.68	2,191.74	3,208.11	1,379.62	559.56	139,949.65
2000	184,880.72	579.76	1,317.58	605.5	297.07	133,352.31
2001	198,595.16	1,856.16	4,218.35	1,938.56	951.1	162,677.64
2002	201,840.04	3,531.31	6,256.06	2,635.32	813.43	191,952.32
2003	197,604.40	2,046.52	6,247.70	4,067.44	788.76	153,326.72
2004	220,782.11	3,851.73	6,720.95	5,175.94	830.11	200,124.33
2005	248,698.26	7,453.38	6,803.71	4,890.83	1,303.98	182,460.57
2006	277,396.49	7,770.32	9,579.96	5,733.58	1,200.84	192,324.80
2007	310,115.10	4,606.04	9,612.16	5,395.96	542.57	160,504.96
2008	344,775.46	5,874.87	12,255.16	5,134.15	2,908.06	137,916.54
2009	379,362.44	5,839.64	11,751.06	5,796.05	2,605.48	122,810.40
2010	419,217.77	5,702.94	17,275.44	8,675.40	2,923.49	148,021.60
2011	475,647.50	5,414.95	18,318.13	10,974.77	3,403.89	165,379.70
2012	517,026.54	5,729.70	21,349.02	10,126.68	2,828.94	155,463.60
2013	568,432.35	7,596.39	24,333.84	10,238.01	4,334.49	150,554.64
2014	626,977.14	8,300.40	24,527.90	11,715.80	4,559.23	166,708.69
2015	692,221.86	6,782.38	24,529.89	11,096.28	4,583.96	172,296.81
2016	1,449,397.00	16,988.32	40,253.79	26,543.24	9,102.53	585,664.84
2017	1,595,316.48	16,469.54	38,380.51	26,290.55	8,339.42	617,728.47