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COLLGE OF BUSINESS AND ECONOMICS

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Tax and Government Revenue: in Ethiopia

By: Abdulbasit Yassin Nuro

October, 2019

Wolkite, Ethiopia

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This is to certify that the thesis prepared by Abdulbasit Yassin Nuro, entitled: The Tax and Government Revenue in Ethiopia: Submitted in partial fulfillment of the requirements for the Degree of Master of Science in development economics complies with the regulations of the University and meets the accepted standards with respect to originality and quality.

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Table of Contents **Page**

List of Tables

List of Figures

Lists of Abbreviation and Acronym

AIC	Akaike Information Criterion
Br	Birr
CV	Critical value
EPRDF	Ethiopian Peoples' Revolutionary Democratic Front
ERCA	Ethiopian Revenues and Customs Authority
FAD	Fiscal Affairs Department
GATT	General Agreement on Tariffs and Trade
GDP	Gross Domestic Product
GR	Government revenue
GST	Goods and service tax
GTP	Growth and Transformation Plan
HQ	Hannan-Quinn Information Criterion
IBFD	International Bureau of Fiscal Documentation
I (D)	Integrated difference
I (0)	Integrated at order of level
I (1)	Integrated at first order
IGAs	Income Generating Activities
IMF	International Monetary Fund
IPT	Income and profit tax
IRS	Internal Revenue Service
ITT	International trade tax
LR	likelihood ratio
MFA	Ministry of Federal Affairs
MoFED	Ministry of Finance and Economic Development
NTR	none tax revenue
OECD	Organization for Economic Cooperation and Development
OLS	Ordinary least square

PRSP	Poverty Reduction Strategic Program
SC	Schwarz Information Criterion
SDPRP	Sustainable Development and Poverty Reduction Program
SIGTAS	Standard Integrated Government Tax Administration System
SNNPRS	Southern Nations, Nationalities, and Peoples' Regional State
TIN	Tax Identification Number
TR	Tax revenue
VAT	Value Added Tax
VECM	Vector error correction model
WTO	World Trade Organization

Abstract

This study investigated both theoretically and empirically economic impacts of tax and tax reform on government revenue growth in Ethiopia using time series data from the time of its inception 1974 to 2016.

Both descriptive statistics and econometric tools of error correction model (ECM) to analyzing the long run and short run relationships on components of tax, tax reform and government revenue growth.

The results show that tax revenue and tax reform variables of goods and service tax (GST), international trade tax (ITT) have positive and significant impacts on government revenue growth in the long run and short run analysis, whereas profit and income tax (IPT) and non-tax revenue (NTR) have positive impacts and insignificant on government revenue growth.

Keywords: Government revenue growth, Influences of major taxes and tax reform, Time Series analysis, Ethiopia Federal Government.

Chapter One: Introduction

1.1 Background of the study

Tax is an involuntary levy on the citizens and a policy tool for the government that helps to mobilize revenue to provide goods and services to the public, which are necessary for the society. By collecting tax, the government finances its mega projects, which are important to accelerate the economic while minimizing wealth distribution inequalities. Economic growth is the increase in a country's productive capacity, as measured by comparing the gross national product (GNP) in a year with the GNP in the previous year (Mulalem, 2017).

Ethiopia has achieved a remarkable socio-economic and human development results by implementing blueprints called Sustainable Development and Poverty Reduction Program (SDPRP), Plan for Accelerated and Sustained Development to End Poverty (PASDEP) and Growth and Transformation Plan I since 2002. Taxation in developing countries is a strategic tool of the highest order. It makes it possible to finance the provision of public goods such as infrastructure, education, health and justice, which are essential for growth. However, beyond that, taxation affects individual savings, work and training decisions; production, job creation, investment and business innovation; as well as the choice of savings instruments and assets by investors (OECD, 2009).

Lauden, 2015 defined "government Revenue" is income of a government receives or all amounts of money (i.e. taxes and/or fees) received from sources outside the government entity (Yohannes, 2013). Nowadays, tax and government revenue practice on the current environment has an ambiguous economic growth in Ethiopia.Hugh Dalton defined Tax is not punitive but compulsory and unreturned transfer of resources from the private to the public sector, levied based on prearranged criteria(António andJuan González, 2008).

According to Kaldore (1963) if a country wants to develop, it requires to collect tax revenue more than other means of financing in developing countries. This is because of taxation is one of the best instruments to boost the potential for public sector performance, to finance the social insurance program and for the repayment of public debt. A country's revenue generation primarily depends upon its sufficient capacity to tax more in both economic and administrative term. It is compulsory revenue transfers to the central government for public purposes, but certain compulsory transfers such as fines, penalties, and most social security contributions are debarred. Refunds and corrections of mistakenly collected tax revenues treated as negative revenue (Belay, 2015).

In Ethiopia, from the time when modern tax system took a root, the 1940‘s, there have been a Number of tax reform. Various taxes have introduced at different times with the principal objectives of enhancing revenue productivity, economic mobilization and financing development plans (Amin, 2010; Delessa, 2014).

In Ethiopia, the government’s fiscal power divided between the federal and state each of which has different tax jurisdictions. For revenue to grow it must change of the structures and tax collecting system indicating that traditional tax revenue has never assumed a strong role in the country’s management of fiscal policy. Government revenues are sources of finances used under different circumstances. Tax is one among them and it is a contribution demanded by the state. Tax is a compulsory levy imposed on the citizens (including their property) by the government for the main purpose of providing infrastructures for economic growth and development. The political, economic and social development of any country depends on the amount of revenue that generated for the provision of infrastructure in that given country. One means of generating the amount of revenue for providing the needed infrastructure is through a well-structured tax reform system. This tax reform system is an avenue for government to collect additional revenue that needed in discharging its immediate obligations (Azuibik, 2009).

The main factors contributing to improved revenue performance are changes in tax legislation, tax administration and minimal tax evasion. (Amin and John, 2010) try to conduct the Impact of Tax Reform on Private Sector in economic development of Ethiopia. Thus and other findings of the modern global adoption of tax reform for government revenue growth discourse achieved significant transformation especially by increasing the tax rate and broadening the tax base of tax reform in Ethiopia. Reforms may also address the issue of equity in the distribution of the tax burden as well as composition of the tax structure. There is, as well, the question of the administrative adequacy of the tax system usually approached within the wider context of political structures and feasibilities (Morrisset and Izquierdo, 1993).

Comparing direct tax, domestic indirect tax and foreign trade tax categories, direct tax shows the tendency of declining contrary to the comprehensive tax reform main objective which gave due attention to increase the share of the direct tax to total revenues.

1.2 Statement of the problem

Ethiopia initiated (establishing a unified national tax system) in 1942-1944 and The major tax reform system (such as introduction of VAT, TIN, SIG TAS, etc) has been taking place by increase in the coverage of tax bases and tax rates owing to the need to raise more revenues to finance and the ever-growing public sector in 2002/2003 (Wogene, 1994).

In the light of this fact in Ethiopia, Revenue Customer Authority (ERCA) to meet its annual revenue targets has necessitated the need to look for avenues that will lead to an increase in government revenue generated by way of taxation. So the role of tax revenue and tax reform determining government revenue growth is not only a main concern of the economic policy makers, tax specialists and administrators but has long been of interest to academics. In this regard, the government of Ethiopia exerts a great effort towards achieving economic prosperity in all aspects. For that matter, financing the development project by taxation and non-taxation means had given due attention. Hence, knowing the relationship between taxation and non-taxation revenue and government revenue growth is mandatory. Since the variables relationship of interdependence of each other's; for this main reason the study conducting to ensure whether there is long run or short run causal relationship between the two variables, where it is important to understand whether the impact is a short run or long run. To the best of this study to meet annual revenue targets of the research has necessitated the need to look for avenues that will lead to an increase in government revenue generated by way of taxation and investigation in economic impacts of tax in general. For best to investigation on major components tax (such as income and profit tax (IPT), goods and service tax (GST) and international trade tax (ITT) and non tax revenue (NTR) with government revenue (GR) growth in Ethiopia. In addition, these call for policy makers to look for ways that help the government to raise more in general tax components of revenue and non-tax revenue to changes in national income growth with the proxy to government revenue GR.

