

**ADDIS ABABA UNIVERSITY
SCHOOL OF GRADUATE STUDIES**

**FISCAL POLICY AND ECONOMIC GROWTH:
EMPIRICAL EVIDENCE FROM ETHIOPIA**

**By
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“Fiscal Policy and Economic Growth: Empirical Evidence from Ethiopia.”

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*In memory of my unforgettable late brother,
Tefera Ayenew, may he rest in peace.*

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List of Acronyms

ADF	Augmented Dickey-Fuller
AIC	Akaike Information Criterion
ARCH	Autoregressive Conditional Heteroskedasticity
CSA	Central Statistical Agency
DSP	Difference Stationary Process
ECM	Error Correction Model
EPRDF	Ethiopia People's Revolutionary Democratic Front
GDP	Gross Domestic Product
GNP	Gross National Product
I(d)	Integrated of Order d
IMF	International Monetary Fund
LR	Likelihood Ratio
MDGs	Millennium Development Goals
MoFED	Ministry of Finance and Economic Development
OECD	Organization for Economic Cooperation and Development
OLS	Ordinary Least Squares
PP	Phillips-Perron
R&D	Research and Development
TSP	Trend Stationary Process
VAR	Vector Autoregressive
VECM	Vector Error Correction Model

Abstract

The purpose of the paper is to examine the effect of fiscal policy variables on economic growth in Ethiopia using annual data over the period 1960/61-2007/08. To achieve the stated objective “Barro type” growth model is estimated with the aid of cointegrated Vector autoregressive (VAR) and error correction modelling techniques. This paper decomposes public spending and revenues into various subcategories and estimates the impact of each of them on economic growth.

The result support growth neutral nature of nondistortionary taxes and total recurrent expenditures excluding health and education spending. Strong positive effect of human capital development expenditure was ascertained. There was evidence that shifting the government revenue source from distortionary taxation towards non distortionary taxes can enhance real per capita GDP. Government investment, on the other hand, revealed a short run beneficiary effect being unimportant in the long run. In light of this, the study proposes that in the quest for sustainable growth in Ethiopia, fiscal policy should be designed so that government expenditure is focused in increasing human capital development with limiting government investments in areas which are not complementary for the private sector.

1. Introduction

1.1. Background of the Study

In both developed and developing countries there is a concern for raising living standards over time. However, given the extent and depth of poverty in developing countries, this need is much more pronounced in these countries. Since sustained economic growth is the most important determinant of living standards, there would not be more important issue demanding the research efforts of economists than understanding the causes of economic growth. On the issue of bringing economic growth, Romer (1989) emphasized the importance of economic policies by stating that, 'of all the questions concerning economic growth, the most fundamental is where there are any policies that planners could implement to raise the welfare of all individuals in an economy.'

The central aim of economic policy is to ensure the highest and most general welfare possible to the citizens of a country. In this respect, there can be no other way to improve welfare over the long run but stimulating intense and sustainable economic growth. However the question of whether or not fiscal policy stimulates growth has dominated theoretical and empirical debate for a long time. One perspective believes that government has essential role for economic growth. In this view government role in regulation of market, stabilization of the economy, promoting research and development activities and productive investment in human and physical capital enhance growth. An opposing view, on the other hand, holds that government activities are naturally bureaucratic and inefficient and therefore suppress rather than promoting growth.

Despite the above argument, the role of government for an economy differs across countries depending on the structure and level of development. In developing countries like Ethiopia,

where there is relatively low development of private institutions to mobilize and direct savings, the role of the state is obvious in controlling developmental resources. Since the regulatory apparatus is weak and market signals are imperfect, added with state dominant control of resources, the government has an important role in allocating investment funds. Furthermore, with low level development of infrastructural facilities, social services such as education, health and pervasive multi dimensional poverty, it is perceived that government spending play a major role in the efforts to sustain development. However, government is handicapped with shortage of funds to finance its activities. Thin tax bases and weak tax administrations hinder government to generate sufficient revenue. Moreover poor credit and bond markets and fiscal expenditures that is inflexible in the downward direction leads to heavy dependence on uncertain external sources and the central bank to finance the resultant budget imbalances.

Ethiopia has shown a fiscal imbalance over the last five decades. The surplus government budget in the early 1960s has turned in a continuous and rising deficit. Explicit tax revenue had not been usually high by even the standards of Sub-Saharan African countries. Despite some improvement in revenue collection of government over time, the existing budget deficit witnessed the excess rate of growth in expenditure over revenue. For instance, the total government expenditure to GDP ratio that was maintained at 9.3 % 1960s has grown to 17.3% of GDP in the year 2007/08. In the same period the tax revenue increased marginally from 6.9 % to about 8.8 % as a share of GDP. The ever increasing growth of public expenditure over the revenue results on average 5.4 % of fiscal deficit (excluding grant) over the period 1991/2-2007/08 from a surplus of 0.1% of GDP in 1960s (MoFED, 2008).

The government expenditure has shown changes in its composition following the changes in political regimes and associated economic ideologies. In the Imperial era (before 1974), capital expenditure as a share of GDP has found to be lower as compared with the subsequent

regimes. On average the total government expenditure in 1960/61-1973/74 takes 10.1% of the GDP, of which only 1.46% directed towards capital spending. The average total revenue of the period was 7.2 % of GDP in which 5.3% of revenue as a share of GDP collected from taxation. In relative sense the period is characterized by low level of government budget deficit amounted to 1.55 % of GDP excluding grants. In this period greater emphasis was given to the development of directly productive sectors; agriculture and industry (Teshome 2006).

High involvement of the government in the economy during the Derg Regime (1974/75-1990/91) results an increase in public expenditure. In this regime the total government spending grew to 25.9% of GDP and mainly devoted for financing recurrent expenditures (18.8% as a share of GDP). The period is characterized by high spending for defence as compared with the other regimes. From the proportion of spending on economic activities, the share industrial and agricultural activities were greater on the cost of low spending on human development activities. Relative to the Imperial era, there was some improvement in tax revenue collection. However, the share of tax revenue as a percentage of GDP remained at its low level averaged at 12.8%. Deficit as a ratio of GDP reached to 4.4% from 1.55% in the previous regime (MoFED, 2008).

In the period of Post 1991, the new government has taken policy measures on its expenditure to improve the budget balance and prioritizing its use. These measures results a sharp decline in the size of government during the early post 1991 periods. Up to 1998/99, the size of government expenditure as a share of GDP was generally less than the last decade of the Derg regime. Since 1997, however, the share has been rising in which on average 26.3 % of GDP was registered during 1997/98-2007/08 .Related with the composition of government spending, the current government has the tendency to reallocates resources towards human development activities and infrastructure which are deemed to be growth enhancing.

Even if different governments of Ethiopia embark for the growth of the economy through their policy actions, the performance of Ethiopian economy during the last five decades was not impressive. The growth of real GDP averaged 3.6 % per year over the period 1960/61 – 2007/8. Regarding the trends of the real GDP, generally it has fluctuation trend. During the imperial era, the economy had been growing at the fairly steady state of 3.6% per annum. But the post-1973/74 periods experienced tremendous growth fluctuations of GDP ranging about 11% growths in 1973/74 to -9.5 % in 1984/85. On average the growth rate of real GDP was 1.8% in the entire period. Growth during the post Derg period shows an upward trending specially in recent years. The growth rate of the economy between 1990/91- 2007/8 averaged on 5.5 % per year (MoFED, 2008).

Yet, the current development strategies of Ethiopia are mainly of fiscal nature and fiscal policy is directly linked with the macroeconomic aggregate. Thus, studying the possible effects of government policy actions and economic growth helps to direct efforts to their most beneficial uses for the economy. As a result, it is crucial and timely question from Ethiopia point of view to identify growth effects of government budgetary components.

1.2. Statement of the Problem

Ethiopia is one of the poorest countries in the world. In 2005 GDP per capita (in US\$2003) was calculated as \$97 giving Ethiopia a ranking of 153 out of 154 countries. Using a measure of GDP (Purchasing Power Parity) adjusted to take account of the cost of a basket of common items across different countries, Ethiopia (in 2003 PPP US\$716) was ranked 148th out of 154 countries. On the Human Development Index (HDI) is ranked 169 out of 177 countries and on the Human Poverty Index (HPI) 105 out of 108, (UNDP, 2008). Thus on all four indices in 2005 Ethiopia was ranked in the last 9 among all countries with national statistics worldwide.

To reduce the wide ranging poverty level and to sustain development, Ethiopian government together with development partners adopts a range of developmental strategies and programs since the beginning of this decade. However, bringing about positive and sustainable economic performance depends on the type of investment and its source of financing. In implementing the poverty reduction strategies, the Ethiopian government have invested in physical infrastructure, human development, rural development, human security and capacity building over the last decade. Despite the efforts under taken by the government, income poverty¹ in Ethiopia is still pervasive. This is mainly because the decadal growth in per capita income in Ethiopia has been quite erratic and as a result the long-term trend in GDP growth is pretty small. As of the IMF (2008) report, given the current trend in population growth rate, the Ethiopia's real GDP needs a minimum growth rate of 7 % per annum until 2015 at least to attain the Millennium Development Goals (MDGs). However, the trend of Ethiopia's real GDP growth maintained at its subsistence level with the average real GDP growth of below 4% over 1960/61-2007/08.

The government pro-growth strategies of development are heavily relied on increasing public expenditures. For example poverty targeted public spending alone increase from 17651.5 million birr in 2001/02 to 30189 million birr in 2005/06 (MoFED, 2008). The continuous rise in government spending added with poorly performing revenue collection system based on narrow tax bases results everlasting deficit for Ethiopia. Despite some improvement in the fiscal balance as compared with previous periods, still it stands as a challenge to keep positive budget balance. The level of deficit excluding grants was 3.7% GDP in 1996/97. This figure reaches at a peak of 14.8% of GDP in 2001/2002 and falls down to 7% of GDP in 2007/08. Financing of this deficit relies on both domestic borrowings and external sources. The

¹The income-based measure of poverty is defined as a function of mean per capita income,

magnitude of fiscal deficit, however, points to the country's dependence on external resources. Alemayehu (2005) indicate that the lion share of external source is used for financing capital expenditure. For instance, 48% of capital expenditure in 2000/01 was financed through loan and assistance from external sources. High dependence on uncertain and conditional external sources of finance for the most development oriented capital expenditures would leave the economy at open air when there is no a good deal with the donors.

Most of the recurrent public expenditures of Ethiopia are covered by borrowing from the Central Bank. The public sector borrowing has remained high and it has been about 5% of GDP in 2006/7 and 2007/8 (IMF, 2008). It is believed that excess borrowing of government from the central bank to finance its deficit crowds-out private capital formation by increasing interest rate and reducing the amount of savings available for private investors. Hence, raising proceeds from taxation by taking in to account the distortionary effects of the tax system is a sustainable means of financing public spending. However in Ethiopia the tax-GDP ratio has shown downward trend in recent years. Tax revenue per GDP decrease from 12.4% in 2003/04 to 11% in 2005/06 and further declines to 10% in 2007/2008. High tax on the rebounding agricultural sector and tax breaks of the newly emerged sectors in service and industry attributes for this decline (IMF 2008).

In sum, the government faces three inter-related policy confronts to sustain economic growth in Ethiopia. First, it has to finance the programs and projects launched as a development strategy. Second, it needs to raise finance from sustainable sources without harming the economy. Third, it should rearrange priorities in public expenditures to promote sustainable economic growth. These challenges indicate that most parts of the solution rely on fiscal policy measures. Thus, to deal with these issues, the link between fiscal policy and economic growth in Ethiopia need to be looked at. While the connection across these factors is evidently a complex one, it is possible to draw conclusions based on past experience in Ethiopia.

The issue of public finance has received empirical attention in Ethiopia (see Teshome (1993), Eshetu (1994), Wogene (1994), Yoseph (1998)). However, none of these studies have attempted to analyze the association between fiscal policy and economic growth. They devote their effort on the structure and trend analysis of fiscal instruments. On the other hand, Endrias (1996) and Teshome (2006) have made an attempt to analyze the link between public spending and economic growth. Yet, these studies focused on one side of government budget. It is quite clear from the literature that an empirical test without full specification of the government budget is potentially misleading.

One study in this line is Wondaferahu (2002). This study estimates the relationship between fiscal policy and economic growth in Ethiopia during 1960/61-1999/2000 based on functional classification of budget variables using time series estimation techniques. In that analysis, the government spending are broadly classified in to recurrent and capital classification. However, new theories of growth indicate the problem associated with such classical type of classification. Human development expenditures such as health and education expenditures are grouped under recurrent government spending in the classical classification. But theories and empirical evidences, especially in developing economies, show that these types of expenditure are growth enhancing. Thus, to have an appropriate proposition on the growth effects of fiscal policy components, further detail classification is vital. Moreover, the assumption of implicit financing mechanism of government spending has far reaching policy aspects by identifying the most appropriate method of financing.

In an attempt to make realistic contribution in the links between fiscal policy and economic growth, this study uses Barro type growth model on a disaggregated data for government spending with implicit financing budget element using Ethiopia data. Ethiopia has experienced three political regimes and the associated economic ideologies over the period

1960/61 -2007/08. So it is more reasonable and indicative to test the role of fiscal policy in the process of growth over this period.

1.3 Objective of the Study

The broad objective of this research is to analyse the short run and long run link between fiscal policy and economic growth in Ethiopia. To achieve its broader objective the study specifically focuses on

- 1) Analysing the effect of human capital development government spending on real GDP per capita.
- 2) Investigating the real per capita GDP effect of non-human capital development recurrent expenditures of government.
- 3) Examining the effects of government investment on real per capita GDP
- 4) Identifying the most appropriate means of financing government spending.

1.4. Significance of the Study

Balancing fiscal stance and keeping macroeconomic stability is essential for sustainable economic growth of Ethiopia. This call for identifying the channels through which fiscal policy largely affects economic growth so as to understand how to redirect public spending to most productive areas and raising revenues from non distortionary sources. Unlike the previous empirical works on Ethiopia, this paper contributes to in various ways. First, it takes into account explicitly both sides of the government budget, since the policy variables in the growth regressions include both revenues and expenditures. Second, it extends the past work by disaggregating government expenditures in a more detailed way as potential determinants of growth. Third, for each of these components of public spending it determine the most beneficial source of financing. Moreover, it updates the data set including more recent and

larger data set which covers the period 1960/61 to 2007/08. This research may be useful for further researches in related areas.

1.5. Limitations of the study

One limitation of the study arises in measuring some variables used in the analysis. Due to the absence of data for the real private investment especially for early periods of the study, gross capital formation in excess of government investment is used as a best proxy. The institutional factors which would affect the quality of government activities and hence growth are not explicitly included in the analysis. Given the inconsistency of data from different organizations and even different departments of the same organization, the results of the regression are limited by the quality of the data. However, an attempt was made to keep consistency by taking the same group of variables from the same source.

1.6. Organization of the study

This study is organized in six sections. Following the introduction, section two describes the fiscal and economic performance of Ethiopia over the study period. Section three presents the review of theoretical and empirical literature on the issue of budget components and economic growth. This is followed by empirical model specifications and the estimation methodology in section four. Section five provides the regression results and its interpretation. Section six concludes with policy implications.

2. Economic and Fiscal Performance of Ethiopia

(1960/61-2007/08)

2.1 Introduction

Over the period 1960/61-2007/08 Ethiopia has experienced three political regimes and the associated economic ideologies emanates from the existing political process. In the imperial era of Ethiopia which was on power before 1974 the macroeconomic policy was largely in line with the market economic system. Most of economic activities were under the private sector and public command of economic resources was relatively limited. In general, this era is characterized by small size of government.

The involvement of the government in the economy was very much intensified after 1974 when Derg came to power. In the Derg regime (1974-1991), the government pursued a command economic system and the public finance was directed towards expanding the public sector at the expense of the private sector. High government involvement in the economy and the overall expansion of the public sector has lead to considerable increase in public expenditure. The Derg government had certainly high fiscal deficit and had financed by all available manses which include substantial resource to monetization.

After the down fall of Derg, the transitional government in 1991 undertook economic reforms programme with the initiation and support of bilateral and multilateral donors. The major trust of the reform was to transform the economy from the command economy to market based economy. The current government of Ethiopia, Ethiopian People's Revolutionary Democratic Front (EPRDF) adopts the market oriented economic system as a means to encourage the participation of the private sector. The government took different expenditure and revenue measures to improve the balance of fiscal stance.

The change in structure and the role of government in Ethiopian economic history is also reflected in the performance of the overall economy. The trend of Ethiopian economic growth shows cyclical movements in different periods. The change in this growth of economy is attributed to the political regimes and the economic ideologies of the existing government of the country. Accordingly, Alemayehu (2005) noted that economic performance in Ethiopia is highly correlated with the political process. In line of this view, this part of the paper describes the fiscal and economic performance of Ethiopia in the three distinct political regimes.

2.2 Trends in Real Gross Domestic Product (GDP)

The Imperial regime political feature was characterized by land owning aristocracy where the King has dominant power at the apex of the system. In economic aspect it largely followed a market based economic policy. Growth performance during that period (1960/61-1973/74) was quite good. The real GDP increased by an average of 3.6 % per annum. This rate of growth was higher than the 2.6 % growth in population results an average annual per capita income growth of 1.4 %.

With the fall of the imperial regime and coming of Derg, there was a radical shift in political and economic spheres. Many of the means of production, distribution and exchange were nationalized in 1975 and socialist economic ideologies became the guiding principle of the economy. Growth during the Derg period (1974/75 –1990/91) was lower than that registered before 1974 and averaged at 1.8%. The population statistic on the other hand showed 2.9 % average annual growth. Income per head therefore fell on average by 1.2 per cent per year. Various factors such as instability induced by new policy of the regime, war with Somali, drought of 1983/84 and overall internal instability can be cited as causes of this poor performance.

Table 2.1: Summary of Real GDP Growth of Ethiopia (1960/61-2007/08)

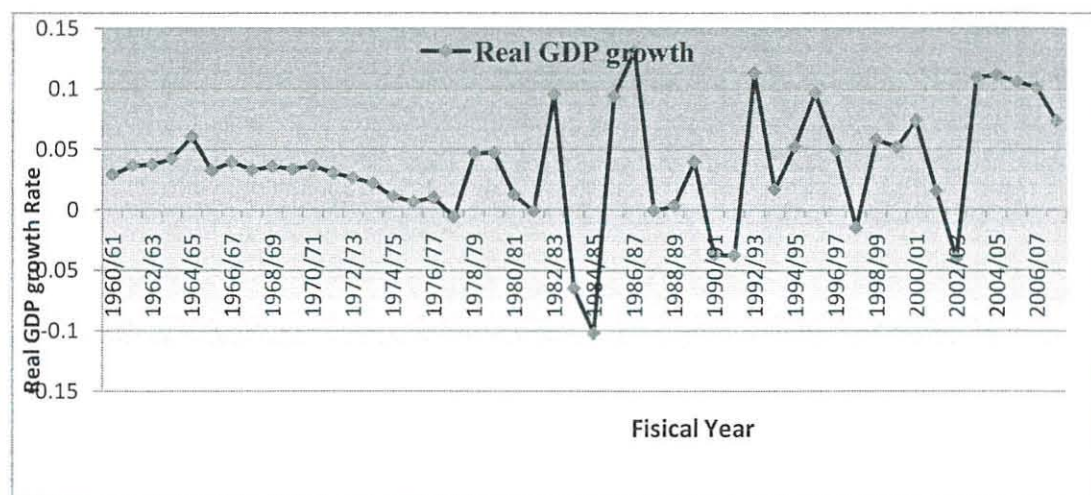
Period Average	1960/61-1973/74	1974/75-1990/91	1991/92– 2007/08	1960/61-2007/08
GDP Growth	3.6	1.8	5.5	3.6
Per-Capita GDP	1.4	-1.2	1.2	0.6

Source: Author's computation using data from MoFED and CSA

Growth performance during the post-Derg period (1990/91-2007/08) is reasonable. Real total and per head GDP on average grew by 5.5 % and 1.2 % per annum, respectively. The period witnessed a major policy shift of liberalization of the economy to encourage private sector. These policies, partly attributes the good growth performance as compared with the previous two regimes.

