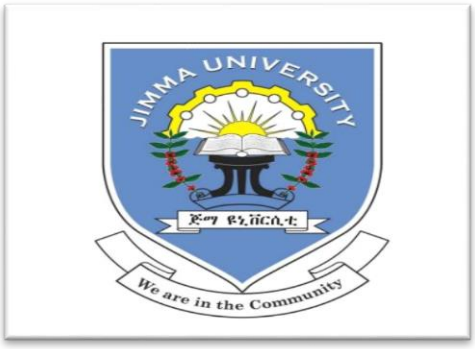

JIMMA UNIVERSITY

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RELATIONSHIP BETWEEN GOVERNMENT REVENUE GROWTH AND ECONOMIC GROWTH IN ETHIOPIA

BY

BIRUK BIRHANU

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A RESEARCH SUBMITTED TO THE SCHOOL OF POSTGADUATE STUDIES OF JIMMA UNIVERSITY IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF SCIENCE IN ECONOMICS (ECONOMIC POLICY ANALYSIS)

JUNE, 2015

JIMMA, ETHIOPIA

DECLARATION

1. Student

   This research is my original work and has not been presented for a Degree programs in any other university, and that all sources of materials used for the study have been duly acknowledged.

   Signature: _____ Date: _____

   Name/Id: _____

2. Supervisor

   This research has been submitted for review with our approval as university supervisor.

   Main Advisor Name _____

   Signature: _____ Date: _____

   Co-Advisor Name _____

   Signature: _____ Date: _____

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Haregewoyn Lakew and Meron Worku, your strength was the source of my inspiration. I am grateful to have such a mother and friend like you. May God protection and mercy be with you. All errors are mine.

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ACRONYMS

ADF	Augmented Dickey-Fuller
ADLI	Agricultural Development Lead Industrialization
CAB	Current account Balance
CPI	Consumer Price Index
EPRDF	Ethiopian People Revolutionary Democratic Front
ERCA	Ethiopian Revenue and Costume Authority
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
GNI	Gross National Income
I (0)	Integrated of Order Zero
I (1)	Integrated of Order One
I (D)	Integrated of Order D
IMF	International Monetary Fund
M1	Narrow Money
M2	Broad Money
MDGs	Millennium Development Goals
MoFED	Ministry of Finance and Economic Development
NBE	National Bank of Ethiopia

NTR	Non-Tax Revenue
ODA	Official Development Assistance
OECD	Organization for Economic Cooperation and Development
OLS	Ordinary Least Square
PP	Philip Peron
R and D	Research and Development
TR	Tax Revenue
TTR	Total Tax Revenue
US	United States
VAR	Vector Autoregressive
VAT	Value Added Tax
VECM	Vector Error Correction Model

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ABSTRACT

The main aim of this study is to demystify the mystery surrounding the belief that, high tax revenue growth rates engineered through the government multiplier process. The relationship between government tax revenue growth and economic growth is investigated for Ethiopia during the period 1974/75-2013/14. Theoretically and empirically it has been shown that taxes affect the allocation of resources and often distort economic growth. While, analyzing the long run and short run relationship between government tax revenue growth and economic growth the study applied Johansen's cointegration test, VAR, VECM, and granger causality test,

Government tax revenue growth in general and with its component though affect economic growth found to have no causal relationship with economic growth in the long run. This implies there is fiscal independence between tax revenue and economic growth. Furthermore, in the short run the finding showed that there is independence relationship and the speed of adjustment is slow; only 27% and 7% for the components and total tax revenue growth with economic growth models respectively. However, compared with post tax reform periods the latter has high speed of adjustment; meaning the speed of disturbances corrected each year in the short run become fast. Based on the findings the study highlighted some major issues that policymakers should consider for effective taxation policy formulation and implementation in line with the dynamic nature of the Ethiopian economy.

Key words: - Ethiopia, Government tax revenue growth, Economic growth, Growth in real total tax revenue, Growth in real tax revenue, Growth in real non-tax revenue.

CHAPTER ONE

INTRODUCTION

1.1.BACKGROUND

Taxation is central to development and provides governments with the funding they require to finance economic development and growth. Governments all over the world strives to create conducive environment that attract investments domestically as well as from abroad. Among others, the means that help to this kind of aspiration would be self-sufficient in tax revenue and financing whatever the economy requires by domestic means, so that managing inflationary tendencies become unforgettable task. The role of taxation in influencing economic growth is not only a main concern of the economic policy makers, tax specialists and administrators but has long been of interest to academics.

The economic history of both developed and developing countries, reveals that taxation is an important weapon or instrument in the hand of government; not only to generate revenue, but also to create fiscal goals that influences the direction of investment and taming the consumption and production of certain goods and services. It is on the basis of this Anyanwu (1997) and Anyafo (1996) argues that taxes are imposed to regulate the production of certain goods and services, protection of infant industries, control business and commerce, curb inflation, reduce income inequalities etc.

There has been an unmitigated debate regarding the role of fiscal policy in regulating the levels and composition of revenue, expenditure and public debt with the objective of achieving fiscal tolerance over a period of time. In this context, in the literature numerous, basic policy issues are also highlighted: including appropriate size of the state, the role of the government in accelerating economic growth, social development and redistribution of the benefits of the economic growth, improving employment and social justice by reducing inequality in income and wealth between income classes and present and future generations, and ensuring efficiency by promoting optimum allocation of resources (Ihtsham and Naeem, 2009).

According to Ruba (2014) economic growth is one of the most important determinants of economic welfare. The global economic crisis that broke out in 2008 has reawakened interest in fiscal policy as an instrument for longer-term growth and development. The term fiscal policy has conventionally been associated with the use of taxation and public expenditure to influence the level of economic activities. The implementation of fiscal policy is essentially routed through government's budget. Fiscal policy deals with government deliberate actions in spending money and levying taxes with a view to influencing macro-economic variables in a desired direction. This includes sustainable economic growth, high employment creation and low inflation. Thus, fiscal policy aims at stabilizing the economy, Increases in government spending or a reduction in taxes tend to pull the economy out of a recession; while reduced spending or increased taxes slow down a boom.

However, the relationship between government revenue and economic growth has been a center of fiscal policies debate on developed and developing countries. Many academicians ascertain the role of taxation and other revenues for the wellbeing of an economy in different perspectives.

Literatures discus the relationship between taxation and economic growth into two aspects. The first focuses on the impact of tax policy on economic growth. In this discussion the impact of policy changes towards economic growth is examined (Poulson and Kaplan, 2008; Koch et al., 2005; Lee and Gordon, 2005) and it can be summarize that tax distortion will reduce the growth potential. In other words there are negative relationship between tax policy and economic growth. Second, the analyses focus on empirical examination on the relationship between tax revenue and economic growth and the nature of relationship can be negative, positive or neutral depending on how important the role of revenue as an economic resources.

Since 2004/05 Ethiopia's economic performance continued to boom for the tenth consecutive year with real GDP growth of 11%. As in the preceding years, this growth continued to be broad-based, with all sectors contributing; likewise, on the revenue frontier, improved domestic revenue collection enabled the government to finance 81% of its

expenditure from domestic sources. Studying the relationship between government revenue growth and economic growth, therefore, enables to understand wheather government revenue growth encourage or discourage the growth trajectory of the country.

1.2.STATEMENT OF THE PROBLEM

The Ethiopian economy is highly characterized by following tight fiscal and monetary policy. According to Admit, et.al (2014) the government continued to pursue prudent fiscal policy better coordinated with monetary policy to combat inflation, while maintaining the momentum of spending in physical and social infrastructure. Fiscal policy has focused on strengthening domestic-resource mobilization (particularly tax collection) and reducing recourse to central bank lending while, at the same time, increasing pro-poor spending including investment in physical infrastructure. Domestic revenue collection has been improving in the past several years owing to vigorous tax reform measures, improved tax administration and trade-facilitation efforts. During 2012/13, tax revenue increased by 24.8% and as a ratio of GDP, it increased by 0.1 percentage point from 11.6% in 2011/12 to 11.7%. Improved domestic revenue collection enabled the government to finance its expenditure mainly from domestic sources. But, the role of domestic revenue collection in economic growth of Ethiopia, separately has not been analyzed and/or has it been due to the current economic growth that enables the country to finance government expenditure by own source is not known empirically hitherto.

The Parliament approved a budget of 178.6 billion birr for federal government for 2014/15 fiscal year, 15.3% increase compared to 154.9 billion birr in 2013/14. 46% of the budget goes to capital expenditure of which around one-third (35%) going to road sector development followed by education sector (17%). 81% of the budget will be financed from domestic sources (68.9% from tax and non-tax domestic revenue, 11.8% from domestic loan) and 19% is expected from external sources (9.8% from external loan and 9.4% from external assistance). 16.2% of the total budget will finance the road sector, 13.8% education, 8.4% MDGs support, 4.6% debt service and 2.7% will go to the health sector (MoFED, 2014). The huge attention towards financing the development effort of the country by domestic means (tax revenue) together with investing in capital expenditures

than recurrent, laid suspicion on how this effort related with the current economic growth of the country.

Therefore, understanding the nexus and/or causality between government revenue growth and economic growth requires a closer look at previous studies

Available evidence indicates that efforts have been made to analyze causality between tax revenue and economic growth in different countries. For instance, Roshaiza et.al (2011) investigated the effects of economic growth on government tax revenue for Malaysia over the period of 1970-2009. Finding of this study clearly shows that there is a unidirectional relationship between economic growth and total government tax revenue with 21% speed of adjustment in the short run to reach equilibrium level in the long run. Moreover, Dzingirai and Tambudzai (2014) investigate the short-run and long-run effects of economic growth on government tax revenue growth for Zimbabwe, during the period of 1980-2012. The result does not support the supply-side hypothesis which emphasizes the effect of tax towards economic growth in favor of Baro's theoretical assertion that changes in tax revenue does not change the long term growth trajectory, that is, the economy will be in a steady-state. On the other hand, the empirical Study of Chigbu, et al (2011) on the causality between economic growth and taxation in Nigeria reveals that taxation as an instrument of fiscal policy affects the economic growth and taxation granger cause economic growth of Nigeria. On the basis of the econometric result, the study concluded that taxation is a very important instrument of fiscal policy that contributes to economic growth of a country.

The situation reveals the surge in government revenue, especially tax revenue and economic growth remains debatable issue on the side of fiscal policymakers because, studies conducted in different countries reached at different conclusions on the same issue. Hence, exerting an effort for Ethiopia have a paramount importance to demystify the nexus. Such attention, however, require appropriate policies drawn from the careful analysis on the macroeconomic variables.

Though there are vast literatures on the relationship between government revenue and economic growth in developed countries evidence from developing countries is still limited thus this paper seeks to extend the debate to Ethiopia. This seemingly puzzled many and led many to suspect the credibility of the stories of fast economic growth over the past few years are a result of improved tax revenue. Moreover, understanding the direction of causality requires a thorough understanding in what manner does the taxation policy the country works and how it is related with the main macroeconomic objectives of a country; maintaining sustainable economic growth.

1.3.OBJECTIVES OF THE STUDY

The main objective of this study is to investigate the relationship between government revenue growth and economic growth. More specifically, the research attempt:-

- To identify how the growth in components of government revenue affects the long term and short term economic growth of the country.
- To identify how the growth in total government revenue affects the long term and short term economic growth of the country.
- To identify the causal relationship between the growth in components of government revenue and economic growth.
- To identify the causal relationship between the growth in total government revenue and economic growth.
- To capture the effect of tax reform on economic growth Ethiopia.
- To suggest feasible policy options to enhance the impact of government tax revenue and its components growth on the country's economic growth.

1.4.SIGNIFICANCE OF THE STUDY

The government of Ethiopia exerts a great effort towards achieving economic prosperity in all aspects. For that matter, financing the development projects by domestic means had given due attention. Hence, knowing the relationship between domestic sources and economic growth is mandatory.

Though, many researches were conducted in the area both at developed and developing nations, studies in the Ethiopian context are scarce. In the prevailing literature, few researches has been done in assessing the nexus between tax revenue and economic growth in Ethiopia. On the contrary, there are many studies that examine correlation between fiscal policy instruments as a whole and economic growth in the Ethiopian context using econometrics technique. Most of them focus mainly either on tax or expenditure or deficit side of fiscal policy only. These include among others the study by (Shibeshi, 1994; Nadir and Abrar, 1994; Mesfin, 1994; Demirew, 1998; Yoseph, 1998; Wondaferahu, 2003). Thus, this research more than analyzing the current development on the issue, it attempt to fill the existing knowledge gap first, by finding the result on the causal relationship between governments revenue growth including components with economic growth and second, empirically examining the impact of tax reform on the growth trajectory of the country.

1.5.SCOPE AND DELIMITATION

The conduct of the analysis is limited to the availability of data from 1974/75-2013/14 of the fiscal year, a period spanning 40 years. All of the data contained in the study are obtained from National Bank of Ethiopia (NBE) (1974/75-2013/14) and MoFED (1974/75-2013/14).

Moreover, contrary to pre tax reform the post reform periods are expected to enhance economic growth considerably. Hence based on the restriction imposed, this study empirically examines in depth the relationship using time series data of the variables such as; real GDP growth and government revenue growth (i.e., including tax revenue and non-tax revenue). Therefore, econometric analysis is made to ascertain the issue.

Therefore, the study neither look other fiscal policy instruments (i.e., expenditure and budget deficit side) nor the monetary policy instruments. It is only limited to the government revenue excluding grants and with its components.

1.6.ORGANIZATION OF THE STUDY

The study is organized into six chapters. Following the introductory chapter, Chapter two presents a review of literatures. Chapter three gives an overview of macroeconomic developments in Ethiopia, followed by Chapter four, methodology and data used. Chapter five deals about results and discussion. Finally, Chapter six presents the conclusions and recommendation of the study.

CHAPTER TWO

LITERATURE REVIEW

2.1. THEORETICAL LITERATURE

Understanding economic growth has long been a central concern in economics. At the risk of vastly oversimplifying the rich insights about economic growth gained over more than two centuries of economic thought, this study look at three generic ingredients—factor accumulation, diminishing returns, and the contemporaries of the Neoclassical/Exogenous and Endogenous growth models.

Adam Smith's Wealth of Nations Smith (1776) is arguably concerned primarily with economic growth, or, in Smith's words, the "*progress of opulence*". Given that Smith was writing during the industrial revolution, it is perhaps not surprising that he emphasized the rising ratio of capital to labour as a key ingredient in economic growth. The growth of inputs such as capital was making a strong contribution to the growth of output, so Smith could understand a lot about eighteenth century growth by looking at the processes by which capital was accumulated, through deliberate savings ("parsimony"). More generally, increasing the quantity of inputs (factors of production) will (usually) lead to an increase in the quantity of outputs, so studying factor accumulation is a key strand in attempts to explain economic growth.

The second ingredient of economic thinking about growth is that of diminishing returns, which relates to the link between factor accumulation and output growth. In particular, diminishing returns captures the idea that doubling the amount of capital will in general lead to less than a doubling of output. The idea was discussed in detail by Ricardo (1821), although it appears earlier in the work of Turgot.[1] Ricardo focused on the case of agricultural (corn) production, where land was in fixed supply, and adding more capital or labour forced activity onto less fertile land, leading to less than proportional increases in output as inputs grew. The more general version of the "law" of diminishing returns, which has been incorporated into many subsequent economic models, applies the same principle

[1] *See cannon (1892).*

to any set of factors where one is in relatively fixed supply. This point will be picked up again in the discussion of the neoclassical growth model of Solow.

Solow's main contribution is an elaboration of neoclassical growth theory. His first pioneering work was the article "*A Contribution to the Theory of Economic Growth*" (1956), in which he developed a neoclassical-type mathematical model of long-run growth based on criticisms of the Keynesian Harrod-Dommar model (regarding the fact it was a single factor model where the sole growth factor was capital accumulation). Solow abandoned the standard Keynesian assumption of a fixed ratio between production factors and introduced a ratio variable. The basis of growth in his model was, on the one hand, the substitution of labor by capital and, on the other hand, technological progress, which he considered to be a key determinant of growth in the long run.

The growth theory of the 1950s and 1960s, typified by Solow and Swan (1956), was based on a production function that had capital and labour (with labour measured in man-hours) as the inputs into production. Constant returns to scale were assumed, as was diminishing marginal productivity of both inputs. Growth occurred in the model through the accumulation of capital but, without any exogenous changes, there had to be a limit to this process. The clear implication from this model is that in the long run, growth stops. Moreover, growth gets slower as capital per worker approach capital accumulation from below. Not only does the amount of investment decline, but the output generated by an additional dollar of investment also gets smaller. The neoclassical growth model so far is a model of no growth, at least in the long run. The drawback of this approach is that the mechanism for growth-the 'growth engine'-is exogenous, so preventing the models from explaining the most fundamental factor of what determines the rate of growth. Furthermore, because it is exogenous, the rate of economic growth cannot be affected by policy. As such, exogenous growth models have limited value for exploring the determinants of growth. This explains why interest in growth theory declined in the 1960s and did not revive until the development of endogenous growth theory almost 25 years later.

Models that both allow sustained growth and determine its level are said to have '*endogenous growth'*. To achieve this requires circumventing the decreasing marginal product of capital in a way that is determined by choices made by the agents in the economy. There have emerged in the literature four basic methods by which this can be achieved. All of these approaches achieve the same end-that of sustained growth-but by different routes.

The simplest method, called the '*AK model'*, is to assume that capital is the only input into production and that there are constant returns to scale. Under these assumptions, the production function is given by *Y=AK;* hence the model's name. Output will then grow at the same rate as net investment in capital. Whilst simple, this model is limited due to the fact that it overlooks the obviously important role of labour.[2] The second approach is to match increases in capital with equal growth in other inputs. One interpretation of this is to consider human capital as the second input rather than just raw labour. Doing so allows labour time to be made more productive by investments in education and training which raise human capital. There are then two investment processes in the model: investment in physical capital and investment in human capital. If the production function has constant returns to scale in human capital and physical capital jointly, then investment in both can raise output without limit. Such model according to Barro, et al (1992) can either have one sector, with human capital produced by the same technology as physical capital or as Lucas (1988) and Uzawa (1965) said to have two sectors, with a separate production process for human capital. The latter approach is able to incorporate different human and physical capital intensities in the two sectors, so making it consistent with the observation that

[2] *It is possible for the model to be given a broader interpretation of including both physical and human capital. The argument is as follows. Assume that the production function,* $Y = f(K, H)$ *, where H is human capital, has constant returns to scale. Then it can be written* $Y = Kf(\frac{H}{K})$*. If the output produced can be turned into consumption, physical capital or human capital equally easily, then all three must have the same price. Profit maximization by firms then fixes a value of* H/K*. This allows A to be defined by* $A \equiv f\left(\frac{H}{K}\right) A$*.*

human capital production tends to be more intensive in human capital-through the requirement for skilled teaching staff etc.

Alternatively, output can be assumed to depend upon labour use and a range of other inputs. Technological progress then takes the form of the introduction of new inputs into the production function without any of the old inputs being dropped (Romer, 1987and 1990). This allows production to increase since the expansion of the input range prevents the level of use of any one of the inputs becoming too large relative to the labour input. An alternative view of technological progress according to (Aghion and Howitt, 1992) is that it takes the form of an increase in the quality of inputs. Expenditure on research and development results in better-quality inputs which are more productive. Over time, old inputs are replaced by new inputs and total productivity increases. Firms are driven to innovate in order to exploit the position of monopoly that goes with ownership of the latest innovation. This is the process of '*creative destruction'* which was seen by (Schumpeter, 1934) as a fundamental component of technological progress.

The final approach to ensure sustained growth is to assume that there are externalities between firms. The mechanism through which this externality operates is learning by doing (Arrow, 1962; Romer, 1986). Investment by a firm leads to parallel improvements in the productivity of labour as new knowledge and techniques are acquired. Moreover, this increased knowledge is a public good so investment, and learning, by one firm flow into other firms. This makes the level of knowledge, and hence labour productivity, dependent upon the aggregate capital stock of the economy. Decreasing returns to capital for a single firm (given a stock of labour) then translate into constant returns for the economy.

On the taxation frontier the Wikipedia (2014) definition says, a tax (from the Latin *taxo*; "*rate*") is a financial charge or other levy imposed upon a taxpayer (an individual or legal entity) by a state or the functional equivalent of a state to fund various public expenditures. A failure to pay, or evasion of or resistance to taxation, is usually punishable by law. Taxes are also imposed by many administrative divisions. Taxes consist of direct or indirect taxes and may be paid in money or as its labour equivalent. Few countries impose no taxation at all, such as the United Arab Emirates

Taxes-necessary as they are-distort private decisions, create misallocations of resources and generate dead weight losses. One might therefore conjecture that at least some of these distortions are reflected in aggregate economic performance, and that more distortive tax systems are associated with lower economic growth. Tax systems can be more or less distortive for two reasons: either because they extract more or less resources from private agents (the tax level), or because they raise a given amount of revenue in more or less distortive ways (the tax structure).

Theories and empirics identified those tax structure, reform, and instruments that are associated with the growth performance. Although the analysis in this paper looks only at the link to growth, it is of course important to acknowledge that growth may not be the only policy objective for tax design.

The role of the tax structure has been somewhat neglected in the macroeconomic literature on fiscal policy and growth, although the differences in distortions created by different taxes may be substantial, and the negative effect of taxes may ultimately depend on what exactly governments decide to tax. This would suggest a link between economic growth and the way taxes are combined and designed to generate revenues. Governments may consider changes to the structure of taxes in order to minimize the negative consequences for growth, while maintaining the desired level of public goods and services provided.

Theory predicts that all taxes–with the exception of lump-sum taxes–create distortions, and such distortions could have negative consequences for growth. Similarly, tax structure varies around the globe with the prime motive of attaining maximum revenue with minimum distortion. Different countries have different philosophies about taxation and have different methods for collection; in the same manner countries have different uses of their revenue which affect the growth differently and as a result their growth rates are different. (Atkinson, 1995; Castles and Dawrick, 1990; Agell et al, 1997), all argued that the different uses of total government tax revenue expenditure affect growth differently and a similar argument applies to the way the tax revenue should be raised. Over the last few decades, most countries have increased taxation quite

dramatically while others are following suit. Some have incorporated value added tax like Zimbabwe in 2004 and some are on the pipeline to do so (Dzingirai and Tambudzai, 2014).