(Workineh, 2014) period ranging from 1975-2013 from his study, implies that the tax revenue of the country is at low level. (Biruk, 2016) during the period 1974/75-2013/14 the relationship between government revenue growth and economic growth investigated for Ethiopia. Alemayehu Geda and Abebe Shimeles December 2005 on their paper attempts to explore the contribution of the tax reform, the changes in its structure and institutional reform in order to understand its role in raising revenue. Thous researchers have tried to examine the tax and government revenue on economic growth and examine in different relationship between taxation and government revenue for economic growth in Ethiopia.

Hence, to best of my knowledge there are no more the same research factor variables and technical analysis of model estimation done on "taxation and government revenue growth and good tax administration in Ethiopia". This study conducted on above related issue giving great attention to make decision on major determinants of tax like direct tax, domestic indirect tax, foreign trade tax and other component of government revenue of non-tax revenue in Ethiopia. Furthermore, this study is an attempt to evaluate the following basic research questions.

- What are economic impacts and contributions of tax and government revenue in Ethiopia?
- What are the long run and short run relationship on major tax and government revenue components (such as income and profit tax (IPT), goods and service tax (GST), international trade tax (ITT) and non-revenue tax) in Ethiopia?
- What are the impacts of tax and government revenue on economic growth in Ethiopia?
- How can we recommend the relationships and impacts of major components of tax and government revenues growth in Ethiopia?

1.3 Objective of the study

1.3.1 The general objective:

- To investigate the impacts and contributions of tax and government revenue in Ethiopia.

1.3.2 The specific objectives:

- To examine the long run and short run relationship on major tax and government revenue components (such as income and profit tax (IPT), goods and service tax (GST), international trade tax (ITT) and non-revenue tax) in Ethiopia.
- To examine the impacts of tax and government revenue on economic growth in Ethiopia.
- To recommend the relationships and impacts of major components of tax and government revenues growth in Ethiopia.

1.4 Hypotheses of the study

Research hypothesis used in the context of the research objectives to bring clarity, specificity and focus to research problem.

- H0: There is no significant relationship between all independent variables on dependent variable at significant level of $\alpha = 0.05$ or 95% CI.
- H1: There is significant relationship between all independent variables on dependent variable of the study.
  - ❖ Decision Rule: Reject H0 if p-value is less than significance level.
  - ❖ Otherwise, do not reject H0, if P-value is greater than α (0.05).
- **Test of Hypothesis 1:**
  - ❖ **Ho:** there is a significant relationship between income and profit tax (IPT) and government revenue Growth in Ethiopia.
  - ❖ From Coefficients in the table of Error correction or short run estimation, reject the null hypothesis that there is a significant relationship between income and profit tax (IPT) and government revenue Growth in Ethiopia.Because the probability value for IPT is 13.47%, which is not significant at 5% level.
- **Test of Hypothesis 2:**
  - ❖ **Ho:** there is a significant relationship between goods and service tax (GST) and government revenue growth in Ethiopia.
  - ❖ We failed to reject the null hypothesis that there is a significant relationship between goods and service tax (GST) and government revenue growth in Ethiopia.Because the probability value for (GST) is 1.76% that is significant at 5%.

Test of Hypothesis 3:

- **Ho:** there is a significant relationship between international trade tax (ITT) and government revenue growth in Ethiopia.
- We failed to reject the null hypothesis that there is a significant relationship between international trade tax (ITT) and government revenue growth in Ethiopia. Because the probability value for ITT is 0.37%, which is significant at 5%.

Test of Hypothesis 4:

- **Ho:** there is a significant relationship between non-tax revenue (NTR) and government revenue growth in Ethiopia.
- We reject the null hypothesis that there is a significant relationship between non-tax revenue (NTR) and government revenue growth in Ethiopia. Because the probability value for NTR is 8.68%, which is not significant at 5%.

1.5 Significance of the Study

This study expected to determine the most significant variables. In addition, it provide feedback to the Ethiopian government in making policy measures to be under taken regarding those determinants and also serves in improving performance of tax collection as well as making future policy recommendations in Ethiopian revenue and customs authority (ERCA). That means it can give an insight about effect of the study variables on government revenue and enables them to give high attention. Finally, the output of this study will also serve as an input for the upcoming researchers further investigate the points under considerations.

1.6 Scope of the study

The Study focuses on tax and government revenue in Ethiopia and all needed time series data have collected based on the registry of 1974/75 to 2016/2017. The reason of using an indicated years, after 2016/2017 there is a few tax reform on component of personal income and profit tax in Ethiopia. Major tax revenue and government revenue components (such as income and profit tax (IPT), goods and service tax (GST) and international trade tax (ITT)) and non-tax revenue (NTR) were select as independent variables and government revenue as dependent variable in this study. The variables selected owing to their ability to influence the level of government revenue growth in Ethiopia.

1.7 Limitation of the study

Even though the researcher used his maximum effort to make the study perfect, there are some limitations, which occurred during the study. Such as lack (shortage) of financial power and insufficient availability of time are common limitations to collect relevant information and data.

1.8 Organization of the research

The paper was classified into five chapters the first chapter provides general introduction about topic understudy, background of the study, statement of the problem, objective of the study, significance of the study, scope of the study ,limitation of study and organization of the paper.

The second chapter outlines the related literature reviews of different Authors about subject matter under study. The third chapter was research design and methodology used. The fourth chapter was main analysis and presentation part. Finally, the fifth chapter sum up all points that are raised in the paper, draw conclusion and render sound recommendation.

Chapter Two: literature review

2 Introduction

The previous chapter presented about the background of the study, statement of the problem, objectives of the study, significance of the study, limitations of the study and scope of the study. Hence, as explained in chapter one in the statement of the problem section, the major components of tax and government revenue creates variation on government revenue growth in the country. Therefore, this chapter related literature reviews of different Authors about subject matter under study.

2.1 Theoretical literature Review

In this part, the researcher tries to define and analyze the concepts of the variables included in the study to give a clue on the concept boundaries of the study and the interaction of the variables.

Taxation: A number of authors have tried to define the term **"tax"** however, it is hard to say that these attempts at coming up with a definition for the term have been successful (mainly owing to the fact that too great precision is attempted in a single sentence). in general terms, tax can be defined as a contribution from individuals out of their private property for the maintenance and defense of government, so that it may perform its functions and the ends of the state be realized (Sisay, 2013).

In simpler terms, "tax" is a financial charge or other levy imposed on an individual or a legal entity by government. To the citizen of the modern state, taxation, however disagreeable it may be, seems natural. It is difficult to realize that it is essentially a recent growth and that it marks a comparatively late stage in the development revenue, and that the taxes of today are different from those of former times; it is still more difficult to perceive that our ideals of justice in taxation change with the alteration in social conditions (Yohannes, 2013).

Taxes are revenue collected by the government to afford public services for the country and finance its daily activities (Bhatia, 2009). The work of Jhingan (2004) shows as the main and most important reasons for taxation are to finance government expenditure and to redistribute wealth for the development of country in general. The tax that is levy directly on personal or corporate income is direct tax and if it levied on the price of a good or service, then it is an indirect tax. According to Shenk and Oldman (2007), indirect taxes of a tax on consumption have long been the heart of taxation in developing countries and it provide two-thirds or more of tax revenues in many countries. Similarly, the author argued as indirect tax is more important instrument for the poorest countries to boost domestic tax revenues on goods and services. Value added tax (VAT) is one of indirect tax that

applied on consumption of goods and services and it is to be charge on the value of imports and on value added on goods and services supplied by Original one business to another till it reaches to final consumers (Bird, 2005).