The growth record of Ethiopia is not only mixed but typically irregular. A look at on a-year-to-year basis of growth show rhythmical and unstable trend due to its heavily dependent both on vagaries of nature and external shocks. Figure 2.1 below shows the erratic nature of real GDP growth rate over 1960/61-2007/08.

Figure 2.1 Trends of Real GDP growth rate for Ethiopia (1960/61-2007/08)



Source: own computation using data from MoFED (2008).

The above figure exposes that the fluctuation of real GDP growth was more pronounced in the Derg regime. Prior to 1974, it was in 1973 that the economy performed at its low annual growth rate of 2.2 %. In the subsequent periods the growth rate decelerated and recorded a negative growth rate in 1977/78. Among other things the instability induced by the emerging new policy as well as the war with Somalia could explain a good part of this negative growth performance. During 1978/79- 1980/81 is relatively characterized by stability and favourable weather condition hence the annual growth rate averaged at 3.5% back from negative value. In 1983/84 and 1984/85 growth decelerated by 6.5% and 10.1%, respectively. These were periods of severe drought. The rate rose to an average of about 11.3% in the following two years, mainly showing the recovery from depression. The economy growth rate fell back to 0.03% in 1988/89. In the period of transition from the Derg regime to the new government of 1990/91 and 1991/92, the real GDP dipped to -3.6 %. In general 1980s were characterized by weakening economic performance which can largely explained by a prolonged civil strife, which devastated social and economic infrastructure, recurrent droughts and inappropriate economic policies and management, which reject the role of private sector.

The Ethiopian economy turned to growth in the early 1990s. This recovery was, however, interrupted by two major shocks: the war with Eritrea (1998/99-1999/00) and a severe drought in 2002/03. At the outset of the war in 1997/98 the real GDP retarded by -1.5 % and the severe drought resulted a -4 % growth rate in 2002/03. Since then growth has started again and with a stronger momentum than before. Unlike the period between 1974 and 1991, GDP growth during this period was higher than population growth. Income per capita therefore increased on average by more than 1.9 % per annum. An average annual real GDP rate of growth of 10% has been registered during the period 2003/04 to 2007/08.

2.3 Fiscal Performance of Ethiopia

2.3.1 Structure of Government Budget

A detailed assessment of the Ethiopian fiscal performance will not be complete without first examining the structure and coverage of the fiscal budget and its respective constituents. Ethiopia's fiscal budget covers all governmental functions and activities at national, regional and local levels. On the revenue side there are three broad categories: tax revenue, non-tax revenue and grants. The expenditure side comprises current and capital expenditure. On the other hand, taxes revenues are further divided into direct taxes, indirect taxes and foreign trade taxes.

Direct taxes are taxes imposed directly on persons or legal person entities in the form of personal income taxes, rental income tax, agricultural income tax, property taxes, corporate profit and income taxes, chance winning tax and others. Indirect taxes are those taxes levied on expenditure. It includes excise and sales tax on locally produced goods, services sales tax, stamp and duty. Taxes imposed on export and import form foreign trade tax. Custom duty, excise tax and sales tax on imported goods are the main components of foreign trade tax. Non- tax revenue consists of charges and fees, sales of goods and services by public sector, government investment income, pension contributions and privatization proceeds. Grants, which are essentially capital receipts, include (largely) borrowing from abroad and local sources.

The expenditure side of government is traditionally classified under recurrent and capital expenditure headings. Recurrent government expenditure consists spending that are repeated in nature. The recurrent expenditure further structured functionally as: general services, economic services, social services and other expenditures. Capital public expenditure on the other hand, consists of outlays for acquisition of new capital assets and improvements of

existing fixed assets. Economic development, social development, the general development spending are the components of capital spending.

Despite the above mentioned functional classification of Ethiopia's total public expenditure, for analysis purpose, this paper follows the theoretical classification of spending. So, the total government expenditure is classified into three main categories: human capital development government spending, other expenditure and government investment. Similarly the revenue sides categorized under distortionary, non-distortionary and other revenues.

2.3.2 Public Expenditure Trends

In absolute terms, government spending has upward trend in Ethiopia without considering inflation. However nominal GDP follow the same path with public spending. So it is essential to look at the trend of public spending relative to the capacity of the economy rather than at its level value. Table 2.2 reveals that the GDP share of government total expenditure averaged at 21.1% over the study period while that of government capital expenditure and human development (health and education) expenditure has been consistently below 7% throughout the entire period and averaged at 4.8% and 3.6 % respectively. Generally the total expenditure as a share of GDP has shown upward trend in early periods of the study up to 1991/92 (See figure 2.2.). During the emperor era (before 1974) there was moderate growth rate of government spending. Limited involvement of government in the economy attributes for low growth of government in this period. On average the total expenditure of government held out at 10.1 % of GDP per annum over the period 1960/61-1973/74. The period witnessed a relatively small share of GDP for economic development and human development expenditure amounted on average 1.2 % and 1.9% per year. However, the sectors expenditure has showed a decimal improvement from time to time.

Table 2.2: Categories of Expenditure as a Shares in GDP (1960/61 – 2007/08)

Period Average (As % of GDP)	1960/61- 1973/74	1974/75- 1990/91	1991/2- 2007/08	1960/61- 2007/08
Health and Education Expenditure	1.9	3.5	5.2	3.6
Capital Expenditure (excluding health & education)	1.2	6.3	6.2	4.8
Other Expenditure	7	16.1	14	12.7
Total Expenditure	10.1	25.9	25.4	21.1

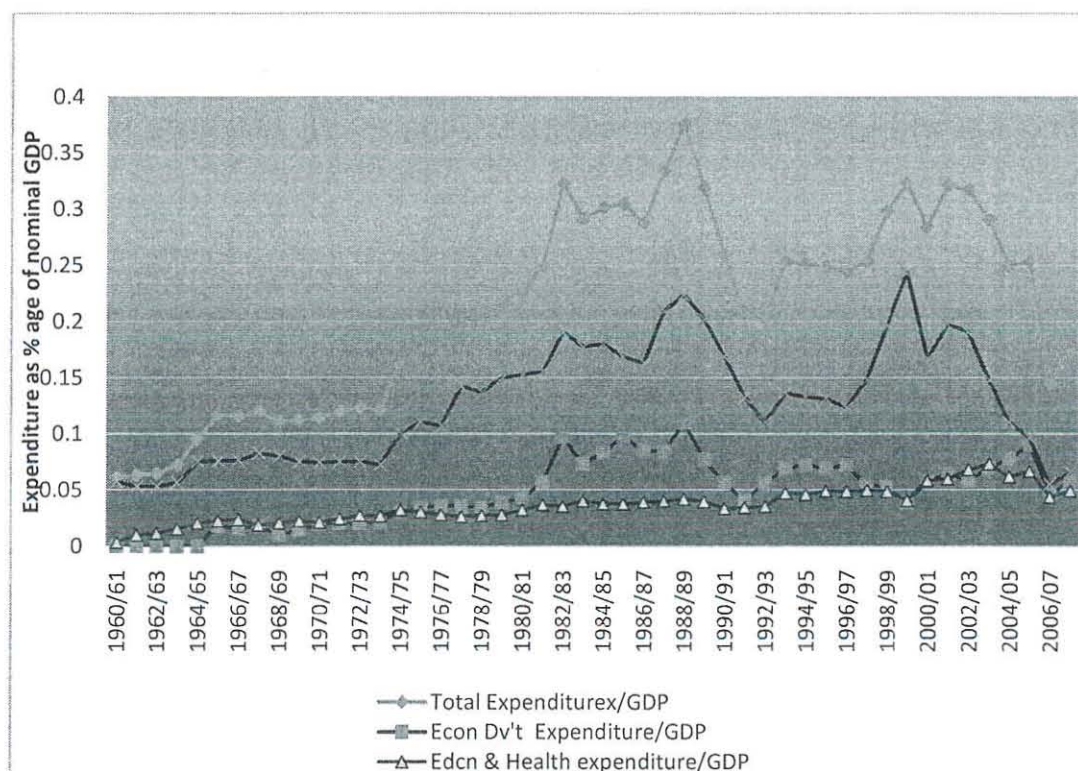
Source: Author's computation using data from MoFED

A sharp increase in total government spending was recorded in military government regime. During the Derg period, the rise in recurrent spending especially, defence and relative activities, high involvement of government in the economy and overall expansion of public sector have lead to a substantial increase in the general government spending. Total expenditures as a proportion of GDP grew from yearly average of 10.1 % in imperial era to 25.9 % in the military regime. This growth was largely the result of the increase in expenditures categorized in unproductive (other) expenditures in this study specifically for defence and general services. For example, during the 1977/78 war with Somali, defence took close to 60% of the budget. Capital and human development expenditure remained at their subsistence level and on average accounted 6.3% and 3.5% of GDP per annum, respectively.

The current government has embarked on a cautious program of economic reform, including privatization of state enterprises and rationalization of government spending to keep the fiscal balance. While the process is still ongoing, the government remains heavily involved in the economy. Compared to the pre-1991, total government spending has shown a little decline and took an average of 25.4% as a share of GDP. As shown on the figure 2.2 below, the total spending has been falling for late 1980s and beginning of 1990s. The declining trend in

expenditure over this period may be attributed to austerity measures imposed on the government by the Bretton woods institutions - either in form of WB's structural adjustment programmes or through IMF's stabilization programmes.

Figure 2.2: Trends of Components of Ethiopia's Public Spending (1960/61-2007/08)



Source: Authors calculation of MoFED data.

In the years 1997/98 to 1999/00 pressure on macro economy has been observed mainly due to rise in hostility with Eritrea. Government expenditure showed an increasing trend from 24.4% in 1996/97 to 32.3% in 1999/00 as a share of GDP. The macroeconomic policies between 2001/02-2007/08 are built on the continuing support of the IMF program of poverty reduction and sustainable development. There has been a notable change in government policy and action in favour of social sector and infrastructure in the current and capital budget allocation. In recent years poverty targeted expenditures such as expenditure on education, health, agriculture, water, and roads have grown significantly. Accordingly, spending on human

development (education and health) has been increasing in relative terms and has been even more pronounced subsequently after the launching of the Education and Health sector development programs in 1997/98. Total spending on education and health increased from 3.5% of GDP in 1992/93 to 5% in 1996/97 and it kept the same value for the successive two years. In 1999/00 human development spending showed modest decline to 4.1%. The trend reversed back and it rose to 6.8 % and 7.3 % in 2002/03 and 2003/04 respectively. With a slight decline, this spending became 5 % of GDP in 2007/08.

2.3.3 Sources of Revenue

Revenue mobilization had risen under the Derg period with the share of tax revenue in GDP increased from an average of 7.2% over the decade preceding 1973/74 to an average of 12.8% over 1973/74-1990/91 (see table 2.3). With a majority of population living a subsistence level, there was limited opportunity to increase taxes on personal or agricultural income. As a result the imperial government relied mainly on foreign trade and indirect taxes to generate revenues. For instance, over 1960/61-1973/74 taxes on foreign trade and indirect taxes on average accounted for 3.1 % and 2.1% of GDP per year in their respective order. At the same time, direct taxes accounted for less than 2% as a share of GDP.

The revolutionary government changed the tax structure in 1976, replacing taxes on agricultural income and rural land with a rural land-use fee and a new tax on income from agricultural activities. The government reduced the tax collection problem that existed during the imperial period by delegating the responsibility for collecting the fee and tax on agriculture to peasant associations which received a small percentage of revenues as payment.

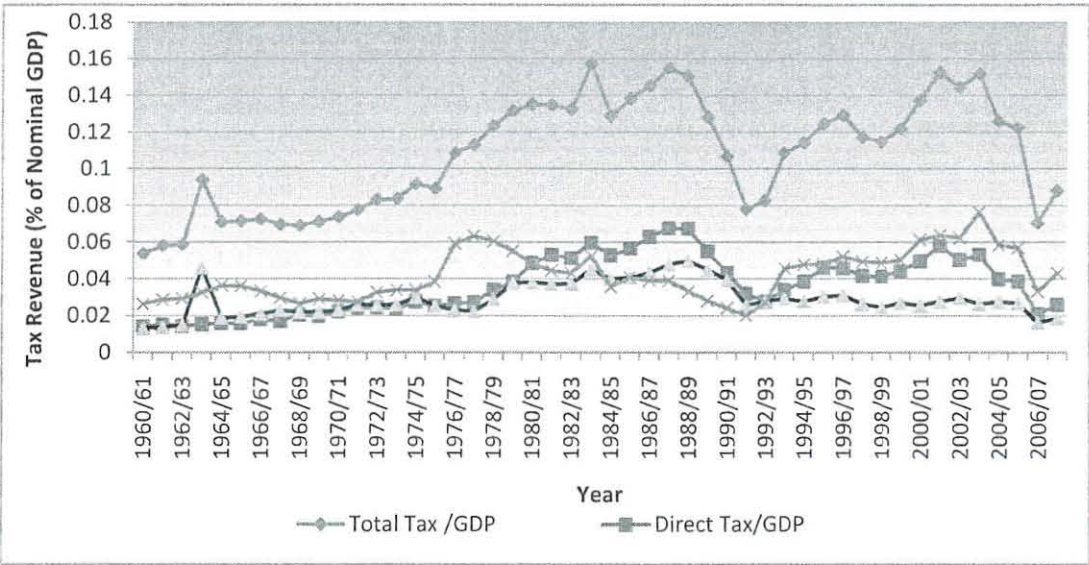
Table 2.3 Summary of Government Tax Revenue Components of Ethiopia
(1960/61-2007/08)

Period Average (% of GDP)	1960/61- 1973/74	1974/75- 1990/91	1991/2- 2007/08	1960/61- 2007/08
Direct Tax	1.9	4.7	4.1	3.6
Indirect Tax	2.3	3.7	2.6	2.9
Foreign Trade Tax	3.1	4.4	5	4.2
Tax Revenue	7.2	12.8	11.7	10.8

Source: author's computation based on MoFED (2008).

The components of tax revenues (in Table 2.2) shows that trade taxes, which have been the major source of revenue for governments in pre-1974, have increased to an average of 4.4 % of GDP during the period 1974/75-1990/91, but direct tax revenue being 4.7 % of GDP, dominate the foreign trade and indirect tax revenue. This is an encouraging trend in expanding the amount of tax revenue. On average, the indirect tax revenue has also increased to 3.7 % as a share of GDP.

Figure 2.3 Trends of Tax components of Ethiopia (1960/61-2007/08)



Source: Data from MoFED; author's computation

The post-Derg government has registered lower average tax revenue relative to the Derg regime. The average total tax as percentage of GDP declined from 12.8 % of pre-1991 to 11.7 in post- 1991. The components of tax revenue show that, the source of tax revenue relied more on foreign tax (5%) followed by direct (4.1%) and indirect (2.6%) taxes. After the fall of Derg receipts of taxes on goods and services have generally increased in Ethiopia, but the more significant increases have occurred during the 1980s (See Fig 2.3). By 1987/88 the share of tax revenue accounted about 15.5 % of GDP (above twice of the 1960s average). Although this ratio fell to 8.3 % per cent in 1992/93, it has shown a gradual increase in the subsequent four periods. Of this foreign trade taxes took the lion share.

The government has enacted a series of tax reforms starting in 2001/02 to boost tax revenues through improved tax administration and compliance. Results indicated that some positive progress was made in this regard. Total tax revenue, for example, rose from 11.5 % of GDP in 1998/99 to 15.2% in 2003/04. During the four year period (2004/5-2007/8) revenue from taxation has exhibited a declining trend (see fig. 2.2). Given the encouraging GDP growth

during the period, one would have expected tax revenue to contribute more to total revenue. The data indicates that the proportion of revenue on domestic transactions (direct and indirect taxes) has been falling over the period more than foreign trade taxation.

2.3.4 Trend of Fiscal Balance

As shown in the above discussion the major components of tax revenue have not kept pace with the growth of expenditure. The implication of the differences in growth rates of expenditure and domestic revenue is a persistent primary budget deficit over the sample period. The fiscal deficit (without grant) in Ethiopia has averaged approximately 0.6 per cent of GDP in the study period (Table 2.4). As Figure 2.4 shows up to the mid of 1960s public revenue persistently outstripped expenditure resulting budget surplus which peaked at about 4 % of GDP (excluding grant) in 1963/64. After 1964, the public expenditure-revenue gap widened and made deficit as a notable feature of Ethiopia’s fiscal history.

Table 2.4: Summary of Ethiopia’s fiscal balance with and without Grant
(1960/61-2007/08)

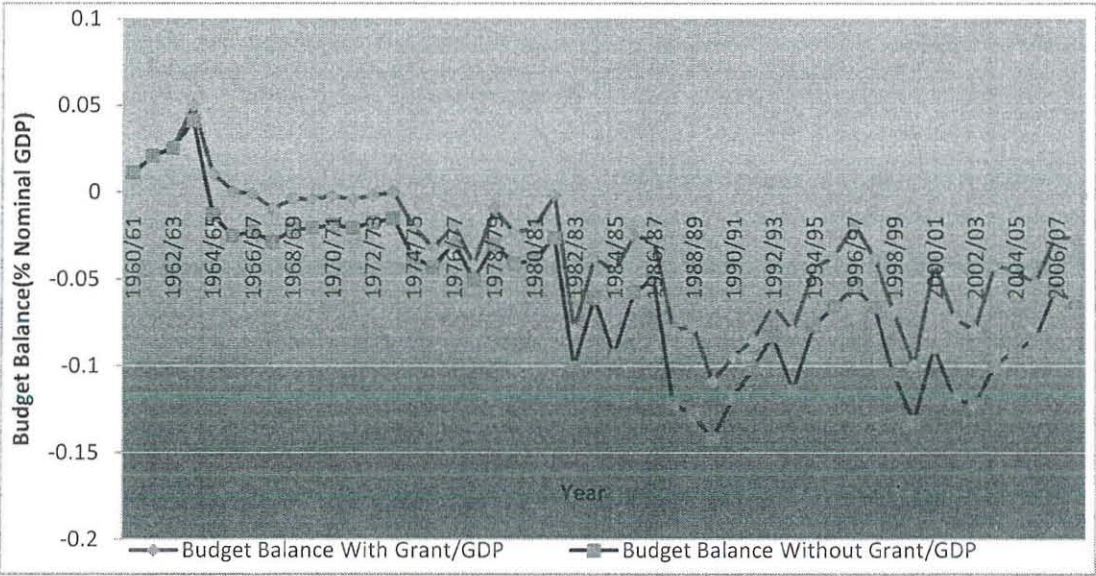
Period Average (As a % of GDP)	1960/61-1973/74	1974/75-1990/91	1991/92-2007/08	1960/61-2007/08
Deficit (Including Grant)	0.1	-4.4	-5.4	-3.3
Deficit Excluding Grant	-0.1	-0.7	-0.9	-0.6

Source: Data from MoFED; author’s computation

Conservative fiscal practices of the imperial era resulted, manageable deficits and deficit without grant averaged at 0.1% of GDP for the period 1960/61-1973/74. About 80 percent of these deficits were financed by borrowing from external sources and an extensive use of domestic bank borrowing was not made due to relatively lower deficit (Teshome, 2006). Excessive growth in government spending relative to its revenue caused a large budgetary

deficit in the Derg period. On average, deficit excluding grant as a ratio of GDP turned out to be 7% over the entire period of the regime (see Table 2.4).