According to Harberger (1962 and 1996), firstly, higher corporate taxes can depress investment rate, or the net growth in the capital stock, through high statutory tax rates on corporate and individual income, high effective capital gains tax rates and low depreciation allowances. Secondly, tax policy can also discourage productivity growth by reducing research and development (R and D) and economic development; if there would be any subsidy (negative tax) it will boost the research activities whose spillover effects can potentially enhance the productivity of existing labor and capital. Thirdly, taxes may reduce the work incentive which will reduce the labor force participation and hours of work, or it may also create biased occupational choice or the acquisition of education, skills and training. Fourth, heavy taxation on labor supply can distort the efficient use of human capital by discouraging worker from employment in sectors with high social productivity but a heavy tax burden and lastly tax policy can also affect the marginal productivity of capital by distorting investment from high taxed to low taxed sectors. This will hinder balanced growth and economic development.

Mirrlees (1971) launched the second wave of optimal tax models by suggesting a way to formalize the planner's problem that deals explicitly with unobserved heterogeneity among taxpayers. In the most basic version of the model, individuals differ in their innate ability to earn income. The planner can observe income, which depends on both ability and effort, but the planner can observe neither ability nor effort directly. If the planner taxes income in an attempt to tax those of high ability, individuals will be discouraged from exerting as much effort to earn that income. By recognizing unobserved heterogeneity, diminishing marginal utility of consumption, and incentive effects, the Mirrlees approach formalizes the classic tradeoff between equality and efficiency that real governments face, and it has become the dominant approach for tax theorists.

The earliest work on optimal taxation, considered taxation in single-period settings. However, subsequent work in dynamic settings such as (Judd, 1985; Chamley, 1986),

typically ignored uncertainty about individual earnings. Recent work on optimal taxation has considered stochastic dynamic economies and begun to explore new and sophisticated tax policy designs. The main insight has been that, except in special cases, optimal taxation in dynamic economies depends on the income histories of individuals and requires interactions between different types of taxation, such as taxes on capital and labor. Key recent references in this literature include (Golosov, Kocherlakota, and Tsyvinski, 2003; Albanesi and Sleet, 2006; Kocherlakota, 2005; and Golosov, Tsyvinski, and Werning, 2006).

The public policy instruments, such as tax rate changes, have different implications in exogenous (neoclassical) and endogenous growth theories. The neoclassical theory predicts that permanent changes in government policies do not have permanent effect on the growth of output. This implies that changes in a country's tax structure should have only transitory impact on its long-run economic growth (Ramsey, 1928; Solow, 1956; Cass, 1965; and Barro, 1979). Such changes allow a country to move towards a higher or lower level of economic activity, but the new long-run growth path converges to the old long-run path. It is only the transition period from the old path to the new path that rate of growth of a country's real output can increase or decrease. The policy effects according to the endogenous growth theory are opposite to that of neo-classical theory which argues that changes in tax rate may have an impact on growth (Romer, 1986 and 1990; Lucas, 1988; Rebelo, 1991; Jones, Manuelli, and Rossi, 1993; Aghion and Howitt, 1992; Kim, 1992; and Gomme, 1993).

Neoclassical growth models determine the long term rate of growth of a country by the labor supply and its technical progress (Tobin, 1955; Solow, 1956). This model, therefore, does not include any reference to tax on economic growth. In addition, it is still uncertain on how tax policy can promote economic growth and stability (Herfindahl, 1957). However, tax is believed to affect a country's economic growth and should be considered in any economic growth model (Futagami et al, 1993; Barro and Sala-I-Martin, 1992). Therefore, in the endogenous growth theory the impact of tax is dependent on how other factors such as human capital are affected by the tax (Tanzi and Zee, 1997; Saint-Paul, 1992) and is included in the discussion. Economists have always believed that

there is a connection between fiscal policies and economic growth. This connection has been thought to originate from various channels such as the negative effect of distortive tax on the performance of the economy (Roshaiza Taha et al, 2011).

On the other hand Barro's (1979) tax-smoothing hypothesis says that, if the marginal cost of raising tax revenue is increasing the optimal tax rate is a marginal. This implies that changes in the tax rate will be permanent and, given their different effects on growth, under the two types of growth models, very useful in empirically distinguishing between the exogenous and endogenous models. The endogenous growth models predict that temporary government spending policies have a positive effect on output but a zero effect for permanent spending shocks. To analyze the effects of government spending decision, (Devereux and Love, 1995) used a two-sector endogenous growth model which has been extended to allow for an endogenous consumption leisure decision. The findings explore that a permanent increase in the share of government spending in output financed with lump-sum taxes will endorse interest and long-run economic growth at the cost of social welfare.

Based on Ihtsham and Naeem, (2009), It also argues that a permanent increase in government spending reduces the long-run growth when it is funded with an income tax or wage income tax but a temporary rise in government spending increases the GDP but it has only transitory impact on the economic growth.

According to Karayan et al (2002) throughout the world, governments are first and fore mostly financed through taxation. The main reason of tax existence at everywhere is due to their characteristics as they are paid for the government to some extent but not the total price in many ways, both directly and indirectly. The study conducted by Oboh et al (2012) indicates as the concept of taxation has been a concern of global significance because it affects every economy irrespective of national differences.

While defining the concept of taxation within the context of Africa; Adedeji and Oboh (2012) show as it are as old as mankind. In the early periods, governments of different countries impose the tax system to cover the expensive costs of the daily

administration system, for defense and maintaining law and order in the country. In this contemporary periods however, the government gives much emphasis for the general welfare development in the country (McGee, 2008). Thus Parameswaran (2005) said in the modern civilization periods, tax becomes an essential part of all economic activities of both developed and developing countries.

These findings imply that in our contemporary era of large government, high taxes lead to lower economic growth. When taxes go up, the growth in the income of taxpayers should decline. In fact, several decades of studies by economists confirm the proposition that the higher the level of taxation, the lower the rate of economic growth, holding nontax factors constant. This reversed earlier conventional wisdom, such of that of distinguished public finance expert John F. Due, who, speaking about industrial location of firms, opined that studies "suggest very strongly that the tax effects cannot be of major importance". By the later 1970s, however, research was reaching different conclusions, in part because the negative effects of taxes grew as the tax burden itself grew larger (Richard, 2001).

The literature also identified three main hypotheses to explain the nexus between government tax revenue growth and government spending induced growth. One is the "*tax and grow*" hypothesis, which perceives a unidirectional causal relationship running from tax revenue to economic growth. The advocate of this theory was Friedman (1978), who argued that raising tax revenue either through increasing tax rates or tax base would lead to more fiscal space which will drive growth.

The second is the "*grow and tax*" hypothesis, which argues that increased tax revenue arises because of accelerated economic growth achieved through government spending multiplier. Peacock and Wiseman (1979) postulates a case that government spending induced growth might increase due to crises and the increased levels of accelerated expenditure growth continue even after the crisis is over applying the Keynesian growth theory and the tax ratchet effect. They are of the view that severe crisis that initially force up government expenditure induce economic growth rate, more than tax revenue growth rate. This is capable of changing public attitudes about proper size of government. The main idea is that the original tax revenue increases due to the crisis becomes a

permanent feature in the tax policies (Narayan, 2005). In an empirical sense, this hypothesis implies unidirectional causality running from economic growth to tax revenue growth.

The third is the fiscal synchronization hypothesis owing to Barro's (1979) "*tax smoothing*" model. This hypothesis explains that government tax spending induced growth and tax revenue maximization decisions are taken simultaneously. This idea that tax revenue and real GDP change concurrently was explained by Meltzer and Richard (1981) in their quest to explain the size of government spending viz-a-viz tax revenue collections. In an empirical sense, this hypothesis postulates bidirectional causality between economic growth and government tax revenue.

For Ethiopia, according to Yesegat (2009) the principal domestic revenue is tax revenue and mainly that revenue is generated by indirect taxes such as Value added tax, excise and foreign trade taxes. The author stated as in the fiscal year 2003/04, indirect taxes raised about 70 percent of the total tax revenue and the income tax along with other types of direct taxes accounted for the remaining share of only about 30 per cent of the total tax revenue of Ethiopia. It has been argued since long time that revenue from tax is the vehicle for the growth of one country's economy as it allocates the welfare among the public and privates.

From the tax reform side, as countries consider their tax systems identifying the growth implications of different tax instruments is useful for policy design, regardless of whether or not a change to the overall level of taxes is envisaged. Another reason for focusing on tax structures rather than the overall tax burden is that the overall level of taxes reflects societal choices over the size of the public sector, while the tax structure is first and foremost a tool to implement these choices.

Tax reform is the process of changing the existing tax system or the status quo to a new level of tax system so that the tax system can serve the main objective of financing government expenditure and meet other objectives. The general objective of tax reforms is similar among different countries, particularly among developing countries. A number of studies show that in developing countries tax systems are used to serve

multiple objectives which include mobilization of resources to finance government expenditure; promoting saving and investment; encouraging the use of labor intensive techniques mostly the small and medium scale enterprises, whereby bringing about greater equity in distribution of income (Roa, 2000; Islam, 2001).

Thus, among the multiple objectives of tax reforms literatures focuses on the argument that the main focus of tax reform should be to raise adequate revenues to finance public expenditures on social goods and services. The issue has grown in importance in light of the recent fiscal crises in most of the developing nations and showed that fiscal crises have been proven to be the mother of tax reforms in most of these countries. Sustainable economic growth in turn needs huge investments on physical infrastructures and other social goods and services. While domestic resource capacities of tax revenues are low to finance the capital accumulation effort, these countries are forced to depend on foreign sources to finance economic growth. But economic literature bears evidence to the fact that the dependency of developing countries on foreign sources has not led to economic growth over a long period of time. Therefore, tax reforms in developing countries as a fiscal instrument to reduce dependency on foreign sources by raising adequate tax revenues to finance economic and social projects are the need of the time with a view to achieving sustainable economic growth over the long run.

While, the contribution of foreign resources is significant in public finance of developing countries, there is no doubt that the role of domestic resources in financing government expenditure on public goods and services remains critical in the historical development of a country. Developing countries in general and Ethiopia in particular lag behind in domestic revenues mobilization from their taxes and are forced to look for external resources that are tied to a number of conditionality for a long period of time. As most of the developing countries in sub Saharan Africa, Ethiopia is among the highly dependent on foreign sources for poverty reduction and economic development.

Geda (2005) identified that Ethiopia is the most dependent nation for financing government expenditure in general, and capital expenditure in particular than other developing nations. On the contrary, foreign funds are mostly tied with a number of

conditionality that might not align with the country's economic and social priorities, which resulted in unsuccessful implementation of national plans due to financial constraints. The largest dam in Africa-Ethiopian Grand Renaissance Dam project, which is currently under construction by Ethiopian Government with its own financing sources, could have been constructed earlier in the absence of the foreign financing.

The tax system of Ethiopia is directly related to the government formation in the country. Modern state was established in Ethiopia at the beginning of 20th century. Historically, it is possible to say that Ethiopia as a country established modern tax system so as to raise funds to finance social and economic expenditures. Hailesilasie II was the pioneer to adopt modern tax system in the country after Second World War. Before Hailesilassie II, the economic system of Minilik II was known as "*GebarMadria*" system in central and southern part of Ethiopia whereby the resources for war were mobilized from the serfs when needed to support a war as the land was under the direct control of the king, (Tsegaye, 2011).

Literature shows that different tax reforms in Ethiopia were initiated after Second World War period (1942-44), the years 1944-52 covering its second stage of tax changes. These changes were generally discretionary changes including amendments to property taxes (land and cattle). Broad-based taxes on goods and services were also introduced in the mid-1950s. Later in the decade and in the early 1960s, changes were also made in the rate and structure of taxes, especially on income. In the post-revolution period (1974-91), there was an increase in the coverage of tax bases and tax rates owing to the need to raise more revenues to support war efforts and to finance the ever growing public sector. Particularly during 1976-79, significant major changes on the rate and structure of all types of taxes were made. These involved widening the land tax base, introducing capital and surplus transfers from nationalized firms, as well as certain minor arrangements on other taxes, (Ministry of Finance, 1997; Geda and Abebe, 2005:2).

The Ethiopian Government has been introducing tax policy reforms with a view to improving tax revenues collection because the fiscal deficit has necessitated tax reforms in the Tax and Customs Administrations since 1992. As pointed out by Demrew

(2004), the country faced severe macroeconomic imbalances such as falling export earnings, worsening balance of payments, and mounting debts and declining economic growth, the country undertook various policy measures following a major economic shift from central planning to market oriented system.

The government has attempted to rationalize the tax structure, broaden the tax base, and improve equity, fairness, consistency, in the administration and the tax laws so as to increase revenues performance. As part of this reform program, the government has undertaken different tax policy measures through designing and implementation of six projects under tax policy and administration package. The Ethiopian Government has been introducing tax policy and administration reforms over the last twenty two years; specifically during the last ten years tax policy and administration reform was comprehensive and intensive in nature. On the policy side, rate schedules have been rationalized and the numbers of rate slabs have been substantially reduced. Moreover, Value Added Tax (VAT) has been introduced as a replacement of conventional sales tax in 2003 and foreign trade tariffs brought down from the maximum of 230 percent to a maximum of 35 percent by the reforms. Customs reforms and modernization was one of the major integral parts of Ethiopian tax reforms carried out over the last two couple of decades related to customs tariff of import and export trades to meet government revenues targets, facilitate the flows of legitimate goods and passengers eventually to register fastest and sustainable economic growth by putting in place conducive business environment for Foreign Direct Investment (FDI) and local investors to increase the competitiveness of the country's export on the international trade.

The relationship between taxation and economic growth have been a center of fiscal policies debate in both developed and developing countries. Many academicians ascertain the role of taxation for the wellbeing of an economy in different perspectives. Most of the time the debate concern on the distortionary impact of tax and how it transmit to the real sector. On the other hand the debate emphasis the role of tax revenue on economic growth and different conclusions has been made.

In this study, the nature of relationship would be positive, negative or neutral. The causality between tax revenue and economic growth from the policy side concerns, examining the nature of causal relationship from the following three directions using Granger Causality framework. First, if government tax revenue causes growth through government multiplier, budget deficits can be eliminated among others by policies aimed at stimulating government tax revenue, decreasing spending over revenue, and issuing debt. Second, if government tax multiplier driven growth causes government tax revenue growth, it implies government induce growth through spending first which is an injection, and later to pay for this spending from raising tax revenue due to rising taxable incomes and widened tax base. Third, if the fiscal synchronization hypothesis doesn't hold it implies that growth decisions are made in isolation from tax revenue accumulation decision, which may lead to serious budget deficit due to misallocation of tax revenue to recurrent expenditure.

2.2. EMPERICAL LITERATURES

Studies reveal that any changes in policy that lead to an increase in tax burden distort economic growth (Karran, 1985; Easterly et al, 1994; Kneller et al., 1999). As mentioned earlier supply side hypothesis has support the inverse relationship between tax and economic growth. Specifically, increases in the tax rate lead to a significant negative impact on economic growth. Second, the relationship between tax revenue and economic growth shows the positive association between these two. Any significant increase in tax income will have a positive impact on economic growth. A possible explanation is that an increase in tax revenue will boost the economy and prospective development.

Again Karras (1999) analyzed the effect of tax policies on economic growth for a panel of 11 OECD countries. The results support the theoretical predictions of the neoclassical growth theory and inconsistent with that of endogenous theory. Similar findings were found by Tomljanocich (2004) who tests empirically whether tax policies have transitory or permanent impact on the growth rate of output for the U.S. states. These all studies are

about developed economies and almost no such study is available for developing economies.

Easterly (1993) provides empirical evidence for this hypothesis using data for 57 countries. He measures distortions by focusing on deviations from US prices for 151 commodities, and interprets the variance of prices as a measure of how distorted relative prices are in a given economy. The paper shows that the degree of distortions in an economy-whether caused by taxes or by other policies-is indeed negatively correlated with growth. Obviously this falls short of demonstrating a link between distortive taxes and growth, but it is nonetheless a powerful demonstration of the potential of price distortions, such as those caused by taxes, to affect economic growth.

The findings of the few studies that analyzed the link between growth and tax structures rather than tax levels provide somewhat more conclusive answers than the studies that have focused on the level of taxation.

Kneller et al (1999) make a distinction between distortionary taxes on one hand, which they define as taxes on income and property, and so-called non-distortionary taxes on the other hand, which include consumption taxes. Their conclusion is that while the former reduce growth, the latter do not. Similarly, they find that productive government expenditure is beneficial for growth while non-productive public expenditure is not. In a related study Gemell et al (2006) use annual data and account for short-run dynamics in a similar way and confirm the findings of (Kneller et al, 1999). Widmalm (2001) examines economic growth between 1965 and 1990 in a cross-section of 23 OECD countries, and finds that the proportion of tax revenues raised from taxing personal incomes is negatively correlated with growth. She also documents a tendency for consumption taxes to be growth-enhancing. Using disaggregate data, Schwellnus and Arnold (2008) and Vartia, (2008) document a negative effect of corporate taxes on the productivity of firms and industries, based on a large data sets of firms and industries across OECD countries.

With regard to the nexus between government tax revenue growth and economic growth veritable empirical studies have been done to test the adequacy of the aforementioned

theories. Most economists have always asserted that there is a strong connection between fiscal policies and economic growth, as compared to the connectedness between monetary policies and growth. This idea has been thought to originate from various channels such as the negative effect of distortive tax on the performance of the economy (Tanzi and Zee, 1997). So that, studies have revealed that any policy changes that led to an increase in economic incidence and deadweight loss distort economic growth (Karran, 1985; Easterly et al; 1994; Kneller et al., 1999).

Furthermore, a tour of literature suggests that changes in tax will distort economic growth. However, in terms of the connection of tax revenue and economic growth the results are totally different. A number of studies have empirically examined the nexus between tax in terms of revenue and economic growth. For instance Karran,(1985) found that economy and tax always grows together, and for that reason economic growth always has a positive/negative effect on tax. Any significant increases in revenue collection positively affect the economic growth and vice versa. The changes in tax by increasing the tax burden might affect the long term growth of the economy and might involve higher deficits in the future. The results of Castro and Cos (2008) using VAR methodology show that net-tax increases often produce a positive although small and hardly significant output response.

Most of the prior studies have found a positive relationship between tax and economic growth, but Reed (2008) has found a negative relationship between these two variables in US Compare to previous studies conducted in various part of the globe, this study have its own strength. Most recently (Gordon and Li ,2009; Kuismanen and Kamppi, 2010) again emphasize on the significant effect of fiscal policy on the economic activity.

The tests on the relationship between the tax revenue growth and economic growth have been extensively performed especially in developed countries. The results show that economic development was the strongest determinant of tax growth. For instance Easterly et al (1994) has shown how the distortion in tax structure affects the growth rate. Similarly Kneller et al (1999) found evidence on how tax can negatively

affect the growth rate. In contrast, it was found that a rise in income tax could lead to an increase in economic growth if the time preference is endogenously determined (Chang et al, 1999). It was further assumed that the government collects income tax revenue and transforms it into a productive public expenditure that has an effect on the economic growth. Besides, most studies have examined how tax may encourage or discourage the long term economic growth rate (Padovano and Galli, 2002; Koch et al, 2005; Lee and Gordon, 2005).

The empirical literature on the tax-grow debate has yielded mixed results due in part to the various time periods analyzed, lag length specifications used, and methodology. Generally, the methodology used in most of these studies has been to test for Granger causality within a vector autoregressive model; however, some of the studies test for Granger causality within an error-correction framework. Tah et al (2011), studied the causal effects of economic growth on government tax revenue for Malaysia during the period of 1970-2009 they applied cointegration, vector error correction model (VECM) and Granger causality methodology. Empirically they showed that taxes affect the allocation of resources and often distort the economic growth. However findings of their study further clearly showed that there was a unidirectional relationship between economic growth and total government tax revenue with 21% speed of adjustment in the short run to reach equilibrium level in the long-run.

In the case of the United States, (Blackley, 1986; Ram, 1988a; Bohn, 1991; Hoover and Sheffrin, 1992) provide evidence to support the tax-grow hypothesis while (Anderson et al, 1986; Von Furstenberg et al, 1986; Jones and Joulfaian, 1991; Ross and Payne, 1998) find support for the grow-tax hypothesis. (Manage and Marlow, 1986; Miller and Russek, 1989; Owoye, 1995) suggest the fiscal synchronization hypothesis was valid for the United States while (Baghestani and McNown, 1994) support the institutional separation hypothesis. Also for Zimbabwe independence was found by (Dzingirai and Tambudazai, 2014).

In a study of OECD countries Joulfaian and Mookerjee (1991) found support for the tax-grow hypothesis in Italy and Canada; support for the grow-tax hypothesis in the United

States, Japan, Germany, France, United Kingdom, Austria, Finland, and Greece; and support for the fiscal synchronization hypothesis in Ireland. Baffes and Shah (1990 and 1994) have extended this analysis for Argentina, Brazil, Chile, Mexico, and Pakistan. It was found that for Brazil, Mexico, and Pakistan strong bi-directional causal relationship existed between tax revenues and growths, while for Argentina and Chile growth appear to cause tax revenue growth.

Delessa et al (2015) analyzed the long run relationship between direct tax and economic growth in Ethiopia for the period 1971-2013. The granger causality test shows that direct tax causality on economic growth of Ethiopia was found to be significant.

Since, the nature of relationship between these two variables being positive, negative or neutral, the main reason for conducting a causality test is to ensure that; wheather there is a causal relationship between the two variables, to avoid spurious regressions and also for policy making purposes where it is important for understanding whether the impact is a short run or long run. Therefore, the result provide insights for the quest whether and how strong the relationship between these two variables especially for Ministry of Finance and Economic Development (MoFED) and Ethiopian Revenue and Custom Authority (ERCA). In addition the study will serve as a tool for fiscal policy makers in their aspiration effort towards achieving sustainable growth and development.

CHAPTER THREE

AN OVERVIEW OF MACROECONOMIC DEVELOPMENT IN ETHIOPIA

3.1. GENERAL INDICATORS

Ethiopia is one of the fastest-growing economies in the world and is Africa's second most populous country. Many properties owned by the government during the previous regime have now been privatized and are in the process of privatization. However, certain sectors namely Telecommunications, Electricity, Financial and Insurance services (for foreign investors) considered as strategic sectors and would remain under state control for the conceivable future.

The current government has embarked on a program of economic reform, including privatization of state enterprises and rationalization of government regulation. While the process is still ongoing, the reforms have begun to attract much-needed foreign investment. Despite recent improvements, with an exploding population Ethiopia remains one of the poorest nations in the world.

Like most countries in the world, the wellbeing of Ethiopian economy depends to a larger extent on how governments manage macroeconomy. In macroeconomic management the most important objectives policy makers seek to achieve could be classified into internal and external balance. With internal balance the government wishes to achieve fast growth of income with stable prices while with external balance the objective is mainly maintenance of balance of payments equilibrium. However, the simultaneous achievement of all these objectives has proved to be difficult, yet, Ethiopia is still among the fastest growing non-oil producing economies in Africa.