Tax revenue: does the government through taxation or taxing working individuals gain the income.

Government revenue: The income gained by the government through taxation and Non-tax revenue income that the government makes from sources other than taxes, like bonds or issued profits from state-owned companies. The difference between the two is that one is solely from taxation paid by tax- payers (tax revenue), and the other is generated from items other than regular taxes (non-tax revenue) (Pazhoyan and Jamshid, 2012).

2.1.1 General Goals of Taxation

Taxation, as a major source of government revenue, of course plays a pivotal role in this regard. Without taxation, few governments would be able to meet their responsibilities in providing even basic public services. Few would argue with the observation that taxation helps governments raise revenues for their various activities. Beyond this bare minimum, there is hardly any agreement about why and how governments raise revenues through taxes. In spite of the contentious views about the role of governments, taxation remains one of the most prominent powers and instruments of governments to date. Whatever public policies governments have deemed appropriate as their roles, taxation has often assumed an integral part of that public policy. Developing countries have looked to taxes as engines not just for generating revenues to carry out major public projects but also for stimulating the rate of capital investment in the private sector. Different writers have developed their own versions of roles for governments, and these roles have in many ways shape their views about the goals of taxation. One of the most famous is that of Richard and Peggy Musgrave who drew up three major objectives for government budgetary policy and by extension tax policy, calling them the "allocation function," the "distribution function" and the "stabilization function (TADDESE, 2014).

The "allocation function" determines the proportion of government involvement in the provision of what Richard and Peggy Musgrave called "social goods" or what are more commonly known as "public goods. The "distribution function" of budgetary policy (of which, once again, taxation is an important instrument), determines the distribution of income and wealth in accordance with "what society considers fair or just," which is not usually obtained through the operation of market forces alone. Taxation is one recognized fiscal instrument for redistribution of income and wealth. Richard Bird sees "distribution" as one major objective of tax policy just like Richard and Peggy Musgrave,

but he relegates it to a second-order objective as far as the tax policies of developing countries are concerned (Gupta, 2007).

Unlike the goal of "economic growth," he views the goal of redistribution of income and wealth through taxation as "a luxury poor countries can ill afford." The last, perhaps not the least, goal of taxation may be to play its part in the stabilization of the economy. The third goal of taxation for Richard Bird is not different from that of Richard and Peggy Musgrave. Richard Bird sees some role for taxation in the area of stabilization in which taxation may use to regulate price levels and balance of payments (Bird, Richard, and Eric, 2010).

There are various theory and framework that were used and being discussed by various researchers to see the relationship between tax and government revenue growth as well as economic growth.

Adam Smith considered the father of the scientific taxation theory. He is the most well known classical economist. In his monograph, "An Inquiry into the Nature and Causes of the Wealth of Nations" Adam Smith gave a definition of the taxation system, indicating the main conditions for its formation and putting forward four main taxation principles: equity, determination, convenience and thrift of taxation administration. Accordingly, his four principles are taking as the classists' tax principles. For him, the first principle is justice and equality based on which tax load must fairly divide among people. It depends on taxpayers' affordability and Smith regards proportional tax as rightful tax. The second principle is the specificity and certainty of taxes. Based on this principle, the amount, origin, payment time and method must be accurately determined. The third principle is convenience based on which individuals' relative consent and different facilities considered for taxation. The conditions and means of payment misarrange with the least pressure possible as well. The last principle is about conservation. In tax collection, maximum saving must do and collection costs must be minimized (Dadgar, 1999 and Pazhoyan, 2012).

Optimal tax theory or the theory of optimal taxation is the study of designing and implementing a tax that reduces inefficiency and distortion in the market under given economic constraints. The standard theory of optimal taxation posits that a tax system should choose maximize a social welfare function subject to a set of constraints. Optimal tax theory addresses such questions as should the government use income or commodity taxes. Within commodity taxes, how should tax rates vary across commodities? How progressive should the tax system be? The optimal tax theory helps to integrate the various welfare effects of taxation and points to an "optimal" type of tax, the tax rate differential as well as progressivity. Its adherents have developed a number of economic models to test the various taxes in terms of particularly "equity" and "efficiency" and have provided insights about how

various taxes affects the behavior of taxpayers and the allocation of goods and services. The basic function of the optimal tax theory is purportedly to help governments decide the types and rates of taxes that maximize social welfare once they decide to raise a certain amount of revenues in taxes. Optimal tax theory encompasses a range of models that focus on particular aspects of the tax system. These different models share three features. First, each model specifies a set of feasible taxes for the government, such as commodity taxes, and the government's revenue needs. The models typically rule out lump sum taxes, which would cause no economic distortion. Second, each model specifies how individuals and firms respond to taxes. That is individuals have preferences about goods and leisure; firms have a given technology for producing goods; and individuals and firms interact in a given market structure (often perfect competition). Third, the government has an objective function for evaluating different configurations of taxes. In the simplest models, the government's objective is to minimize the excess burden generated by the tax system while raising a set amount of revenue. The more complicated models balance efficiency considerations with equity concerns. The models that include equity are usually more concerned with vertical equity rather than either horizontal equity or the benefit principle (Slemrod, Joel and Jon Bakija, 2008).

The initiator of the Keynesian taxation theory was John Keynes, who exposed its main principles in his book "The General Theory of Employment, Interest and Money," in which he advocated state interventions in the processes of market economy regulation (Keynes, 1936). According to Keynes, fast economic development must base on a market expansion and an associated increase in consumption. As a result, state interventions has achieved at the level of effective demand. One of the main assumptions in Keynes's theory is [hat economic growth related to monetary savings only in conditions of full-employment. In the contrary case, large amounts of savings hinder economic development as they represent a passive form of income and are not invest in production; as a result, the author suggested that surplus savings must be subtract with the help of taxation. This is why the state must intervene with the purpose of subtracting income savings with the help of taxation in order to finance investments and cover state expenditures. Keynes argue that progressive taxation is necessary and that low tax rates lead to reduced state revenues and as a result contributes to economic instability. That is according to Keynes taxes must play the most important role in the system of state regulation. High taxes stimulate economic activity; influence the stability of the economy and in the context of the economic system act as integrated flexibility mechanisms (Keynes, 2008).

Growth models are fundamentally of two types: the neoclassical growth model, also known as the exogenous growth model developed primarily by Solow (1956) and the new growth theory, also

known as the endogenous growth model, pioneered by Romer (1986), Lucas (1988), Barro (1990), and Rebelo (1991). Economic growth has been emphases as a significant factor in many countries for decades. As a discipline core, economic growth theory was born in the late 1960s. After two decades, growth theory became popular again in the mid-1980s by the emphasis put on the long-run growth, which now called endogenous growth theory. It understood that long-run economic growth is at least as important as short-run fluctuations of growth and in fact, it is even more important than that (King and Rebelo, 1990).

According to the economists supporting 'endogenous growth models' Barro (1990), King and Rebelo (1990), Lucas (1990), Mendoza et al. (1997), Stokey and Rebelo (1995), and Easterly and Rebelo (1993), the share of public expenditure in output or the composition of expenditures and taxation affects the steady state growth rate. Regarding the endogenous growth model, the long-run growth rate depends on the stable environment of business, specifically, government policies and actions on taxation, law and order, provision of infrastructure services, protection of intellectual of property rights, regulation of an international trade, financial markets, and other aspect of the economy. Therefore, the government has also guided long-run growth rate (Barro 1997).