Figure 2.4 : Trends of Fiscal Balance of Ethiopia with and without Grant (1960/61-2007/08)



Source: Data from MoFED; author's computation

A prominent feature of figure 2.4 is the sharp increase in budget deficit in the early 1990s when the share of budget deficit without grants rose from 5% in 1986/87 to a high of 14.2% in 1989/90 before falling gradually to a low of 5.5% in 1996/97. The rise in deficits around this time is partly due to fiscal indiscipline on the side of government at the end of the Derg regime. During the war, the government had certainly run a very high fiscal deficit and had financed it by mainly borrowing from domestic banks. On the other hand, the decline of deficit after 1996/7 could be attributed to the fiscal austerity measures undertaken by the government under the adjustment program which has emphasized improving tax administration and expanding tax base. This was accompanied by stringent expenditure measures, especially in the area of defence spending. In general, the post-Derg period of 1990/91 to 2007/08 witnessed average expansion of deficit and the ratio of deficit to nominal GDP, excluding grants averaged at 9% which however decline to 5.4 % if grant is included

(see table 2.4). In financing the government deficit both external assistance and loan had crucial role during the post Derg period. In financing the increasing pro-poor government spending to achieve the MDGs, MoFED also emphasised on the significant role of external financing in its needs assessment report.

3. Literature Review

3.1 Theoretical Literature

3.1.1 Neo-Classical Growth Theories

The analysis of economic growth has long been based on the Solow (1956) and Swan (1956) growth models, also termed as neo-classical growth theory. In the Solow-Swan models ,as described by Romer (1996),at any time (t) the economy has some amount of capital(K) ,labor (L) and knowledge(A) and they are combined to produce output(Y).The production function assumes constant returns to scale and takes the form;

$$Y(t) = F[K(t), A(t)L(t)] \dots\dots\dots 3.1$$

The initial level of capital, labor and knowledge are taken as given and labor and knowledge grows at constant exogenous rate of n and g respectively. Furthermore the output is divided between consumption and investment. The model assumes that the saving rate (s), which is defined as fraction of output devoted to investment, is exogenous and constant.² Since the economy may grow overtime, the model mainly focuses on the capital stock per unit of effective labor, k , rather than the unadjusted capital stock, K . The fundamental equation of the Solow growth model is derived as;

$$\frac{dK(t)}{dt} = Sf[k(t)] - (n + g + \delta)k(t) \dots\dots\dots 3.2$$

² the rate at which the stock of capital changes over time is $\frac{dK(t)}{dt} = sY(t) - \delta K(t)$ where δ is depreciation rate

Suppose k^* denotes the value of k where actual investment equals break even investment. In the situation where $k=k^*$, $dk(t)/dt = 0$. Thus irrespective of where K starts, it converges to K^* . Since K is constant at K^* , K is growing at a rate of $n+g$. With both capital and effective labor growing at a rate $n+g$, the assumption of constant returns implies that output Y is also growing at the rate equals to $n+g$. Indeed capital per worker and output per worker growth at a rate of growth rate of knowledge (g). Thus the Solow model implies that, the economy converges to a balanced growth path irrespective of its starting point.

The convergence property derives in the neoclassical model from the assumption of diminishing returns to capital. The model predicts that, if all economies were intrinsically the same, except for their starting capital intensities, then the convergence would apply in an absolute sense; meaning, poor countries would tend to grow faster per capita than rich ones. However, if economies differ in various respects, then the convergence force applies only in a conditional sense. The growth rate tends to be high if the starting per capita gross domestic product (GDP) is low in relation to its long run steady state position. Therefore economies that have less capital per worker (relative to their long run capital per worker) tend to have higher rates of return and higher growth rates (Barro, 1996).

Arrow (1962) was among the first economists who relaxed the assumption of decreasing returns to capital by incorporating the concept of learning-by-doing. The argument is that the level of knowledge is itself a productive factor and that new technology is discovered as investment takes place. However, knowledge gains are exogenous because a producer can increase his efficiency only through an increase in the cumulative aggregate output of capital goods, whereby the quality of each new capital good is superior to that of previous ones. A knowledge gain is assumed to be a public good, with the result that the benefits of a firm's investment spill over to the rest of the economy. This means that the production function of

the economy as a whole displays increasing returns, while the production function of each individual firm demonstrates constant returns to scale.

An increase the saving rate raises the steady state of capital via its incremental effect on the actual investment. But this continues till it reaches to a new steady state level a point where it remains constant. When the stock of capital shifts from one steady state to the other, output per worker growth due to increase in both knowledge and stock of capital. Thus the growth rate exceeds the growth rate of knowledge. When stock of capital reaches at new steady state value, growth rate of knowledge accounts only for the growth rate of output per worker Romer (1996). Hence a permanent increase in the saving rate produces a temporary increase in the growth rate of output per worker. Specifically, a change in the saving rate has a level effect but not a growth effect. It changes the economy's balanced growth path and thus the level of output per worker at any point in time but it does not affect the growth rate of output per worker on the balanced growth path.

The fundamental conclusion of the neo-classical model is that the main sources of growth variation either over time or across parts of the world in output per worker is the difference in effectiveness of labor and whose behaviour is taken as exogenous. Growth in income per capita in the steady state is exogenously given and depends on the exogenous rate of technological progress that falls like 'manna from heaven' (Brons et al, 1999).

Despite the introduction of knowledge as a production factor, Arrow's conclusion about the ultimate determinant of economic growth does not diverge from that of the Solow model: given the assumption of an exogenous and fixed labour quality, the marginal product of capital diminishes with a fixed supply of labour; as a result, the rate of growth of per capita output is a monotonically increasing function of the growth rate of population. Like conventional models with diminishing returns, it predicts that the rate of growth is zero in an

economy with zero population growth. Like in the Solow-model, there are no invention costs (since the supply of technologies expands jointly with that of capital goods) or adoption costs (meaning that all countries apply state-of-the-art technology).

In the Solow tradition the government policy might affect the growth rate of the economy through its effect on the saving rate. The treatment of government tax revenue as saving and investment is most likely to affect the fraction of output that is invested. Since it is presumed that all determinants of growth are exogenous, it is obvious that government policy cannot affect growth rates, except temporarily during the transition of economies to their steady state. Yet, Baxter and King (1993) show, based on simulating a neoclassical model for the United States, though fiscal policy may not be able to change income growth permanently, its effects on income levels can be substantial and may take twenty years or more to be fully realised.

Neoclassical theory thus implies that economists can take the long-run growth rate as given exogenously from outside the economic system. Consequently, the role of government in growth process was usually not investigated in standard neo-classical growth models. Barro, (1996) clearly stated that, the neoclassical model explains everything but long run growth in an unsatisfactory situation.

3.1.2 Endogenous Growth Theories

New endogenous growth models developed by Romer (1986), Lucas (1988), Barro (1990) and Rebelo (1991), generate long run growth without relying on exogenous changes in technological progress. New growth models differ as to what mechanism is employed to endogenize the impact of technical progress on growth. The mechanisms in early models (Romer, 1986; Lucas, 1988) are dynamic externalities at the aggregate level, i.e. technology is endogenously provided as a side-effect of private investment decisions. Romer (1986) assumes that the stock of knowledge of a firm increases in proportion to the firm's

expenditure on research and development, while spillovers from these private investments increase public knowledge. In the absence of an effective patent market, the stock of knowledge is like a public good. Even though Romer's model is similar to Arrow's, technological change is endogenized, since in his model long-term growth is driven primarily by the creation of new knowledge by forward-looking, profit-maximizing, private agents. The investment which creates new knowledge displays diminishing returns. But, given the knowledge spillovers due, for example, to the inadequacy of patent protection, the production of goods from new knowledge exhibits increasing returns. Since new knowledge is produced from investment with diminishing returns, each profit-maximizing private agent who invests in knowledge creation – and hence incurs invention costs - faces an optimal upper limit to his investment. Thus, technical change should be responsive, endogenously, to policy, such as tax and fiscal incentives.

The model by Lucas (1988) is also similar to Arrow's (1962). However, the spillover effects which increase the level of technology stem from investment in human capital rather than in physical capital. The model focuses on general skills and in particular those which cannot be separated from the worker who has acquired them. Knowledge grows with the time spent on education and the efficiency with which this time is translated into human capital. This efficiency is associated with different factors depending on whether education is understood as schooling or as learning-by doing. Regarding schooling, efficiency increases with the quality of schooling which, in turn, improves with increased general knowledge. Here, the mechanism of raising long-term growth is learning or doing rather than learning-by-doing. Differences in long-term growth are the result of different rates of human capital accumulation, stemming from differences in countries' time allocation decisions. Regarding learning-by-doing, efficiency is associated with the type of process workers are engaged in. One might think of some activities as carrying with them a high rate of skill acquisition and

others, routine or traditional ones, as associated with a low rate. If so, the mix of goods a society produces will affect its overall rate of human capital accumulation and growth (Lucas, 1990). A country's initial comparative advantage determines the goods it produces, and hence its rate of human capital accumulation and growth.

The recent literature on endogenous economic growth allows for effects of fiscal policy on long-term growth. In such models, fiscal policy can have long-run effects through its effects on factor accumulation (e.g. capital income taxes, public investment) or it influences technical progress via public research and development (R&D) (Gemmell 2001). Moreover government role in promoting accumulation of knowledge, productive public investment, human capital development, maintenance of law and order can generate growth both in the short- and long-run (Colombier , 2006). Unlike neoclassical growth model, the distinguished feature of the public-policy endogenous growth models is that fiscal policy can determine both the level of the output path and the steady-state growth rate. This is clearly illustrated on Barro (1990) growth model and its extensions.

3.1.2.1 Fiscal Policy and Economic Growth in Endogenous Models

Barro (1990), unlike most of the endogenous literatures, provides a detail explanation on the association between fiscal policy and long run economic growth by simultaneous consideration of both public expenditure and its financing mechanism. This basic frame work extends endogenous growth models by including the public sector that affects production or utility. According to Barro (1990) and its extension Barro-Sala-i-Martin (1992), a representative infinite-lived household maximize a utility function of the form;

$$\begin{aligned}
 U &= \int_0^{\infty} U[C(t)]e^{-\rho t}dt.....3.3 \\
 &= \int_0^{\infty} [C(t) - 1][1 - \sigma]^{-1} e^{-\rho t}dt
 \end{aligned}$$

Where $C(t)$ is consumption per head at time t and $\rho > 0$ is the time discount rate. Similarly $-\sigma$ denotes constant elasticity of marginal utility.

There are n producers in the economy each producing per capita output (y) using per capita private capital (k) and publically provided inputs (g) by the production function;

$$Y = AK^{1-\alpha} g^\alpha \dots\dots\dots 3.4$$

$$0 < \alpha < 1$$

The production function is assumed to satisfy constant returns in the broader sense of capital which encompass private and public capital. But the two types of capitals exhibit diminishing returns when they are considered separately. The government is also assumed to produce per capita unproductive goods (g_c) which enter in the consumption of the private agents but do not have an effect on the production function. In this model each person works a given amount of time hence there is no labor-leisure choice.

The government expenditure is financed contemporaneously by a proportionate tax on output at a rate (τ) and a lump-sum tax (L) but deficit financing is ruled out. Thus, the budget constraint becomes

$$ng + g_c = L + \tau nY \dots\dots\dots 3.5$$

Here taxes on output are deemed to affect the investors' decision to invest and are distortionary whereas lump-sum tax does not (non distortionary) Barro (1990). Given the model above, Barro and Sala-i-Martin (1992) derive the following steady-state growth rate (γ)

$$\gamma = \frac{1}{\rho} (1 - \tau)(1 - \alpha) A^{\frac{1}{1-\alpha}} \left(\frac{g}{Y}\right)^{\frac{\alpha}{1-\alpha}} - \sigma \dots\dots\dots 3.6$$

From the above growth rate equation it is observed that, output growth in the steady state positively depends on productive per capita government expenditure (g) where as

distortionary taxes (τ) have adverse effect. But the growth rate is independent of the lump sum tax (L) and government per capita consumption spending (g_c). Likewise private capital is endogenously determined in the model, so does not appear in equation. Gemmell (2001) points out that the overall effects of tax or expenditure changes depending up on the financing means. Summary of the effect of different tax/expenditure and financing mechanism is presented in Table 3.1 below.

Table 3.1 Growth Effects of Taxes and Expenditure

Financed By	Productive Spending	Unproductive spending	Deficit
Distortionary Tax	Positive at low and negative at high government size	Negative	Ambiguous
Nondistortionary Tax	Positive	Zero	Negative
Deficit	Ambiguous	Negative	-----

Source: Gemmell (2001).

Table 3.1 shows that not only do the predicted growth effects of taxes or expenditures depend on the type of tax/expenditure considered (and hence the tax/expenditure mix, as well as the total level), but the overall effect of a tax or expenditure change depends on how this is financed (compensating tax or expenditure change). This is reinforced when budget surpluses/deficits are allowed. Even where all government expenditure is productive, the use of distortionary taxes to finance this can, at sufficiently large tax/expenditure levels, generate negative growth effects.

In an extension to the expenditure side of the Barro (1990) model, Devarajan et al. (1996) consider the possibility of government expenditures which are productive to varying degrees.

They define productive expenditure as ‘that component of public expenditure an increase in whose share will raise the steady-state growth rate of the economy (Devarajan et al. 1996). They then show that the growth rate is a function not just of the relative productivities of any two expenditure components, but also of the relative shares of these components in total expenditure. The intuition behind this result is that while more productive categories have higher average productivity in equilibrium, maximum steady-state growth is achieved where marginal productivities are equalised. This equality determines the growth maximising public expenditure shares which, if exceeded will cause lower marginal productivity (than elsewhere) in the over expanded’ category. Therefore, in the Devarajan et al. model, the mix of different expenditures, as well as the growth-enhancing potential of each, is important for longrun growth outcomes.

For the Barro frameworks it is clearly important to distinguish productive from unproductive expenditures and distortionary from non-distortionary taxes within public budgets. This classification is based on the view that: Productive expenditures enter in the production function of the private sector and influence the marginal product of private capital including while unproductive expenditures enter in to private agent’s utility function and affect consumer’s welfare but not the marginal product of private capital. On the side of taxation, distortionary taxes distort the incentives of economic agents to invest in physical and human capital thus reducing growth whereas non-distortionary taxation does not affect the motivation of economic agents investment decision, due to the nature of the utility function assumed for the private agent.

On spending, a typical ‘first approximation’ is to treat government consumption spending as ‘unproductive’ (i.e. it affects consumers’ welfare but not private production efficiency) and treat investment spending as ‘productive’. The latter should perhaps include (some or all) education and health spending because of their effects on human capital accumulation. The

growth effects of public expenditure on current transfers such as social security remain a debated issue. If these merely affect welfare they can be treated analogously to other ‘unproductive’ expenditures. However, as noted above, transfers may affect savings rates, inequality, enforcement of property rights, etc. and could therefore be either growth enhancing or retarding depending on the empirical relevance of the various hypothesised growth mechanisms (Gemmell, 2001). However, it is not theoretically very clear which items of public expenditure fall under these categories. So, there is some disagreement over the classification of particular expenditure as productive or non-productive. Some researchers such as Kormendi and Meguire (1985), consider defence and education outlays as government consumption and hence unproductive where as Barro (1990) takes them as productive. Therefore the issue of classification more depends on the empirical tests. In the Barro (1990) model ‘distortionary’ taxes are those distorting the decision to invest, essentially capital and labour income taxes. With no labour-leisure education choices, consumption taxes are non-distorting.

The analysis of Barro (1990) and Barro-Sala-i-Martin (1992) on steady growth rate is based on the assumption that the government run a balanced budget each period, an assumption which is impractical especially in the less developed countries. In extension to the Barro-type model, Kneller et al (1999) and Bleaney et al (2001) take in to account a more realistic view by assuming a non-balancing government budget and possibility of deficit financing. So, the budget constraint is constructed by counting a budget deficit/surplus term (b) as;

$$ng + gc + b = L + \tau nY3.7$$

Bleaney et al (2001) predicted positive sign for g and negative for τ .Where as both g_c and L are expected to be growth neutral. The effect of b depends on the proposition of Ricardian

equivalence; it is hypothesized to be zero as long as Ricardian Equivalence holds and non zero otherwise.

3.2 Fiscal Variables and Economic Growth

Fundamental to the discussion is the issue of representation of fiscal policy; literatures show that there are different views as to what variable best captures fiscal stance. In the discussion of Tanzi and Zee (1997), fiscal instruments are grouped under three conventional classifications: taxation, public expenditure and aggregate budgetary balance. However, the literature does not systematically single out one indicator as the most representative in terms of fiscal policy. Though many papers such as Lucas (1990), Rebelo, (1991); Xu, (1994), Stokely and Rebelo (1995), Engen and Skinner, (1996) used tax rates to capture fiscal policy stance, Martin and Fardmanesh (1990) and Easterly and Rebelo (1993) have used deficits as a proxy for the fiscal policy .On the other hand in the estimation of Aushauer (1989), Barro, (1990), Easterly and Rebelo (1993) public expenditure have used as a representative of fiscal variables. Nevertheless, Levine and Renelt (1992) find that none of these fiscal indicators has a robust correlation with economic growth when treated in isolation.

Fu et al (2003) suggested that the inefficiency of a single fiscal policy variable for the representation of fiscal stance stated in Levine and Renelt (1992), but dubious in the majority growth literature, may arise due the failure of any one budgetary element to fully represent a particular fiscal policy stance. The argument is that, since each fiscal variable are related, the change in one of these variables has a wide spread effect on the others. For instance, the impact on growth of taxes would depend on how the tax revenue is spent i.e. the composition of public expenditure, as well as on how taxes affect the overall budgetary balance. An increase in government expenditures could be considered expansionary if it were financed by deficit spending. However, it could also be considered contractionary if it were financed by an

increase in taxes because such a policy would imply an increase in the size of the public sector. This conclusion is confirmed by the analysis of Martin and Fardmanesh (1990) with simultaneous consideration of expenditures, taxes and deficits in evaluating their growth effect.