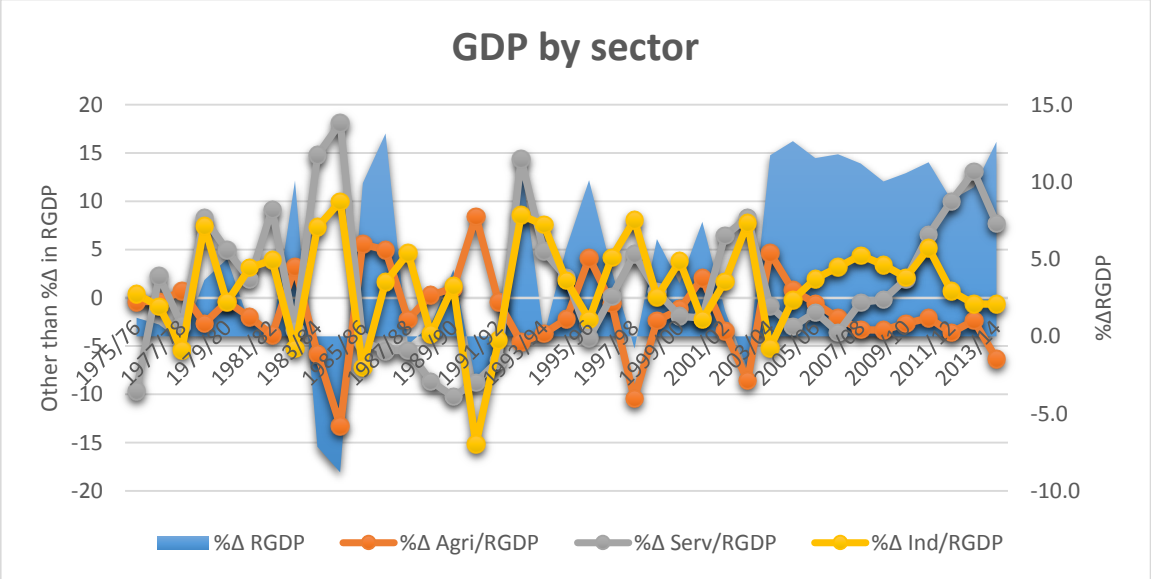
3.1.1. GROWTH BY SECTORS

The 1974 revolution resulted in the nationalization and restructuring of Ethiopian economy. After the revolution the country's economy can be viewed as having gone through different phases. Internal political upheaval, armed conflict, radical institutional reform, drought, large military establishments and uncertainty in political environment among others, were responsible for little economic growth in most of the time during the

Dergue regime. In 1985 the economy experiences a setback and agriculture reached its crises stage. During the period 1985-90 the economy continues to stagnate despite the reversed agricultural decline. The prolonged effect of drought happened in 1984/85 were accounted for the stagnation.

In recent years Ethiopia's economy has expanded rapidly, exhibiting an average annual growth rate of 11% for the past 10 years. This is mainly attributed to the share of agriculture accounted 47%, service 11% and, industry 43% of GDP. It can be seen from the data that, when we compare the series with the first 10 years average, the share of agriculture to GDP has been declined and, both the service and industry sector exhibited increment. The three sectors evolve in different patterns pertinent to the country's reliance on rainfall since agriculture plays great role, policy changes, and other socio economic developments.

Figure 3.1. GDP by Economic Sector



Source: Owen computation using NBE data.

The potential for growth in agriculture is enormous. According to Admit et al (2014) agricultural productivity is one of the lowest in sub-Saharan Africa. This indicates that there are untapped opportunities to increase production and productivity by promoting modern farming practices. Scaling up the practices of model farmers to the others by

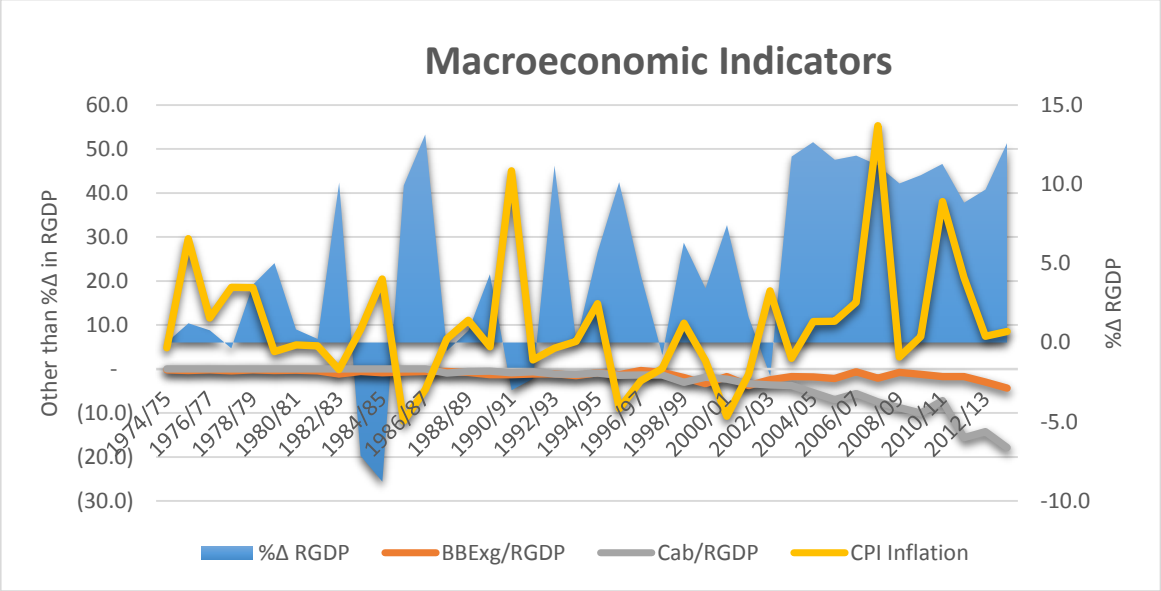
promoting the use of modern technologies, supporting the commercialization of agriculture and the production of high value crops, encouraging micro-irrigation schemes, and improving marketing institutions and infrastructures are some of the key policy tools that the government is pursuing to enhance agricultural production and productivity. In spite of these, the sector is characterized by a number of problems limiting its growth potential. Marketing institutions and infrastructures are weak, leading to high transaction costs notwithstanding the role of commodity exchange in disseminating price information to farmers. In addition, the rising price of agricultural inputs, such as chemical fertilizers remains a challenge for the adoption of improved technologies.

On the other hand, both service and industry sector has gaining momentum in the past few years. This has been related with (ADLI) Agricultural Development Lead Industrialization policy, the country is perusing to date. The strategy have a salient feature of transforming the agrarian base economy to industry. In this policy, agriculture plays a leading role by creating conducive environment to industrialization process. For that matter government exert great effort for the transformation process. Sectors namely, agro processing, flower, textile and leather, manufacturing, hotel and tourism has given due attention. Thus both government and private sector partnership in capitalizing the sectors and absorption of a considerable labor force can make the sectors to boost. Besides, the (SMEs) small and medium scale enterprises development strategy in urban areas, huge government involvement in manufacturing industries despite prohibiting private investments, special support scheme for prioritized sectors among others induce the growth in service and industry sectors.

3.1.2. MACROECONOMIC DEVELOPMENT

Macroeconomic management is key for the health of an economy. Macroeconomists follow each and every aspect of variables in order to draw appropriate policy tools to cure unwanted deficiencies created by the dynamism of the globalized economy. There are many signals which dictates the pulse of an economy, among others real GDP growth, overall balance (or government finance; for that matter the analysis uses budget balance excluding grant), current account balance and inflation are there.

Figure 3.2. Macroeconomic Indicators



Source: Owen computation using NBE data.

As pointed earlier, RGDP grow on average at 11% for the past 10 years. Historically Ethiopia is not suffered from chronic inflation over the period under review. Although in some years there has been annual CPI inflation goes up to 45.0% for instance in 1990/91 and 55.2% in 2007/08, the annual average for 40 years were 9.8%, and going with single digit inflation would be acknowledged as stimulating consumer demand and hence production as a whole. In some of the years this study addressed, there were different factors which contributed for the resurgence in inflation in Ethiopia and much has been said for the causes. According to Ahmed (2007), increase in aggregate demand should a priori put pressure on demand for food, resulting in acceleration of food inflation in Ethiopia. He also lists, various domestic and external factors including money supply and world commodity prices. Ayalew (2007) on the other hand using time series data from 1970-2006 outlined, the chief claim is that supply shocks, inertia, and the consumer prices of major trading partners are among the most important determinants of inflation. (IMF, 2008b) suggests that inflation is being led by rapidly rising food prices, demand pressure and expectations. Supply side factors may also explain part of the rise in food prices, such as reduced distress selling by farmers and the switch from food to cash aid. Tadesse (2010)

using a rational expectation model and threshold regression, find evidence of speculative storage during periods of high prices over 1996-2006.

Recently in an effort to combat inflation, the government pursued a tight monetary policy stance using base money as the nominal anchor to control monetary expansion. The government's determination to reduce inflation was further reflected in the pursuance of prudent fiscal policy focused on strengthening domestic resource mobilization and reducing domestic borrowing. The strong fiscal stance, particularly measures to improve tax administration and enforcement, contained the fiscal deficit at 1.8% of GDP in 1991-2014 compared to 1% of GDP in 1974-1990.

A critical examination of the share of revenue to total expenditure shows that government expenditure over the period under review has always exceeded revenue. According to Eyasu (2003), government expenditure growth could be attributed to a lot of interrelated variables. Among others the adoption of socialism, embracing a strong state economy, large scale resource transfer from private to public sector via nationalization, adoption of a new system of state machinery and the phenomenal expansion of the existing bureaucracy, government investment in economic and social infrastructure, and of being the sole employer of skilled labor, political instability, boarder conflict and civil war has a paramount importance on pre-reform periods. The revenue generation within the economy has been bedeviled by the narrow base of the economy, low-income levels, dominance of the primary sector, low monetization and urbanization. These constrained the federal government from generating and increasing its revenue from taxes. Consequently, government fiscal measure concentrated on few areas with high distortive tax rates and employed implicit tax to raise revenue.

However, Federal Research Division (2005) reveals that government revenue has been increasing steadily since the late 1990's, reflecting in addition to other measures the recently improved tax collection method and adoption of value added tax in Jan. 2005. In addition, government spending has shifted from funding of defense to economic and social activities since 2000 and at the end of war with Eritrea.

Ethiopia's overall balance excluding grant for the past 40 years has not shown surplus. From the macroeconomic indicators that show the wellbeing of an economy financing development aspiration by own capacity is very important since it shows the degree of reliance on foreign sources. In the pre reform periods the regime heavily expends on military establishments rather than sectors inducing further growth. Saying in other words, during 1974-90 average share of revenue to GDP were 1.81% while after 1991 the share has growing up to 8.04% of GDP. On the expenditure frontier, average share of expenditure to GDP before reform were 2.64% and after reform it has growing to 11% of GDP. Thus, it can be expected that the country never experiences an overall balance surplus excluding grant from the time where the Dergu regime took power. Nonetheless, it should be worth mentioning the pattern and efforts taken to induce resource mobilization capacity before and after the reform has huge difference.

The external sector of Ethiopia is characterized by persistent current account deficit due to mainly merchandize trade deficit which in turn results from steady and significant growth in import of goods while earning from export of merchandize goods remains extremely low compared to financing of import bills. In fact export performance can be viewed as the relative success and failure of the effort of firms or nation to sell domestically produced goods and services in other nation and it depends largely on the competitiveness of the export product in the international market particularly in relation to specific export items that are important in terms of, for example, productivity, growth potential and foreign currency earning capacity, i.e., improving export performance require enhancing competitiveness and then improve current account gap and thereby avoid losing foreign reserve and limit external debt dependence.

There are many factors affecting the current account balance (or deficit) in Ethiopia; economic growth (i.e., higher percentage of consumer spending on consumption), exchange rate depreciation not back up by competitive export products, relative competitiveness of industrial production, and capital flow affects the CAB.

Average value of Ethiopian export from 1991-2014 has been 14132.86 million birr, while the import value accounted 53971.1 million birr showing 39840.2 million birr deficit.

The deficit in trade balance has been due to the steady and significant growth in import of goods in association with the economic recovery since 1990/91. The export earning has been extremely low compared to financing of imports. The nature and structure of the export sector and low level of productivity has worth mentioning here. The CAB also shows 21014.2 million birr deficit after 1991. In nutshell, it's possible to conclude about the country's external sector; trade balance with in the periods under review never experiences surplus, trade balance has huge impact on net goods and services balance, and CAB has highly affected by trade balance on goods.

3.2. MONETARY POLICY DEVELOPMENT

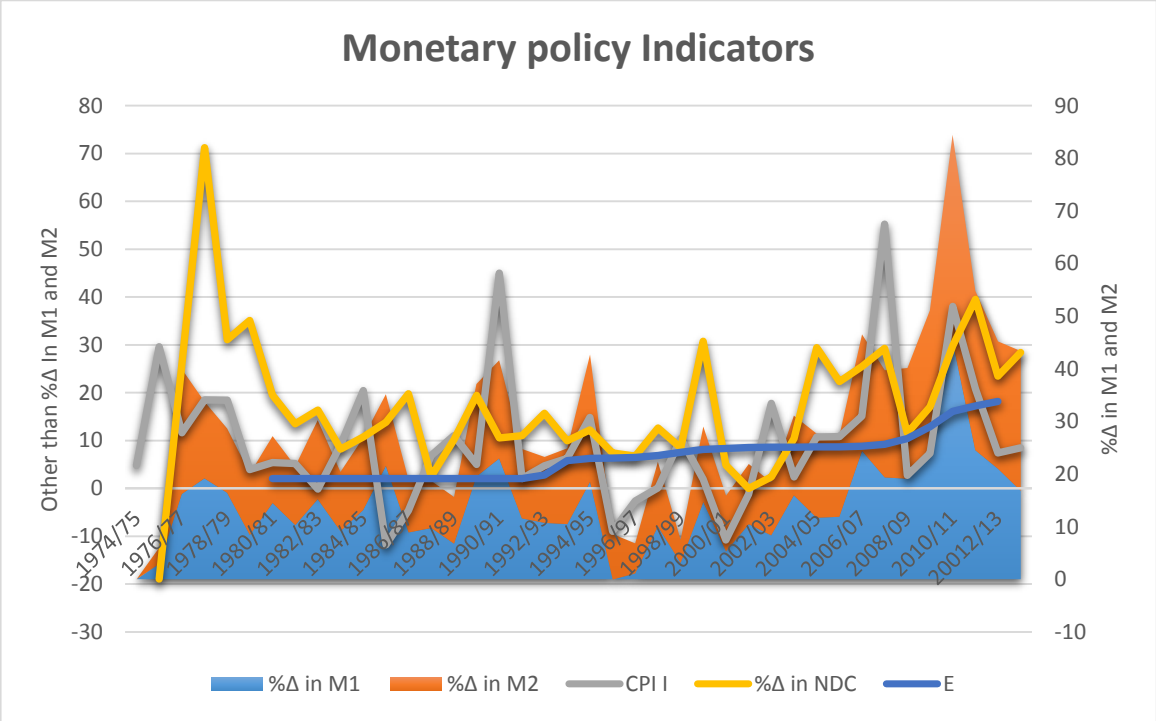
Monetary policy guides the central bank's supply of money in order to achieve the objectives of price stability (or low inflation rate), full employment, and growth in aggregate income. This is necessary because money is a medium of exchange and changes in its demand relative to supply, necessitate spending adjustments. Fiduciary or paper money is issued by the central bank based on an estimate of the demand for cash. To conduct monetary policy effectively, the central bank adjusts the monetary aggregates, the policy rate or the exchange rate in order to affect the variables which it does not control directly. The instruments of monetary policy used by the central bank depend on the level of development of the economy, especially the financial sector. These instruments could be direct or indirect.

Increasing the growth rate of monetary base along with the growth rate of nominal GDP is the immediate strategy to contain inflationary tendencies and maintaining external balances (NBE, 2004).

According Sylvanus (2004) considering the structure of developing countries, the experience also indicates that the primary obligation of the many monetary authorities is to finance the government budget shocks in the absence of broad and active financial markets. Under these circumstances, monetary growth depends primarily upon fiscal policy shocks by borrowing from the public via bond, running down foreign exchange reserve, and printing money. These in turn have implications on the macroeconomic

performance in general and exchange rate in particular. Moreover, inflation rate shocks can also be emerged due to excessive public deficit financings.

Figure 3.3. Monetary Policy Indicators



Source: own computation using NBE data.

Empirical analysis of indicators shows, how the country pursues monetary policy under two regimes. Looking at the monetary development in Ethiopia, M2 (Broad money) has shown maximum percentage change on 2010/11 about 39.2% change, while this year CPI was 38.04% which is lower than the highest inflation reported 2007/08 by 17.19 percentage point. On the other hand M2 exhibited its lowest growth on the year 1975/76 about 3.1%, while this year CPI was about 29.59% which is higher than the historic minimum CPI of -11.8% of year 1985/86 by 41.4 percentage point. Thus in nutshell, in Ethiopia it can be evident that inflationary tendencies are not most of the time a monetary phenomenon. This finding is consistent with Zerayehu (2014) the objective of stabilizing the price level is determined not by the monetary phenomena. Rather, it was directly linked with the agricultural supply bottlenecks like erratic rainfall, drought, political instability and war.

Furthermore, growth in M2 of the current regime has shown increment by 4.5 percentage point on average.

Above and beyond, the expansion in broad money was solely driven by the rise in domestic credit. Broad money is determined by net foreign asset and net domestic asset. In addition net domestic credit is the summation of net credit to gov't of banking system plus net credit to other sectors of the banking systen or it's the summation of claim on government and claim on other sector of the banking system. Hence it is possible to see that money supply expansion is highly attributed with the expansion in credit of the banking system.

Nominal simple average lending rate during the Dergue regime were 8.21% while after reform it increases to 12.01% showing 3.8% increment at percentage point. On the other hand minimum deposit rate average during the Dergue regime was 5.41% while currently the average rate is 5.45% only showing 0.04% increment at percentage point. Therefore, it's possible to conclude, that monetary authority of Ethiopia follow the constant band width of 2.8% untill 1991/92 between simple average lending rate and minimum deposit saving rate. While after the current government took power the interest rate band width has shown volatility from the minimum witnessed in the year 1994/95 of 4% to the maximum in the year 2009/10-2010/11 of 8.25%. Thus unlike, most central banks around the world use the interest rate as the main instrument of monetary policy, the authority determine money supply by setting the supply of monetary base and upholds certain restrictions on the value of assets and liabilities held by commercial banks.

The findings of Naude and Abu (1994) Ethiopia's trade policy, which became increasingly inconsistent with some of the macroeconomic policies especially during the Dergu regime, has long been characterized by controlled foreign exchange allocation, import quotas, high tariffs, state owned marketing exports, export prohibitions , export subsidies and export taxes.

Following the collapse of the Britton Wood system in 1971, the birr was revalued to 2.30 birr per US dollar on 21 December 1971. The subsequent 10% devaluation of the

US dollar had temporarily brought about under-valuation of birr. To realign the Ethiopian Birr, it was again revalued to 2.07 birr per the US dollar in February 1973. From then on, the Ethiopian currency was pegged to the US dollar at the rate of 2.07 birr per dollar until the massive devaluation of October 1992 . This fixed official exchange rate was left unaltered for two decades despite the floating of the major world currencies including the US dollar. In effect the birr became over valued in terms of the US dollar as well as many other foreign currencies (Befikudu, 1991; Derresse, 2001).

Today, the official exchange rate is determined in the daily inter-bank foreign exchange market as the weighted average exchange rate prevailing on the preceding day. Since 1992/93 birr per dollar on average devalued by 9.26 and never shows an overvaluation. Many reasons has been given for these, among others to boost export earnings, to improve domestic manufacturing and thereby reduce imports, to boost foreign exchange reserves, and more importantly to pursue a more aggressive strategy of import substitution. However several bottlenecks remains unsolved and deficit on trade balance continues.

3.2. FISCAL POLICY DEVELOPMENT

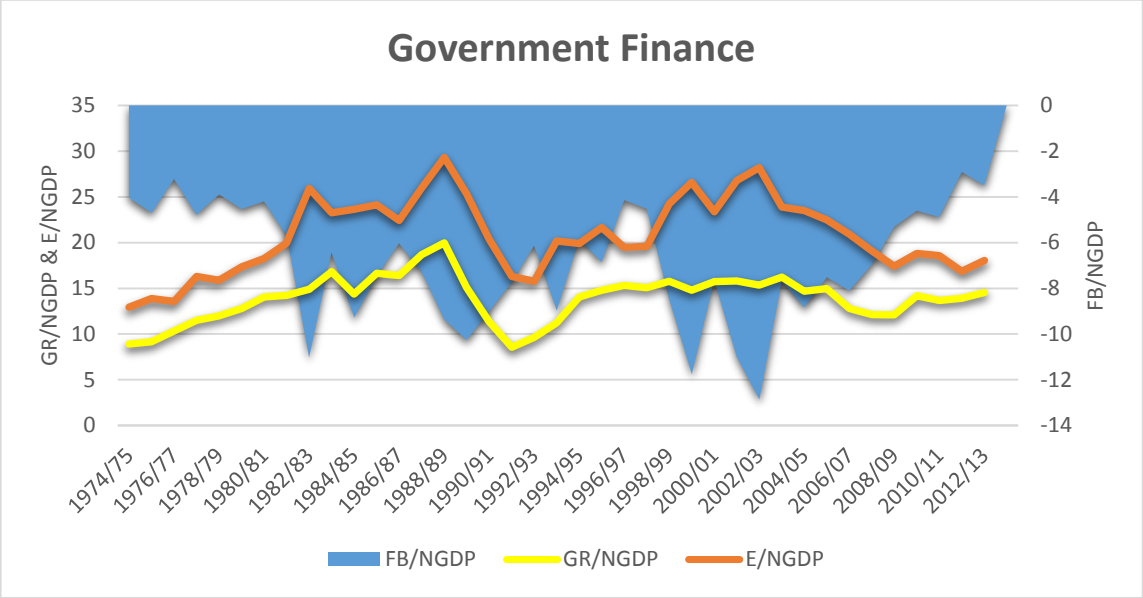
A commonly used indicator to assess the stance of fiscal policy is the overall balance, which measures the difference between revenues and grants, and expenditure and net lending. This balance may be in surplus or deficit. As a starting point for analysis, an overall deficit (surplus) would suggest an expansionary (contractionary) fiscal stance on the basis that the negative impact of taxes and other revenue on aggregate demand is more (less) than offset by the positive effects of government spending. Developments in the overall balance over time, particularly when related to GDP (or GNI), provide an indication of the changing impact of the government sector on the economy (IMF, 2014).