Exogenous growth theory: This theory is also known as neoclassical theory and the opposite of the endogenous growth theory which also known as the new growth theory. Solow model is a theory of exogenous and the pioneer of this theory is Robert Solow (1956). According to Solow (1956), the fiscal policy was not give any impact to the long term economic growth, but it assumes that it was caused by the main factor of production such as labor and technological progress are determined outside the modal (Petru-Ovidiu, 2015).

Endogenous growth rate: Endogenous growth was embraces a diverse body of theoretical and empirical work that emerged in the 1980s (Romer, 1994). This theory predicted that the government expenditure and tax would have both temporary and permanent impact to economic growth (Barro, 1990). The discussion by Barro (1990), Raja, and Rebelo (1990), said that tax will make market distortion and the productive expenditure will give an impact to long-term growth rate. With the development of Information Technology and the movement of endogenous economies towards globalized economies, taxes have also undergone changes and evolutions. Taxes have turned out to be one of the main tenets of election system, which own social, political, and information characteristics except for economic effects. Although the principles cited in the classists' statements and Keynesian theory still prevail and many tax systems are organize based on them, some new principles are added to the previous tax principles.

Table 2.1 View of Tax System Principles from Classists, Keynesians and Modern

Tax System Principles from Keynesians' View	
Principle of personalizing tax	The fair distribution of tax load and difference between various tax bases
Principle of intervention	Augmenting wellbeing and social services system
Principle of income desirability	The fair distribution of income and reduction of consumption tax
Modern Views on Tax System Principles	
Principle of distinguishing where to spend	The specificity of where to spend taxes
Principle of convenience in voluntarily pay tax	Accepting and arranging the voluntary tax payment
Principle of participation	Civil organs and public participation

Source: (King, and Rebelo, 1990)

Moreover, Economic growth is the basis of increased prosperity. Growth comes from the accumulation of capital (both human and physical) and from innovations, which lead to technical progress. Accumulation and innovation raise the productivity of inputs into production and increase the potential level of output. The rate of growth can affected by policy through the effect that taxation has upon economic decisions. An increase in taxation raises government revenue (in both physical and human capital), Research, and Development (R&D). Raises mean increase capital accumulation and innovation and hence there occur high rate of growth. This is the positive aspect of taxation. As provides the means to finance these expenditures and indirectly can contribute to an increase in the growth rate (Gareth, 2007).

2.1.2 History and Over view of the tax and tax reform in Ethiopia

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 II. Before Hailesilassie II, the economic system of Minilik II was known as "Gebar Madria" system in central and southern part of Ethiopia where by 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).

Tax and institutional reform in Ethiopia can trace back to the early 1940s where the Government made tax reforms that include amendment to property taxes. After the change of the socialist government in 1991, there have a wide range of reforms and liberalization measures undertaken by the government including tax reforms (Geda and Shimelis, 2005).

Table 2.2 History of Tax reforms in Ethiopia

No	Years	Reforms
1	1942-1944	Initiated (establishing a unified national tax system)
2	1944-1952	Discretionary changes including amendments to property taxes (land and cattle)
3	1950	Broad-based taxes on goods and services
4	1960	The rate and structure of taxes, especially on income
5	1974-1991	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
6	July 2002	The major tax reform system has been taking place. (such as introduction of VAT, TIN , SIG TAS, etc)

Source: - (Wogene 1994).

The main objective of this study attempts to explore the contribution of the tax revenue and tax reform the changes in its structure and institutional reform in order to understand its role in raising revenue. Better investigation in tax revenue and tax reform generates well government revenue growth as well as requires strong economic decisions and good tax administration. Hence, it conducted on above related issue giving great attention to make decision on major tax revenue and tax reform variables like income and profit tax (IPT), goods and service tax (GST), international trade tax (ITT) and other component of government revenue of non-tax revenue (NTR) in Ethiopia. The main reason for Ethiopian Tax Reform of 2002 is in 1992/93, the Government of Ethiopia has made a major economic policy shift from Central Planning to market oriented economic system. In line with this change, a series of tariff and tax reform measures have been takes. The reasons to these were outdated tariff and tax laws; weak customs and tax administration; failure of the tariff and tax regime to attract investment, to facilitate trade and to generate adequate revenue to cover current and capital expenditure, and hence finance development and poverty reducing projects (Belew, 2001).

Ethiopia's standard VAT rate of 15% and 10% equalization for services and 2% for goods have to studied in the medium term whether or not they could broaden the tax base and register high revenue performance. If government purchases of expenditure G exceed net tax revenue T, the deficit (G – T) borrowed from the financial markets from framework relationship. Moreover, if net tax revenue T exceeds government purchases of expenditure G, the government surplus flows to the markets. As imports and exports; if imports exceed exports, the deficit with the rest of the world (M–X) is borrowing from the rest of the world. Since, the budget deficit of the Ethiopian Government was not stable from 1990-2002. Ratio of budget deficit to revenues declined from a high of 57 percent after the fall of Derg in 1991 to 7.6 percent lowest in 1992. During the Current Government (Ethiopian People's Revolutionary Democratic Front (EPRDF)), the lowest budget deficit 7.6 percent in1992 rose to 40 percent in 1999/2000 when the war broke out with neighbor Eritrean government (see Table - 2).

Table 2.3 Ethiopian Budgetary revenues, expenditures and Deficit

Year	Total Revenue	Government Expenditure	Deficit	Ratio of Budget deficit to Revenues
1990/91	2,706.30	3,640.33	-934.03	34.5%
1991/92	2,742.40	3,253.61	-511.21	18.6%
1992/93	3,191.23	3,434.47	-243.24	7.6%
1993/94	3,938.90	4,399.66	-460.76	11.7%
1994/95	5,912.79	5,215.47	-697.32	11.8%
1995/96	6,966.16	5,582.17	-1383.99	19.9%
1996/97	7,885.63	5,750.40	-2135.23	27.1%
1997/98	8,381.35	7,190.52	-1190.83	14.2%
1998/99	9,550.51	10,533.06	-982.55	10.3%
1999/00	9,769.70	13,678.41	-3908.71	40.0%
2000/01	10,540.15	11,824.63	-1284.48	12.2%
2001/02	10,431.06	12,125.71	-1694.65	16.2%
2002/03	11,699.34	14,219.40	-2520.06	21.5%

Source: Ministry of Finance and Economic cooperation (MOFEC)(1990- 2002)

The financing of budget deficit through different deficit financing instruments can have serious macroeconomic effect in an economy if necessary cautions have not be taken in selecting the instrument of deficit financing. The sources of deficit financing of developing nations can categorized into two major sources namely external and domestic financing. Financing budget deficit

from external sources can create debt-servicing problems. From domestic sources such as borrowing form, Central Bank fuels inflationary tendencies whereas borrowing from the public through treasury bills exerts an upward pressure on other interest rates hence impeding private sector borrowing through crowding out effect. Hence, the non-inflationary source of public finance is to mobilize tax revenues to finance public expenditures. It is a necessary condition for the country sustainable economic growth. For these reasons, starting in 1990s, Ethiopia has been implementing a set of tax reform packages mainly in view of improving revenues performance at all levels of government to meet the growing expenditure requirements of Ethiopia's poverty reduction strategy. Furthermore, Ethiopian tax reforms measures have taken place to simplify complex and outdated tax laws, to improve weak tax administration performance and to reduce the existing tax evasion and avoidance (Demirew, 2005).