3.2.1 Taxation and Economic Growth

Usually a clear and direct linkage between fiscal policy and growth has been associated with tax policy. Tanzi and Zee (1997) underlined that the allocative effects of taxation on labor-leisure choice, on consumption- saving behaviour and on the relative profitability of different industries reveal the direct relation of tax policy with economic growth. Obi (2007) summarized the link between tax and economic growth on the basis of allocative, factor accumulation and tax incentives effect of tax policy in the decision of economic agents. The categorization inspires that the structure of taxation could have important implications for growth. This consideration is actually not limited to simply the area of capital income taxation or even to income taxation in general. In fact, it has broad significance for the overall structure of the entire tax system.

When policy matters for growth, a tax on income from physical capital would lower the rate of after tax returns to the investments of the private sector and leads to decline in physical capital accumulation thus impede growth (Tanzi and zee, 1997). The effect of taxation, however, is weaker when capital is disaggregated in to human and physical capital. As a support of this Robelo (1990) held the view that income taxation makes the private sector to decrease the capital labor ratio, so the impact of the income tax rate on the steady state growth rate is smaller. This evaluation highlights the important point that the growth effects of income taxation are responsive to the specification of production function.

Neo-classical growth models also conclude that high income tax rates translated in to lower rate of growth. But economic policy can only affect the rate of growth during the transition path towards the steady state, since the steady state growth rate is given by the exogenous rate of technical progress. In contrast in a growth model of Turnovsky (1998), where labor is endogenized, tax on capital income has no effect on the growth rate. Moreover Romer (1996) argues that the effect of income tax on growth depends on the size of government³. An increase in income tax rate reduce the growth rate but the rise in government productive expenditure per output leads for the rise in productivity of capital which in turn leads for the increase in the growth rate. However, the later outcome outweighs the first when the size of government is large. On the view of Tanzi and zee (1997), even if the government engages in productive activity with the same efficiency of the private sector, income tax results a net efficiency loss to the whole economy due to excess burden of taxation.

Endogenous growth models, (for example Robelo, (1990), Barro, (1990)) show that Permanent change of tax on consumption does not affect the rate of growth but solely the level of consumption path. The fact that consumption tax does not distort the only decision made by agents in the economy, but decision of consuming now versus later, it is comparable to a lump sum tax. This analysis is based on the assumption of no labor-leisure choice. However, endogenizing labor supply leads reverse conclusion. According to Martin (1990), taxes have opposing substitution and income effects on the labor supply: they reduce the incentives to work by lowering the price of leisure, but they also reduce real disposable income and, thus, the demand for most goods, thus affect growth. By endogenizing labor supply in the basic endogenous growth model Turnovsky (1998) has revealed consumption tax rates have real distortionary effects, operating in a qualitatively similar way as the capital

³ Size of government is defined here as the value of government purchase per output

income tax. With the same view Mendoze et al (1997) argues that human capital investment can be affected by consumption taxes when labor supply is endogenous.

As what most governments do, tax incentives are the other channels through which tax policy influence growth. To stimulate private investment both developing and developed countries allow tax holidays, exemptions or lower rates for some selected activities. But there is no consensus among economists on the benefit of tax incentives in promoting investment. The argument is that non targeted incentives are of questionable value relative to its other effect on the economy such as the stability simplicity, and neutrality of a tax system with internationally comparable tax rates. By their very nature, all tax incentives create distortions; however, if targeted incentives are designed to mitigate certain market failures, then the distortions that they cause may well be outweighed by the benefits that can be reaped from their use (Tanzi and Zee, 1997).

Gemmell (2001) argues that in low income economies the acquisition of foreign technologies such as those embodied in imported capital and/or final goods is affected by fiscal policy, specifically by tax policy. Tanzi and Zee (1997) held the same view that heavy reliance on trade taxes could impede an economy's capacity to absorb or develop new technologies-thus harming its growth prospects-by reducing the exposure of domestic industries to international markets and competition. However, tax administration constraints may pose difficulties for their elimination.

3.2.2 Government Expenditures and Economic Growth

A classic approach in explaining growth of government spending is the Wagnerian hypothesis stating that in the process of economic development, government spending tends to increase relative to national income (Wagner, 1990). However, the relationship between economic growth and public expenditure is perceived to be reversed within the Keynesian

macroeconomic framework. A fiscal expansion is expected as a result of multiplier effect on output behind its assumption of price rigidity and the possibility of excess capacity.

The neo-classical growth models as developed by Solow (1956) and Swan (1956) for decades had been useful in explaining growth in terms of income per capita which is exogenously given. Their important assumption is that only during the transition of economies to their steady state can economic policy affect the rate of growth. Unlike the neo-classical growth model which did not lay down the channel through which government spending may influence long run growth, the new growth theory suggests that there is both temporary and a possible long term effect from government expenditure on economic growth.

The productive nature of government spending may arise from complementarity between public infrastructure and private investment. Public investment in infrastructures (roads, ports, basic utilities, etc), in education and in research and development may have externalities which enhance private factor productivity (Barro, 1990). Thus, a high growth rate could be achieved by a higher level of such expenditure.

Direct investment of government on physical or human capital can also affect economic growth through factor accumulation. As an opposition to direct government involvement in productive activity Martin (1990) maintains that the scale of government activities in the economy could itself be an indicator of the propensity of the government to regulate, and control the economy. Generally this crowds-out the private sector, which results reductions in efficiency. The net impact on growth of the crowding -out effect of public expenditure depends on the marginal productivity of the public and private sector. According to Ram (1986) and Dowrick (1993), Productivity and sector efficiency differences in private and public investments provide growth-affecting opportunities via inter-sectoral flows. It is widely believed that in the absence of externalities, public production tends to be less efficient

than private production. Hence, on account of this effects alone, the higher the level of public expenditure, the greater the inefficiency and the lower the level of output (Tanzi and Zee 1997).

Government outlays for maintenance of law and property rights might also have indirect positive effect on growth. From the stand point of investors, enhancing property rights look like reduction in marginal tax rate. Therefore, an improvement in property rights also generates an increase in saving and rates of growth. An increase in government spending in areas that enhance property rights causes a reduction in the effective value of the income tax rate than a direct effect on the production function. However its effect as growth and saving are similar to these for the productive government expenditure (Romer, 1996).

The relationship between government spending and economic growth can be demonstrated by the famous army curve. In this proposition, the existence of government is necessary for the smooth functioning of the economy so as to bring growth, but excessive control of government slower growth. In other words the complete absence of government causes a state of disorder and low levels of output per capita, because there is no rule of law, and no protection of property rights. Thus, there is little incentive to save and invest, because the threat of expropriation exists. On the other extreme, when all economic decisions and resource allocations are made by government, output per capita becomes low due to disincentive effect on the private economic agent.

The output-enhancing features of government dominate when government is very small. However, at some point of output of the economy, growth-enhancing features of government spending stagnates and further expansion of government lead to output decline. This tendency is due to the fact that, as spending rises additional projects financed by government become increasingly less productive and the taxes and borrowing levied to finance government

impose increasing burdens on the private sector. Economic progress is limited when government is zero percent of the economy, but also when it is at or near 100 percent. Where there is mix of private and government decision on the allocation of resources, however, output often is larger (Vedder and Gallaway 1998). Armey (1995) employ a graphical technique for further illustration of the association between economic growth and size of government. The author argues that government expenditure increase economic growth until it reaches a critical point where its marginal productivity becomes zero but further increase in public spending beyond this point harms growth. The conclusion is that for output to be higher a combined economic decision of both government and private sector is essential.

3.2.3 Budget Balance and Economic Growth

Conventionally fiscal balance is measured by the difference between total government expenditure and government revenue. Kneller et al (1999) extension of the Barro equation allows for the incorporation of budget balance in growth models. This inclusion of the budget balance in growth analysis warrants a discussion of the arguments about the irrelevance of the deficit as viewed under Ricardian equivalence assumptions.

Bleaney et al (2001) predicts that signs of these components in growth regression and the effect of budget deficit on per capita income growth depends on whether Ricardian equivalence holds or not. The idea is that, if private sector fully anticipates future tax burden and adjusts their saving to compensate changes in public sector saving, deficits are analogous to lump-sum taxes and have no long run growth effect (Gemmell, 2001). Despite this proposition, budget deficits are expected to reduce long run growth especially in developing economies. This is because, in a country where there exists high government deficit financed by selling bonds to the national bank, through money creation, there would not be future tax liability for private agents. The increase in monetary base indirectly affects the economic

growth of the country adversely. The indirect effect is through the negative relationship between inflation and real economic activity in the economy (Martin, 1990).

Alternatively, as Tanzi and Zee (1997) argue, if deficits are perceived as unsustainable, then changes in tax/expenditure policy and/or monetary policy will be anticipated. Either is likely to retard growth via effects on investment from increases in expected inflation or uncertainties associated with possible fiscal policy changes. Even if monetary policy is designed to 'neutralise' the inflationary effects of a budget deficit, growth is still likely to be retarded by the associated increases in interest rates. The net effect on growth of increasing the budget deficit depends on the simultaneous change in taxes and/or expenditures. In this case the method of financing the increased deficit could be important if alternative financing sources involve different impacts on private sector savings and accumulation decisions.

3.3 Empirical Literature

There is a substantial number of empirical evidence on the effects of fiscal policy on long run growth. In this endeavour, cross section, panel and time series data have been used. However empirical findings have been diverse. M' Amanja and Morrissey (2005) noted that one of the contributory factors to these varied empirical evidences is the measure used to proxy for fiscal policy. Gemmell (2001) stress the problems of empirical studies related with the government budget constraint. Prior to the notable work of Kneller et al (1999) most of empirical estimations test the effect of fiscal policy by taking one side of government activity, either tax or expenditure or deficit. The empirical estimation of Martin and Mohsen (1990) seems an exception. This analysis test growth effects of fiscal policy variables on economic growth using cross sectional linear regression for developed and developing countries together. Taxes and deficit are negatively related with GDP growth treated separately. However, when tax benefits in terms of reducing deficit are considered, taxes are associated with a higher rate of growth. The

positive association of government expenditures and GDP growth, on the other hand, is turned into negative when their impacts on deficits are factored in. It is also found that the level of development seems to influence the effectiveness of fiscal policy to influence growth

In cross section evidence on the association between public finance activities and economic growth, the empirical literature was initiated by Barro (1991). The study covers the period 1960-1985 for a sample of 98 countries and estimates the relation between the growth rate of GDP as a dependent variable and proxies of human capital, initial real GDP, investment in physical capital, government consumption (excluding spending on education and defence) per GDP, measures of political stability and market distortion proxies as explanatory variables for growth. The study suggests negative and significant correlation of public consumption with growth and no significant effect for public investment. Barro and Sala-i-Martin (1995) extends and updates Barro (1990) estimation. However these two studies reach at the same general conclusion.

By extending Barro (1990) cross country study, Bleaney et al (2001) examine Barro type endogenous growth models for OECD countries over the period 1970-95. Based on a full specification of the government budget constraint, including distinctions between productive and non-productive government expenditures, the results are consistent with the predictions of endogenous growth model, where taxes impede the long run growth rate and productive government expenditures increase it. Gemell et al (2005), with similar specification update the study of Bleaney et al (2001) for the period 1970-2004. The study concludes similarly with the former one regards to tax and expenditure but deficit appear to have only transitory effect.

Using a panel data technique Afonso and Alegre(2008) estimate the association of budgetary variables and economic growth for a sample of 27 EU countries for the period 1970-2006. On

functional expenditure categories the study points a negative impact of health expenditure on production and the growth enhancing behaviour of public expenditure on education. The crowding in effect of public investment in to the private investment provokes an overall positive effect of public investment on economic growth. Similarly recent study of Nikos (2009) covering the period 1990-2006 provides the same conclusion on the effect of public investment outlays but expenditure in human capital developing activities and social protection do not have a significant effect on growth. Distortionary taxation depresses growth but the growth impact of deficit is ambiguous. By and large, more consistent evidence is found on the effect of public activities on economic growth for developed economies, in particular for the OECD countries when the growth effects of taxes, expenditures and deficits are tested all together.

The above empirical results have little significance in understanding the way by which public policy correlated with economic growth for developing countries. This is attributed to the fact that there is a significant difference in the structure of fiscal policy and there is a distinction on the role of government in the economy between developing and developed countries. Thus exclusive focus on developing countries is important. Hakro (2009) study on the of Size of Government and Growth Rate of per capita income in Selected Asian Developing economies result indicate Positive relationship between government expenditure and GDP per head growth where as Taxation has negative relationship with GDP per head growth.

In examining the contribution of public spending (particularly capital spending) to growth in Nigeria, Ekpo (1994) shows that infrastructural spending crowds in private investment and consequently enhances growth, while other public spending such as on manufacturing crowds out private investment. On the whole, Ekpo shows private investment to be more efficient than public investment. Drawing from the expenditures by Ghana and Zimbabwe, Schiidt-

Hebbel (1995) concludes that deep fiscal adjustment is necessary for achieving high economic growth.

The empirical study of M'Amanja and Morrissey (2005) in Kenya intended to test the relevance of endogenous growth theory predictions in developing countries. The study, unlike most of the others, focuses on a country case study instead of cross sectional analysis; this is because the authors believe that solution to the fiscal policy-growth conundrum rests in specific country studies. In examining the relationship between fiscal policy variables and economic growth, the paper used annual data for the period 1964-2002 with the aid of time series techniques of estimation. Categorizing public spending in to productive and non productive and taxes in to distortionary and non distortionary, the result mainly implies that fiscal policy affect economic growth. As far as the effect of individual variables is concerned, it is found that unproductive and non distortionary tax revenue to be neutral to growth as the prediction of the theory. Productive expenditure has strong negative effect on growth while no evidence on a growth retarding effect of distortionary tax; in contrast to the expectation. Of the non fiscal variables, private investment and school enrolment (a proxy for human development) turned to be growth enhancing.

Recently Ocran (2009) test the implication of Barro type modelling in the association between fiscal policy and economic growth for South Africa on quarterly data covering the period 1990-2004 using vector regressive technique and impulse response function. The outcome supports the conclusion that government consumption expenditure and gross capital formation are significantly and positively related with growth, consumption spending being explained growth more. Deficit size seems to have no significant effect on growth whilst taxes add to growth. This contradicts the empirical findings in most developed countries.

The existing evidence on public finance and growth relation in Ethiopia are few and focusing on one of fiscal components. For instance Endrias (1996) and Teshome (2006) focus on public expenditure and economic growth of Ethiopia covering different study period. Both findings show growth enhancing nature of public spending on human development activities. Capital expenditure has significant positive effect on the growth of per capital income in the first study where as the later prove negative insignificant relation between government investment and economic growth.

Wondaferahu (2002) estimate the growth effects of fiscal policy instruments in Ethiopia using vector error correction method covering the period 1960/61-1999/2000. This analysis employ both fiscal and non fiscal variables per output to analyze the growth rate of the economy measured by real per capita income. Direct tax, indirect tax, other revenue (foreign tax, on tax revenue and grants), public capital expenditure, public recurrent expenditure, primary budget deficit are the fiscal variables used in the estimation. The control variables are labor force engaged in production and private investment. Despite the adoption of the notion of full budget constraint of endogenous growth framework, the findings are not consistent with the theoretical predictions, except direct taxes. Indirect taxes and public capital expenditures fail to explain economic growth significantly while recurrent expenditures prove to be robustly positively related with economic growth. It is also found that fiscal deficit crowds- out private investment. At the bottom line, the researcher concludes that, fiscal policy variables could play a role in affecting economic growth of Ethiopia

4. Model Specification and Econometric Methodology

4.1 The Model

Testing the growth effects of fiscal policy on an economy is based on the assumption that fiscal policies have a long run relation with growth. In this respect Barro (1990) and Barro and Sala-i-Martin (1992) endogenous growth models provide an empirical model to test the relation between fiscal policy and economic growth. These models have been widely used for testing the association between fiscal policy and economic growth especially in developed countries. However, Gemmell (2001) assured the relevance of this theory for developing countries. Accordingly M'Amanja and Morrissey (2005) and Ocran (2009) use this model for Kenya and South Africa respectively. This study also builds upon the same theoretical model for testing the association between fiscal policy and economic growth in Ethiopia.

Following Kneller et al (1999), this study considers both fiscal and non fiscal variables. Hence, the growth of the economy, proxied by per capita real GDP at time t ($RPCGDP_t$) is a function of a set of $i=1...K$ non fiscal variables (E_{it}) and a set of $j=1...M$ fiscal variables (X_{jt}) which gives the typical growth equation;

$$RPCGDP_t = \alpha + \sum_{i=1}^K \beta_i E_{it} + \sum_{j=1}^M \delta_j X_{jt} + \varepsilon_{it} \dots \dots \dots 4.1$$

Where ε_{it} are the classical error terms.

This specification takes in to account both revenue and expenditure of the government. Full specification of government budget constraint implies that the revenue side is equivalent to the expenditure. Therefore the sum of fiscal variables which incorporate both revenue and expenditure is zero. As a result, the fiscal components from equation 4.1 become:

$$\sum_{j=1}^M X_{jt} = 0$$

To keep the balance of the budget equation, a change in one variable entails a compensating change in some other variable. According to Kneller et al (1999), to avoid this perfect collinearity at least one fiscal variable should be left out from the regression. The omitted variable should be the one in which theory suggest a neutral effect on growth say (X_{mt}). Hence :

$$X_{mt} = - \sum_{j=1}^{M-1} X_{jt}$$

So equation 4.1 can be re-written as;

$$RPCGDP_t = \alpha + \sum_{i=1}^K \beta_i E_{it} + \sum_{j=1}^{M-1} \delta_j X_{jt} + \delta_m X_{mt} + \varepsilon_{it} \dots \dots \dots 4.2$$

When X_{mt} is omitted from the above equation, it would give as the final estimated growth equation;

$$RPCGDP_t = \alpha + \sum_{i=1}^K \beta_i E_{it} + \sum_{j=1}^{M-1} (\delta_j - \delta_m) X_{jt} + \varepsilon_{it} \dots \dots \dots 4.3$$

From the above equation it is observed that testing the zero coefficient for fiscal variables implies testing the null hypothesis; $\delta_j - \delta_m = 0$ unlike the usual procedure of testing; $\delta_j = 0$. Since the omitted variable is the assumed compensating element in the government budget equation the interpretation of the coefficient of the fiscal variables is in the sense of implicit financing assumption. The implication is that, the proper interpretation of the coefficient of the fiscal variables in the growth equation is as *the effect of a unit change in the relevant variable offset by a unit change in the element omitted from the regression* (Kneller et al; 1999: 175).