A number of other fiscal indicators are often used to provide additional insight into the impact of government fiscal policy stance. The current fiscal balance (the difference between current revenue and current expenditure), primary balance (or debt/GDP ratio), the domestic fiscal balance (only those components of the conventional deficit that arise

from transactions with the domestic economy) and cyclically adjusted or structural balances.

For the purpose this study focuses on the overall balance excluding grant. The following figure provides an insight how the indicators evolve over time in Ethiopia.

Figure 3.4. Government Finance



Source: Own computation using NBE data.

Ethiopia since 1974/75 never experiences fiscal surplus, if it has, can be used to finance productive expenditure, stabilize the economy, sustain debt and build up wealth. The share of average gross tax revenue to GDP during the Dergue regime was 13.95% while under the current government it declined to 13.88% in nominal terms. On the other hand, the percentage change in gross tax revenue to GDP during the Derge regime were 2.37% while under the current government it reached at 1.69%, showing 0.67% decline at percentage point. Currently domestic tax revenue collection capacity excluding grant reached at 14.5% of NGDP, meaning progress has been registered compared to the previous regime.

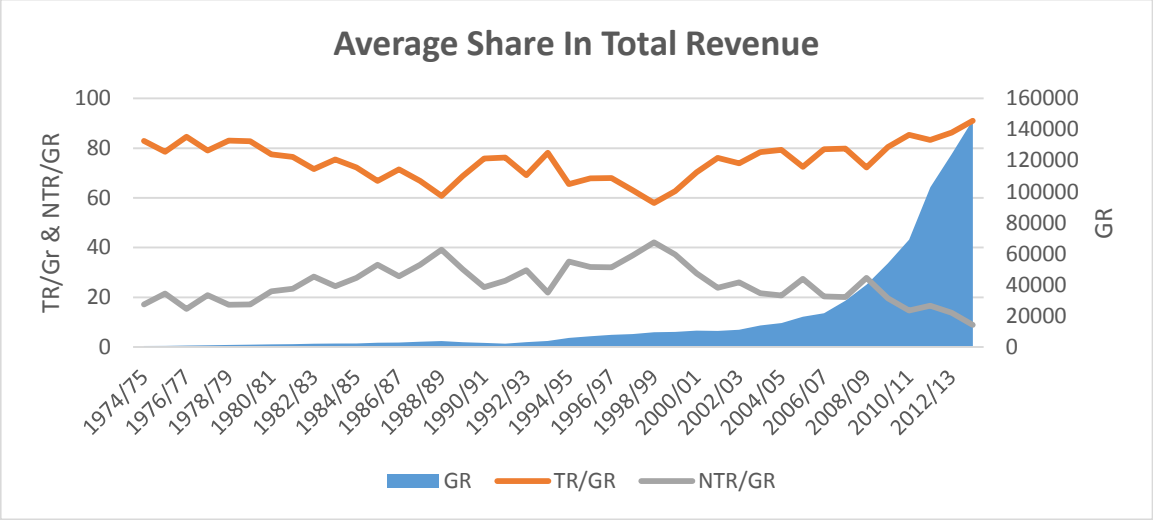
According to Geda and Shimeles (2005), the evolution of tax revenue and its structure in Ethiopia is closely related to three distinctie policy regimes that existed in the country over the last four decades. Let alone the Emperial regime, under the military regime the policy regime can be characterized as hard-control reime. The regime enacted tax laws consistent with its socialist economic policy. All privatly owned firms had been nationalized and the source of government fund were transfers from nationalized firms and transfer from agricultural marketing bored. Thus, the importance of tax revenue as such was significantly reduced.

EPRDF, end the hard control regime and introduce liberalization. The government scaled up the previous revenue commission to the level of a ministry and rationalized its activity through recruitment of skilled personnel and training of the ministry's staff. The government has also enacted a number of proclamations aimed at reforming the income tax, taxes on goods and services, and tax on international trade. In line with the liberalization drive, the government not only reduced the average level of tax and tariffs but also made the move to focus more on the value-added. This was augmented by an effort to introduce information technology to increase the efficiency of tax administration.

Likewise, the evolution of revenue collection in Ethiopia has shown that, from the gross tax revenue collected (GR), tax revenue (TR) all the time is above the non-tax revenue (NTR). The share of Tax revenue to gross tax revenue during the Dergue regime were 74.99% and under the current government it showes a slight decline and registered 74.66%, overall showing a decline at 0.33% in nominal terms. On the other hand, the share of non-tax revenue to gross tax revenue during the Dergue regime were 25% while under the current government reached at 25.46%, exhibitting 0.46% increment in nominal terms.

Looking at the gross figures does not show the size of government relative to the economy. Thus, it is necessary to scrutinize the trend of government revenue and expenditure as a percentage of GDP, which can clearly depict the size of the government in the economy.

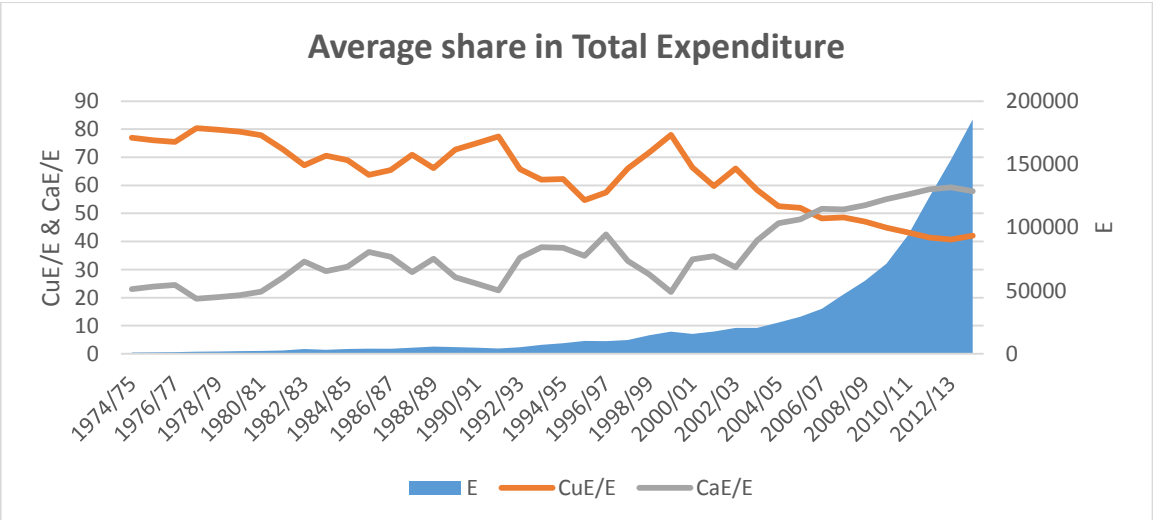
Figure 3.5. Average Share in Total Revenue



Source: Own computation using NBE data.

On the expenditure frontier, average share of expenditure to GDP during the Derge regime were 20.49 while during the EPRDF it reaches at 20.98. To the side, percentage change in expenditure between the two regimes has showen also 3.50% decline in nominal terms at percentage point. While looking at the trend, it has growen dramatically.

Figure 3.6. Average Share in Total Expenditure



Source: Own computation using NBE data.

Thus basically it can be evident from figure 3.4 and 3.6. there is huge involvement of government in the economy. In addition, over the period under review all the time expenditure exceeds revenue and even the direction of expenditure were on recurrent budget untill 2006/07. It was after 2006/07 that government expenditure pattern has changed to pro-poor sectors. Thus capital expenditure share to GDP has grown significantly and the current economic growth among other factors is expected to come as a result of the development in infrastructure, education, telecomunication, energy and other allied activities.

Most literatures deal with government expenditure structure in terms of capital and current expenditure. Capital expenditure refers to those expenditures on fixed assets such as land, buildings, plant and machinery, which are long lasting. These are outlays on develop-mental projects that enhance the capacity of the economy for the production of goods and provision of economic and social services. Current expenditure, on the other hand, includes expenditure on wages and salaries, supplies and services, rent and so on, which are considered as consumables and recurring in the process of delivering government services Bailey (2002).

The average percentage share of current expenditure (CuE) to total expenditure (E) during the Dergu regime were 72.89% while under the current government witnessed 56.80%, so that showing decline at 16.09 percentage point. On the other hand the average share of capital expenditure (CaE) to total expenditure (E) before the current regime was 27.10% while under the current regime reaches at 42.21% showing an increment of 15.11% at percentage point. Moreover, the evolution of expenditure tell us, until 2005/06 the share of (CuE) to (E) has shown decline whereas the share of (CaE) to (E) shows increment. It was in 2005/06 that the two are equal and since then the share of (CaE) got a lion share.

Moreover the two regimes under considertion has significant difference interms of the intended objectives the expenditure were directed. Under the Derge regime all the time expenditure were made to recurrent budgets which means future gain from the expenditure were almost insignificant, even it was little. For the country once government has huge involvment in the economy it has to play in a manner that pave the way for private sectors

to invest. To do that government investment in capital goods play a paramount importance. In this regard though come latter, the current government has so much more than the previous regime. And it will enhance the economy.

The study conducted by Tofik (2014) during the Dergue regime, public spending had a slight increase and the real GDP too. This could mainly be due to the limited revenue source of the government as the private sector involvement in the economy, the potential tax payers, was very low due to the socialist ideology of the government. Besides, the flow of ODA to the country, which is another source of revenue for the government, was very low since the then policy and ideology was not in conformity with the western states' interest. It was after the downfall of Dergue that total public spending increased significantly following the reconstruction of the country. Spending on infrastructure development and provision of social services had grown tremendously during this period. As a result, the real GDP had registered a significant growth. The change in economic policy to a relatively free market economic system and the subsequent private sector involvement could also be the reason behind.

As mentioned earlier the country never experiences fiscal surplus since 1974/75. During the Derge regim the share of fiscal deficit to GDP were 6.54% while during the current regime it reaches at 7.10%, so in other words the average percentage change in fiscal balance to GDP has shown 9.45% decline in nominal terms at percentage point between the two regimes. This has an implicaton for the usage and the direction of usage on the country's rsource. The two regimes has so much difference regarding ressource mobiization and expenditure composition.

Pursuant to this change in resource mobilization and expenditure composition, the current government among the measures taken, includes changing the economy to market oriented system and made reform in diverting spending on the production of private goods and services, leaving it for the private sector towards the development of infrastructure and accumulation of capital. As a result, there was a sharp decline in the size of government expenditure as a percentage of GDP during the early post 1991/92.

Moreover, while looking at the average share of current and capital expenditures to total expenditure, the two regimes has shown significant departure in terms of the direction of spending.

Both the ADLI strategy and the trend toward increased fiscal decentralization have informed the government's public expenditure priorities. ADLI, conceived at the onset of the current government in 1993, is formulated as a long-term strategy to bring about economic growth and poverty reduction through a focus on agriculture as the engine of growth. Within this focus on the agricultural sector, ADLI emphasizes the development and use of labor-intensive and land-augmenting technologies, the commercialization of agriculture, and expanding markets for agricultural products through greater export-orientation.

Now a day's government exert a great effort to enhance education, health, transportation and communication, energy and agricultural sector by spending a great sum of money. Thus, compared to the previous regime the direction of spending in terms of principle and relevance favored the current regime. To galvanize this saying, the Dergu regime were busy to establish huge military army; thus both in theory and practices mobilizing domestic investment to defense sector has by far lower impact on growth than investing on social developments, capital goods and sectors that make the economy more integrated.

CHAPTER FOUR

DATA AND METHODOLOGY

In the literature part different theories and studies conducted on different countries conclude about the nature of relationship between government revenue and economic growth in different aspects. Meanwhile, the main objective of investigating the relationship, direction of causality and the impact of tax reform in the long run and short run for Ethiopia, this study inculcate the recommendations forwarded by previous studies for developing countries in order to fill the existing knowledge gap for the period under investigation and the following methods are designed to reach on more meaningful results.

4.1. DATA SOURCE AND DESCRIPTION

This study investigates the empirical relationship between government tax revenue growth and economic growth in Ethiopia. Yearly time series data is collected for the period 1974/75 to 2013/14 providing 40 observations. Most of the studies conducted to study the relationship of economic growth with any variables (Colombage, 2009, Koch et al., 2005, Soli et al., 2008, Karran, 1985, Hahn, 2008, Butkiewicz and Yanikkaya, 2005) used the Gross Domestic Product (GDP) as the measurement of economic growth. This study uses real GDP growth rate as a proxy of economic growth (EG) and the value of GDP (using 2010/11 as base year). Base-year analysis expresses economic measures in base-year prices to eliminate the effects of inflation. Government tax revenue measured as total tax revenue growth (i.e., including the tax and non-tax revenue growth) is used in real terms. That is change in real GDP and change in real government tax revenue is used to estimate the whole model. All data's are obtained from NBE and MoFED.

- **Growth In real GDP ($grRGDP$):-** Real Gross Domestic Product (real GDP) is a macroeconomic measure of the value of economic output adjusted for price changes (i.e., inflation or deflation). This adjustment transforms the money-value measure, nominal GDP, into an index for quantity of total output. GDP is the sum of consumer spending, Investment made by industry, Excess of Exports over Imports and Government Spending. Due to inflation GDP increases and does not actually reflect the true growth in economy.

That is why inflation rate must be subtracted from the GDP to get the real growth percentage called the real GDP. Hence, the growth form of real GDP is used as a proxy to represent economic growth.

- **Growth in real tax revenue ($grRT_xR$):-** Tax revenue is the income that is gained by governments through taxation. A tax is a financial charge or other levy imposed upon a taxpayer (an individual or legal entity) by a state or the functional equivalent of a state to fund various public expenditures. This paper uses tax revenue (summation of income and profit tax, rural land use fee, domestic indirect tax, import duties and taxes, and export taxes). The adjustment transform the money value measure, nominal TR, thus values of tax revenue adjusted for price change and the growth form of real tax revenue is taken as a proxy to represent growth in tax revenue.
- **Growth in real non-tax revenue ($grRNTR$):-** Non-tax revenue or non-tax receipts are government revenue not generated from taxes. Non-tax revenue in this paper is (summation of charges and fees, sale of goods and services, government investment income, pension contribution, reimbursement and property sales, miscellaneous, other extraordinary,[3] privatization proceeds and other revenue). The adjustment transform the money value measure, nominal NTR, thus values of non-tax revenue adjusted for price change and the growth form of real non-tax revenue is taken as a proxy to represent growth in non-tax revenue.
- **Growth in real total revenue ($grRTR$):-** is the sum of tax revenue and non-tax revenue. The adjustment transform the money value measure, nominal TR, thus values of total government revenue adjusted for price change and the growth form of real total revenue is taken as a proxy to represent growth in total government revenue. It should be mentioned here that, government revenue doesn't include grants. This can be justified by the fact that examining the relationship and the direction of causation between the government revenue growth and economic growth has a paramount importance to understand the degree of country's reliance on foreign sources to boost economic growth and the post-tax reform issues have only be viewed from domestic side.

[3] *Through 1991/92 war levy; in 1992/93transfer for the evacuation of Felasha; in 1995/96 coffee traders' surcharge, sugar auction sales, customs deposit and drought aid sales in 1995/96; in 1996/97 onwards proceeds from sugar auction sales only.*

4.2. THE MODEL

4.2.1. CONCEPTUAL FRAMEWORK

Taxation is a veritable fiscal policy tool. It offers to be a major source of revenue to government and a mechanism for regulating economic and social policies. Jhingan (2011) recognizes that tax is a main source of government revenue and should be accorded strict and close monitoring to achieve maximum compliance. For taxation to be a main source of revenue and equally impact on economic growth and achieve the desired results, the tax system ought to be designed on the basis of appropriate set of principles to be seen as fair, equitable, effective and efficient. Musgrave and Musgrave (2004) and Nzotta (2007) all claim that taxes have beneficial roles to play in allocation, distribution, regulatory and stabilizing functions to correct market imperfection/failure. It can be used as a catalyst to influence economic activities by influencing private sector investment decisions, attracting capital inflows, encouraging and/or prohibiting the production of certain goods and services, as well as contributing to government revenue and enhancing economic growth. However, Nwezeaku (2005) argues that the scope of these functions depend inter alia on the political and economic orientation of the people, their needs and aspirations as well as their willingness to pay tax.

4.2.2. SPECIFICATION OF THE MODEL

Many scholars have used different models to analyses the contributions of taxation and related concepts on economies of different developing and developed countries. However, the model used in this paper is akin to Adereti et al. (2011) but modified based on macro-economic development to meet our objectives. The study used macroeconomic development indicators (GDP, VAT, TTR, and TGR[4]). However, this study by its very nature is interested to investigate the domestic sources of revenue with economic growth; it improves the past model by including the two regimes of the period spanning 40 years or by inculcating the most recent phenomenon's, converting all the variables in real terms to contain the impact of inflation, and tries to analyze the impact of tax reform on economic growth of the country. Hence, the model of this study is developed based on the variables

[4] *Total government revenue.*

selected above (GDP, TR, T_xR, and NTR) in order to address the objectives. Therefore, functional form between government revenue and economic growth is used for the trivariate and bivariate cases; meaning the relationship between government tax revenue and non-tax revenue with economic growth on one hand, and total revenue with economic growth on the other hand is developed for Ethiopia. Guided by the perceived functional relationship between the matrix of economic growth and total revenue, the link is established between these two variables. From macroeconomic perspective, this model states that economic growth depends on tax revenue and non-tax revenue for the trivariate system, and on total revenue for the bivariate system. Accordingly, the purposeful relationships and resulting models are specified below:

Model 1. The functional forms of the trivariate model used are specified as follows:

$$RGDP = f(RTR, RNTR) ----------------------------(1)$$

Where, RGDP= Real Gross Domestic Product

RTR= Real Tax Revenue

RNTR= Real Non-Tax Revenue, accordingly we specify, accordingly we specify;

$$RGDPt = \beta_0 + \beta_1 RTR_t + \beta_2 RNTR_t + u_t ------------------(1a)$$

Where, β_0= Intercept Term (Parameter)

β_1 *and* β_2= parameter known as partial regression coefficient

u_t= Error term or unexplained variable

$t =$ Denotes variable at time t

Because the data collected were of different magnitude and range, they were transformed to the same magnitude or close to par level consistent with Gujarati (2006) to obtain the following model:

$$grRGDPt = \beta_0 + \beta_1 grRTR_t + \beta_2 grRNTR_t + u_t ----------- (1b)$$

Where, gr = the growth form of variables (i.e., $for\ a\ given\ variable\ y, gry = \frac{yt}{y_{t-1}} * 100 - 100$

Model 2. The functional form of the bivariate model is specified as below

$$RGDP = f(RTR) ----------- (2)$$

Where, RGDP= Real Gross Domestic Product

RTR= Real Total Revenue. Accordingly we specify;

$$RGDPt = \beta_0 + \beta_1 RTR_t + u_t ----------- (2a)$$

Where, β_0= Intercept Term (Parameter)

β_1= parameter known as partial regression coefficient

u_t= Error term or unexplained variable

t = Denotes variable at time t

Again, Because the data collected were of different magnitude and range, they were transformed to the same magnitude or close to par level:

$$grRGDPt = \beta_0 + \beta_1 grRTR_t + u_t ----------- (2b)$$

Where, gr = The growth form of variables (i.e., $for\ a\ given\ variable\ y, gry = \frac{y_t}{y_{t-1}} * 100 - 100$

The goal of most empirical studies in econometrics is to determine whether a change in one variable causes a change in, or helps to predict another variable. Therefore, based on the objectives of the study both models is estimated using Johansen cointegration test, VAR, VECM and grange causality test environment. Moreover, Model 2 is relaxed to capture the impact of tax reform on economic growth.

4.2.3. RESEARCH HYPOTHESIS

The preliminary study and different previous researches on this area shows that the relationship between taxation and economic growth would be positive, negative or neutral. To discuss the relationship between government revenue growth and economic growth, the following hypothesis is outlined.

First, regarding the relationship;

H_0*:* Government revenue growth has no contribution to economic growth of Ethiopia.

H_A*:* Government revenue growth has contribution to economic growth of Ethiopia.

Second, regarding the time series nature of the data from equation (4c);

$H_0 : \delta = 0$, i.e., there is a unit root, and the series is non-stationary; against

$H_A : \delta < 0$, i.e., there is no unit root and the series is stationary.

Third, regarding the long run relationship between variables;

$H_{0:}$ There is no cointegration between series.

$H_{A:}$ There is cointegration between series.

4.3. DATA ANALYSIS

4.3.1. UNIT ROOT TEST

The classical time series regression model is based on the assumption that the data generating processes are stationary, i.e., the moments of the variables under consideration are time invariant. However, as the economy grows and evolves over time, most macroeconomic variables are likely to grow over time rendering them non-stationary (Granger and Newbold, 1974). Regression using non-stationary variables will only reflect a relationship that is not real, and accordingly such regression is termed as "spurious regression". In this case, as the sample size increases, the coefficient variance doesn't tend

to be constant and the consistency property of OLS estimators breaks down. The sampling distribution of the estimators will be non-standard and the usual statistics (t and F) based on normal become invalid (Maddala, 1992).

Nelson and Plosser (1982) distinguish between two types of stationary series: trend stationary processes (TSP) and difference stationary processes (DSP). These two distinctions derive from the two widely used techniques of converting non-stationary series into stationary series. A trending mean is a common violation of stationarity. There are two popular models for non-stationary series with a trending mean.

The first one is trend stationary, in this case the mean trend is deterministic. Once the trend is estimated and removed from the data, the residual series is a stationary stochastic process. The other one is difference stationary, in this case the mean trend is stochastic. Differencing the series (D) times yields a stationary stochastic process.

According to Nelson and Kang (1984), the distinction between a deterministic and stochastic trend has important implications for the long-term behavior of a process. Time series with a deterministic trend always revert to the trend in the long run (the effects of shocks are eventually eliminated). Forecast intervals have constant width. Whereas, time series with a stochastic trend never recover from shocks to the system (the effects of shocks are permanent). Forecast intervals grow over time. Though both techniques may lead to stationary series, caution is needed in choosing between the two as de-trending a DSP series or differencing a TSP series may lead to spurious autocorrelation. Nelson and Plosser (1982) indicate that in most economic time series DSP is more appropriate and the TSP should be applied only if we assume the residuals exhibit strong autocorrelation.

Time series that can be made stationary by differencing are called integrated processes. Specifically, when D differences are required to make a series stationary, that series is said to be integrated of order D, denoted I (D). Processes with $D \geq 1$ are often said to have a unit root.

In the Box-Jenkins modeling approach[5] non-stationary time series are differenced until stationarity is achieved. You can write a difference-stationary process, Y_t, as

$$\Delta^D Yt = \mu + \psi(L)\varepsilon t ---------------------------(3)$$

Where, $\Delta^D = (1-L)^D$ is a D^{th}-degree differencing operator.