The change of regime from central resource allocation policy to the market oriented resource allocation policy necessitated tax reforms and modernization of customs administration to facilitate trade. It aimed at improving international trade tariff and procedures to create conducive trade environment through efficient customs service delivery system in order to smoothen the flow of goods and passengers crossing the boundary to the country. Recent major customs reform and modernization has been taking place since 2003 focusing on rationalization of tariff rates, cutting through red tape, reduction in documentary requirements, simplification and computerization of the core function of the administration. As noted by Mawete (2011) customs reform and modernization resulted in dramatic reduction and clearance times, and increase in revenues collection and the elimination of systemic corruption. In general, Ethiopian tax policy and administration reforms and customs reform and modernization during the past two decades have largely focused on improving revenues performance to finance the developmental projects. It is possible to say that tax reforms used in Ethiopia as an instrument of raising revenues productivity.

Table 2.4 Ethiopian Budgetary revenues, government expenditures and government surplus flows to the markets

Year	Total Revenue	Government Expenditure	Government surplus flows to the markets	Ratio of Government surplus flows to the markets to Revenues
2003/04	13,712.06	13,008.02	704.04	5.1%
2004/05	15,592.00	13,236.00	2356	15.1%
2005/06	19,529.88	15,233.96	4295.92	22.0%
2006/07	21,796.82	17,323.92	4472.9	20.5%
2007/08	29,794.00	22,794.00	7000	23.5%
2008/09	40,173.66	27,175.60	12998.06	32.4%
2009/10	53,861.34	32,012.00	21849.34	40.6%
2010/11	69,119.87	40,534.71	28585.16	41.4%
2011/12	102,863.65	51,445.50	51418.15	50.0%
2012/13	124,077.43	62,745.80	61331.63	49.4%
2013/14	146,172.77	78,086.90	68085.87	46.6%
2014/15	186,618.69	113,375.50	73243.19	39.2%
2015/16	230,657.28	131,902.78	98754.5	42.8%
2016/17	256,629.04	176,703.00	79926.04	31.1%

Source: Ministry of Finance and Economic cooperation (MOFEC) (2003-2016)

In Ethiopia, taxation is the single largest source of government budgetary resources. Between 2002/3 and 2016/17 of recent tax reform period, Tax revenue constituted 83.9% of total government revenue (including grants). Relatively, the importance of non-tax revenue is also significant in sustaining the public budget, although its importance is much less than the role of taxation given that it's share over the same period was 16.1%. Given its central role, taxation has applied to meet two objectives. First, taxation used to raise sufficient revenue to fund public spending without recourse to excessive public sector borrowing. Second, it is use to mobilize revenue in ways that are equitable and that minimize its disincentive effects on economic activities (Ethiopian Journal of Development Research, 1987).

The main objectives of the reforms were to enhance the organization and management of revenue administration and improve regulatory framework and completion of reforms rolled forward from the previous period. With these broad objectives in place, Ethiopian Revenue and Customs Authority ERCA expected to achieve its revenue targets, streamline internal processes, uphold professionalism among staff and improve service delivery to its customers. The growth and transformation plan (GTP the 5 yearly development plan for the period 2010–2015). Compared to the marginal tax rate of 89 percent during the military (Derg) period, the current reform that reduced the maximum marginal tax rate to 35 per cent was quite radical. The 1978 income tax for rural land and agricultural activities also amended in 1995 and 1997. For land use, farmers are now taxed Birr 10 for the first hectare and Birr 7.5 for each additional half hectare. Moreover, annual income exceeding Birr 1,200 is subject to a progressive tax rate. Fore saw an increase in tax revenue of about 25 percent a year in nominal terms, to reach a tax share of (GDP by 15 percent 2015). Given that Ethiopia's tax share stood at about 11 per cent of GDP at the beginning of the GTP period, this objective is certainly ambitious. Proclamation No. 608/2008 amends the earlier income tax proclamation No. 286/2002. The amendment includes the change of name of the federal tax authority to the Ethiopian Revenues and Customs Authority (ERCA); it also allows deduction of the actual amount of maintenance and improvement expenses of a business asset. The additional articles focus mainly on the various penalties for failure to meet the requirements of the use of a sales register machine by registered businesses (ERCA, 2016).

The evidence above indicates that the increase has achieved almost entirely at the expense of easy to tax formal and large businesses. It is clear that the tax base remains very narrow. Whether tax revenues would have increased by more or less without the tax reform is difficult to say, and beyond the scope of this study. It is quite possible; however, that the way in which the tax reforms have implemented has led to their being less effective than might have been hoped by the government. The results of the survey shown later in this report certainly suggests that it is the implementation of the tax laws, which causes greater concern to businesses than the laws themselves. The lack of revenue in turn impacts on government plans to invest in public goods such as transport infrastructure, resulting either in lower investment or, through borrowing, crowding out of private investment, both of which serve to reduce further the nation's international competitiveness. Probably the most significant change, which has resulted from the tax reforms, is the rise of VAT as a source of tax revenue. The share of VAT in total tax revenue reached about 41 percent in 2007/08 and this tax is almost certainly the reason for the increase in the proportion of revenue from indirect taxes. VAT operates on a much wider base than the sales tax that it replaced and is far harder to evade, as its

application through the value chain allows the tax authorities to crosscheck sales invoices and sales receipts. This Impact of the Tax System on Government Revenues adoption of VAT in 2003/04 has led to rise in the share of revenues generated by consumption taxes. It is clear, however, that this has not been without some adverse effects on private businesses and there remains widespread uncertainty and misunderstanding amongst taxpayers about both the theoretical and practical operation of VAT (Amin and John, 2010).

Tax reform has impacts the private sector in many ways. Unsurprisingly, businesses focused mainly on the negative impacts but some positive impacts have also noted. The negative perceptions are concerned mainly with the time, cost burden of paying taxes, and reinforce the points made in earlier questions; this is no surprise very few people enjoy paying taxes. However, it is very striking that the reform of the tax administration, perhaps because of the business process re-engineering, has recognized by businesses as improving the bureaucracy associated with the tax system. A few of those surveyed also remarked on the more convenient tax payment options available, such as payment through intermediary organizations like banks, as a result of the reforms. Further reforms along similar lines would greatly appreciated by businesses (Delessa Daba, 2014).

2.2 Empirical literature review

Many empirical studies have been conduct on the effects of taxes on economic growth and development in Ethiopia and all over the world. In contrast to the previous policy regime of hard control, EPRDF initiated a wide range of reforms that covered not only the tax system but also the exchange rate, interest rates, trade, domestic production and distribution. This paper attempts to explore the contribution of the tax and government revenue for economic growth in Ethiopia.

(Geda and Shimelis, 2005) reviewed tax reforms in Ethiopia and explored the contribution of the tax reforms (structural and institutional) to understand its role of increasing revenue in using incidence analysis. They found that most commodities that are subject to some kind of tax whether excise, import duty or sales tax, turned out to be progressive while commodities such as salt, sugar and kerosene tend to be regressive. In addition, the distributional impact of the benefits of freely provided services such as education examined.

(Belew, 2001) studied tax reforms in Ethiopia and argued that the low tax to GDP in Ethiopia shows existence of modest tax burden and room for raising more revenue. This may suggest that there is opportunity to increase revenue without affecting savings, investment and productive incentives to the private sector. The tax policy may focus on taxation of the growing sector, income, profits and consumption of goods with high elasticity of demand.

(Biruk, 2016) conducts research attempts to determine the causal relationship between government revenue growth and economic growth. To capture this, time series macroeconomic data culled from 1974/75-2013/14. to conduct an empirical test to observe the time related nature of the relationship between revenue growth excluding grant and growth in order to see the direction of movement of the 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. The granger causality test reveals causal relationship exists only between growth in tax and non-tax revenue growth not, with economic growth in real terms. Hence, there is only long run bi-directional causal relationship exists in components of government revenue. In addition, looking at the causal relationship between government revenue growth and economic growth the result affirms, there is no causal relationship between government total revenue growth and economic growth for the period 1974/75-2014/15 in Ethiopia.