The suggestion that testing only the difference between two budget components and not each component individually does not exclude the possibility of testing whether two coefficients of fiscal variables are equal. However, this is appropriate when theory suggests that there is

more than one neutral category and both values of the variables are expected to have equal value. If the hypothesis of equality cannot be rejected, then more precise parameter estimates can be obtained by omitting both categories. In other words, the appropriate procedure is to test down from the most complete specification of the government budget constraint to less complete specifications, taking care to omit only those elements which theory suggests will have negligible growth effects. If this is not done, and, for example, expenditure variables are omitted from the regression and only tax variables are included, Kneller et al (1999) noted that results will be biased because of the implicit partial financing by non-neutral elements of the government budget

4.2 Econometric Procedures

4.2.1 Stationary and Non-stationary Series

Empirical works on time series data are based on the assertion that the series is stationary. A variable or a stochastic process is said to be stationary if its mean and variance are constant over time and the value of the covariance between two time periods depends only on the gap between the two time periods and not the actual time at which the covariance is computed (Gujarati 2004). Any analysis based on non stationary time series is merely explains the behaviour of the variables only for the time period under consideration. Hence such analysis has a little practical value since it is impossible to make generalization for the other periods. In technical words Granger and Newbold (1974) noted that, estimation of non stationary data will cause spurious regression problems. First, the least squares estimators of the intercept and slope coefficients are not consistent. Second, the conventional test statistics, such as the t ratio, F-statistic, etc., do not have distributions like t- and F-distributions that is expected to hold when the null hypothesis is true, not even asymptotically. Consequently, the critical values normally used are inappropriate. Third, there will be an apparently high degree of

goodness of fit, as measured by the coefficient of multiple correlations R^2 or the adjusted $\bar{R}^2$, but the Durbin-Watson d statistic will converge to zero as sample size grows. Fourth, there will be spurious rejections by co-integration tests.

4.2.2 Unit Root Tests

Practically the question of whether a particular variable is non-stationary or stationary resides on testing whether it has unit root or not. If variables have unit root and so non stationary, one often gets 'spurious regression' results, that is, a seemingly significant effect though the variables are actually unrelated in a statistical sense. To avoid spurious relations among economic variables, time series analysis should not use the original series but recommended to be transformed as of weakly stationary process. To transform the non stationary processes in to stationary processes, the deterministic or stochastic trends have to be eliminated. It can be possible to eliminate non stationarity by using difference and such variables are called difference stationary process (DSP). Other categories of variables, known as trend stationary process (TSP), experiences upward trend along a deterministic line and calls for de-trending. But most of economic variables are characterized by difference stationary process (Madala, 1992).

A stochastic process is said to be integrated of order d , (I (d)), if it can be transformed to a stationary stochastic process by differencing d times. In order to test unit root so as to establish the order of integration, it is possible to employ the standard Augmented Dickey Fuller (ADF) test⁴ or Phillips Perron (PP) tests⁵. However, ADF test is biased towards

⁴ The ADF test for a time series variable Y_t is conducted by the regression;

$$\Delta Y_t = \alpha + \beta_1 + \delta Y_{t-1} + \sum_{i=1}^m \gamma_i \Delta Y_{t-i} + \varepsilon_t$$

Where $\varepsilon_{t,i}$ is a pure white noise error term and $\Delta Y_{t-i} = Y_{t-i} - Y_{t-i-1}$.

accepting the null hypothesis of unit root in the series if the series exhibits significant structural break (Harris, 1995). Hence, time series data should be checked for structural break before it is employed for analysis.

Although differencing may transform non-stationary series into stationary ones, it leads to the loss of important long run information about the variables. However, if there is relation between the long-run components of economic time series, this lost information might be special interest of most researches. So it is necessary to develop statistical procedures which are suited for capturing long-run relations between non-stationary variables correctly. The solution is provided by the theory of co-integrated relations as developed and popularized by Engle and Granger (1987).

4.2.3 Co-integration and Error Correction

Even if variables individually are non stationary, if their linear combination is $I(0)$, they are called co-integrated. So regression of one variable on the others is meaningful. Economically co-integration explains, given a particular model, how a set of economic variables behaves in the long run equilibrium. If several variables are co-integrated, then they may drift apart in the short run but in the long run economic forces will draw them back to their equilibrium relationship (Engle and Granger 1987). Generally co-integration might be characterized by two or more variables indicating a common long run development, i.e. they do not drift away

The test is on the null hypothesis: $\delta = 0$ (the time series is non stationary) against $\delta < 0$ (the series is stationary) using the critical values developed by the authors. Here i is chosen to ensure that the residuals follow a pure random process.

⁵ ADF test take a care of possible serial correlation on the error terms by adding the lagged difference of the dependent variable whereas Phillips Perron (PP) test use nonparametric statistical methods to take care of possible serial correlations without adding lagged difference terms. But the asymptotic distribution of the PP test is the same as the ADF test statistic Gujarati (2004).

from each other except for transitory fluctuations. This defines a statistical equilibrium which, in empirical applications, can often be interpreted as a long-run economic relation. In this case the absence of co-integration leads back to the problem of spurious regression. The implication that non stationary variables can lead to spurious regression unless at least one co-integration parameter is exist mean that some forms of testing for co-integration is almost mandatory. In empirical analysis Engel-Granger two step procedures and Johansen maximum likelihood estimation procedure are the most widely used methods of testing co-integration.

4.2.3.1 Engle –Granger Procedure

In order to handle co-integration test using Engle-Granger test, it is presumed that there exists at most one co-integrating relation between K of $I(1)$ variables which comprehends all variables (Kirchgassner and Wolters , 2007). In this case, unit root tests can be used to test for co-integration by applying them to the residuals of an estimated (static) equilibrium relation among variables. Engle and Granger (1987) proposed a testing procedure for the null hypothesis that there is no co-integration relation and, therefore, the residual process is nonstationary against the alternative of co-integration, that is; this process is stationary. This test requires two steps.

At the first step long run static model of $I(1)$ variables is estimated using Ordinary Least Square (OLS) technique to obtain residuals. The ADF test⁶ is applied to test the stationarity of the estimated residuals. If the residual is found to be stationary, then the variables are said to be cointegrated to mean they have a long run relationship. At the second test, after co-

⁶ However the critical values are quite different from ADF test. This is because the test is applied on the generated series based on the estimated co-integrating parameter, so Engle and Granger calculated the critical values for the test of co-integration.

integration test, the residuals from the static regression are used as error correction term in the dynamic first difference regression, which involves the estimation of Error Correction Model (ECM). ECM is estimated to capture the existing long-run relation between variables. In the error correction model the first difference of the regressand is regressed on the first difference of the dependent variables with their appropriate lag and the first lag of the residual obtained on the first step.

The two step procedures of testing co-integration are not free of limitations. Thomas (1997) indicates that, the residual used on the second step comes from the static regression which is suspected to have meaningless relation. The predetermined causation of variables on the first step regression might have a problem of simultaneity. The presumed single co-integrating vector irrespective of number of variables is the major problem associated with these procedures. There can be more than one co-integrating vector in case of more than two variables in the system of the regression. This intimidates the validity of the coefficients when the Engle-Granger procedure is used since the procedure does not give consistent estimates of the coordinating vector

4.2.3.2 Johansen Procedure

Johansen maximum likelihood estimation has superiority in filling the limitations of the above procedure. So, this analysis employs Johansen's (1998) maximum likelihood procedures for testing co-integration of variables. To carry out the Johansen method of determining the number of co-integration vectors, first the VAR model which shows the relationship between disaggregated fiscal variables, control variables and the growth of per capita GDP is formulated. Following Davidson and Mackinnon (1999) the following system of VAR (P) model is constructed to determine cointegrating vector in Johansen procedure.

$$Y_t = \lambda_1 Y_{t-1} + \lambda_2 Y_{t-2} + \dots + \lambda_p Y_{t-p} + \psi Z_t + \varepsilon_t \dots \dots \dots 4.5$$

Where Y_t is a vector of $(n \times 1)$ potentially endogenous non-stationary $I(1)$ variables (fiscal and control variables), Z_t is a vector of $(m \times 1)$ deterministic (a constant and trend) exogenous variables and λ_i ($i= 1, \dots, p$) and Γ are $(n \times n)$ and $(n \times m)$ matrix of the parameters. ε_t is vector of white noise error term. The system is in a form with each variable in Y_t regressed on only lagged values of both itself and all the other variables in the system. Thus Ordinary Least Square (OLS) is an efficient way to estimate each equation comprising the above model. According to the Granger Representation theorem, if variables are co-integrated, their relation can be expressed as Error Correction Model (ECM) (Gujirati 2004). So given that the variables are integrated of order one and are co-integrated VAR of order p has an error correction representation. The above VAR model is reparametrized to give the following Vector Error Correction (VECM) form;

$$\Delta Y_t = \Gamma_1 \Delta Y_{t-1} + \dots + \Gamma_{p-1} \Delta Y_{t-p+1} + \Pi Y_{t-p} + \psi Z_t + \varepsilon_t \dots \dots \dots 4.6$$

Where $\Gamma_i = -(I - \lambda_1 - \dots - \lambda_i)$, ($i = 1 \dots p-1$), which contains information of short run adjustments to changes in Y_t (i.e. coefficients which estimates the short run effects of shocks on ΔY_t) and $\Pi = -(I - \lambda_1 - \dots - \lambda_p)$, which contains long run adjustments to change in Y_t .

Here Π can be factorized in to $\Pi = \alpha\beta'$ where α is $n \times r$ matrix which represent the speed of adjustment to disequilibrium whereas β is $n \times r$ matrix of long run coefficients such that the term $\beta' Y_{t-p}$ in equation * represents up to $(n-1)$ co-integration relationship which ensures that the Y_t converges to their long run steady-state path. Here r denotes the rank of matrix to be determined and n is the number of variables entering in the co-integration space. In this model since it is assumed that Y_t is a vector of non-stationary $I(1)$ variables, then all terms in ΔY_{t-i} are $I(0)$. For the error term to be white noise it requires the stationarity of ΠY_{t-p} . One

way for ΠY_{t-p} to be $I(0)$ is when Π has reduced rank⁷; that is, $r < (n-1)$ co-integration vectors exist in β .

Determining how many $r < (n-1)$ co-integrating vectors exist in β is analogous to determining the zero columns of α . Therefore testing for co-integration concerned with determining the rank of Π , that is finding the number of r linearly independent columns in Π . To determine the number of co-integrating vector (rank of a matrix), the null hypothesis of no co-integration between variables is tested against the alternative hypothesis that there is at least one co-integration vector between variables. The number of distinct co-integrating vectors can be obtained by checking the significance of the characteristic roots of $\Pi = \alpha\beta'$. The number of distinct co-integrating vector is equal to the number of the characteristic roots that differ from zero (Enders, 1995). Thus, testing that there is $n-1$ co-integrating vectors is equivalent to testing that the first $r (=n-1)$ eigenvalues are nonzero while the remaining $n-r$ eigenvalues are zero. This is the same as testing that the last $(n-r)$ columns of the matrix α are effectively zero (Harris, 1995).

The Likelihood Ratio (LR) test is employed to test the significance of the estimated eigenvalues. The test statistics that are used to test the number of characteristic roots that are insignificantly different from unity is conducted using trace test statistics using PcGive. Generally in the process of testing the null hypothesis of no cointegrating vector is tested against there is at most one cointegrating vector. The trace statistic tests the null $H_0: \lambda_i = 0, i=r+1, \dots, n$ implying that there are at most r co-integrating vectors Harris (1995).

⁷ If Π has full rank, there are $r = n$ linearly independent columns of β , then all the variables in Y_t are $I(0)$ which implies that there is no problem of spurious regression and the appropriate modelling strategy is to estimate the standard VAR model at level (equation 5). In the case where the rank of Π is zero (Π is $n \times n$ matrix of zeros), implying that there are no cointegration relations at all. VAR in first difference without involving the long-run relation between variables is the appropriate model.

4.2.3.3 Variables Definition and Data source

As discussed in section 3 of this research, endogenous growth models assume a classification of budget variables in to four groups; productive/unproductive expenditures and distortionary/non-distortionary taxation. The theoretical classification, however, is not very clear about categorization various functional public spending. So it is better to simply mentioning them and leaving the estimation to determine whether these catagories are productive or unproductive.

On the revenue side the theoretical framework put direct taxes as distortionary on the ground that such taxes reduce the return of investment whereas indirect (consumption) taxes hypothesized as nondistortionary since they do not distort the decision to invest⁸. This research groups those revenues which are not categorized in the above categorization as other (unclassified) revenues. Table 4.1 provides functional/theoretical classification of major fiscal elements of Ethiopia.

⁸ The issue of classifying taxes as distortionary and nondistortionary is controversial and dominate both theoretical and empirical debate. In the Mendoza et al. (1997) model for example, consumption taxation (which is non-distortionary in the Barro (1990) model and thus has no effect on the growth rate) becomes distortionary, with a (negative) effect on growth if leisure is included in the utility function, affecting education / labour leisure choices and thus capital / labour ratios in production.

Table 4.1 Theoretical/Functional Classification of Fiscal Policy Instruments

Theoretical Classification	Functional Classification
Distortionary taxation	-Income and profit taxes -Rural land use fees -Urban land lease fees
Non Distortionary taxation	-Taxation on domestic goods and services
Other (unclassified) revenues	-Foreign trade taxes -Non tax revenue -External grants
Productive/ Unproductive Government spending	-General public service expenditure -Economic service expenditure -Pension payments and rehabilitations -Interest and charges -Transfers and social welfare -Culture and sport -Health expenditure -Education expenditure -Social Development -Economic development

Source: Author's categorization

To reduce the number of variables and increase the efficiency of estimates, the various categories of revenue and expenditure are grouped together. Following Barro and Sala-i-Martin (1995); Devarajan et al. (1996), public spending on education and health are incorporated in the variable LHDE, which represents the type of expenditures that enhance human capital development. Furthermore the variable LGINVT, which comprises public

spending on social and economic development (capital expenditure), is constructed as a proxy for government investment. The remaining expenditures together defined to be other expenditures (LOE).

On the side of government revenue, variable LDIT is created for distortionary taxation, which contains tax on income, profit, and land use fees. On the other hand taxes on domestic goods and services are assumed as nondistortionary tax (LNDT). Also, the variable other revenues, (LOR), is included to represent those taxes in which their classification is not clear. This encompasses foreign trade taxes, non tax revenue and external grant. To care for the linear relationship among fiscal variables, the difference between total revenue and total expenditure is taken to measure budget deficit (LDEF).

With the intention of take into account robustly the determinants of growth and to control government activities, this empirical test includes non fiscal variables in the regression. So, private investment as (LPINVT) and the share of population between the age of 15 and 64 from total population as a proxy for economically active labor force (LLAB) are included. Given the agrarian nature of Ethiopian economy, it is believed that the working force of the population would have a significant contribution for economic growth. These conditioning variables are the most widely used in usual Barro –type regression.

Despite its perceived importance for growth, the measurement of private investment is controversial in growth literatures. Subtracting government investment budget from the gross capital formation is the widely used method of deriving private investment. Hence in this paper private investment is derived by deducting capital budget expenditure of the government (as a proxy for public investment) from gross capital formation. This analysis uses real per capita GDP (LRPCGDP) as a measure of economic performance. The nominal

values of gross domestic product are converted to their real value based on 1983/84 constant factor price.

All the variables used in the study are in their natural logarithmic form. In doing so a problem is faced with the variable deficit in which it has a negative value in most of the study period. This problem is treated by adding a constant number along the series so as to have a positive value without distorting the nature of the series.

The analysis use annual Ethiopian data covering the period 1960/61-2007/08 but With regard to sources of data, Ethiopia's macro variables show differences from one to the other source. Hence an attempt was made to keep data consistency by taking all fiscal variables from MoFED and labor force from CSA.

5. Empirical Analysis and Interpretation

5.1 Unit Root Test Results

Time series models that incorrectly assume stationary process lead to invalid parameter estimates. So the first stage of empirical analysis involves examination of the stationarity of all the variables under consideration. This is achieved by testing for unit roots in the series to ensure they are integrated of same order, usually one, so that their first differences are integrated of order zero. According to Granger and Newbold (1974), if the series are integrated of the same order and co-integrate, then estimation results and statistical inferences would be non-spurious.

Table 5.1 ADF Unit Root Test of variables in level

Variables in Levels		Without drift and trend		With drift		With drift and trend	
		Lag		Lag		Lag	
		1	2	1	2	1	2
LRPCGDP		1.297	1.682	-0.05057	1.052	-0.7502	0.3435
LDIT		-0.1628	-0.2549	-2.326	-2.643	-2.528	-2.985
LNDT		-0.4272	-0.4302	-1.983	-1.981	-1.905	-1.836
LOR		-0.02769	0.07926	-2.000	-1.943	-1.707	-1.460
LHDE		0.2562	0.3378	-2.618	-2.531	-3.306	-3.445
LOE		-0.3713	-0.3350	-1.814	-1.750	-0.9630	-0.6987
LDEF		-0.6666	-0.6533	-2.131	-1.966	-2.350	-2.175
LGINVT		-0.07414	0.2852	-1.961	-1.535	-3.045	-2.339
LPINVT		0.8870	0.6864	0.1327	-0.1907	-0.2110	-0.2463
LLAB		0.5345	0.5028	-1.614	-1.669	-2.495	-2.731
Critical value	1%	-2.618	-2.620	-3.593	-3.597	-4.190	-4.196
	5%	-1.949	-1.949	-2.932	-2.934	-3.519	-3.522

Source: PcGive 10 software unit root test output.

In this study, all variables are tested for unit roots by employing the widely used Augmented Dickey-Fuller (ADF) test. The results suggest that the null hypothesis of the presence of unit root in the variables in levels could not be rejected implying that all the variables are non stationary in levels (see table 5.1). However, after first differencing the variables, the null hypothesis of unit root in each of the series was rejected below 5% level of significance. Thus all data series are integrated of order one. Table 5.2 reports the results of Unit-root tests for the first difference of all the variables that allow for time trend, constant and use different values of the lag parameters. This result permits testing of co-integration and related analyses.

Table 5.2 ADF Unit Root Test of Variables at First Difference

Variables in First Difference		Without drift and trend		With drift		With drift and trend	
		Lag		Lag		Lag	
		1	2	1	2	1	2
DLRPCGDP		-5.218**	-2.690**	-5.546**	-2.973*	-5.886**	-3.287*
DLGIT		-4.077**	-4.186**	-4.031**	-4.147**	-3.991**	-4.104**
DLNDT		-7.144**	-5.708**	-7.037**	-5.574**	-6.961**	-5.538**
DLOR		-4.967**	-3.532**	-4.960**	-3.522*	-5.196**	-3.760**
DLHDE		-4.903**	-4.303**	-4.901**	-4.340**	-5.042**	-4.529**
DLOE		-4.959**	-3.442**	-4.898**	-3.388*	-5.409**	-3.918**
DLDEF		-5.667**	-3.708**	-5.613**	-3.674**	-5.651**	-3.727**
DLGINVT		-9.224**	-7.534**	-9.923**	-8.359**	-10.71**	-9.048**
DLPINVT		-4.746**	-3.992**	-4.795**	-4.067**	-5.349**	-4.813**
DLLAB		-4.666**	-3.463**	-4.713**	-3.525*	-4.653**	-3.574*
Critical Value	1%	-2.620	-2.621	-3.597	-3.602	-4.196	-4.202
	5%	-1.949	-1.949	-2.934	-2.936	-3.522	-3.525

**, * Represent rejection of the null at 1% and 5% significance level, respectively

Source: PcGive 10 software unit root test output.