$\psi(L) = (1 + \psi_1 L + \psi_2 L^2 \ldots\ldots\ldots)$ Is an infinite-degree lag operator polynomial with absolutely summable coefficients and all roots lying outside the unit circle.

εt is an uncorrelated innovation process with mean zero.

Unfortunately, for any finite amount of data there is a deterministic and stochastic trend that fits the data equally well Hamilton, (1994). Unit root tests are a tool for assessing the presence of a stochastic trend in an observed series.

The starting point is the following autoregressive process:

$$Yt = \rho Yt - 1 + \mu t ----------------------------(4)$$

When $\rho = 1,$ we have a unit root and a random walk without a drift. In principle, we can run this regression and see if $\rho = 1,$ to check for a non-stationary random walk (unit root) process but we cannot estimate a model regressing the series on its lagged value to see if the estimated *rho* is equal to 1 because in the presence of a unit root, the t-statistics for the ρ coefficient is severely biased. Therefore, the procedure manipulate this equation and express it somewhat differently subtracting the lagged value from both sides.

$$Yt - Yt - 1 = \rho Yt - 1 - Yt - 1 + \mu t ----------------(4a), or$$

$$\Delta Yt = (\rho - 1)Yt - 1 + \mu t ---------------------(4b)$$

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[5] *Box, G. E. P., G. M. Jenkins, and G. C. Reinsel. Time Series Analysis: Forecasting and Control. 3rd ed. Englewood Cliffs, NJ: Prentice Hall, 1994.*

Let us call $(\rho - 1) = \delta, then$

$$\Delta Yt = \delta Yt - 1 + \mu t - (4c)$$

Note that this is a one-tailed test, and if δ= 0, then from $(\rho - 1) = \delta$ we can conclude that $\rho = 1$ such that there is a unit root (or the series is non-stationary) and we cannot reject the null! Also, note that the alternative hypothesis sets $\delta < 0$ because this means $\rho < 1$ (we reject the null and conclude there is no unit root and the series is stationary). We have already ruled out $\rho > 1$ so the alternative hypothesis cannot be two-tailed but it should be one-tailed (one-sided).

There are several tests of stationarity, this paper focus on a test which became popular over the past years: This is the unit root tests (Dickey-Fuller tests). Therefore, unit root tests for stationary will be examined on the levels and first differences for all variables using the most common unit root tests, which is the Augmented Dickey-Fuller (ADF). In some circumstance, lack of power in both the ADF and PP tests is widely acknowledged, then the NG-Perron (NP) test must be done (Ng-Perron, 2001). Usually ADF yields superior results than PP test, if the data set has no missing observations and structural breaks whilst PP test also yields superior results than ADF test, if the dataset have some missing observations and have structural breaks (Green, 2003). Since, the data has no missing observation and structural breaks ADF unit root test is used in this study.

The testing procedure for the ADF unit root test is applied to the following model;

$$\Delta Yt = \alpha + \beta t + \delta Yt - 1 + \alpha i \sum_{j=1}^{\rho} \varpi \, \Delta Yt - j + \varepsilon it - - - - - - - - - - - - - (5)$$

Where,

$\alpha \; is \; constant.$

$\beta \; coefficient \; of \; a \; time \; trend.$

δ $the\ coefficient\ of\ Yt-1$.

ρ $is\ the\ lag\ order\ of\ autoegressive\ process.$

$\Delta Yt = Yt - Yt - 1\ are\ first\ difference\ of\ Yt, in\ this\ case\ \Delta Y_{t=} \frac{X_t}{X_{t-1}} * 100 - 100$

$Yt - 1\ are\ lagged\ values\ of\ Y_t$

$Yt - 1\ are\ changes\ in\ lagged\ values.$

$\varepsilon it\ is\ the\ white\ noise.$

Then, this study is conducted with three options:

Option one: A random walk without drift, obtained by imposing constraint $\alpha = 0, \beta = 0\ and\ \delta = 0$ in equation 5, this leads to equation5a.

$$\Delta Yt = \delta Yt - 1 + \varepsilon it - (5a)$$

Option Two: A random walk with drift, obtained by imposing constraint $\beta = 0\ and\ \delta = 0$ in equation 5, this leads to equation 5b.

$$\Delta Yt = \alpha + \delta Yt - 1 + \varepsilon it - (5b)$$

Option three: A random walk with drift around a stochastic trend, obtained by imposing constraint $\beta \neq 0$ in equation 5, this leads to equation 5c.

$$\Delta Yt = \alpha + \delta Yt - 1 + \beta t + \varepsilon it - (5c)$$

4.3.2. OPTIMAL LAG LENGTH SELECTION

The determination of autoregressive lag length for a time series is especially important in economics studies. Various lag length selection criteria such as the Aikaike's information criterion (AIC), Schwarz information criterion (SIC), Hannan-Quinn criterion (HQC), final prediction error (FPE) and Bayesian information criterion (BIC) have been

employed. As the outcomes of these criteria may influence the ultimate findings of a study, a throughout understanding on the empirical performance of these criteria is warranted.

Hence, another key element in a model specification process is to determine the correct lag length. Several studies in this area demonstrate the importance of selecting a correct lag length. Estimates of the model would be inefficient and inconsistence if the selected lag length is different from the true lag length (Brooks, 2004). Selecting a higher order lag length than the true one over estimates the parameter values and increases the forecasting errors and selecting a lower lag length usually underestimate the coefficients and generates autocorrelated errors. Therefore, accuracy of parameters and forecasts heavily depend on selecting the true lag length. Though, there are so many criteria used in the literature to determine the lag length of an AR process. Criteria's the study uses are as follows.

Criteria one: Final prediction error

$$FPEp = \ln(\hat{\sigma}^2)(n+\rho)(n-\rho)^{-1} - - - - - - - - - - - - - - - - (6a)$$

Criteria two: Aikaike's Information Criterion

$$AICp = nln(\hat{\sigma}^2) + 2p - (6b)$$

Criteria three: Schwarz Information criterion

$$SICp = nln(\hat{\sigma}^2) + n^{-1}pln(n) - - - - - - - - - - - - - - - - - - (6c)$$

Criteria four: Hannan-Quinn criterion

$$HQCp = nln(\hat{\sigma}^2) + 2n^{-1}\rho \ln(\ln(n)) - - - - - - - - - - - - - - - (6d)$$

Where,

n is the sample size,

$$\hat{\sigma}^2 = (n-p-1)^{-1}\sum_{t=1}^{n} \varepsilon t^2$$

εt Is the model's residual.

Akaike Information Criterion (AIC) developed by Hirotugu Akaike in 1971 Greene (2003), has been found to be nearly unbiased estimator of selecting lag order and also it's a large sample size measure of thirty and more items, while the Schwarz Information Criterion (SIC) is a small sample measure of less than thirty observations. Moreover, Liew and Venus; Khim Sen (2004) provide useful insights for empirical researchers. First, these criteria managed to pick up the correct lag length at least half of the time in small sample. Second, this performance increases substantially as sample size grows. Third, with relatively large sample (120 or more observations), HQC is found to outdo the rest in correctly identifying the true lag length. In contrast, AIC and FPE should be a better choice for smaller sample. Fourth, AIC and FPE are found to produce the least probability of under estimation among all criteria under study. Finally, the problem of over estimation, however, is negligible in all cases. As many econometric testing procedures such as unit root tests, causality tests, cointegration tests and linearity tests involved the determination of autoregressive lag lengths, the findings in this simulation study may be taken as useful guidelines for future economic researches.

Hence, the ability to correctly locating the true lag order depends on IC the ordinary least Squares regression model is run starting with lag zero upwards, since according to Engle et al (1995) it is the mostly used and recommended methodology used to determine the lag length. Accordingly, lag that provides the minimum value is chosen as the optimal lag length, in other words, among the IC that provides majority lag is chosen as optimal lag length.

4.3.3. COINTEGRATION TEST

On the basis of the theory that integrated variables of order one, I(1), may have a cointegration relationship, it is crucial to test for the existence of such a relationship. If a group of variables are individually integrated of the same order and there is at least one linear combination of these variables that is stationary, then the variables are said to be cointegrated. The cointegrated variables will never move far apart, and will be attracted to their long-run relationship. Testing for cointegration implies testing for the existence of

such a long-run relationship between economic variables. This study considers a number of cointegration tests, namely the Engle-Granger method commonly known as the two-step estimation procedure, the Phillips-Ouliaris methods and the Johansen's procedure.

4.3.3.1. ENGLE GRANGER METHOD

As we have stated, the regression of non-stationary series on other series may produce spurious regression. If each variable of the time series data is subjected to unit root analysis and it is found that all the variables are integrated of order one, I(1), then they contain a unit root. There is a possibility that the regression can still be meaningful (i.e. not spurious) provided that the variables cointegrate. In order to find out whether the variables cointegrate, the least squares regression equation is estimated and the residuals (the error term) of the regression equation are subjected to unit root analysis. If the residuals are stationary, that is I(0), it means that the variables under study cointegrate and have a long-term or equilibrium relationship. The Engle-Granger method is based on the idea described in this paragraph.

In the two-step estimation procedure, Engle-Granger considered the problem of testing the null hypothesis of no cointegration between a set of variables by estimating the coefficient of a statistic relationship between economic variables using the OLS and applying well-known unit root tests to the residuals to test for stationarity. Rejecting the null hypothesis of a unit root is evidence in favor of cointegration.

4.3.3.2. PHILLIPS OULIARIS METHOD

Phillips-Ouliaris introduced two residual-based tests namely: the variance ratio test and the multivariate trace statistics.

These residual-based tests are used in the same way as the unit root tests, but the data are the residuals from the cointegrating regression. These tests seek to test a null hypothesis of no cointegration against the alternative of the presence of cointegration using scalar unit root tests applied to the residuals. Phillips-Ouliaris methods are based on residuals (differences between the observed and expected values) of the first order autoregression, AR (1), equation. The multivariate trace statistics has the advantage over the variance ratio

test in that it is invariant to normalization, that is, whichever variable is taken to be the dependent variable, and this test will yield the same result (pfaff, 2006).

In the literature, there are no studies directly linked to the application of the Phillips-Ouliaris cointegration test only. However, there are a few studies in which cointegration has been tested using other techniques including the Phillips-Ouliaris methods. The results showed that the null distributions of residual-based cointegration tests differed from those derived from the use of the Phillips-Ouliaris methods. The practical implication of these results is that we need to test not only for the presence of a unit root for individual series, but also for the presence of cointegrating vectors for the regressors prior to performing residual-based tests for cointegration. Thus Johnsen's procedure resolve these issues.

4.3.3.3. JOHANSEN'S PROCEDURE

Since the influential work of Granger and Newbold (1974); and Engle and Granger (1987) on the treatment of integrated time series data, many studies have been conducted using the co-integration methodology in order to yield consistent results and avoid the spurious regression problems, particularly in causality testing. The purpose of co-integration test in this study is to examine whether economic growth and government tax revenue share a common stochastic trend, that is, whether they move on the same wave-length in the long-run though there might be some disequilibrium in the short-run. This research will employ Johansen's (1988) approach to determine whether any combinations of the variables are co-integrated. Johansen and Juselius (1990) recommend the trace test and the maximum Eigen-value t-statistics in making the inference of the number of co-integrating vectors.

Johansen's methodology takes its starting point in the vector autoregression (VAR) of order ρ given by:

$$Yt = \mu + \mathrm{A1Yt} - 1 + \cdots + \mathrm{ApYt} - \mathrm{p} + \varepsilon\mathrm{t} - - - - - - - - - - - - - - - - - - - (7)$$

Where Y_t is an $n \times 1$ vector of variables that are integrated of order one-commonly denoted I(1) and εt is an $n \times 1$vector of innovations. Reparameterising equation 7, that is, subtracting Y_{t-1} on both sides leads to

$$\Delta Yt = \Pi Yt - 1 + \sum_{i=1}^{p-1} \Gamma i \Delta Yt - 1 + \varepsilon t - (7a)$$

Where,

$$\Pi = \sum_{i=1}^{p} Ai - I \; - (7b)$$

and,

$$\Gamma i = \sum_{j=i+1}^{p} Aj - (7c)$$

If the coefficient matrix Π has reduced rank r < n, then there exist n x r matrices α and β each with rank r such that $\Pi = \alpha\beta$' and $\beta' Yt$ is stationary. r Is the number of cointegrating relationships, the elements of α are known as the adjustment parameters in the vector error correction model and each column of β is a cointegrating vector. It can be shown that for a given r, the maximum likelihood estimator of β defines the combination of $Yt - 1$ that yields the r largest canonical correlations of ΔYt with $Yt - 1$ after correcting for lagged differences and deterministic variables when present. Johansen proposes two different likelihood ratio tests of the significance of these canonical correlations and thereby the reduced rank of the Π matrix: the trace test and maximum eigenvalue test, shown in equations (8) and (9) respectively.

$$J\text{trace} = -T \sum_{i=r+1}^{n} \ln(1 - \tilde{\lambda}\, i) - (8)$$

$$Jmax = -T \ln\left(1 - \tilde{\lambda} r + 1\right) - (9)$$

Here T is the sample size and $\tilde{\lambda}i$ is the ith largest canonical correlation. The trace test tests the null hypothesis of r cointegrating vectors against the alternative hypothesis of n cointegrating vectors. The maximum eigenvalue test, on the other hand, tests the null hypothesis of r cointegrating vectors against the alternative hypothesis of 1 + r cointegrating vectors.

For trace statistic, the null hypothesis is the number of co-integrating vectors is less than or equal to co-integrating vectors (r) against an unspecified alternative. In the case of maximum Eigen-value co-integration test, the null hypothesis is the number of co-integrating vectors (r) against the alternative of 1 + r (Ng et al, 2008). If the trace statistic is greater than the Eigen-value (critical value), we conclude that the model contains at least one co-integrating equation. Where this condition is violated at a higher order, determines the maximum number of co-integrating equations. Therefore, procedures in accordance with Johansen approach is used in this study.

4.3.4. SHORT RUN COINTEGRATION: VECTOR ERROR CORRECTION MODEL (VECM)

According to Engle-Granger (1987) if two time series are co-integrated then the VECM will represent them most efficiently. If cointegration has been detected between series we know that there exists a long-term equilibrium relationship between them so we apply VECM in order to evaluate the short run properties of the cointegrated series. In case of no cointegration VECM is no longer required and we directly precede to Granger causality tests to establish causal links between variables.

An error correction model is defined as a dynamic model in which the movement of a variable in any period is related to the previous period's gap from the long-run equilibrium. Although it may be possible to estimate the long-run or cointegrating relationship, $Yt = \beta Xt + \epsilon t$ economic systems are rarely in equilibrium, as they are affected by institutional and/or structural changes that might be temporary or permanent.

A simple dynamic model of a short-run adjustment model is given by

$$Yt = \alpha 0 + \gamma 0Xt + \gamma 1Xt - 1 + \alpha 1Yt - 1 + \varepsilon t - - - - - - - - - - - - - - - - - (10)$$

Where,

Yt is dependent variable, and $Yt - 1$ are lagged values

Xt is independent variable, and $Xt - 1$ are lagged values

$\alpha 0, \gamma 0, \alpha 1, \gamma 1$ are parameters

εt is the error term assumed to be $\varepsilon t \sim iN(0, \delta^2)$.

The problems associated with the use of the short-run model are multicollinearity (this is a situation in which two or more independent variables in a multiple regression model are highly correlated), and Spurious correlation (this is a situation in which two variables have no causal connection, yet it may be inferred that they do as a result of a certain third unseen factor).

The problems are solved by estimating the first difference of equation (10) to obtain

$$\Delta Yt = \alpha 0 + \gamma 0\Delta Xt - 1 + \gamma 1\Delta Xt - 1 + \alpha 1\Delta Yt - 1 + \varepsilon t - - - - - - - - - - -(10a)$$

This, however, introduces problems of loss of information about the long-run equilibrium and the economic theory is differenced away. Thus, the possible solution is to adopt the error-correction mechanism (ECM) formulation of the dynamic structure. The setup is as follows.

$$\Delta Yt = \gamma 0\Delta Xt - (1 - \alpha 1)[Yt - 1 - \beta 0 - \beta 1Xt - 1] + \varepsilon t - - - - - - - - - - (10b)$$

Which is ECM of the study. This model satisfies the assumptions of classical normal linear regression model. Among others the assumption includes, a linear regression model, residuals are normally distributed, there is no serial correlation among residuals, and there is no perfect multicollinearity.

Where,

$-(1-\alpha 1)$ is the speed of adjustment

$\varepsilon t-1=Yt-1-\beta 0-\beta 1Xt-1$ as error-correction mechanism which measures the distance of the system away from equilibrium.

Therefore, the coefficient of $\varepsilon t-1$ should be negative in sign in order for the system to converge to equilibrium. The size of the coefficient $-(1-\alpha 1)$ is an indication of the speed of adjustment towards equilibrium in that;

- Small values of$-(1-\alpha 1)$, tending to -1, indicate that economic agents remove a large percentage of disequilibrium in each period.
- Larger values, tending to 0, indicate that adjustment is slow.
- Extremely small values, less than -2, indicate an overshooting of economic equilibrium.
- Positive values would imply that the system diverges from the long-run equilibrium path.

4.3.5. CAUSALITY ANALYSIS

4.3.5.1. TODA-YAMAMATO CAUSALITY-TRIVARIATE MODEL

Toda and Yamamoto (1995) proposed causality test which is robust for cointegration and stationarity properties. They levied criticism on VECM based causality test that its results may not be correct because preliminary tests biases of cointegration and first difference stationarity can be a possible source of wrong inferences regarding causality. Following system of equations is proposed to check causality inferences under Toda-Yamamoto causality test and SUR (seemingly unrelated regression) technique is utilized to estimate the model because due to SUR estimation Wald test experiences efficiency.

In order to check that growth in real tax revenue growth does not granger cause economic growth in real GDP from equation (11a), null hypothesis will be: $\delta_{1i}=0\ \forall_i \leq k$. If null hypothesis is rejected then we can infer that growth in tax revenue granger causes growth in real GDP. In a similar fashion all other possible causations is checked.

$$grRGDP = \alpha_1 + \sum_{i=1}^{k+dmax} \beta_{1i}\, grRGDP_{t-i} + \sum_{i=1}^{k+dmax} \delta_{1i}\, grRT_xR_{t-1} + \sum_{i=1}^{k+dmax} \lambda_{1i}\, grRNTR_{t-i} + \mu_{1t} - (11a)$$

$$grRTR = \alpha_2 + \sum_{i=1}^{k+dmax} \beta_{2i}\, grRGDP_{t-i} + \sum_{i=1}^{k+dmax} \delta_{2i}\, grRT_xR_{t-1} + \sum_{i=1}^{k+dmax} \lambda_{2i}\, grRNTR_{t-i} + \mu_{2t} - (11b)$$

$$grRNTR = \alpha_3 + \sum_{i=1}^{k+dmax} \beta_{3i}\, grRGDP_{t-i} + \sum_{i=1}^{k+dmax} \delta_{3i}\, grRT_xR_{t-1} + \sum_{i=1}^{k+dmax} \lambda_{3i}\, grRNTR_{t-i} + \mu_{3t} - (11b)$$

4.3.5.1. GANGER CAUSALITY-BIVARIATE MODEL

The deterministic components are selected using the Pantula principle suggested by Johansen (1992). The Pantula principle select the co-integration equation with linear deterministic trend. Lag lengths in vector auto regression is selected using likelihood ratio test. Before testing the causality of the VECM, first Granger causality test between government tax revenue (TR) which used growth in real total TR and economic growth (EG) which use growth in real GDP as proxy variable is examined to determine the long run causality in VAR context, and then short run causality has been estimated using VECM. The Granger causality test or well known as 'joint F-test' between government tax revenue growth and economic growth is used in order to check the direction of causality between two variables in Ethiopia: The Granger procedure is selected because it consists more powerful but simpler way of testing causal relationship Granger (1986). Using this test the following null and alternative hypotheses are estimated.

In testing long-run causality, three hypothesis is tested using VAR. The first one is based on the "*Grow and Tax*" hypothesis advocated by (Peacock and Wiseman, 1978). They postulate a case that government spending induced growth continue even after the crises is over applying the Keynesian growth theory and the tax ratchet effect. They are of the view that severe crises that initially force up government expenditure induce economic growth rate, more than tax revenue growth rate. Generally, they argue that increased tax revenue

arises because of accelerated economic growth achieved through government spending multiplier.

$$grRTRt = \sum_{i=1}^{n} \alpha i grRTRt - i + \sum_{j=1}^{n} \beta j grRGDPt - j + \phi\gamma t - 1 + \mu t - - - - - - (12)$$

Equation (12) postulates that growth in real tax revenue is related to past values of itself as well as that of growth in RGDP and a certain proportion of equilibrating error.

The null and alternate hypotheses in this case are;

H_0: Economic growth doesn't granger cause total revenue growth.

H_A: Economic growth granger cause total revenue growth.

The other one is based on the "*Tax and grow*" hypothesis advocated by Friedman (1978). He argued that raising tax revenue either through increasing tax rate or tax base would lead to more fiscal space which will drive growth. In this case the VAR has the following form;

$$grRGDPt = \sum_{i=1}^{n} \lambda i grRTRt - i + \sum_{j=1}^{n} \delta j grRGDPt - j + \theta\gamma t - 1 + \varepsilon t - - - - - (13)$$

Equation (13) postulates that growth in RGDP is related to past values of itself as well as that of growth in real tax revenue and a certain proportion of equilibrating error.

The null and alternate hypotheses in this case are;

H_0: Total revenue growth doesn't granger cause economic growth.

H_A: Total revenue growth granger cause economic growth.

The final hypothesis tested in this study is the "*Fiscal synchronization*" hypothesis asserted with Barro's (1979), tax smoothing model holds. This hypothesis explains that

government tax spending induced growth and tax revenue maximization decisions are taken simultaneously. This idea, that tax revenue and real GDP change concurrently was explained more by (Meltzer and Richard, 1981), in their quest to explain the size of government spending vis-à-vis tax revenue collections. In an empirical sense, this hypothesis postulates 'bidirectional' causality between economic growth and government tax revenue.

Otherwise, independence will happen. This is to mean that tax revenue growth and economic growth decisions are taken independently.

The short-run causality between tax revenue growth and economic growth is examined using the difference of the variables in equation (12) and (13). Therefore, the above models are estimated in anticipation of yielding four distinct cases.