Asaminew (2010) estimated the size of the informal or underground economy in Ethiopia and its implication on the size of tax evasion. He used a monetary approach to estimate the size of the underground economy. The study suggests that there is a significant amount of economic activity (>36percent of the recorded economy) that is not reported and captured by the official statistics. The amount of tax evasion estimated to be10 percent of the economy in 2010. This is an important finding with implications on tax policy. He particularly pointed out the implication of the finding on the incentive structure towards the small and medium scale enterprises.

Alm et al. (2004) took agricultural/GNP, mining/GNP, GNP per capita, taxes on international trade/GNP and shadow economy/GNP as the determinants of total tax to GDP ratio by using the data of developed and developing countries. His results showed the negative but not significant relation with agricultural/GNP and international trade/GNP, positive and statistically significant relation with mining/GNP and negative but statistically significant relation with GDP per capita and shadow economy/GDP.

(Delessa, 2014) conducts research on tax reforms and tax revenues Performance in Ethiopia. Descriptive analysis used to compare different categories of tax performance of the Derg and Ethiopian People's Revolutionary Democratic Front (EPRDF) regimes. In public finance important measures that have used to assess the responsiveness of a tax system in terms of tax revenues mobilization is tax to GDP ratio. In light of this major tax categories of tax to GDP and total tax revenues ratios over the period of 1974/75 to 1912/13 (39 years) were computed and analyzed.

In addition, comparison has made between pre and post-tax reforms to compare tax system flexibility in terms of raising tax revenues during the EPRDF regime. The period after 2002/03 was, consider as post comprehensive tax reforms years. The result shows that the comparison of two governments' different categories of tax ratios shows a slight increment from an average 3.77 percent to 9.95 during EPRDF period. Comparing pre and post-tax reforms during the period 1991/92 to 2012/13, the ratios of different category tax revenues show insignificant change for post-comprehensive tax reform period. Comparing direct versus indirect tax categories, direct tax shows the tendency of declining contrary to the comprehensive tax reform main objective which gave due attention to increase the share of the direct tax to total revenues. The overall analysis reveals that tax reforms failed to boost total tax revenues and to bring tax structure change from indirect tax to direct tax (Delessa, 2014).

United Nations Development Program (UNDP) Ethiopia, 2016 Studies on Performance and Prospects of Tax Collection in Ethiopia estimate the gap between the potential and actual tax revenue performance in Ethiopia and explore some of the challenges why tax to GDP ratio remains low despite strong and sustained growth recorded in the past twelve years. The empirical results above suggest that macroeconomic stability, trade openness and share of agricultural GDP are important determinants of tax collection in Ethiopia. Per capita GDP as well as policy and institutional reforms have also influenced tax revenues. A simple tax gap analysis of comparing Ethiopia with peer countries in Africa also indicated that there is untapped potential to collect more tax revenue (UNDP Ethiopia, 2016).

Amin Abdella and John Clifford (2010) conduct the impact of tax reform on private Sector development by Considering the relative role of inland revenues and trade taxes in economic development: The latter has to be decreased (specially in relation to capital goods and raw materials as inputs) in order to enhance private sector development. Yet importantly, the impacts (positive or negative, direct or indirect) of the reformed tax system depend upon the way in which different groups of taxpayers have already perceived the reform and how they are reacting to their perception.

It is mutual understanding between the public and the private sector that promotes simplicity, equity and effi ciency for effective taxes.

The private sector is also required to promote knowledge of public finance (taxation) and the effect of tax laws on production, income, price, saving and investment. As an element of the reform, in January 2003, Value Added Tax (VAT) was introduced to replace the existing sales tax. It is contended that VAT increases government revenue, improves economic efficiency, promotes exports, and fosters growth. Although the VAT system has accepted and adopted by businesses there have been many difficulties in its implementation and these have led to complaints from VAT-registered taxpayers. A major complaint is the perceived market distortion created by VAT, placing VAT registered businesses at a price disadvantage against non-VAT-registered businesses (Amin and John, 2010).

Azime A. and Hassen (2016) the study conduct agricultural taxation and economic growth in Ethiopia investigated tax responsiveness to changes in gross domestic product in Ethiopia for the period 1981 - 2014. It mainly focused on the agricultural tax revenue components: agricultural income tax and land use fee. Personal income tax and business profit income have also analyzed. An understanding and analysis of the level of sensitivity of the other tax revenue to discretionary policy measures and GDP are essential to the formulation of fiscal policy. The trend of the agricultural income tax and land use fee collection are highly inconsistent. The study revealed that the Ethiopian agricultural income tax and land use fee are not buoyant, implying that the growth of the agricultural sector has no statistically significant impact on agricultural income tax buoyancy. However, personal income tax revenue, business profit revenue, and total direct taxes are relatively responsive to changes in non-agricultural GDP (Azime and Hassen, 2016).

Lutfunnahar (2007) identified the determinants of tax share and revenue performance for Bangladesh along with 10 other developing countries for the 15 years through a panel data analysis. The results obtained suggest international trade, broad money, external debt and population growth to be significantly determinants of tax efforts. The study concluded that Bangladesh and other countries have low tax effort (less than unity index) are not utilizing their full capacity of tax revenue, and therefore have the potential for financing budgetary imbalance through raising tax revenue.

(Gylych , Samira and Abdurahman, 2016) the study examines the impact of tax reforms on the economic growth of Nigeria from 1986 to 2012. Results shows that tax reforms is positively and significantly related to economic growth and that tax reforms indeed causes economic growth. he conclude that favourable tax reforms improves the revenue generating capacity of government to

undertake socially desirable activities that translate to economic growth in real output and per capita basis. However, it recommended that sustainable economic growth can be heightened through taxes in line with macroeconomic objectives, corrupt-free and efficiency in tax policies of the government, alongside, accountability and transparency of government officials (Gylych, Samira and Abdurahman, 2016)

Helms' (1985) study on the effect of taxes on economic growth indicates that at the state and the local level, increases in taxes support economic growth on the proviso that tax revenue used by government to finance improved public services rather than transfer payments. This they attribute to these services being more highly valued by labor and business, and there by incentivize productivity. When taxes used for transfer payments or redistribution of income, Helms finds a negative relationship between tax increases and economic growth. Yi and Suyono (2014), in their study of the Hebei Province in China, find that at provincial level tax increases may not have as negative an effect on growth as most other studies have indicated, by amending the tax multiplier formula in their methodology. They find that reforming indirect to direct tax produces more conducive effects on growth, as well as directing government spending to factors that promote better living standards such as social security and other social programmers, and compensation for costs in the medical system.

Although Gale and Samwick (2016) focus on income taxes, they find that reforms that entail base-broadening measures have a positive impact on growth due to "the reallocation of resources from sectors that are currently tax-preferred to sectors that have the highest economic (pre-tax) return, which should increase the overall size of the economy". They further assist with defining economic growth as "the expansion of the supply side of the economy and of potential Gross Domestic Product (GDP).

Dzingiari and Tambudzai (2014) focused on Zimbabweans tax performance from the years 1980 until 2012 while this paper researched on 22 sub-Saharan African countries but there was cohesion with the use of same tests in obtaining evidence used which were unit root test, co-integration test, vectors error correction model and granger causality test. This paper was in support of tax performance being stationary at the first difference.

De Gregorio (1993) finds that inefficient tax systems lead to high inflation, which in turn negative impacts on growth. Thus, in order to promote economic growth, the tax system of a country needs to be efficient and not contribute to raising inflation. Myles (2000) includes innovation in production techniques and in goods and services provided to stimulate growth.