Before going to the empirical estimation, all series are tested for structural break which may exist in some of the years over the study period. Between 1960/61- 2007/08, Ethiopian government went through two major economic reforms. The first reform is in 1974/75 when Ethiopian government economic ideology shifts from market oriented to socialist economy and the second is in 1990/91 when the new government of Ethiopia came back with market oriented economic system. The data is tested for these periods if there has been any change in the trend due to these events using Chow Breakpoint Test. However there is no evident for structural break of the series (See Appendix IV)

5.2 Co-integration Analysis

5.2.1 Model Estimation

The appropriate procedure of estimating the theoretical model of equation 4.3 involves testing down from the most complete specification of the government budget constraint to less complete one. The theoretical prediction of the Barro (1990) growth model as illustrated by Kneller et al (1999) state that, omitting growth neutral elements of fiscal element from the equation gives a better estimates as long as there is no a significant variation in the sign and magnitude of the remaining parameters. Simultaneous dropping out of both variables implicitly assumes equal estimated coefficient for the perceived growth neutral elements. In such a case, the interpretation of the coefficients becomes the effect of a unit change in the respective budget element compensated by equivalent adjustment on some combination of the omitted variables.

In this research it is evident that LNDDT and LOE are appeared to be growth neutral. In such a case according to the theoretical frame work, omitting both variables from the regression would improve the accuracy of the result. But this is based on the assumption of equal coefficient of growth neutral elements and insignificant variation in the sign and magnitude of the remaining coefficients from one specification to the other. The estimated result in this particular study, however, reveals significant difference in the magnitude and significance of the respective coefficients of LDIT, LOR, LDEF, and change in the sign of LGIVT, value LNDDT and LOE from one model to the other. This limits the possibility of setting zero restriction on the difference of the coefficients. Moreover, there is a mixed evidence on the accuracy of the estimates resulted by omitting both other spending and nondistortionary taxes and one element at a time. Some parameters reveal improvement in statistical significance where as some others go in opposite way. (See appendix 1). Also, Gemmell et al (2000)

strongly argue that the problem of collinearity in the full budget constraint specification is better solved by omitting just single variable at a time instead of many. This is because it is difficult to identify precisely what is the assumed implicit financing.

By considering the regression results of the four variant specifications summarized in appendix 1 and the above argument, this research proceeds through a detail analysis of two models in which each assumes one compensating element at a time. Since the estimation result ensure insignificant coefficient for nondistortionary taxes and other expenditures, these two variables are used as implicit financing budget element.

5.2.1.1 Model I (Non- Distortionary Taxation as Implicit Financing)

The first model assumes non distortionary (LNDT) taxation as implicit financing element and estimated using the following variables; real per-capita GDP (LRPCGDP), distortionary taxes (LDIT), other revenues (LOR), human capital development expenditure (LHDE), other government expenditure (LOE), budget deficit (LDEF), government investment (LGINVT), private investment (LPINVT), and labor force (LLAB). This specification is employed to examine per-capita GDP effect of change in fiscal variables compensated by corresponding change in non distortionary taxes (LNDT).

To see the long run relation of these variables, their co-integration was carefully examined by employing Johansen trace test procedure. An important practical issue for the implementation of the co-integration analysis is the determination of the optimal lag length. If the lag length is too small then the remaining serial correlation in the errors will bias the test and if it is too large then the power of the test will suffer. Hence the appropriate lag length should be long enough to make the residual white noise and short enough to preserve degree of freedom. In this study a model up to 3 lags is tried to account the cumulative impact of the variables on growth, in order to maintain a sufficient number of observation, which is necessary to derive

reliable conclusions. In this analysis the lag length used is determined using various information criteria. Table 5.3 below shows the results from various VAR lag length selection criteria used in determining the lag length of the model.

Table 5.3 VAR Lag Order Selection Criteria for model I

Lag	LR	FPE	AIC	SC	HQ
0	NA	1.02e-10	2.537284	2.898617	2.671985
1	326.1189*	3.60e-13*	-3.180398	0.432927*	-1.833387*
2	82.04256	8.71e-13	-2.735881	4.129436	-0.176560
3	79.95382	1.18e-12	-3.839047*	6.278263	-0.067415

* indicates lag order selected by the criterion

Source: EvIEWS 6 software output

LR: sequential modified LR test statistic (each test at 5% level)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

As shown in table 5.3 the VAR estimates is conducted and the first lag is found to be the optimal by LR, FPE, SC and HQ standards but AIC propose it is three. As a complimentary to these tests overall significance tests through model reduction is conducted and it confirm the first lag to be the appropriate lag (see appendix III). Hence this study is going to employ the optimal lag length of one as a data congruent model.

The Johansen trace statistics of a VAR system with one lag length show the existence of one co-integration relationship between the variables. The result of the co-integration test for the specification is reported below in table 5.4.

Table 5.4 Test for number of co-integrating vectors of model 1

H0: rank=r	Trace test	P value
$r = 0$	221.52	[0.002] **
$r \leq 1$	158.10	[0.058]
$r \leq 2$	112.04	[0.250]

** denotes rejection of the null at 1% significance level

Source: PcGive 10 cointegration test output

Number of lags used in analysis = 1

Variables entered unrestricted = constant

Vector AR 1-2 test: $F(162,106) = 0.93947$ [0.6427]

Vector Normality test $\chi^2(18) = 21.979$ [0.0791]

Vector hetero test: $\chi^2(810) = 824.02$ [0.3583]

From the above table it is apparent that the diagnostic test results do not reject the classical assumptions of normality and no autocorrelation. The results presented in table 5.4 depict that the null of no co-integration is rejected at 1% significance whereas the alternative hypothesis that at most one co-integrating vector cannot be rejected. Hence there is one long run relationship between the variables that can be explained by a linear combination of first difference stationary variables. The existence of one co-integrating vector implies that the relevant linear combination of variables represented by first column of α matrix and the first row of β' matrix (long run coefficient) are essential for the analysis (see appendix 1).

To identify the long run equation there is a need to impose zero restriction on α coefficient which is essentially a likelihood ratio (LR) test of weak exogeneity. Rejection of weak exogeneity hypothesis entails that the variable under investigation is determined within the model (endogenous). Table 5.5 displays the weak exogeneity test result.

Table 5.5 Test for zero restrictions on α Coefficient s for Model I

Variables	α Coefficients	LR test , Chi ² (1)	P-values
LRPCGDP	-0.25320	13.640	[0.0002]**
LDIT	0.079022	0.069076	[0.7927]
LOR	-0.042793	0.016873	[0.8966]
LHDE	-0.30970	1.5988	[0.2061]
LOE	-0.43718	1.1264	[0.2885]
LDEF	-0.16873	0.11341	[0.7363]
LGINVT	0.62364	1.1635	[0.2807]
LPINVT	0.64877	0.34607	[0.5563]
LLAB	0.024969	0.0026997	[0.9586]

** represents rejection of weak exogeneity at 1% significance level

Source: PcGive 10 weak exogeneity test output

From the above table (table 5.5) it is evident that the null hypothesis of $\alpha=0$ is rejected for the per-capita real GDP (LRPCGDP) at 1% significant level, but not for the other variables. Hence LRPCGDP is judged to be the dependent variable and the effect of the other variables on it is going to be analysed from now onwards.

The next step of the analysis involves identifying the variables which are statistically significance in the long-run relation identified above. This is accomplished by imposing zero restriction on the β coefficients of the variables and checking the validity of the restriction by the Likelihood Ratio (LR) test. The following table 5.6 reports the result of significance test of the variables.

Table 5.6 Test for zero restrictions on β coefficients for Model I

Variables	β coefficients	LR-test:x2(1)	p- value
LDIT	-0.24225	6.9552	[0.0084]**
LOR	-0.55497	11.382	[0.0007]**
LHDE	-0.58758	15.940	[0.0001]**
LOE	0.032506	0.12728	[0.7213]
LDEF	0.17474	4.1805	[0.0409]*
LGINVT	0.018636	0.11112	[0.7389]
LPINVT	-0.082610	4.8412	[0.0278]*
LLAB	-0.015121	0.17800	[0.6731]

** and * indicates rejection of the null at 1% and 5% level of significance respectively

Source: PcGive 10 coefficient significance test output

The test result clearly shows that, except other expenditure, government investment and labor force, all variables found to explain real GDP per head in statistically meaningful way. So, given all the above tests, it is possible to construct the appropriate single long run equation using the long run coefficients in the form;

$$\text{LRPCGDP} - 0.24225\text{LDIT} - 0.55497\text{LOR} - 0.58758\text{LHDE} + 0.032506\text{LOE} + 0.17474\text{LDEF} + 0.018636\text{LGINVT} - 0.082610\text{LPINVT} - 0.015121\text{LLAB} = 0. \dots \dots \dots 5.1$$

The long run equation indicate that government spending on education and health which affects quality and quantity of human capital accumulation (LHDE) is positively related with GDP per head and it is statistically significant. This result coincides with the hypothesis of the study. The elasticity of per capita income with such expenditure found to be 0.587. This value implies that, the point elasticity of real per capita GDP due to an increase in government human development spending financed by an equivalent increase in indirect taxes (the omitted variable), would be about 0.588. Improvement of human capital through higher

education and improved health status of the associated labor force through expenditure in education and health is of a considerable importance in economic growth. Recent endogenous growth models have shown human capital accumulation as an important source of long term growth either because of its direct input in to research and development activities or its positive activities. Similarly the overall effect of financing public deficit through non distortionary taxes is estimated to be negative with elasticity of about 0.17.

Government investment is negative in its coefficient but not significant for this estimation. One possible reason is that it may be due to the fact that government investment is represented by capital expenditure as there is no data for public investment for Ethiopia. With this caution, however, it is possible to argue that government investment has insignificant effect on real per capita GDP probably because there is less pressure and incentive by the public sector to allocate funds to the most profitable and efficient investment areas. Thus there is little relation of growth to the quantity of public investment. As a support of this finding, the studies by Barro (1990) and Barro and Sala-i-Martin (1995) (though cross sectional study) indicate that growth rate of real per capita GDP is insignificantly related to the share of public investment in GDP.

As expected, the coefficient of distortionary taxes (LDIT) appeared to have positive and significant relation with long run real GDP per head. The elasticity coefficient of 0.24 shows the real GDP per capita effect of a unit reduction in the so called direct taxes offset by equivalent increase in non distortionary taxes. Similar to this study M'Amanja and Morrissey (2005) get positive significant coefficient of distortionary taxes for Kenya. On the other hand, Kneller et al (1999) found negative relation of distortionary taxation with economic growth for OECD countries. Other (unclassified) revenues (LOR) also reflect a significant positive estimated coefficient of 0.554. This finding is possibly interpreted as both forms of revenues (direct taxes and other revenues) are better ways of financing government spending rather than the

alternatives sources of financing like issuance of money which might create macroeconomic instability.

With regard to the control variables, the positive significant coefficient attached to private investment and labor force (although insignificant) follow from the standard economic theory, in which an increase in the amount of factors of production will naturally induce a rise in production.

5.2.1.1.1 Error correction for model I

So far, the existence of long run relationship is statistically assured and the associated long run parameters are determined. For the complete analysis of the Johansen frame work, one extension remains. The coefficient of the short run dynamics have yet to be estimated. Existence of co-integration allows for the analysis of short run dynamic model that identifies adjustment to the long run equilibrium relationship through the parsimonious Error Correction Model (ECM) representation using David Hendry general to specific modelling approach. This involves simplifying the model in to interpretable way using sequential. To assure the accuracy of removing variables diagnostic tests are employed at each stage.

In this particular analysis, a case of one co-integrating vector is supported and the variables other than real per capita GDP are weakly exogenous. Thus there is no need to use a simultaneous equation model in estimating the structural parameters. In the estimation the error correction term ECT_{-1} is included to capture the speed of adjustment of the disturbance in the long run equilibrium. Hence, an error correction model that incorporates the short-term interactions and the speed of adjustment towards long run equilibrium is estimated using ordinary least squares (OLS) technique and the results are summarized in Table 5.7.

Table 5.7 Parsimonious Error Correction for Model I

Dependent Variable: DLPCGDP

Variables	Coefficient	St.Error	t- value	t-prob
Constant	0.000603251	0.004954	0.122	0.904
DLDIT	0.0565856	0.03161	1.79	0.083
DLOR_1	0.195767	0.03011	6.50	0.000
DLHDE	0.112856	0.03402	3.32	0.002
DLHDE_1	0.0812340	0.03520	2.31	0.028
DLDEF_1	-0.0379700	0.01805	-2.10	0.043
DLGINVT	0.0524262	0.01380	3.80	0.001
DLGINVT_1	0.0422058	0.01400	3.01	0.005
DLPINVT	0.0203486	0.007220	2.82	0.008
DLPINVT_1	0.0145660	0.007924	1.84	0.075
DLLAB	0.0115043	0.01487	0.774	0.445
ECT_1	-0.697557	0.2282	-3.057	0.000
R² 0.732586 F(13,32) = 6.743 [0.000]** DW 2.01				
Diagnostic Tests				
AR 1-2 test: F(2,30) = 0.053548 [0.9480]				
ARCH 1-1 test: F(1,30) = 3.1390 [0.0866]				
Normality test: Chi ² (2) = 1.7159 [0.4240]				
Hetero test: F(26,5) = 0.27379 [0.9877]				
RESET test: F(1,31) = 0.31458 [0.5789]				

Source: PcGive 10 error correction model estimate result

In the above model D in front of each variable stands for the first difference of the variables. This specification passes all the diagnostic tests. The explanatory variables account for 73% of the changes in the real GDP per capita. The joint significance test of variables is also

.confirmed by the F- statistics at 1% significance level. The Jarque- Bera statistic for testing normality of residuals is 1.7 with a p - value of 0.4240; hence the null of normality cannot be rejected. Breusch- Godfrey asymptotic serial correlation test indicate that the residual of the estimated errors correction model do not face autocorrelation. The assumption of homoschedastic residuals is not also rejected as of the result of the ARCH test. The null of model misspecification is soundly rejected by the Ramsey RESET test for specification error. Since the variables entered in the above equation are stationary and the model passes the Gaussian assumptions, all the test statistics and t- values give the right inference.

The coefficient of the error correction term (ECT_1) is significant with expected sign and of fairly large magnitude (-0.697). Its magnitude implies that deviation of LRPCGDP from its the long run equilibrium is adjusted quickly and 69.7% of the disequilibrium is removed in each period.

The coefficient of each variable in the above error correction model depicts the direct short-run effect of the variables on the real GDP per head (see table 5.7). The result suggests that both fiscal and non fiscal (control) variables play a role in determining the short run fluctuation of real per capita GDP in Ethiopia. Human development government spending, government investment (financed by nondistortionary taxes), other revenue and private investment are appeared to be the significant short run per capita income enhancing factors. Deficit, on the other hand, retards it. This is largely consistent with the long run analysis. In relative sense, other revenues are the most significant and valued short run per capita GDP raising source of proceeds for the government. This might attribute to the fact that such financing likely affect the economy in several ways. One it serves as a means of financing government human development and investment outlays which have a positive effect for the economy. Second in a situation where tax collection becomes difficult and creates disincentive, other revenues are easy ways of generating revenue for the government.

Moreover, as a means of filling the budget gap, it helps to reduce the unfavourable effect of deficit.

Distortionary taxes and labor force have positive sign but their coefficient is insignificant. The implication is that, the two variables are not important in explaining the short run fluctuation of real GDP per head. It seems reasonable that given availability of surplus labor in Ethiopia, the economy would not respond immediately with increase in working force. This result is also expected for an economy where about 85% of the labor forces make their living on agriculture in the face of static land size. Likewise investors and even employed workers need enough time to adjust their decision due to imposition of tax on their earning.

5.2.2.1 Model II (Other Spending as Implicit Financing Element)

The second model aims at evaluating the effect of the change in taxes, productive spending and public investment on real GDP per head compensated by corresponding reduction in unproductive government expenditure (omitted variable). So the variables entered in the VAR are similar with model I except replacement of non-distortionary taxes for unproductive government spending. To proceed for the long run analysis, the co-integrating behaviour of the variables is examined using the Johansen procedure.

Test for the optimal lag length is conducted using various information criteria. Table 5.8 below shows the results from various VAR lag length selection criteria used in determining the lag length of the model.

Table 5.8 VAR Lag Order Selection Criteria for model II

lag	LR	FPE	AIC	SC	HQ
0	NA	2.41e-06	4.090912	4.331800	4.180712
1	54.65737*	1.73e-08*	-0.861270*	0.824948*	-0.232665*
2	33.60322	3.27e-08	-0.311371	2.820178	0.856039
3	248.9829	2.50e-08	-0.813577	3.763301	0.892637

*indicate lag order selected by the criterion

Source: EvIEWS 6 optimal lag length selection output

LR: sequential modified LR test statistic (each test at 5% level)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

As can be seen from table 5.8 all test statistics suggest that the appropriate lag length is one.

Hence one lag length of the variables is employed in determining the number of cointegrating vectors.

Table 5.9 Test for number of co-integrating vectors for Model II

H0: rank=r	Trace test	P value
r = 0	202.58	[0.026] *
r ≤ 1	135.14	[0.478]
r ≤ 2	89.546	[0.874]

* denotes rejection of the null at 5% significance level

Source: PcGive 10 co integration test result.

Number of lags used in analysis = 1

Vector AR 1-2 test: $F(162,106) = 1.0717 [0.04157]$

Vector Normality test: $\chi^2(16) = 21.979 [0.0791]$

As apparent by the diagnostic tests in table 5.9 above, there is no evidence for model misspecification. Vector serial correlation and normality tests do not detect serial correlation and normality problems at 5% and below 10 % level respectively. The trace test statistics of table 5.8 implies that the null of zero co-integration is rejected at 5% level of significance while the alternative hypothesis that at most one co-integrating vector is not rejected. Hence a single co-integrating vector is identified.

This test is followed by weak exogeneity test which is a test of zero restriction on α coefficient. The result of the likelihood ratio test (LR-test) for weak exogeneity test is reported in table 5.10 below

Table 5.10 Test for zero restrictions on α Coefficient for Model II

Variables	α Coefficients	LR test , Chi ² (1)	P-values
LRPCGDP	-0.21036	7.0126	[0.0081]**
LDIT	0.21970	0.53881	[0.4629]
LNDT	-0.54158	1.9316	[0.1646]
LOR	-0.17243	0.23612	[0.6270]
LPGE	-0.25037	0.94969	[0.3298]
LDEF	-0.18472	0.11428	[0.7353]
LGINVT	1.3938	0.03098	[0.8603]
LPINVT	1.6648	2.4034	[0.1211]
LLAB	0.46817	0.85963	[0.3538]

** represent rejection of the null at 1% of significance

Source: PcGive 10 weak exogeneity test result

As revealed in table 5.10 all the variables happened to be weakly exogenous except real per-capita GDP (LRPCGDP). The reason is that, the likelihood ratio test (LR- test) for zero restriction on α coefficient for LRPCGDP is rejected at 1% of significance level. This makes

possible to express the long run relation of the variables in such a way that LRPCGDP as a function of the remaining variables.