I. Unidirectional causality from $grRTR\ to\ grRGDP$ is indicated if the estimated coefficients on the lagged $grRTR$ in equation (12) are statistically different from zero as a group (i.e.,$\alpha i \neq 0$) and the set of estimated coefficients on the lagged $grRGDP$ in (13) is not statistically different from zero (i.e.,$\delta j = 0$).
II. Conversely, unidirectional causality from $grRGDP\ to\ grRTR$ exist if the set of lagged $grRTR$ coefficient in (12) is not statistically different from zero (i.e., $\alpha i = 0$) and the set of the lagged$grRGDP$ coefficients in (13) is statistically different from zero (i.e., $\delta j \neq 0$).
III. Feedback, or bilateral causality is suggested when the set of $grRTR\ and\ grRGDP$ coefficients are statistically significantly different from zero in both regressions.
IV. Finally, independence is suggested when the set of $grRTR\ and\ grRGDP$ coefficients are not statistically significant in both cases.

There has been much criticism of Granger causality testing in the econometrics literature. Roberts and Nord (1985) found that the functional form of the time series affected the sensitivity of both Granger's and Sims' tests. Data that had undergone logarithmic transformation showed no sign of causality while the untransformed data yielded significant results. This stands to reason, as logarithmic transformation tends to reduce heteroskedasticity and increase the stationarity of the variables. However

Chowdhury (1987) found more disturbing results that give support to those who have doubted whether Granger causality was related to philosophical causality or economic exogeneity in any meaningful way. He found that a Granger test indicated that gross national product caused sunspots! A Sims test showed that prices caused sunspots! None of the alternative hypotheses were validated. Prices and income may be exogenous in the sunspot equations, but sunspots are not endogenous in any meaningful philosophical or economic way. But because sunspots are quite predictable prices and income might have anticipated them. The forward-looking behavior of human agents can be an obstacle to Granger causality testing.

CHAPTER FIVE

RESULT AND DISCUSSION

5.1. UNIT ROOT TEST

Dickey and Fuller (1979) developed a procedure for testing whether a variable has a unit root or, equivalently, that the variable follows a random walk. Hamilton (1994) describes the four different cases to which the augmented Dickey-Fuller test can be applied. The null hypothesis is always that the variable has a unit root. They differ in whether the null hypothesis includes a drift term and whether the regression used to obtain the test statistic includes a constant term and time trend.

Both from economic theories and practices for all the variables (i.e., real GDP growth, real total tax revenue growth, real tax revenue growth and real non-tax revenue growth) we can expect an increasing and decreasing trend. The trend properties of the data under the alternative hypothesis will determine the form of the test regression used. Thus, the test regression onwards must include a constant and trend to capture the deterministic trend under the alternatives.

Estimation of a single equation framework with integrated or nonstationary variables tends to create: non-standard distribution of the coefficient estimates generated by the process not being stationary, explanatory variables generated by the process that display autocorrelation, the existence of more than one cointegrated vector and tendency to weak exogeneity (Banerejee et al, 1993).

The ADF test for unit root of the variables are conducted at level. Table 5.1 shows unit root test of variables at growth form.

Table 5.1. Unit root test of variables at Growth form

Variables	Augmented Dickey Fuller test								Decision
	Constant only				Constant and Trend				
	Test statistics	1% c.v	5% c.v	10% c.v	Test statistics	1% c.v	5% c.v	10% c.v	
grRGDP	4.305	3.615	2.941	2.609	6.156	4.226	3.536	3.200	I(1)
grRTR	4.956	3.615	2.941	2.609	4.909	4.219	3.533	3.198	I(1)
$grRT_xR$	4.314	3.615	2.941	2.609	5.394	4.219	3.533	3.198	I(1)
grRNTR	7.319	3.615	2.941	2.609	7.404	4.219	3.533	3.198	I(1)

Source: own computation using NBE data.

From the ADF test result of table 5.1, we can overwhelmingly reject the null hypothesis of a unit root test at all level of significance and the model can be accepted since the coefficient of variables in all cases are negative. Since, all the variables are integrated of order one, i.e., I (1), we can proceed with the Johansen test of cointegration to determine wheather there exist long run relationship of variables in the trivariate and bivariate system. But, before that since Johnsen's cointegration test is very sensitive to lag length determination we need first determine the correct lag length.

5.2. LAG LENGTH SELECTION

Determining the correct lag length is very helpful to run johansen test of cointegration, VAR and VECM. Moreover, two of the important issues in constructing a model are: determining the model's lag length and checking the model's parameter stability. When there is no structural break the lag length of an AR process is estimated using any of the criteria discussed under the methodology part. On the other hand when the lag length is known the parameter stability may be tested by employing various testing procedures (Yang, 2001).

In this study the correct lag length is determined for the trivariate as well as bivariate model. In order to determine the optimal lag order lag length is run up to four lags to include. Table 5.2A and 5.2B, shows the correct lag length determination procedure according to the five information criterion.

Table 5.2A. Lag length Selection for Trivariate Model

VAR Lag Order Selection Criteria
Endogenous variables: GRRGDP GRRT$_x$R GRRNTR
Sample: 1 40
Included observations: 35

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-418.9872	NA	5956361.	24.11355	24.24687*	24.15958*
1	-411.5745	13.13104	6541233.	24.20426	24.73752	24.38834
2	-408.1640	5.456783	9124039.	24.52366	25.45687	24.84580
3	-388.3963	28.23965*	5095160.*	23.90836*	25.24151	24.36856
4	-385.2111	4.004228	7563972.	24.24063	25.97374	24.83890

Source: EViews version 6 using NBE data
Note: * indicates lag order selected by the criterion
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

Table 5.2A. Lag length Selection for Bivariate Model

VAR Lag Order Selection Criteria
Endogenous variables: GRRGDP GRRTR
Sample: 1 40
Included observations: 35

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-248.8558	NA	5761.147	14.33461	14.42349*	14.36530*
1	-246.4114	4.469702	6301.843	14.42351	14.69014	14.51555
2	-245.9810	0.737873	7751.683	14.62748	15.07187	14.78089
3	-236.4042	15.32283*	5675.917*	14.30881*	14.93095	14.52357
4	-233.5709	4.209478	6144.671	14.37548	15.17537	14.65160

Source: EViews version 6 using NBE data
Note: * indicates lag order selected by the criterion
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

While, checking up to four lag order to include the 5% significance level suggest that lag 3 would be the correct lag length. This has been confirmed by LR, FPE, and AIC in both cases. Thus, it can be taken to estimate johansen test of cointegration, VAR, VECM, and granger causality models.

5.3. THE LONG RUN RELATIONSHIP

Economic theory often implies equilibrium relationship between the level of time series variables that are best described as integrated of order one, i.e., I(1). Hereafter, all the variables are integrated of order one johansen test of cointegration is run in order to infer the long run relationship for the trivariate and bivariate model. For trace statistic, the null hypothesis is the number of co-integrating vectors is less than or equal to co-integrating vectors (r) against an unspecified alternative. In the case of maximum Eigen-value co-integration test, the null hypothesis is the number of co-integrating vectors (r) against the alternative of 1 + r (Ng et al, 2008). If the trace statistic is greater that the Eigen-value (critical value), we conclude that the model contains at least one co-integrating equation. Where this condition is violated at a higher order, determines the maximum number of co-integrating equations. Therefore, procedures in accordance with Johansen approach has conducted and the number of cointegrating equations corresponding to this row of data is selected.

Table 5.3A and 5.3B shows johansen test of cointegration for trivariate and bivariate time series system.

Table 5.3A. Cointegration Rank Test for Trivariate Model

Included observations: 35 after adjustments

Trend assumption: Linear deterministic trend (restricted)

Series: GRRGDP GRRT$_x$R GRRNTR

Lags interval (in first differences): 1 to 3

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.451374	43.62735	42.91525	0.0423
At most 1	0.288463	22.61553	25.87211	0.1207
At most 2	0.263488	10.70405	12.51798	0.0986

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

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None	0.451374	21.01183	25.82321	0.1903
At most 1	0.288463	11.91147	19.38704	0.4234
At most 2	0.263488	10.70405	12.51798	0.0986

Source: EViews version 6 using NBE data
Max-eigenvalue test indicates no cointegration at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

From the above result, performing a sequence of trace and maximum-eigen value test at a given significance level produce an estimate of the number of cointegration equations. Accordingly, the trace test rejects the null hypothesis of no cointegration with one cointegrating equations at 0.05 level. While max-eigenvalue test indicates no cointegration equation for the trivariate time series data.

Table 5.3B.Cointegration Rank Test for Bivariate Model

Included observations: 35 after adjustments
Trend assumption: Linear deterministic trend (restricted)
Series: GRRGDP GRRTR
Lags interval (in first differences): 1 to 3
Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.436412	28.26669	25.87211	0.0247
At most 1	0.208787	8.196604	12.51798	0.2360

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

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.436412	20.07009	19.38704	0.0398
At most 1	0.208787	8.196604	12.51798	0.2360

Source: EViews version 6 using NBE data
Max-eigenvalue test indicates 1 cointegrating equation at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Furthermore, from table 5.3B, a sequence of trace and maximum eigenvalue test at a given significance level produce an estimate of the number of cointegration equations. As a result, both the trace test and max-eigenvalue test rejects the null hypothesis of no cointegration with one cointegration equation at 0.05 level.

Henceforward, based on Johansen and Juselius (1990), recommendation of trace test and the max eigenvalue test in making the inference of the number of cointegrating vectors, it has been confirmed in both cases i.e., with trivariate and bivariate cases models share a

common stochastic trend, that is they move on the same wave length in the long run. Having the johansen test of cointegration it is been double confirmed in the bivariate case whereas, for the trivariate case the trace test confirm that variables has long run relationship for the first case. Based on this it would be possible to analyze both the long run and short run relationship between these variables in Ethiopia for the period under investigation.

5.4. THE LONGRUN IMPACT OF VARIABLES ON ECONOMIC GROWTH

5.4.1. TRIVARIATE MODEL

After identifying the level of cointegration rank order, in order to identify how the growth in real tax revenue and real non-tax revenue encourage or discourage economic growth in Ethiopia VAR is estimated using OLS. The following trivariate form of the model regression is run with constant, linear trend.

The parameter estimate of components of government revenue on economic growth is presented in Table 5.4A. In the trivariate setting, growth in total revenue is decomposed into growth in tax and non-tax revenue and wheather it has an impact on economic growth is estimated. The normalized cointegration coefficient (standard error in parenthesis) is as follows.

Table 5.4A. Normalized Cointegrating Coefficient for Trivariate Model

GRRGDP	$GRRT_xR$	GRRNTR	@TREND(2)
1.000000	1.013516	0.112073	-0.601685
	(0.37066)	(0.19702)	(0.24103)

Source: EViews version 6 using NBE data

Note: Standard error in parenthesis

The long run relationship is derived by normalizing growth in real GDP from Table 5.3A. The long run relationship is specified mathematically as;

$$grRGDP = -0.601T + 1.013grRT_xR + 0.112grRNTR$$

Where, T is time trend. The trend exert a negative effect on growth in RGDP. This implies that holding all other factors constant in the long run, as time passes by, the growth in real GDP of Ethiopia decline by about 60% each year. This is justified by the fact that since all the variables are changed in real terms inflation (i.e., imported inflation) and persistent devaluation of birr in terms of other currencies mainly dollar restrain the activities in the real sector. The other result has come up with the expected sign. On average a 1% growth in real tax revenue and real non-tax revenue increases the growth in real GDP by 1.01% and 0.11% respectively. Moreover, the degree of relationship is strong in the case of real tax revenue growth than real non-tax revenue growth. Accordingly, in the long run improving both tax and non-tax revenue is important for economic growth in Ethiopia, in other words both tax and non-tax revenues encourage economic growth of the country.

Table 5.4B. VAR Estimation of Coefficient for Trivariate Model

Dependent Variable: GRRGDP
Method: Least Squares
sample (adjusted): 5 40
Included observations: 36 after adjustments
GRRGDP = C(1)*GRRGDP(-1) + C(2)*GRRT$_x$R(-1) + C(3)*GRRNTR(-1) + C(4)*GRRGDP(-2) + C(5)*GRRT$_x$R(-2) + C(6)*GRRNTR(-2) + C(7)*GRRGDP(-3) + C(8)*GRRT$_x$R(-3) + C(9)*GRRNTR(-3) + C(10)

GRRGDP	Coefficients	t-prob
GRRGDP(-1)	0.3721	0.0609**
GRRT$_x$R(-1)	0.0088	0.9174
GRRNTR(-1)	-0.0206	0.5437
GRRGDP(-2)	-0.2958	0.1619
GRRT$_x$R(-2)	0.0500	0.5449
GRRNTR(-2)	-0.0246	0.4887
GRRGDP(-3)	0.5195	0.0135*
GRRT$_x$R(-3)	0.0095	0.9014
GRRNTR(-3)	-0.0679	0.0488*
CONSTANT	3.1224	0.0418*

Source: own computation
*Note: * and ** indicates statistical significance at 5% and 10%*

R-squared	0.420366	Mean dependent variable	5.424255
Adjusted R-squared	0.219723	S.D. dependent variable	6.040573
S.E. of regression	5.335836	Akaike info criterion	6.416901
Sum squared residual	740.2498	Schwarz criterion	6.856768
Log likelihood	-105.5042	Hannan-Quinn criteria	6.570427
F-statistic	2.095097	Durbin-Watson stat	2.119903
Prob(F-statistic)	0.068101		

The result in the above table shows the long run impact of growth in real tax revenue (GRRT$_x$R) and growth in real non-tax revenue (GRRNTR) with growth in real GDP (GRRGDP) for the warranted lag length.

The result from the above table shows that lag three of all the variables are used, only GRRGDP (-1), GRRGDP (-3) and GRRNTR (-3), are statistically significant; meaning in the long run the impact on economic growth is only observed from the previous one and three years of growth in real GDP itself and the three year lagged value of real non-tax revenue. On average, it can be explained that 1% increase in the previous one year real

GDP increases the current real GDP growth by 0.37%, also a 1% increase in the previous three year real GDP increases the current year real GDP by 0.5% and 1% increase in the previous three year real non-tax revenue decreases growth rate of real GDP by 0.06%.

Among the coefficients of variables only three got statistical significance, however measuring the statistical significance of two independent variables jointly would be very important in order to clearly say wheather two independent variables at a given lag length are jointly significant or not. To do this Wald test of coefficient restriction is examined with null hypothesis of two coefficients can't jointly influence dependent variable, against the alternative hypothesis of joint influence dependent variable. The following table shows Wald test of coefficient restriction.

Table 5.4C. Wald Coefficient Restriction

Wald-coefficient restriction	Year effect	Prob (chi2)
C(1)=c(2)=0	1	0.0748**
C(2)=c(3)=0	1	0.8275
C(4)=c(5)=0	2	0.3538
C(5)=c(6)=0	2	0.6710
C(7)=c(8)=0	3	0.0066*
C(8)=c(9)=0	3	0.1177

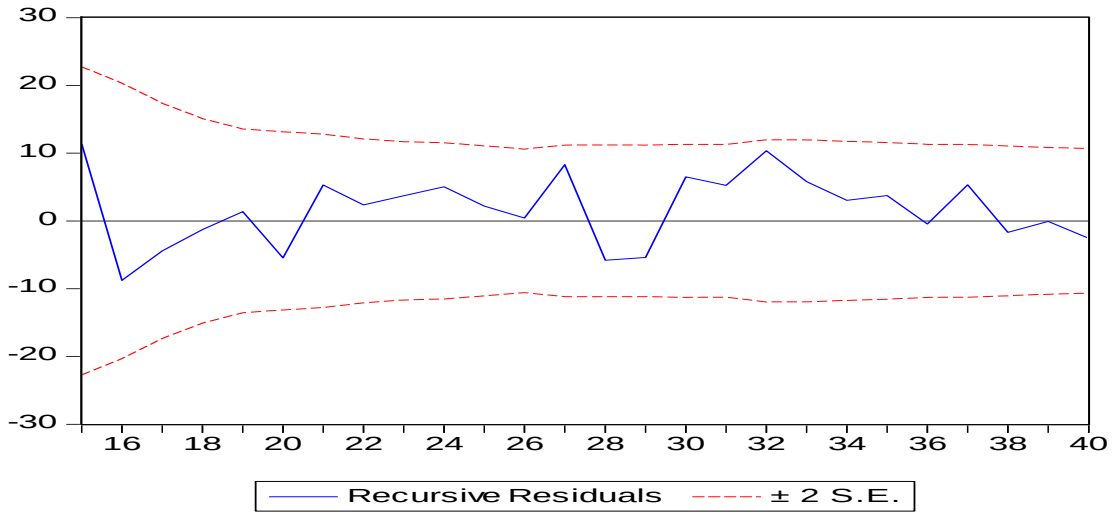
Source: own computation

*Note: * and ** indicate statistical significance at 5% and 10%.*

Furthermore, performing the joint significance of coefficients provided that only the coefficients for growth in real GDP and growth in real T_xR at lag 1 and lag 3 jointly affect economic growth for the period under investigation. Meaning, a 1% growth in real GDP and real tax revenue of the past 1 year increases the current growth in real GDP on average by 0.07%, and a 1% growth in real GDP and real tax revenue of the past 3 year increases the current growth in real GDP by 0.006% and it can be seen the joint impact doesn't come from the growth in real non-tax revenue for the period under investigation. It could be explained that the distortionary impact of growth in real non-tax revenue have a temporary impact on real GDP growth and its impact would be normalize by the growth in real tax revenue.

As if, the independent variables are not significant most of the time individually and jointly examining the stability of regression coefficient have a paramount importance. Unless, the model can be verified by its ability to justify a maintained hypothesis that the coefficients of the model are stable over a sample interval, a shift from one regression scheme to another cannot be located easily. Figure 5.1 shows the parameter stability test for trivariate model using recursive residual procedure[6].

Figure 5.1. Parameter Stability Test for Trivariate Model-VAR: Recursive Estimates (OLS only)



Source: EViews version 6 using NBE data

Therefore, according to the above figure, the plot bounds within the plus and minus 2 standard errors. Thus the test shows that the parameters are stable over the period under investigation.

[6] *In recursive least squares the equation is estimated repeatedly, using ever larger subset of the sample data. The one-step a head forecast error resulting from the prediction, suitably scaled, is defined to be recursive residual. The option shows a plot of recursive residuals about the zero line. Plus and minus two standard errors are also shown at each point. Residuals outside the standard error bands suggest instability in the parameters of the equation.*

Likewise, the trivariate system diagnostic test of residuals show that the model has desirable properties of OLS. Residual test of normality, serial correlation LM test and heteroskedasticity test is conducted and the result is presented under ANNEX 1.

In nutshell, while identifying wheather components of total revenue encourage or discourage economic growth in Ethiopia, from the normalized cointegrating coefficient its confirmed that the growth in both i.e., real tax and non-tax revenue is important for economic growth. Accordingly, the growth in both variables encourage economic growth in Ethiopia for the period under investigation.

5.4.1.1. LONG RUN CAUSALITY FOR TRIVARIATE MODEL (VAR)

Examining pairwise granger causality test is important for the trivariate system in order to infer the direction of causation between three variables. The following table shows Granger causality test for components of government revenue and economic growth model in the long run.

Table 5.5. Pairwise Granger Causality Test for Trivariate Model

Pairwise Granger Causality Tests
Sample: 1 40
Lags: 3

Null Hypothesis:	Obs	F-Statistic	Prob.
$GRRT_xR$ does not Granger Cause GRRGDP	36	0.03575	0.9908
GRRGDP does not Granger Cause $GRRT_xR$		2.01128	0.1343
GRRNTR does not Granger Cause GRRGDP	36	1.53550	0.2263
GRRGDP does not Granger Cause GRRNTR		1.03833	0.3903
GRRNTR does not Granger Cause $GRRT_xR$	36	4.12221	0.0150*
$GRRT_xR$ does not Granger Cause GRRNTR		2.64244	0.0680**

Source: EViews version 6 using NBE data

*Note: * and ** indicates statistical significance at 5% and 10%*

The result from the above table reveals that, the null hypothesis can't be rejected in all cases except for growth in non-tax revenue and tax revenue, i.e., growth in real non-tax revenue does cause growth in real tax revenue and growth in real tax revenue does cause growth in real non-tax revenue under the trivariate system in Ethiopia for the period under investigation. Therefore, there is only long run causal relationship between components of tax revenue growth, not with economic growth. Hence, no justification found in this study to support the finding by Delessa et al (2015) whom they found that direct tax granger cause economic growth.

5.4.2. BIVARIATE MODEL

Also in the bivariate system it is important to look at how the growth in total tax revenue encourage or discourage economic growth in real term. The normalized cointegration coefficient is as follows.

Table 5.6A. Normalized Cointegrating Coefficient for Bivariate System

GRRGDP	GRRTR	@TREND(2)
1.000000	3.753099	-0.810509
	(0.85991)	(0.62909)

Source: EViews version 6 using NBE data

Note: Standard error in parenthesis

The long run relationship is derived by normalizing growth in real GDP from Table 5.3B. The long run relationship is specified mathematically as;

$$grRGDP = -0.810T + 3.753grRTR$$

Where, T is time trend. The trend exert a negative effect on growth in RGDP. Also it implies that holding all other factors constant in the long run, as time passes by, the growth in real GDP of Ethiopia decline by about 81% each year. Again, this is justified by the fact that as time goes on inflation and devaluation restrain the activities in the real sector. Moreover, the result in Table 5.6A shows the growth in real total tax revenue has a positive

impact on economic growth and come up with the expected sign. In an empirical sense, a 1% growth in total revenue in real term increases the growth in real GDP on average by 3.75% and the coefficient shows strong relationship in Ethiopia for the period under investigation. This might be attributed to the fact that government take measures to enhance the tax collection capacity of institutions.

The finding of this result is consistent with (Friedman, 1978; Barro's, 1979; Easterly et al 1994). On one side of the coin Friedman finds, raising tax revenue either through increasing tax rates or tax base would lead to more fiscal space which will drive growth. On the other side, Barro and easterly finding support the supply side hypothesis that the relationship between tax revenue and economic growth shows a positive relationship. Any significant increase in tax income will have a positive impact on economic growth. A possible explanation is that an increase in tax revenue will boost the economy and prospect development. Moreover these results show that economic development was the strongest determinant of tax growth.

Whether, estimation of parameter coefficient variability drive macroeconomic time series data to change over the pre-determined lag interval is examined based on VAR model using OLS technique. Table 5.6B shows the impact of growth in total tax revenue on economic growth within the VAR framework.

Estimation of unrestricted VAR coefficients from Table 5.6B shows using the optimal lag length provide all the lagged variables are not significant at 0.05 level, except the one and three year lag value of real GDP. Only the coefficients of this value can be explained on average term so that have an impact on the current growth in real GDP. Thus, a 1% growth in real GDP of the past one and three years on average increases the growth in real GDP by 0.4% and 0.65% respectively.