Munir and Sultan (2016) analyses the impact of the various taxes on growth in Pakistan, indicating a "pro-growth" relationship with direct tax, sales tax and tax on international trade. Excise duty, on the other hand, found to have the same trait; however, in the short run, it has a negative effect on growth as measured by real GDP. Pakistan is considered a developing country by the World Bank, i.e. a lower middle income country, thus in a similar, broader group as South Africa considered upper middle, with similar socio-economic challenges, such as income inequality, although with its political instability challenges. In the McBride (2012) paper, he identifies the particularly negative effect of corporate and personal income tax, consumption taxes and property taxes on economic growth. Thus it could be ascertained that the majority of the studies reviewed by McBride point to the more severe negative impact that direct taxes have on growth as opposed to indirect taxes (e.g. sales tax), with the negative impact of corporate tax being the most pronounced. The reform probably brought about by the very analogy of reducing the tax burden to promote further investment and production.

De Wet, Schoeman and Koch (2005) find that direct taxes have a negative effect on economic growth, similar to outcomes performed on most other studies on developed and developing countries; however, in contrast, they find an insignificant effect of indirect taxes on economic growth. They thus recommend a substitution effect of direct to indirect taxes to ease the tax burden and thus less negative impacts economic growth. Phiri (2016) also finds the negative effect of direct taxes on growth; however, in establishing the ideal tax mix in his study on the optimal tax mix for South Africa in promoting growth, that there seems to be an optimal tax of 10.27% of the indirect tax growth ratio.

Below this ratio, indirect taxes are positively related to economic growth, and above this ratio, there seems to be no significant relationship between taxes and economic growth. Thus, he makes similar recommendations to De Wet et al (2005) of a greater burden on indirect taxes not exceeding this threshold of 10.27%. Ilaboya and Mgbame (2012) in their study based on Nigeria, find an insignificant, negative relationship between indirect tax and economic growth, thus differing somewhat to the studies above. It should, however, be noted that in as much as Nigeria is also a developing country like South Africa, its oil-reliant economy is not as diversified as South Africa's, possibly explaining this outcome. To an extent, though, this correlates to Koch et al (2005), who find that the lower the ratio of indirect taxes to total taxes, the more positive the relationship to economic growth, contrary to other South African studies performed.

(Guangjun , 2005) made the co-integration test on the relationship between tax revenues and GDP in China with data from 1986 to 2003 as a sample, and validate co integrated exists between them. Xiaofang Li, Tiemei Gao, Yunfang Liang (2005) build SVAR model on government spending, real GDP and tax revenue to study the dynamic effects of taxation and government expenditure policies on output. Also through the establishment of four variables SVAR model to study the impact on investment, consumption and export government from spending and taxation ,the empirical conclusion is: the government expenditure has a positive relationship with outputs, tax increase have a negative impact on consumption; government expenditures promote consumption. Tax increase harms investment, while the expansion of government expenditure promotes investment.

Widmalm (2001) studied the effect of the tax structure on growth using cross-section data on 3 OECD countries from 1965-1990.However the use of only three OECD countries limits the viability of this study, as more OECD countries could be used for a more efficient result. The methodology follows that of Levine and Renelt (1992), but used four basic variables (initial income, investment to GDP ratio, population growth, and average tax rate). The share of different tax instruments in revenue is considered first (corporate income tax, personal income tax, property tax, taxes on goods and services, and taxes on wages). The proportion of tax revenue from taxing personal income has a negative and robust correlation with growth. There is also some evidence that progressivity affects growth.

Jin Ge (2010) puts economic growth of the optimal tax model from Chamley (1986), economic growth and the optimal model of public expenditure from Barro (1990) to integrated, discussed achieved path under the framework of optimal financial expenditure and optimal taxation in endogenous economic growth theoretically. Thereby obtain a general analysis framework on economic growth, public expenditure and dynamic optimal taxation. The article also cites a special case, and the model conclusion was simulating to estimate the best macroscopic rate. In recent years, the finding out reasons for rapid tax revenue growth is a hot tax issues, but most of the approaches adopted are using normative analysis. Peiyong Gao (2006) concludes that Chinese tax revenue growth is due to “economic growth, policy adjustment and strengthen the collection and other factors” as well as on the basis of interaction influence of economic growth, inflation, GDP and tax structural differences, progressive tax system, strengthening tax administration, foreign trade in exports to GDP growth and tax differences and other factors. The special factors supporting sustained rapid growth of China’s tax are Chinese tax authorities’ collection is huge, a syndrome of Chinese tax yield (statutory tax levy with real negative ratio) increased to illustrate his point. Xuren Xie (2011) attributes the reasons for China’s tax revenue growth to economic factors, price factors,

policy factors, administration factors and the impact of major emergencies from a qualitative point of view.

For the research of China's tax reform and evolution, many scholars conduct studies from the background of domestic tax reform and steps on tax reform, the economic effects tax reform may produce more from a tax reform on the related tax impact in the field research, such as personal income tax reform on the impact of individual consumption and VAT. Foreign researchers' study on tax issues take empirical analysis and measurement methods generally, and put tax placed on endogenous economic growth, tax reform, education, income distribution, etc. to inspect, study on this issue towards diversified, integrated direction.

The section has summarized a number of studies concerning the relationship between taxes as a form of government revenues and a "burden" on citizens and the economic growth across a number of countries, developed and developing, at provincial, local and national levels. It goes to say that most studies of countries considered to the most economically developed countries indicate that increases in taxes negative impacts on economic growth, with corporate income taxes having the most negative impact, followed by personal income tax.

In some of the studies, indirect taxes also exhibit a negative relationship, in others a positive relationship, and yet in others no effect at all. It would thus seem imperative to perform this study taking tax types and tax mix (i.e. the composition of the various tax types to total taxes) into account, as well as the other variables highlighted in the various studies in assessing this relationship. South Africa sits with the current dilemma of establishing the ideal tax structure facilitating economic growth in line with the development objectives and policies such as the National Development Plan, balancing socio-economic challenges it currently faced with, and advancing towards a more inclusive economy benefitting all its citizenry.

2.3.1 The empirical conclusion and framework:

In general, the above researchers have tried to examine the tax and government revenue on economic growth and examine in different relationship between taxation and economic growth in Ethiopia, in Africa and in the World. However, to best of our knowledge there are no more the same research factor variables and technical analysis of model estimation done on "tax and government revenue growth in Ethiopia".

Furthermore, these research different from previous study done by in Ethiopia and other developing countries. This try to study incorporating major tax components of including income and Profit Tax

(IPT), Goods and Service Tax (GST) and international trade tax (ITT) and other component of revenue were not more address in previous studies especially in case of Ethiopia. One of the notable researches in this area is a study by Bayu (2015), which analyses tax buoyancy and its determinants in Ethiopia. The findings of the study indicate that direct and domestic indirect tax revenues were non-buoyant in both the short and long run, though foreign trade taxes showed sign of buoyancy in long run. As for the factors that affect tax buoyancy, the study found out the share of services sector value added, level of import and over all government budget deficits to GDP affected the tax buoyancy positively, whereas the impact of the share of official development assistance to GDP was negative. The impact of the share of industry value added to GDP was positive but not statistically significant. Based on those findings tax revenues are non-buoyant in Ethiopia, emphasizing the need to enhance the efficiency of revenue administration in bringing new customers in to the tax net.

The income and profit tax sound compared to the pre-reform period but it still lacks some important provisions for broad the tax base. However, certain deductions, tax incentives and privileges provide unnecessary advantages for large businesses over small and medium enterprises SMEs without necessarily stimulating economic growth and may result in unnecessary losses of revenue to the government.