To determine which variable uniquely constitute the co-integration vector, test for the significance of the long run coefficients is undertaken. The LR test of zero restriction tests on these coefficients is provided in table 5.11.

Table 5.11 Test for zero restrictions on β coefficients for model II

Variables	β coefficients	LR-test:x2(1)	p- value
LDIT	-0.095286	3.6948	[0.0546]
LNDT	0.093231	3.6450	[0.0562]
LOR	-0.28613	8.8882	[0.0029]**
LHDE	-0.56965	20.719	[0.0000]**
LDEF	0.030457	0.57276	[0.4492]
LGINVT	-0.054566	1.5448	[0.2139]
LPINVT	-0.10305	15.176	[0.0001]**
LLAB	-1.7790	11.554	[0.0007]**

** indicates rejection of the null at 1% level of significance

Source: PcGive 10 coefficient significance test result

The above analysis indicates that, LOR, LHDE, LPINVT and LLAB are significance at 1% significance level in explaining LRPCGDP in the long run. LNDT, LDIT, LDEF and LGINVT, on the other hand are insignificant and are not important to explain the long run variation in LRPCGDP. Thus, the unrestricted co-integration relationship can be written as;

$$\begin{aligned}
 & \text{LRPCGDP} - 0.095286\text{LDIT} + 0.093231\text{LNDT} - 0.28613\text{LOR} - 0.56965\text{LHDE} \\
 & + 0.030457\text{LDEF} - 0.054566\text{LGINVT} - 0.10305\text{LPINVT} - 1.7790\text{LLAB} \\
 & = 0. \dots \dots \dots 5.2
 \end{aligned}$$

From the government budget variable human capital development government spending and unclassified (other) revenues indicate a positive significance impact on per-capita GDP.

Distortionary taxes and government investment show positive but insignificant influence on the economy. Insignificant negative effect is also revealed by non distortionary taxes and the budget deficit.

Relative to model I human development spending has a slightly smaller positive effect in the current specification (compare 0.58758 with 0.56965). This marginal difference would have an implication that financing human capital enhancing activities by generating additional revenue through non distortionary taxation is better contribute for the economy than redirecting resources from other unproductive activities to the productive one. This might be due to the fact that, even if other expenditure does not show significant contribution for the real GDP per head, such expenditures are essential for smooth functioning of the government which would have indirect role for the economy.

The positive sign of LDIT is logically expected result. The result can be interpreted as the elasticity of real per capita GDP due to a unit reduction in direct tax compensated by reducing other government spending by the same amount as compensation is about 0.095. Given positive significant contribution of private investment (LPINVT) and labor force (LLAB), reducing distortionary effect of direct taxes (collected mainly from profit and income) contribute more for the economy by creating incentive for the workers and private investors. This on the other hand reveals better beneficial role of the private sector as compared with unproductive government spending.

Likewise, unclassified revenues (OR) found to contribute positively by the estimated elasticity of 0.29 in significant way. Therefore government still has good opportunity to finance other expenditures using other revenues without harming the real GDP per head.

5.2.2.1.1 Error correction for model II

Analogous to the assumption of other government spending ,(LOE), as a compensating fiscal instrument in the long- run specification, this short run dynamics also omits other spending. Following the usual procedure of dropping out insignificant variables, the parsimonious error correction estimates of the variables is presented in table 5.12.

In the table below D in front of each variable stands for the first difference of the variables. The results of various diagnostic tests reported above do not indicate problem of Heteroscedasticity (ARCH- a test for Autoregressive Conditional heteroscedasticity), non normality and autocorrelation (AR1-2 test) which are the required properties of OLS estimation. Moreover Ramsey RESET test does not indicate any functional miss specification of the model. Since the variables interned in the above equation are stationary and the model passes the Gaussian assumptions, all the test statistics and t- values give the right inference. The overall significance test of F- statistics witnessed the joint significance of the variables at 1% level of significance. Accordingly the value of R^2 indicate that about 74% of the variation in real per-capita GDP is explained by the change in the variables included in the model.

Table 5.12 Parsimonious Error Correction of Model II
Dependent Variable: DLPCGDP

Variables	Coefficient	St.Error	t- value	t-prob
Constant	-0.00017402	0.005006	-0.0348	0.972
DLRPCGDP_1	0.640206	0.1360	4.71	0.000
DLGIT	0.0537719	0.03553	1.51	0.140
DLOR_1	0.168460	0.02806	6.00	0.000
DLHDE	0.136382	0.03706	3.68	0.001
DLHDE_1	0.0681119	0.03828	1.78	0.085
DLDEF_1	-0.00428903	0.01530	-0.280	0.781
DLGINVT	0.0763391	0.01858	4.11	0.000
DLGINVT_1	0.0704741	0.01831	3.85	0.001
DLPINVT	0.0295355	0.007526	3.92	0.000
DLPINVT_1	0.0120804	0.008163	1.48	0.149
DLLAB	0.0295998	0.01535	1.93	0.063
ECT_1	-0.68730	0.2409	-2.853	0.000
R² 0.739403 F(14,31) = 6.283 [0.000]** DW 2.08				
Diagnostic Tests				
AR 1-2 test: F(2,29) = 0.50907 [0.6063]				
ARCH 1-1 test: F(1,29) = 1.3373 [0.2569]				
Normality test: Chi ² (2) = 4.3756 [0.1122]				
hetero test: F(28,2) = 0.12465 [0.9982]				
RESET test: F(1,30) = 2.6039 [0.1171]				

Source: PcGive 10 error correction model estimate result

The error correction term held the expected negative sign and less than one with a statistical significant value of -0.687. This reflects the convergence behaviour of the real per head GDP

towards its equilibrium and about 69% of its deviation from the steady state position is corrected per year.

As compared with the results of the short run dynamics of model I, there is no a major change in the behaviour of variables to explain the short run fluctuation of per capita real GDP. It is observed that increase in human capital enhancing and government investment expenditures, other revenues and private investment, still remain the main positive and significant contributors for the current real GDP per head. A visual fact from this result is that distortionary taxes and labor force are found to be positively related with per capita income whereas deficit has adverse effect, but both are statistically insignificant.

6. Conclusion and Policy Implications

6.1 Conclusion

By any standard measures of poverty, Ethiopia is characterised by widespread chronic poverty. Efforts are undertaken by the government to reduce the persistent poverty through sustainable economic growth. Low and erratic historical per capita income added with government resource constraints put their shade on the efforts of sustaining economic growth. In such circumstance prioritizing government expenditures on the basis of economic benefit and raising funds from sustainable sources are the major economic policy challenges. But little is known about how the composition of government expenditure affects Ethiopia's economic performance. Since the sources of revenues are limited, the main option can be expenditure cuts. It has become critically important to know which component should be adjusted and why. Knowing the relative contribution of each budget component to economic growth is crucial for decision making. So it is important to evaluate how the different components of public expenditures and revenue affect economic performance, since a different composition of budgetary expenditure may affect the economy differently.

Most of studies that relate fiscal policy with economic growth in Ethiopia are partial in nature and have been on highly aggregated data. In this study an attempt was made to examine the link of disaggregated public spending and their respective financing mechanism with economic growth by employing Barro type growth model. Any empirical estimation of the Barro - type growth model needs to address the implications of the linear relationship between the elements of the government budget. This constraint implies that the coefficient of any budget element must be interpreted as the impact of a unit increase in that element financed by a unit change in the element omitted from the regression. To care for the issue of implicit

financing, this research estimates four real GDP per capita equations for Ethiopia data set from 1960/61 to 2007/08 with the aid of Johansen cointegrated VAR technique of estimation.

The result identifies those components of public spending and revenues that could be protected and sustained. As proposed by the study, estimated models guarantee the growth neutral nature of nondistortionary taxes and other expenditures. So this conclusion is drawn based on the regression results which assume the two elements as financing budget components.

The short run and long run estimations signify that, either financed by nondistortionary taxation or other spending, human capital enhancing expenditures raise per-capita real GDP. In relative terms, however, financing human development spending by non distortionary taxation increases its relevance in terms of boosting up real GDP per head. On the other hand despite its positive effect in the short run, government investment is not important in the long run.

The result also suggests that shifting the government revenue source from distortionary taxation towards non distortionary taxes can realistically be regarded as per capita GDP enhancing. The other feature of the analysis is the strong positive effect of other revenues on the real per capita GDP irrespective of the assumed financing mechanism. Tax increases to finance deficit resulted adverse effect where as non-productive spending cuts to accomplish the same task are insignificant.

Strong and beneficial effect of private investment is witnessed both in the short run and in the long run. However, labor force as a potential for human capital development is important for the long run per capita real GDP.

The estimated short –run models indicate that real per capita GDP converges to its long run equilibrium. The speed of adjustment is fairly large implying that it takes less than two periods to come back its equilibrium once it drifts away from its steady state position.

6.2 Policy Implications

The study intended to identify the effects of disaggregated government expenditures and their financing mechanism on the long-run and short run real per capita GDP of Ethiopia. Decomposing government expenditures helps to explain and understand the role of the state in the growth process so as to make a sound economic policy. The policy lessons that can be distilled from the empirical analysis are:

Fiscal policy interventions to sustain economic growth should set priorities based on the virtue of economic benefits. Fiscal adjustment that reduces other expenditure and protected human development spending has proved more likely to result high real per capita GDP. While increasing coverage of education and health services is vital to economic progress, the provision of services with adequate quality is equally necessary to sustain economic growth. To that effect, the government needs to ensure the provision of quality services in education and health services.

Human capital investment can only make important contribution to growth if the skilled and healthy labor force is effectively absorbed in the economy. This in turn calls for continuing efforts to create a better investment climate to encourage more private investment.

The long run beneficial effect of private investment on real per capita income in Ethiopia is confirmed by this analysis. Thus government policies and efforts that foster suitable investment environment to encourage the private sector are crucial to achieve sustained growth. In promoting private investment, the stability and predictability of the incentive

framework is very important. These could be partly reflected in sustainable macroeconomic balances that enhance stability and certainty about future policies. Key policies such as adequate infrastructural provisions, effective institutions and human capital investment would help to generate profitable investment options for the private sector. Moreover, improving access to loans and credit is critical for the expansion and growth of the private sector.

Government investment, on the other hand boosts up real per capita GDP temporally in the short run. Hence the guiding principle of the government investment should be complimentary rather than competitive with the private sector to attain long lasting growth. The implication is that government should not involve in areas in which the private sector operates efficiently and should increase its investment in areas that facilitate the development of the private sector.

Similarly a long run beneficial effect of labor force demands a special policy attention. More efforts should be made for provision of education, training, skill enhancement and professional development facilities for the growing productive labor force, so that high sustainable growth could be achieved and sustained.

Another policy calling problem is the issue of financing government outlays. Prudent fiscal policy should widen persistent and reliable source of revenue without distorting the incentives of the private sector. The finding proposes the possibility of generating more revenue from non distortionary without creating discouragement. Therefore improving the tax collection system, controlling possible tax evasion and identification of the potential tax paying agents added with expanding the tax base would be a sustainable way of financing public activities.

Furthermore to mobilize adequate finance from local sources, the government needs to promote the private sector by facilitating access to, and putting in place, the necessary infrastructures which are essential for enhancing the returns from private investment.

References

- Afonso, A. and Alegre.G.J(2008), 'Economic Growth and Budgetary Components: A Panel Assessment for the EU,' *Working Paper* No 848.
- Alemayehu Geda (2005), 'Macroeconomic Performance in Post-Derg Ethiopia,' *Northeast African Studies* Vol. 8.1 pp.159-204
- Alemayheu Geda, Njuguna Ndung'u and Daniel Zerfu (2007), *Applied Time Series Econometrics: A Practical Guide for Macroeconomic Researchers with a Focus on Africa*, Memo
- Andersen, P. and Gruen, D.(1995), 'Macroeconomic Policies and Growth,' *Research Discussion Paper* 9507, Reserve Bank of Australia.
- Armey, D. (1995), *The Freedom Revolution*, Washington: Regnery Publishing.
- Arrow, K. (1962), 'The Economic Implications of Learning by Doing,' *Review of Economic Studies*, Vol. 29, pp. 155-173.
- Aschauer, D.A. (1989), 'Is public expenditure productive?,' *Journal of Monetary Economics*, Vol. 23, pp.177-200.
- Barro ,R.J (1996), 'Health, Human Capital and Economic Growth', Pan American Health Organization, Washington, DC.
- Barro, R.J. (1989), 'Economic Growth in a Cross Section of Countries', *NBER Working Paper* N0. 3120.
- Barro, R.J. (1990), 'Government Spending in a simple Model of Endogenous Growth', *Journal of political economy*, Vol.98, No. 5, s103-s125.

- Barro, R.J. and Sala-I-Martin, X. (1992), 'Public Finance in Models of Economic Growth', *Review of Economic studies*, Vol.59, Issue 4, PP.645-661.
- Barro, R.J.(1996), 'Determinants of Economic Growth : A Cross-country Empirical Study,' NBER *Working Paper* 5698
- Baxter, M., and King, R.G. (1993), 'Fiscal policy in general equilibrium,' *American Economic Review*, Vol.83, pp. 315-335.
- Benos, N. (2009), 'Fiscal Policy and Economic Growth: Empirical Evidence from EU Countries,' University of Ioannina .
- Bleaney, M, Gemmell, N. and Kneller R. (2001), 'Testing the endogenous growth model: public expenditure, taxation and growth over the long run,' *Canadian Journal of Economics*, Vol.34, No 1, pp. 36-57.
- Bleaney,M., Gemmell, N. and Kneller,R. (2001), ' Testing the Endogenous Growth Model: Public Expenditure, Taxation, and Growth over the Long Run,' *The Canadian Journal of Economics*, Vol. 34, No. 1 , pp. 36-57.
- Brons,M. , de Groot, H. and Nijkamp, P. (1999), 'Growth Effects of Fiscal Policies: A Comparative Analysis in a Multi-Country Context,' Vrije University.
- Cashin, P. (1995), 'Government Spending, Taxes and Economic Growth,' *Staff Papers* International Monetary Fund, Vol. 42, No. 2, pp. 237-269.
- Cochrane, J.(2005), *Time Series for Macroeconomics and Finance*, Chicago: University of Chicago.
- Colombier, C. (2006), 'Testing the Growth Effects of Fiscal Policies Using Modified M-estimator,' Switzerland.

- Davidson, R., and MacKinnon, J. G. (1999), *Foundations of Econometrics*, Oxford University Press.
- Dowrick, S. (1993), 'Government consumption: its effects on productivity growth and investment'. In N. Gemmell (ed) *The Growth of the Public Sector. Theories and International Evidence*. Aldershot: Edward Elgar.
- Easterly, W. and Rebelo, S. (1993), 'Fiscal policy and economic growth,' *Journal of Monetary Economics*, Vol. 32, pp.417-458.
- Ekpo, A. (1994), 'Public expenditure and economic growth in Nigeria 1960—1992,' *Final Report*. AERC, Nairobi.
- Enders Walter (1995), *Applied Econometric Time Series*, John Wiley & Sons, Inc., USA.
- Endrias, Bruke (1996), 'Productivity of Government Spending and Test of Causality between Government Expenditure and Economic Growth,' M.Sc. Thesis, Addis Ababa University
- Engen, E. and Skinner, J. (1996), 'Taxation and economic growth,' *National Tax Journal*, Vol. 49, pp.617-41
- Engle, R. F. and Granger, C. W. J. (1987), 'Co-integration and Error Correction: Representation, Estimation and Testing,' *Econometrica*, Vol. 22, pp. 251-76.
- Eshetu, Chole (1984), 'Towards a History of the Fiscal Policy of the Pre-Revolutionary Ethiopian State: 1941-1974,' *Journal of Ethiopian Studies*, Vol. XVII, Addis Ababa.
- Fu,D., Taylor, L.L, Yucel, M.K. (2003), 'Fiscal Policy and Growth,' Research Department *Working Paper* 0301

- Gemmell, N., Kneller, R. and Sanz, I (2005), 'Fiscal Policy Impacts on Growth in the OECD: Are They Long-Run,' University of Nottingham, UK.
- Gemmell, N. and Kneller, R. (2003), 'Fiscal Policy, Growth and Convergence in Europe,' New Zealand Treasury *Working Paper* 03/04.
- Gemmell, N. (2001), 'Fiscal Policy in a Growth Framework,' *Discussion Paper* No. 2001/84
- Granger, C. W. J. and Newbold, P. (1974), 'Spurious Regressions in Econometrics,' *Journal of Econometrics* Vol.2, No 2, pp 111-120.
- Gujarati, D. (2004), *Basic Econometrics*, 4th Ed, The MacGraw-Hill Companies, Boston.
- Harris, R. (1995), *Using Cointegration Analysis in Econometric Modelling*, Prentice Hall, London.
- Helpman, H. (1991), 'Endogenous Macroeconomic Growth Theory,' NBER *Working Paper* No.3869.
- IMF (2008), The Federal Democratic Republic of Ethiopia: 2008 Article IV Consultation, *IMF Country Report* No. 08/264.
- Johansen, S. (1988), 'Statistical Analysis of Cointegration Vectors,' *Journal of Economic Dynamics and Control*, Vol.12, No.2-3, pp. 231-254
- Kneller, R., Bleaney, M.F. and Gemmell, N. (1999), 'Fiscal Policy and Growth: Evidence from OECD countries', *Journal of Public Economics*, 74, pp.171-190.
- Kormendi, R. C. and Meguire, P. G. (1985), 'Macroeconomic Determinants of Growth: Cross Country Evidence,' Vol. 16, No.2, pp 141-163.

- Lucas, R. E. (1990), 'Supply-Side Economics: An Analytical View,' *Oxford Economic Papers* No. 42.
- Lucas, R.E. (1988), 'On the mechanics of economic development,' *Journal of Monetary Economics*, Vol. 22, pp. 3-42.
- M'Amanja, D. and Morrissey, O., (2005), 'Fiscal policy and economic growth in Kenya,' *Credit Research Paper*, No. 05/06, Centre for Research in Economic Development and International Trade, University of Nottingham.
- Maddala, G.S.(1992), *Introduction to Econometrics*, 2nd Ed. Macmillan Publishing Company, New York.
- Martin, R. and Fardmanesh, M. (1990), 'Fiscal Variables and Growth: A Cross-Sectional Analysis,' *Public Choice*, Vol. 64, No. 3, pp. 239-251.
- Martin, R. and Fardmanesh, M. (1990), 'Fiscal Variables and Growth: A Cross-Sectional Analysis,' *Public Choice*, Vol. 64, No. 3, pp. 239-251
- Mendoza, E., G. Milesi-Ferretti and P. Asea (1997), 'On the Ineffectiveness of Tax Policy in Altering Long-Run Growth: Harberger's Super neutrality Hypothesis,' *Journal of Public Economics*, Vol. 66, pp. 99-126.
- Mugerwa,S.K.,(2002), 'Fiscal Policy, Growth and Poverty Reduction in Uganda,' WIDER *Discussion Paper* No. 2002/33
- Obi, B. (2007), 'Fiscal policy and poverty alleviation: Some policy options for Nigeria,' *AERC Research Paper* 164
- Ocran,K (2009), 'Fiscal Policy and Economic Growth in South Africa,' St. Catherine's College, Oxford University.