Table 5.6B. VAR Estimation of Coefficient for Bivariate Model

Dependent Variable: GRRGDP
Method: Least Squares
Sample (adjusted): 5 40
Included observations: 36 after adjustments
GRRGDP = C(1)*GRRGDP(-1) + C(2)*GRRTR(-1) + C(3)*GRRGDP(-2) + C(4)*GRRTR(-2) + C(5)*GRRGDP (-3) + C(6)*GRRTR(-3) + C(7)

GRRGDP	Coefficients	t-prob
GRRGDP(-1)	0.3980	0.0437*
GRRTR(-1)	-0.0233	0.7662
GRRGDP(-2)	-0.3066	0.1283
GRRTR(-2)	0.0141	0.8581
GRRGDP(-3)	0.6192	0.0023*
GRRTR(-3)	-0.0982	0.2110
CONSTANT	2.7158	0.0659**

Source: own computation
*Note: * and ** indicates statistical significance at 5% and 10%.*

R-squared	0.358270	Mean dependent variable	5.424255
Adjusted R-squared	0.225498	S.D. dependent variable	6.040573
S.E. of regression	5.316053	Akaike info criterion	6.352005
Sum squared residual	819.5523	Schwarz criterion	6.659912
Log likelihood	-107.3361	Hannan-Quinn criteria	6.459473
F-statistic	2.698390	Durbin-Watson stat	2.041301
Prob(F-statistic)	0.033180		

Assessing, the statistical significance of two coefficient should be done in order to clearly say wheather two independent variables at a given lag length are jointly significant or not. To do this Wald test of coefficient restriction is examined.

Table 5.6C. Wald Coefficient Restriction

Wald-coefficient restriction	Year effect	Prob (chi2)
C(1)=c(2)=0	1	0.0626**
C(3)=c(4)=0	2	0.2114
C(5)=c(6)=0	3	0.0035*

Source: own computation

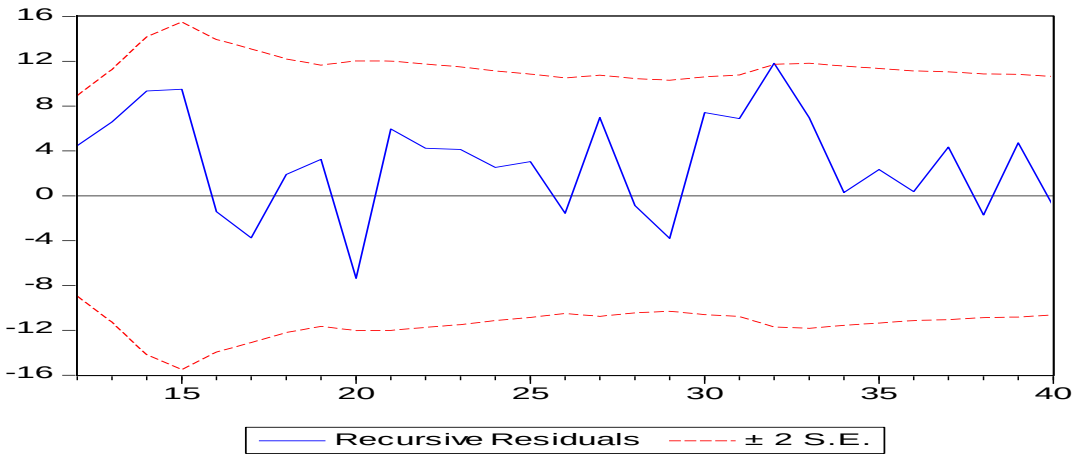
*Note: * and ** indicates statistical significance at 5% and 10%.*

The Wald coefficient restriction provided that the joint significance of variable at a given year for this study. Meanwhile, the growth in real GDP and TR at lagged year one

and three jointly affect economic growth for the period under investigation. Meaning, a 1% growth in past one year real GDP and real total revenue induce current year real GDP growth by 0.06%, and a 1% growth in the past three year real GDP and real total revenue induce current year real GDP growth by 0.003%. However, in both cases the impact remains weak.

Besides, the model can be verified by its ability to justify that the coefficients of the model are stable over a sample interval, otherwise, a shift from one regression scheme to another cannot be located easily. Figure 5.2 shows the parameter stability test for bivariate model.

Figure 5.2. Parameter Stability Test for Bivariate Model-VAR: Recursive Estimates (OLS only)



Source: EViews version 6 using NBE data

Therefore, according to the above figure, the plot bounds within the plus and minus 2 standard errors. Thus the test shows that the parameters are stable over the period under investigation.

Likewise, the bivariate system diagnostic test of residuals show that the model has desirable properties of OLS. Residual test of normality, serial correlation LM test and heteroskedasticity test is conducted and the result is presented under ANNEX 2.

In nutshell, while identifying wheather total tax revenue encourage or discourage economic growth in Ethiopia, in the long run the growth in total tax revenue has a positive impact on economic growth.

5.4.2.1. LONG RUN CAUSALITY FOR BIVARIATE MODEL (VAR)

Only if the analysis of bivariate system make sense when granger causality test is examined for the bivariate system in order to infer the direction of causation between two variables. The following table shows Granger causality test for total tax revenue and economic growth in Ethiopia.

Table 5.7. Pairwise Granger Causality Test for Bivariate Model

Pairwise Granger Causality Tests

Sample: 1 40

Lags: 3

Null Hypothesis:	Obs	F-Statistic	Prob.
GRRTR does not Granger Cause GRRGDP	36	0.61415	0.6114
GRRGDP does not Granger Cause GRRTR		0.81930	0.4938

Source: EViews version 6 using NBE data

The result from Table 5.7 shows that there is no causality between total tax revenue growth and economic growth in Ethiopia. In an empirical sense the null cannot be rejected since the p-values are not significant i.e., greater than 0.05 level. Therefore in the long run the granger causality test between total revenue growth and economic growth suggest independence, meaning the set of growth in real total revenue and growth in real GDP coefficients are not statistically significant in both cases.

It can be explained as, in Ethiopia for the period under investigation growth decisions has been made in isolation with revenue/taxation. Therefore, in the long run for Ethiopia neither the "*Tax-Grow*", "*Grow-Tax*" nor the "*fiscal synchronization*" hypothesis holds. It

implies that growth decisions are made in isolation from growth in government tax revenue. This, could be accounted among others the reason for the dampening budgets deficit due to misallocation of tax revenue to recurrent expenditure.

The result is consistent with the findings in United States and Zimbabwe. According to, Baghestani and McNown (1994) the finding in US support the institutional separation hypothesis. Also for Zimbabwe independence was found by Dzingirai and Tambudazai (2014). Therefore, the strong or weak growth performance does not boost or hamper the revenue collection, since there was no causal relationship between revenue and growth in Ethiopia for the period 1974/75-2013/14.

5.5. THE SHORT RUN VECTOR ERROR CORRECTION MODEL (VECM)

If two series are integrated of order one, i.e., I (1) we could model their relationship by taking first difference of each series and including the difference in VAR. From the johansen test of cointegration of Table 5.3A and 5.3B, we know that there exists a long-term equilibrium relationship between both components of tax revenue and total tax revenue with real GDP, so we can apply VECM in order to evaluate the short run properties of cointegrated series. The trace and maximum eigenvalue test provides that one linearly independent combinations of the non-stationary variables will be stationary.

5.5.1. TRIVARIATE MODEL

First estimating the short run impact of components of tax revenue, i.e., growth in real tax and non-tax revenue on growth in real GDP is done. In the estimation of the dynamic short-run model, a three period autoregressive distributed lag as determined by the information criterion and imposed on all variables. Table 5.8A shows the parameters coefficient estimation of ECM.

The result from the following table shows that, in the short run only the two period lagged value of growth in real GDP is significant in affecting current growth in real GDP. None of the components of tax revenue got statistical significance in affecting growth in real GDP. Thus, the impact on real GDP can be explained on average in the short run as, a 1% growth in real GDP of the lagged two year decreases the current economic growth by

0.52%; as seen from the long run time trend the negative sign show that as time passes on inflation restrain the real sector activities in the short run and hamper the growth trajectory. All other variables become insignificant in affecting growth in real GDP in the short run for the trivariate model.

Table. 5.8A VECM for Trivariate Model

Dependent Variable: D (GRRGDP)
Method: Least Squares
Sample (adjusted): 6 40
Included observations: 35 after adjustments
D(GRRGDP)=C(1)*(GRRGDP(-1) + 1.01351590018*GRRT$_x$R(-1) + 0.112073271853*GRRNTR(-1) – 0.601685328665*@TREND(1) - 0.216836592168) + C(2)*D(GRRGDP(-1)) + C(3)*D(GRRGDP(-2)) + C(4)*D(GRRGDP(-3)) + C(5)*D(GRRT$_x$R(-1)) + C(6)*D(GRRT$_x$R(-2)) + C(7)*D(GRRT$_x$R(-3)) + C(8)*D(GRRNTR(-1)) + C(9)*D(GRRNTR(-2)) + C(10)*D(GRRNTR(-3)) + C(11)

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-0.274418	0.108056	-2.539584	0.0180*
C(2)	-0.270230	0.265143	-1.019188	0.3183
C(3)	-0.524540	0.220262	-2.381437	0.0255*
C(4)	-0.031326	0.238134	-0.131550	0.8964
C(5)	0.145824	0.097506	1.495543	0.1478
C(6)	0.104809	0.089121	1.176033	0.2511
C(7)	0.105295	0.078883	1.334838	0.1945
C(8)	0.026343	0.037140	0.709309	0.4850
C(9)	0.067969	0.042773	1.589065	0.1251
C(10)	0.034469	0.034710	0.993082	0.3306
C(11)	0.332002	0.944603	0.351473	0.7283

R-squared	0.607501	Mean dependent variable	0.191259
Adjusted R-squared	0.443960	S.D. dependent variable	7.274962
S.E. of regression	5.424800	Akaike info criterion	6.471116
Sum squared residual	706.2830	Schwarz criterion	6.959940
Log likelihood	-102.2445	Hannan-Quinn criterion	6.639858
F-statistic	3.714668	Durbin-Watson stat	2.049271
Prob(F-statistic)	0.004072		

Source: EViews version 6 using NBE data

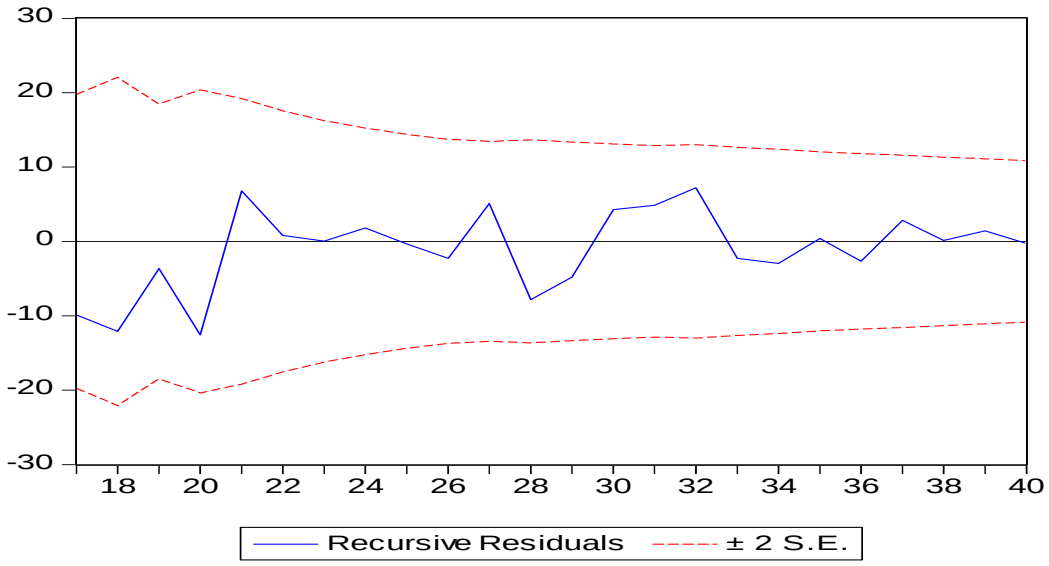
*Note: * indicate level of significance at 5%.*

The speed of adjustment or the error correction term (ECT) in the trivariate setting from the above model is represented by c (1) and come up with the expected sign and level of significance. In an empirical sense, it implies 27% of the disturbance in the short run is corrected each year or it adjust any disequilibrium towards long run equilibrium state. Vis-

à-vis about the model, the coefficient of determination (R^2), indicates 60% of the growth in real GDP is explained by the variables included in the regression. Moreover, the overall significance of (F-test) established all variables are jointly significant.

Similarly, in order to strength our analysis, the stability of the estimated parameters in the model is examined using stability test of Recursive residuals. The following figure affirms that the coefficients of the model are stable over a sample interval.

Figure 5.3. Parameter Stability Test for Trivariate Model-VECM: Recursive Estimates (OLS only)



Source: EViews version 6 using NBE data.

Likewise, the trivariate system diagnostic test of residuals is examined and it shows that the model has desirable properties of OLS. Residual test of normality, serial correlation LM test and heteroskedasticity test is conducted. The result of heteroskedasticity test of the residuals also does not show evidence for autoregressive conditional heteroskedastic errors. This indeed is not surprising, since heteroskedasticity is not much problem in time series (Green14, 1997), the result is presented under ANNEX 3.

5.5.1.1. SHORT RUN CAUSALITY FOR TRIVARIATE MODEL

Only if, the error correction term has negative sign and got statistical significance that we can test the short run causality between components of tax revenue and economic growth. To examine the short run causality we use the technique of Wald coefficient restriction. Table 5.8B shows the result of the tests.

Table 5.8B. Joint F-Test for Trivariate Model

Wald-coefficient restriction	Year effect	Prob (chi2)
C(5)=c(6)=0	1 and 2	0.3132
C(6)=c(7)=0	2 and 3	0.3628
C(8)=c(9)=0	1 and 2	0.2265
C(9)=c(10)=0	2 and 3	0.2637

Source: own computation, EViews version 6 using NBE data

The result of Table 5.8B shows wheather independent variables jointly has short run causality or not. Meanwhile, the null can't be rejected at 0.05 level; meaning there is no short run causality running from the components of tax revenue to real GDP growth in the short run.

5.5.2. BIVARIATE MODEL

In the bivariate form the short run impact of growth in total tax revenue on economic growth in real term is examined using VECM. The following table shows the parameters coefficient estimation of error correction model.

Table. 5.9A. VECM for Bivariate Model

Dependent Variable: D(GRRGDP)
Method: Least Squares
Sample (adjusted): 6 40
Included observations: 35 after adjustments
D(GRRGDP) = C(1)*(GRRGDP(-1) + 3.75309944302*GRRTR(-1) -0.810508841486*@TREND(1) - 13.1653772192) + C(2)*D(GRRGDP(-1)) + C(3)*D(GRRGDP(-2)) + C(4)*D(GRRGDP(-3)) + C(5)*D(GRRTR(-1))+ C(6)*D(GRRTR (-2)) + C(7)*D(GRRTR(-3)) + C(8)

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-0.069438	0.032003	-2.169748	0.0390*
C(2)	-0.456653	0.223450	-2.043651	0.0509*
C(3)	-0.748878	0.193430	-3.871577	0.0006*
C(4)	-0.132123	0.216198	-0.611119	0.5462
C(5)	0.175381	0.101953	1.720221	0.0968**
C(6)	0.190254	0.096094	1.979880	0.0580**
C(7)	0.106422	0.082879	1.284065	0.2100
C(8)	0.521821	0.925198	0.564011	0.5774

R-squared	0.562850	Mean dependent variable	0.191259
Adjusted R-squared	0.449514	S.D. dependent variable	7.274962
S.E. of regression	5.397638	Akaike info criterion	6.407432
Sum squared residual	786.6315	Schwarz criterion	6.762940
Log likelihood	-104.1301	Hannan-Quinn criterion.	6.530153
F-statistic	4.966233	Durbin-Watson stat	2.096358
Prob(F-statistic)	0.001044		

Source: EViews version 6 using NBE data
*Note: * and ** indicates level of significance at 5% and 10%.*

The result from the above table shows that, in the short run the one and two year lagged value of the growth in real GDP got statistical significance in influencing the current growth in real GDP. Likewise, the one and two year lagged value of growth in real total tax revenue too. Thus, the impact on the current real GDP growth can be explained on average, a 1% growth in real GDP of the lagged one and two year decreases the current economic growth by 0.45% and 0.74%; it is expected from the long run time trend negative sign that as time passes on inflation restrain the real sector activities. Also, a 1% increase in one and two year lagged value of growth in real total tax revenue increases the current economic growth by 0.17% and 0.19% respectively. Thus, it can be evident that in the short run too, growth in total tax revenue encourage economic growth in Ethiopia.

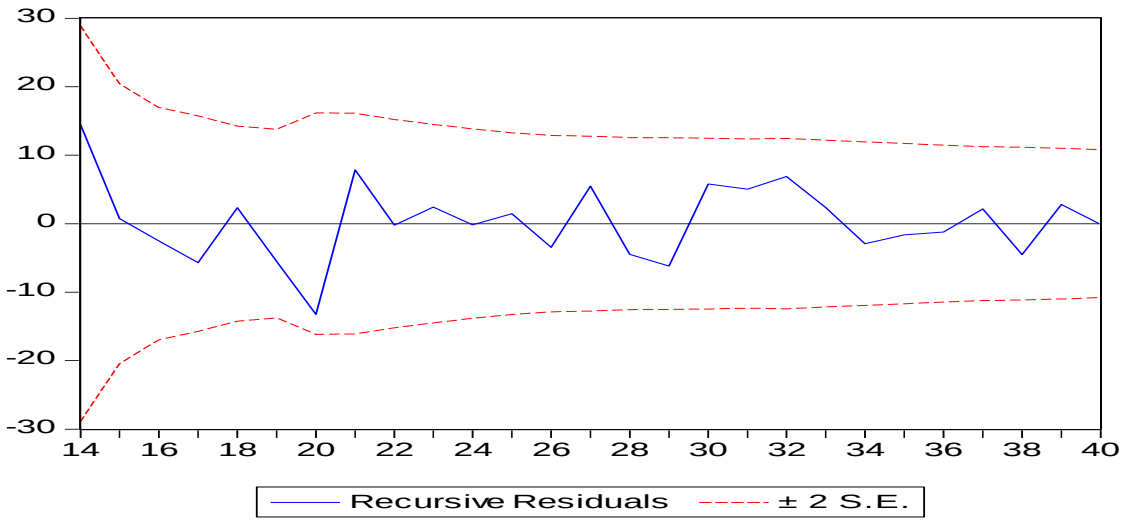
The speed of adjustment or the error correction term in the bivariate setting from the above model is represented by c (1) and come up with the expected sign and level of

significance. In an empirical sense, it implies 7% of the disturbance in the short run is corrected each year or it adjust any disequilibrium towards long run equilibrium state. The slow speed of adjustment could be related to the revenue generation within the economy has been bedeviled by the narrow base of the economy, low-income levels, dominance of the primary sector, low monetization and urbanization. These constrained the federal government from generating and increasing its revenue from taxes.

Vis-à-vis about the model, the coefficient of determination (R^2), indicates 56% variation in the growth in real GDP is explained by the independent variable included in the regression. Though, it's lower than the conventional 60% it can be taken as granted. Moreover, the overall significance of (F-test) established all variables are jointly significant.

Similarly, in order to strength our analysis the stability of the estimated parameters in the model is examined using stability test of Recursive residuals. The following figure affirms that the coefficients of the model are stable over a sample interval.

Figure 5.4. Parameter Stability Test for Bivariate Model-VECM: Recursive Estimates (OLS only)



Source: EViews version 6 using NBE data

Likewise, the bivariate system diagnostic test of residuals is examined and it shows that the model has desirable properties of OLS. Residual test of normality, serial correlation LM test and heteroskedasticity test is conducted. The result of heteroskedasticity test of the residuals also does not show evidence for autoregressive conditional heteroskedastic errors. This indeed is not surprising, since heteroskedasticity is not much problem in time series, the result is presented under ANNEX 4.

5.5.2.1. SHORT RUN CAUSALITY FOR BIVARIATE MODEL

Again only if, the error correction term has negative sign and got statistical significance that we can test the short run causality between growth in total tax revenue growth and economic growth. To examine the short run causality we use the Wald coefficient technique. Table 5.8B shows the result of the tests.

Table 5.9B. Joint F-Test for Bivariate Model

Wald-coefficient restriction	Year effect	Prob (chi2)
C(5)=c(6)=0	1 and 2	0.1224
C(6)=c(7)=0	2 and 3	0.1402

Source: own computation, EViews version 6 using NBE data.

The result of Table 5.9B shows wheather independent variables jointly has short run causality or not. Meanwhile, the null can't be rejected at 0.05 level; meaning there is no short run causality running from the total revenue to real GDP growth in the short run for Ethiopia.

5.6. GOVERNENT TAX REFORM AND ECONOMIC GROWTH

The high rate of sustainable economic growth needs huge investment on physical infrastructure and other social goods and services. While, Ethiopia could not maintain a positive fiscal stance over the period under investigation. This means the country resource capacity of tax revenue is low to finance the capital accumulation effort, hence most of the time the country were forced to depend on foreign sources to finance economic growth efforts. But, literatures has shown that dependence on foreign source has not led to economic growth over a long period of time.

Therefore, tax reform in Ethiopia as a fiscal instrument to reduce dependence on foreign sources are the need of the time for sustainable economic growth for the period under investigation. Literatures provide the evolution of tax revenue and its structure in Ethiopia is related to the government formation in the country. Emperor Hailesilasie ll, was the pioneer to adopt modern tax system and the government was dependent on international trade. Under the military regime (1974-91), the policy enacted tax lows consistent with its socialist economic policy. In this regime all privately owned firms has been nationalized, thus the source of government revenue shifted from tax to the surplus transferred from nationalized firms and other transfers from rural areas through the agricultural marketing board. The importance of tax revenue as such was significantly reduced. The end of the hard control regime in 1991 witnessed the shift from central planning to market oriented system. Since 1992, government introduce tax reform with a view to improve tax revenue collection because fiscal deficit necessitated.

According to Geda and Shimeles (2005) general liberalization extended, among other things to reform in taxation and tax administration. The government scaled up the previous revenue commission to the level of a ministry and rationalized its activity through recruitment of skilled personnel and training of the ministry's staff. The government has also enacted a number of proclamations aimed at reforming the income tax, taxes on goods and services, and tax on international trade. In line with the liberalization drive, the government not only reduced the average level of tax and tariffs but also made the move to focus more on the value-added. This was augmented by an effort to introduce

information technology to increase the efficiency of tax administration. Though it is too early to evaluate the effect of these reforms, the overall result shows that tax revenue is increased over the recent past. International institutes such as the World Bank have begun to refer Ethiopia as one of the highly taxed economies of the region.

Accordingly, wheather tax reform in Ethiopia has a positive impact on economic growth is investigated using Dummy variable with in a VECM environment. Based on the above measures taken in the country year 2003/04, among others witnessed the scaling up of previous tax reforms, introduction of VAT and foreign trade tariff brought down is taken to compare and contrast wheather tax reform has a positive and significant impact on economic growth. The following table provides the result on tax reform and economic growth in Ethiopia.

The result on the following table shows that, tax reform in Ethiopia has a positive and significant impact on economic growth. In addition it can be evident from the result that the c (1) or ECT come up with the correct sign and it can be explained as 109% of the disturbance in the short run is corrected each year. In contrast with to the amount of changes in real GDP to bring the system back to equilibrium before dummy inculcated (i.e., with 7% speed of adjustment) it could be inferred that tax reform remove large percentage of disequilibrium each year.

Hence, we can explain a 1% growth in real total tax revenue after tax reform on average increase real GDP growth by 6.7%. Thus it can be concluded that tax reform makes the contribution of growth in tax revenue very important for economic growth in real terms.

Table 5.10. Tax Reform and Economic Growth

Dependent Variable: D(GRRGDP)
Method: Least Squares
Sample (adjusted): 6 40
Included observations: 35 after adjustments
D(GRRGDP) = C(1)*(GRRGDP(-1) + 0.161859712536*GRRTR(-1) - 0.115596733631*@TREND(1)-3.84938425145) + C(2)*D(GRRGDP(-1)) + C(3)*D(GRRTR(-1)) + C(4)*D(GRRGDP(-2)) + C(5)*D(GRRTR(-2)) + C(6)*D(GRRGDP(-3)) + C(7)*D(GRRTR(-3)) + C(8) + C(9)*DUMMY

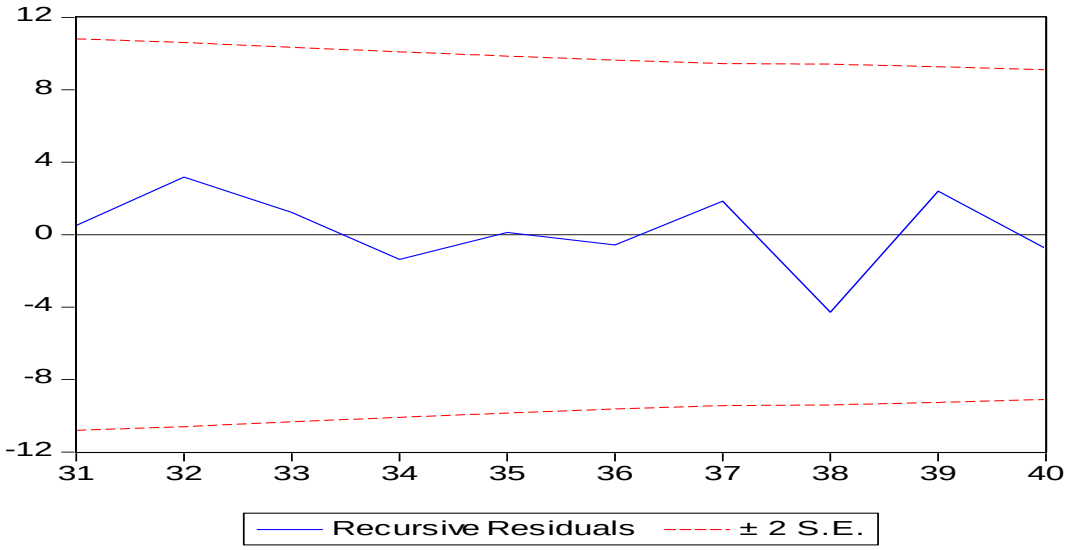
	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-1.092154	0.260481	-4.192841	0.0003*
C(2)	0.264926	0.272305	0.972902	0.3396
C(3)	0.118847	0.064394	1.845633	0.0764**
C(4)	-0.278396	0.203552	-1.367691	0.1831
C(5)	0.161438	0.067714	2.384103	0.0247*
C(6)	0.052866	0.188522	0.280422	0.7814
C(7)	0.091345	0.061649	1.481683	0.1504
C(8)	-1.975807	1.049873	-1.881948	0.0711**
C(9)	6.751703	2.054334	3.286566	0.0029*

Source: EViews version 6 using NBE data
*Note: * and ** indicates level of significance at 5% and 10%.*

R-squared	0.701017	Mean dependent variable	0.191259
Adjusted R-squared	0.609022	S.D. dependent variable	7.274962
S.E. of regression	4.548903	Akaike info criterion	6.084684
Sum squared residual	538.0055	Schwarz criterion	6.484630
Log likelihood	-97.48196	Hannan-Quinn criterion.	6.222745
F-statistic	7.620187	Durbin-Watson stat	2.218387
Prob(F-statistic)	0.000032		

Moreover, in order to strength our analysis the stability of the estimated parameters in the model is examined using stability test of Recursive residuals. The following figure affirms that the coefficients of the model are stable over a sample interval.

Figure 5.5. Parameter Stability Test for Bivariate Model Using Dummy-VECM: Recursive Estimates (OLS only)



Source: EViews version 6 using NBE data

Likewise, the bivariate system diagnostic test of residuals is examined and it shows that the model has desirable properties of OLS. Residual test of normality, serial correlation LM test and heteroskedasticity test is conducted. The result of heteroskedasticity test of the residuals also does not show evidence for autoregressive conditional heteroskedastic errors. This indeed is not surprising, since heteroskedasticity is not much problem in time series, the result is presented under ANNEX 5.

CHAPTER SIX

CONCLUSION AND RECOMENDATIONS

6.1. CONCLUSION

This research attempts to determine the role of government taxation revenue growth in fostering economic growth and the causal relationship both at component and aggregate level with economic growth in the long run and short run for Ethiopia. To capture this, time series macroeconomic data were culled from 1974/75-2013/14. In fact it was worthwhile to conduct an empirical test to observe the time related nature of the relationship between revenue collection and growth in order to see the direction of movement of these so called two potent components of government fiscal policy. The determination of the causal ordering between these two macroeconomic aggregates is crucial to ensure a sharpening of tax policy and the effectiveness of fund management for expenditure and poverty eradication (Taha and Loganathan, 2008).

The econometric analysis, using Johansen test of co-integration affirmed that a long run relationship exists between the explanatory and explained variable both in trivariate and bivariate system.

In the long run, the trivariate form of model estimation reveals both growth in tax and non-tax revenue encourage economic growth though in most cases doesn't got statistical significance. Furthermore, the granger causality test reveals causal relationship exists only between growth in tax and non-tax revenue not, with economic growth in real terms exist. Hence, there is only long run bi-directional causal relationship exist in components of tax revenue growth.

The bivariate system also reveals that, growth in total revenue has a positive impact on economic growth. Meaning, growth in government revenue encourage the growth in economic growth in real terms. However, looking at the causal relationship between government revenue growth and economic growth the result affirms, there is no causal relationship between government revenue growth and economic growth for the period

1974/75-2014/15 in Ethiopia. Besides, the model ability in maintaining hypothesis that the coefficients of the model are stable over a sample interval is verified.

In the short run, for the trivariate model only the two period lagged value of growth in real GDP got statistical significance in influencing the current economic growth. The estimated short run joint F-test for causal relationship also fails to infer causal relationship between the components of government tax revenue growth and economic growth in Ethiopia for the period under investigation. However, the speed of adjustment is slow implying that it takes long time for growth in real GDP to move back to its equilibrium once it drifts away from its long run equilibrium value.

The bivariate system tells most of the variables got statistical significance in influencing the short term economic growth. In addition, like the trivariate form the joint F-test fails to infer any causal relationship between growth in real total revenue and economic growth in Ethiopia for the period under investigation. Besides, the model ability in maintaining hypothesis that the coefficients of the model are stable over a sample interval is verified.

While looking at the relationship between government revenue growth and economic growth in Ethiopia after tax reform periods, the result confirmed that reforming the tax system and structure catalyzes the trajectory of economic growth. More than supported by the variables statistical significance, in terms of the impact of growth in total revenue on economic growth the speed of adjustment for the post-reform period's exhibits very great importance. Hence, the following policy recommendations is forwarded to improve the nexus in government tax revenue growth and economic growth for Ethiopia.

6.2. RECOMENDATION

The findings of the study tells that taxation both with its component and in gross term though found to be insignificant most of the time affect economic growth in Ethiopia. Thus based on the detail analysis of the nexus between macroeconomic variables the study forward the following policy implications;

- Government revenue growth including its component have insignificant effect on economic growth in the trivariate and bivariate system for long run and short run most of the time. It should be noted that improvement in government revenue generation is not productive and buoyant enough to influence economic growth as expected. Therefore, fiscal institutions must build the principle of good governance in administering the revenue generated from the economy.
- The long run and short run result do not provide strong evidence that government revenue growth has been beneficial for economic growth in Ethiopia, but this may be because of the narrow tax base. Thus in order to generate the revenue the economy requires government should increase its revenue either by increasing tax base or tax rate and mobilize the resources to growth enhancing sectors.
- The ratio of tax revenue to GDP is very low in Ethiopia even as compared to sub Saharan African economies, and the country never experiences fiscal surplus over the period under investigation. This is attributed to low tax rate, and oftentimes government were seen on bond financing and foreign debt to finance fiscal gap. Therefore optimal tax rate should be the concern of government and decided to finance the budget. For this purpose government can use debt and tax instrument simultaneously.
- The causal analysis in the long run and short run tells independence in Ethiopia. Thus, policymakers should be pro-growth or must direct tax revenue collection towards infrastructure development which will attract private investment and then through the multiplier process will drive growth with a large margin. On the other hand, the result reveals government is not using taxation as fiscal instrument for equitable redistribution and efficient allocation purpose. A policy shift is expected

from the government side to induce the responsiveness between tax revenue and economic growth.

- In the short run dynamics, the disturbance corrected each year has found to be slow in pre-reform periods. This can be attributed with the revenue generation in the economy is bedeviled by the narrow base of the economy, low income level, dominance of primary sector, low monetization and urbanization. Thus, government fiscal measures should concentrate on areas with low distortive tax rate and employ implicit tax to raise revenue.
- Post tax reform periods has shown significant effect on economic growth. However, the concept of optimal taxation should remain the main concern of the country and planners are expected to deal with unobserved heterogeneity among taxpayers while reforming the tax system of a country.
- There are several ways to extend this paper. Since the impact of fiscal policy on economic growth is unmitigated debate, it could be possible to extend the debate for Ethiopia by examining the correlation fiscal policy (i.e., distortionary revenues, non-distortionary revenues and other revenues) with economic growth, average tax rate and economic growth, and by inculcating control variables to tax revenue (i.e., inflation, population and trade openness) with economic growth.

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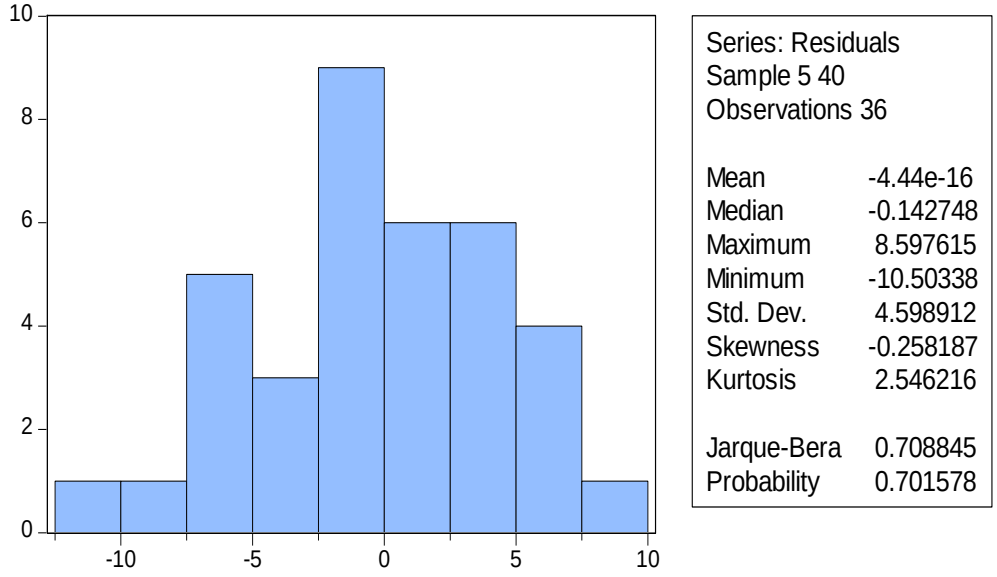
ANNEX

1. The multivariate system diagnostic tests (VAR)

1.1.Residual test of normality



1.2.Serial correlation test

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.193789	Prob. F(3,23)	0.3341
Obs*R-squared	4.850360	Prob. Chi-Square(3)	0.1831

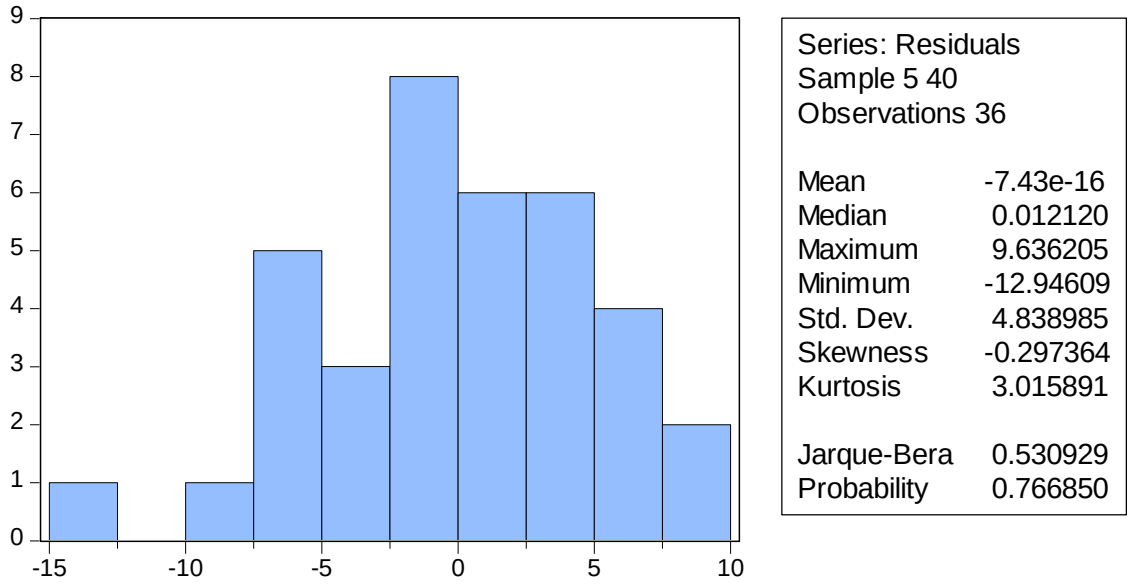
1.3.Heteroskedasticity test

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.940036	Prob. F(9,26)	0.5085
Obs*R-squared	8.838329	Prob. Chi-Square(9)	0.4523
Scaled explained SS	3.564117	Prob. Chi-Square(9)	0.9377

2. The bivariate system diagnostic tests (VAR)

2.1.Residual test of normality



2.2.Serial correlation test

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.836329	Prob. F(3,26)	0.4862
Obs*R-squared	3.168249	Prob. Chi-Square(3)	0.3664

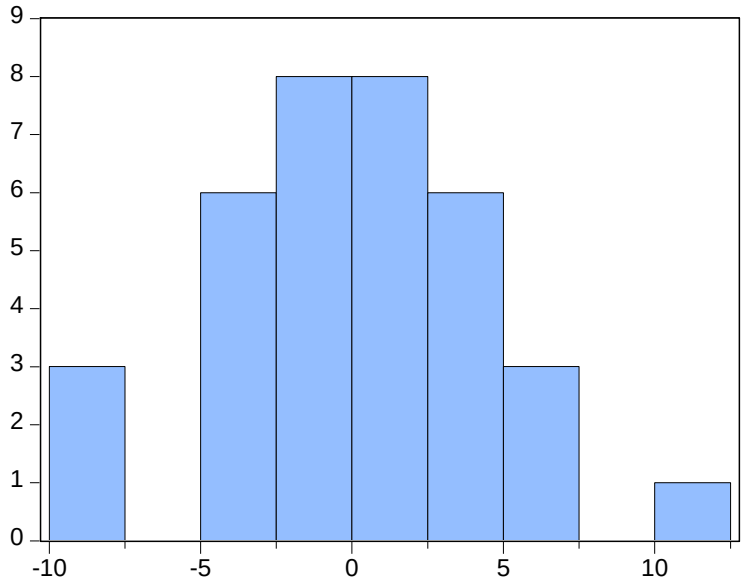
2.3. Heteroskedasticity test

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	1.763048	Prob. F(6,29)	0.1420
Obs*R-squared	9.621899	Prob. Chi-Square(6)	0.1415
Scaled explained SS	6.293452	Prob. Chi-Square(6)	0.3911

3. The Multivariate diagnostic test (VECM)

3.1. Residual test of normality



Series: Residuals	
Sample 6 40	
Observations 35	
Mean	-7.81e-16
Median	0.101719
Maximum	11.12734
Minimum	-9.996989
Std. Dev.	4.557744
Skewness	-0.141963
Kurtosis	3.203520
Jarque-Bera	0.177966
Probability	0.914861

3.2.Serial correlation test

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.867239	Prob. F(3,21)	0.4736
Obs*R-squared	3.858199	Prob. Chi-Square(3)	0.2772

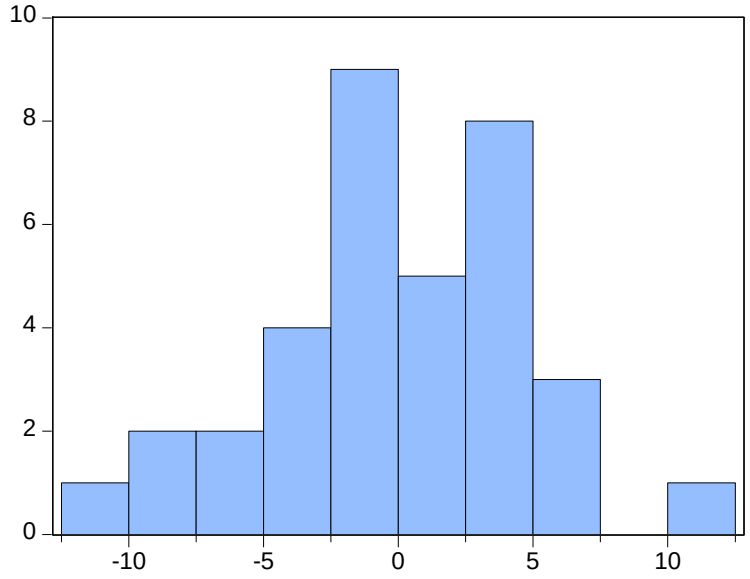
3.3.Heteroskedasticity test

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	4.405694	Prob. F(12,22)	0.0013
Obs*R-squared	24.71528	Prob. Chi-Square(12)	0.0162
Scaled explained SS	12.80380	Prob. Chi-Square(12)	0.3835

4. The bivariate system diagnostic tests (VECM)

4.1.Residual test of normality



Series: Residuals	
Sample 6 40	
Observations 35	
Mean	2.06e-16
Median	-0.092699
Maximum	11.52254
Minimum	-11.52611
Std. Dev.	4.810013
Skewness	-0.192794
Kurtosis	3.167157
Jarque-Bera	0.257570
Probability	0.879163

4.2.Serial correlation test

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.397148	Prob. F(3,24)	0.2679
Obs*R-squared	5.203725	Prob. Chi-Square(3)	0.1575

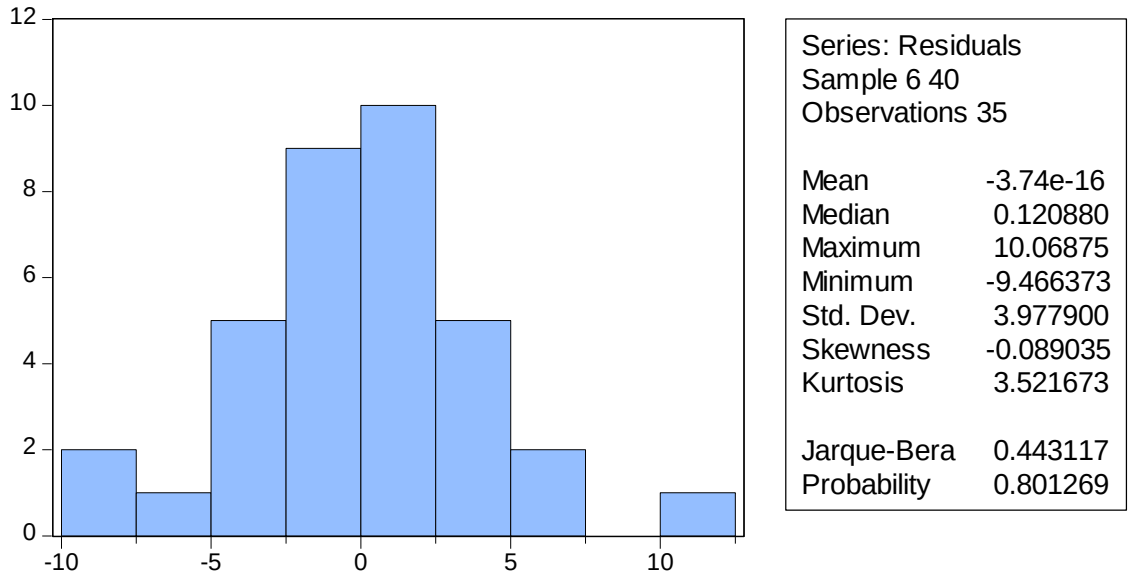
4.3.Heteroskedasticity test

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	3.927570	Prob. F(8,26)	0.0037
Obs*R-squared	19.15202	Prob. Chi-Square(8)	0.0141
Scaled explained SS	12.34998	Prob. Chi-Square(8)	0.1363

5. The bivariate system diagnostic tests using dummy (VECM)

5.1.Residual test of normality



5.2.Serial correlation test

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.576430	Prob. F(3,23)	0.2222
Obs*R-squared	5.969325	Prob. Chi-Square(3)	0.1131

5.3.Heteroskedasticity test

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	3.429502	Prob. F(9,25)	0.0071
Obs*R-squared	19.33739	Prob. Chi-Square(9)	0.0225
Scaled explained SS	13.45449	Prob. Chi-Square(9)	0.1431

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