- Paul, G.S, (1992), 'Fiscal Policy in an Endogenous Growth Model,' *The Quarterly Journal of Economics*, Vol. 107, No. 4, pp. 1243-1259.
- Rebelo, S. (1990), 'Long Run Policy Analysis and Long Run Growth,' NBER *Working Paper* No 3325
- Rebelo, S. (1991), 'Long Run Policy Analysis and Long Run Growth,' *Journal of Political Economy*, Vol.99, pp.500-521.
- Romer, D. (1996), *Advanced Macroeconomics*, The MacGraw-Hill Co. Inc., Singapore.
- Romer, P.M., (1986), 'Increasing Returns and Long-run Growth,' *Journal of Political Economy*, Vol. 94, pp. 1002-1038.
- Romer,P.M (1989), 'Human Capital and Growth: Theory and Evidence,' NBER *Working Paper* No. 3173
- Schmidt-Hebbel, K.(1995), 'Fiscal adjustment and growth in and out of Africa', AERC *Special Paper* No. 19. Nairobi.
- Solow ,R.M. (1956), 'A contribution to the theory of economic growth,' *Quarterly Journal of Economics*, Vol. 71, pp.65-94.
- Stokey ,N.L. and Rebelo ,S. (1995), 'Growth effects of flat-rate taxes', *Journal of Political Economy*, Vol. 103, pp.519-550.
- Tanzi, V. and Zee, H. H. (1997), 'Fiscal Policy and Long-run Growth,' IMF *Staff Papers*, Vol.44, No.2, pp.179-209.
- Teshome Ketema (2006), 'The Impact of Government Spending on Economic Growth: The case of Ethiopia,'MSc Thesis, Addis Ababa University.

- Teshome, Mulat (1993), 'Trends in Government Finance,' *Ethiopian Journal of Economics*, Vol. 2, No. 1, pp.73-100.
- Thomas R.L. (1997), *Modern Econometrics-An Introduction*, Addison WesleyLongman Limited, England.
- Transitional Government of Ethiopia (1991), 'Economic Policy of Ethiopia during the Transition Period,' Addis Ababa.
- Turnovsky, S. (1998), 'Fiscal Policy and Growth in a Small Open Economy with Elastic Labor Supply,' University of Washington
- UNDP (2008), *Escaping the Poverty Trap, The Least Developed Countries Report*.
- Vedder, R. K. and L. Gallaway (1998), *Government Size and Economic Growth*, Washington: Joint Economic Committee.
- Wagner, A. (1890) *Fiannzwissenschaft* 3rd Ed., partly reprinted in *Classic in the Theory of Public Finance*, . R. A. Musgrave and A. T. Peacock, Macmillan, London, 1958.
- Wogene, Yirko (1994), 'History of the Post-War Ethiopian Fiscal System,' in Eshetu Chole (eds.), *Fiscal Decentralization in Ethiopia*, Addis Ababa.
- Wondaferahu Mulugeta (2002), 'Fiscal Policy and Economic Growth in Ethiopia,' MSc Thesis, Addis Ababa University.
- Xu, Bin, (1994), 'Tax Policy Implications in Endogenous Growth Models,' IMF *Working Paper* 94/38, International Monetary Fund, Washington, D.C
- Yoseph Zelalem (1998), 'Revenue Productivity of the Tax System in Ethiopia,' MSc Thesis, Addis Ababa University.

Appendices

Appendix I

Summary of Regression Results of the Long run Models

Variables	Over parameterized model	Non distortionary tax as a financing element	Other expenditure as a financing element	Both non distortionary tax and other expenditure as a financing element
LDIT	-0.16541 (0.0321) *	-0.24225 (0.0084) **	-0.095286 (0.0546)	-0.058797** (0.0008)
LNDT	0.074250 (0.0507)	-----	0.093231 (0.0562)	-----
LOR	-0.39720 (0.0066) **	-0.55497 (0.0007) **	-0.28613 (0.0029) **	-0.27696 (0.2897)
LHDE	-0.61797 (0.0000) **	-0.58758 (0.0001) **	-0.56965** (0.0000) **	-0.39901 (0.0151) *
LOE	0.16523 (0.2243)	0.032506 (0.7213)	-----	-----
LDEF	0.10968 (0.1407)	0.17474 (0.0409) *	0.030457 (0.4492)	-0.0095907 (0.0010) **
LGINVT	-0.039491 (0.4201)	0.018636 (0.7389)	-0.054566 (0.2139)	0.0095218 (0.8641)
LPINVT	-0.087533 (0.0034) **	-0.082610 (0.0278) *	-0.10305 (0.0001) **	-0.12635** (0.0002)
LLAB	-0.052994 (0.1083)	-0.015121 (0.6731)	1.7790 (0.0007) **	-0.070950 (0.0035) **
Sigma	0.0405123	0.323094	0.0441542	0.0438378
RSS	0.05580233465	3.653639956	0.06823567767	0.06918310733
R^2	0.999992	0.99991	0.999984	0.999798
F(81,183)	7.93982	7.3118 [0.0000]	10.2029[0.0000]	9.15639 [0.0000] **
-----	[0.0000] **	**	**	1.3259 [0.0667]
AR1-2 test:	1.3467	1.2214 [0.1481]	1.3668 [0.0797]	
:	[0.0783]			

Appendix II

Standardized β' eigenvectors and standardized α Coefficients

Standardized β' eigenvectors for model I

LRPCGDP	LDIT	LOR	LHDC	LOE	LDEF	LGINVT	LPINVT	LLAB
1.0000	-0.24225	-0.55497	0.58758	0.032506	0.17474	0.018636	-0.082610	-0.015121
4.2428	1.0000	2.0162	-0.63917	-2.6527	-1.6285	-0.67193	-0.69588	-0.59501
1.1214	-0.80288	1.0000	0.35720	0.73808	0.19035	-0.82637	0.22774	0.20332
-0.67754	0.15946	-0.00223	1.0000	-0.44069	0.23893	-0.054239	-0.062616	-0.05128
3.6737	-1.2857	0.71749	-2.6252	1.0000	2.9081	0.77487	-0.64095	1.0052
-23.138	40.144	-13.681	-11.783	16.031	1.0000	-29.211	-3.4448	26.977
0.91431	13.775	-1.0527	-5.4578	1.5165	-2.3122	1.0000	-0.25210	-4.6703
-2.8092	-3.4828	-0.94980	3.0575	1.6296	0.72997	-2.3596	1.0000	-3.4124
165.76	4.6684	-16.460	-2.8489	-6.1225	1.7316	1.8385	-4.5627	1.00

Standardized α coefficient of model I

LRPCGDP	-0.25320	-0.0052164	0.013606	0.056231	-0.010440	-1.2454e-005	-0.0016431	-0.00038163	-8.1781e-007
LDIT	0.079022	0.13076	-0.099909	-0.097195	-0.0068641	0.00095399	-0.013479	0.00082900	-2.4173e-006
LOR	-0.042793	-0.058144	-0.16210	0.028749	0.0014984	0.0038760	0.00019876	0.0050172	-1.6061e-006
LHDE	-0.30970	0.090694	-0.0045895	-0.25415	0.024215	0.0011787	0.0014298	0.0034335	-4.1019e-006
LOE	-0.43718	0.13075	-0.11652	0.41865	0.058801	0.0016926	-0.0042205	0.0082836	1.9337e-006
LDEF	-0.16873	0.069973	-0.094393	-0.37741	-0.12234	0.0026100	0.0031589	-0.0067633	3.2164e-006
LGINVT	0.62364	0.063810	0.31022	0.36087	-0.040216	0.0048056	-0.0053785	0.012899	-4.7642e-006
LPINVT	0.64877	0.42016	-0.21892	0.65238	-0.078820	-0.0015489	0.0040265	-0.036359	-1.7287e-005
LLAB	0.024969	0.10616	-0.13776	0.051979	-0.044542	-0.0046188	0.010024	0.012652	-4.2935e-006

Standardized β' eigenvectors of model II

LRPCGDP	LDIT	LNDT	LOR	LHDE	LDEF	LGINVT	LPINVT	LLAB
1.0000	-0.095286	0.093231	-0.28613	0.56965	0.030457	-0.054566	-0.10305	-0.079303
-0.35709	1.0000	-0.52837	-3.3213	-0.5222	0.13177	1.9456	-0.6358	-0.22123
-9.1056	0.56452	1.0000	-3.0326	5.5438	2.5310	0.91226	0.58996	-0.089916
2.3279	-0.42558	-0.54977	1.0000	-0.68948	1.7401	0.44324	-0.50924	0.11861
-0.27834	-2.2794	0.53081	-0.21203	1.0000	1.1919	-0.28809	-0.099670	1.5828
-0.16149	-11.116	-0.70172	-0.3653	6.6542	1.0000	3.9323	1.0667	-1.7790
2.1611	-2.7925	4.3797	-0.83236	-4.0008	-0.30387	1.0000	0.84412	-1.2066
-30.846	-34.107	-43.310	11.367	62.2220	6.0235	-33.081	1.0000	-12.720
49.383	-0.17799	0.59107	-6.1290	-1.5369	0.92233	1.0906	-1.0115	1.0000

Standardized α coefficient of model II

LRPCGDP	-0.21036	-0.014475	0.0079234	-0.012135	0.0025445	0.00091117	-0.0026385	0.00014561	-0.00019587
LDIT	0.21970	0.045189	-0.049607	-0.019325	0.044351	-0.0014096	-0.0050158	0.0010130	-0.00044073
LNDT	-0.54158	0.080151	-0.030556	0.049692	-0.064538	-0.0028309	-0.0052308	0.0012112	0.00050347
LOR	-0.17243	0.062978	0.031754	-0.033403	0.037096	-0.021713	0.0068790	0.00031405	-4.7016e-005
LHDE	-0.25037	0.0026449	-0.054526	0.024194	-0.0019452	-0.011368	0.0076124	0.00027528	-0.00053915
LDEF	-0.18472	0.035230	-0.048486	-0.19761	-0.046972	-0.0093880	-0.020043	4.9393e-005	0.00043085
LGINVT	1.3938	-0.14396	0.029964	-0.084846	0.070470	-0.023617	0.013651	0.00093040	-0.00062081
LPINVT	1.6648	0.081194	-0.047563	-0.030082	-0.046884	0.0099958	-0.089045	-0.00096153	-0.0037068
LLAB	0.46817	0.036101	0.0040193	-0.027907	-0.10245	0.018876	0.026486	0.00043577	-0.0014166

Appendix III

Model Reduction Test for model I

SYS(2) --> SYS(3): F(81,125)= 0.97374 [0.5466]

SYS(1) --> SYS(3): F(162,90)= 0.91126 [0.6980]

Appendix IV

Structural Break Test

Variable LRPCGDP

Chow Breakpoint Test: 1974 1991

Null Hypothesis: No breaks at specified breakpoints

Equation Sample: 1962 2007

F-statistic	1.210745	Prob. F(4,40)	0.3214
Log likelihood ratio	5.257228	Prob. Chi-Square(4)	0.2619
Wald Statistic	4.842978	Prob. Chi-Square(4)	0.3038

Variable LDIT

Chow Breakpoint Test: 1974 1991

Null Hypothesis: No breaks at specified breakpoints

Equation Sample: 1962 2007

F-statistic	0.117009	Prob. F(4,40)	0.9757
Log likelihood ratio	0.535115	Prob. Chi-Square(4)	0.9700
Wald Statistic	0.468035	Prob. Chi-Square(4)	0.9765

Variable LNDT

Chow Breakpoint Test: 1974 1991

Null Hypothesis: No breaks at specified breakpoints

Equation Sample: 1962 2007

F-statistic	1.351337	Prob. F(4,40)	0.2680
Log likelihood ratio	5.830521	Prob. Chi-Square(4)	0.2122
Wald Statistic	5.405348	Prob. Chi-Square(4)	0.2482

Variable LDEF

Chow Breakpoint Test: 1974 1991

Null Hypothesis: No breaks at specified breakpoints

Equation Sample: 1962 2007

F-statistic	0.633838	Prob. F(4,40)	0.6413
Log likelihood ratio	2.826981	Prob. Chi-Square(4)	0.5872
Wald Statistic	2.535352	Prob. Chi-Square(4)	0.6383

Variable LOE

Chow Breakpoint Test: 1974 1991

Null Hypothesis: No breaks at specified breakpoints

Equation Sample: 1962 2007

F-statistic	0.869833	Prob. F(4,40)	0.4904
Log likelihood ratio	3.836687	Prob. Chi-Square(4)	0.4286
Wald Statistic	3.479332	Prob. Chi-Square(4)	0.4810

Variable LHDE

Chow Breakpoint Test: 1974 1991

Null Hypothesis: No breaks at specified breakpoints

Equation Sample: 1962 2007

F-statistic	0.377570	Prob. F(4,40)	0.8233
Log likelihood ratio	1.704836	Prob. Chi-Square(4)	0.7898
Wald Statistic	1.510280	Prob. Chi-Square(4)	0.8248

Variable LGINVT

Chow Breakpoint Test: 1974 1991

Null Hypothesis: No breaks at specified breakpoints

Equation Sample: 1962 2007

F-statistic	1.673639	Prob. F(4,40)	0.1751
Log likelihood ratio	7.118413	Prob. Chi-Square(4)	0.1298
Wald Statistic	6.694555	Prob. Chi-Square(4)	0.1529

Variable LOR

Chow Breakpoint Test: 1974 1991

Null Hypothesis: No breaks at specified breakpoints

Equation Sample: 1962 2007

F-statistic	0.078213	Prob. F(4,40)	0.9885
Log likelihood ratio	0.358379	Prob. Chi-Square(4)	0.9857
Wald Statistic	0.312851	Prob. Chi-Square(4)	0.9890

Variable LPINVT

Chow Breakpoint Test: 1974 1991

Null Hypothesis: No breaks at specified breakpoints

Equation Sample: 1962 2007

F-statistic	2.287787	Prob. F(4,40)	0.0767
Log likelihood ratio	9.476954	Prob. Chi-Square(4)	0.0502
Wald Statistic	9.151147	Prob. Chi-Square(4)	0.0574

Variable LLAB

Chow Breakpoint Test: 1974 1991

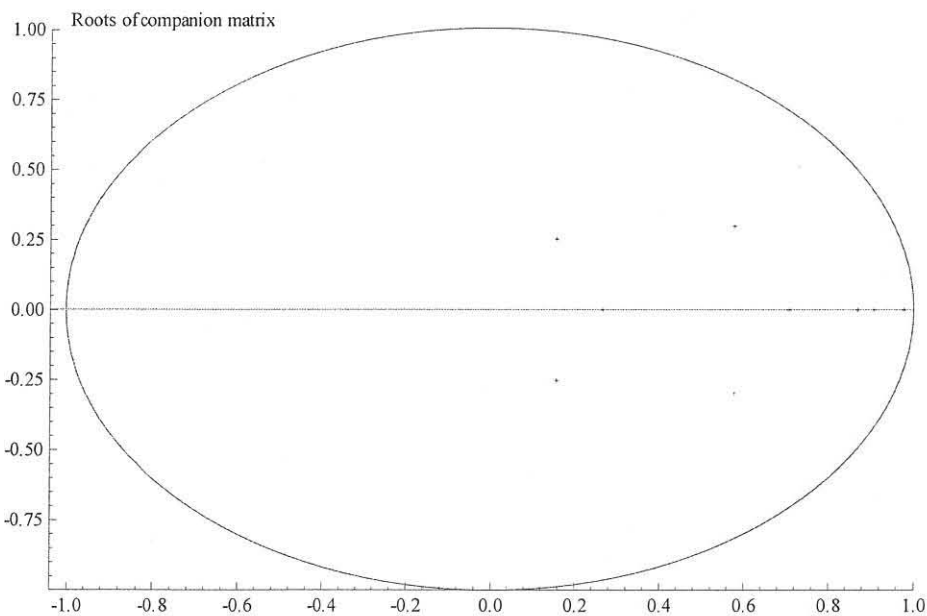
Null Hypothesis: No breaks at specified breakpoints

Equation Sample: 1962 2007

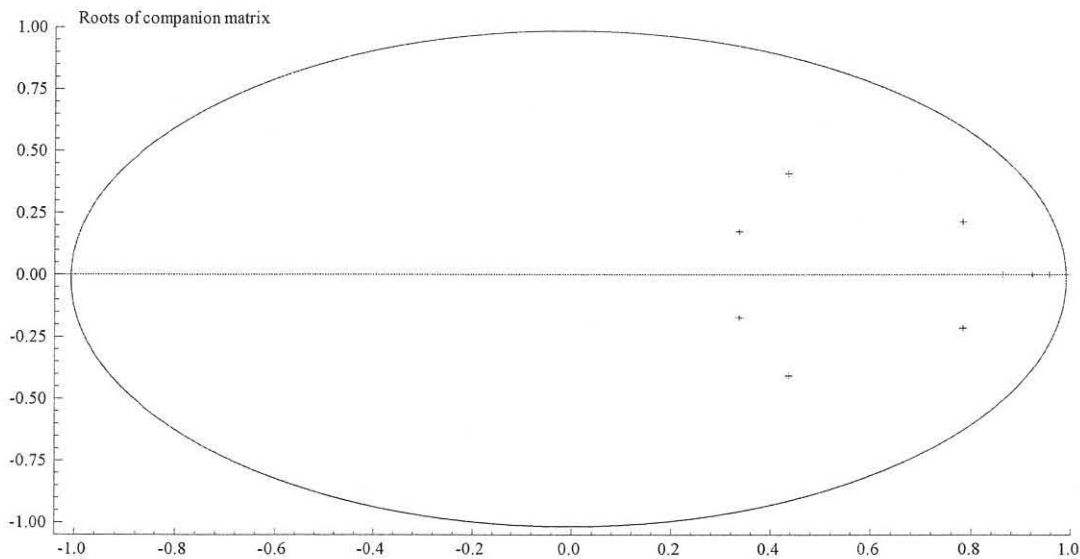
F-statistic	0.102764	Prob. F(4,40)	0.9809
Log likelihood ratio	0.470303	Prob. Chi-Square(4)	0.9763
Wald Statistic	0.411057	Prob. Chi-Square(4)	0.9816

Appendix V

VAR Stability Test for model I



VAR stability test for model II



Declaration

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

The examiners' comments have been duly incorporated.

Declared by:

Name: Tewodros Ayenew

Signature: 

Date: July 6/2010

Confirmed by Advisor:

Name: Girma Estiphano

Signature: 

Date: July 6/2010