Broaden the tax base through a combination of new revenue measures and improved tax administration (strong tax administration, limiting special tax incentives, and closing loopholes for tax avoidance) to decrease the tax burden on private sector business whilst still generating more revenue.

In summary, the literature suggests the existence of untaxed income due to reasons related to the structure of the economy and administrative inefficiencies. This indicates there is a room to increase tax revenue by improving the tax administrations and enhancing the structural transformation towards industry sector.

2.3.2 Variables of the model

Government Revenue: is income of a government receives. Government revenue includes all amounts of money (i.e. taxes and/or fees) received from sources outside the government entity. Revenues earned by thegovernment are received from sources such as taxeslevied on theincomes and wealth accumulation ofindividuals and corporations and on the goods andservices produced, exports and imports, non-taxablesources such as government-owned corporations 'incomes, central bank revenue and capital receipts in theform of external loans and debts from internationalfinancial

institutions. It is used to benefit the country.Governments use revenue to better develop the country,to fix roads, build homes, fix schools etc.

Income and Profit Tax: The terms “profit” and “income” often used as synonyms, but you need to distinguish the difference between these two numbers. Income is the top-line revenue. This number calculated by tallying every penny that came into the company during a given period. Income commonly referred to as “Gross Revenue.” On the other hand, profit is the amount that is over after the expenses have paid. To calculate this number, figure out your gross revenue and subtract the cost of goods that sold as well as the expenses. Profit also often called “Net Revenue.”

Goods and services tax (GST):is a tax on goods and services with value addition at each stage having comprehensive and continuous chain of set of benefits from the producer’s/service provider’s point up to the retailers level where only the final consumer should be art he tax. GST is a comprehensive indirect tax levy on manufacture, sale and consumption of goods as well as services at the national level.

International trade Tax: Taxes on international trade include import duties, export duties, profits of export or import monopolies, exchange profits, and exchange taxes.

A tax on international trade (of revenue) in Ethiopia was 29.66% as of 2011. Its highest value over the past 21 years was 48.86 in 2007, while its lowest value was 14.33 in 1990.

Non-Tax Revenue: the recurring income earned by the government from sources other than taxes). Description: The most important receipts under this head are interest receipts (received on loans given by the government to states, railways and others), dividends, and profits received from public sector companies. Various services provided by the government police and defense, social and community services such as medical services, and economic services such as power and railways yield revenue for the government. Though the Railways are a separate department, all their receipts and expenditure are rout through the Consolidated Fund.

Chapter Three: Research methodology

3.1 Introduction

This chapter discusses the methodology followed in testing the hypothesis presented. It presents data used for purposes of this study as well as the sources therefore, the research approach, design, study area and model specification and estimation employed.

3.2 Research Approach

Post positivism research approach used, because the study had used numerical and secondary data for analysis. In addition, researchers used quantitative research approach to infer the result for other developing countries as well as to test existed theory. In addition, since quantitative research, approach is free from biasness, researcher has chosen for this study. Also, to be more reliable and objective, to reduces and restructures a complex problem to a limited number of variables.

3.3 Research design

The objective of this study is to establish whether a relationship exists between tax revenue components and nontax revenue on government revenue growth in Ethiopia; thus, an explanatory study taken as indicated above, the nature of this study was quantitative, investigating the hypothesis of the independent variables on the dependent variable. Co-integration approach and error correction model to analyze and present the data collected from the major components of tax revenue and non-tax revenue on total government revenue.

A number of studies rely on the Federer model (1983) in their analysis including De Wet et al., (2005) and Lerato Riba (2016). It noted that seeks to examine the impact of tax revenues in general total tax and revenue of Income and Profit Tax (IPT), Goods and Service Tax (GST) and International Trade Tax (ITT) on total government revenue GR growth in Ethiopia.

3.4 Source of data and Measurement of Variable

To achieve the desired objectives this study was used secondary and time series data. The study covers the period from 1974/75 to 2016/2017 data, as sample to investigate the tax and revenue on government revenue (GR) growth in Ethiopia. For the purpose of this, study time series variables obtained from National Bank of Ethiopia (NBE) (gross domestic product GDP) and Ethiopian revenue and Customs Authority (ERCA) (tax revenue components of Income and Profit Tax (IPT), Goods and Service Tax (GST) and International Trade Tax (ITT) as well as Non Tax revenue (NTR)). Thus, secondary data had used by the author to gain the idea and information to develop the literature review and complete this study. The choice of 1974/75 is the study wants to analysis and compares

the two-government administration collecting systems of tax and revenue before 2016/2017; here, there are a few tax reforms on component of personal income and profit tax in Ethiopia. Hence, our total sample is 43.

Table 3.1 summary data sources and measurement of the study variables

Components of variable	Unit/proxy	Source
Gross domestic product (GDP)	From 2015 base year real GDP of the country of Ethiopia	NBE
Government revenue (GR)	Total revenue share to Gross domestic product (GDP), i.e. The sum of Tax revenue (TR) and Non Tax revenue (NTR)	NBE&ERCA
Tax revenue (TR)	Tax revenue (TR) share of Government revenue (GR) i.e. The sum of direct tax and indirect tax.	NBE &ERCA
Non Tax revenue (NTR)	Non Tax revenue (NTR) share to Government revenue (GR)i.e. interest receipts (received on loans given by the government to states, railways and others), dividends, and profits received from public sector companies	NBE &ERCA
Income and Profit Tax (IPT)	The sum of direct taxes of Income and Profit tax (IPT) and Agricultural Taxes of urban & rural land lease & use fee share to tax revenue (TR)	NBE &ERCA
Goods and Service Tax (GST)	Goods and Service Tax (GST) share to tax revenue (TR), i.e. indirect tax levy on manufacture, sale and consumption (VAT) of goods as well as services at the national level	NBE &ERCA
International Trade Tax(ITT)	International Trade Tax(ITT) share to tax revenue(ITT), i.e. measured by the sum of import duties, export duties, profits of export or import monopolies, exchange profits, and exchange taxes	NBE &ERCA

3.5 Data analysis

All the data collected were process by using Eviews8 software program. Aco-integration approach of error correction model to analyze and present the data collected from dependent and independent variables. Computers have used to solve the complex nature of data and time required. Descriptive statistics used to explain the selected variables. The presentation of findings has made to examine the relationship among independent variables and dependent variable (tax revenue).

3.6 Model Specification

The neoclassical growth model framework of Solow (1956) has adopted in this study. The framework of the growth model take as its starting point an aggregate production function of Cobb-Douglas functional which relates output to factor inputs. Different scholars adopted and used some models to analyze the contributions of VAT on economy of different countries. However, this paper was adjusted based on the macro-economic development as more or less similar to Adereti, et al., (2011), that uses four macro-economic development indicators of GDP, VAT, TTR and TGR and establish the link among the VAT and GDP. Since tax revenue and non tax revenue are the main sources and the backbone of the government revenue to finance for expenditures, it played a great role for economic growth in Ethiopia.

That is government revenue growth GR is the sum of Tax revenue (TR) and Non-tax revenue (NTR).
i.e. GR = TR + NTR……..…..(1)

Tax revenue (TR) is the sum of tax and tax reform components such as Income and profit tax (IPT), Goods and service tax (GST), Foreign trade taxes (FTT).

i.e. TR = IPT + GST + FTT……..(2)

Model assumption is that, the dependent variable is a linear function of the independent variables.

Therefore: GR = (IPT + GST + FTT) + NTR ⇔ GR = IPT + GST + FTT + NTR

The neoclassical growth model framework of Solow (1956), growth model take as its starting point an aggregate production function of Cobb-Douglas functional that relates output to factor inputs. Accordingly:

$GR = f(A, IPT, GST, FTT, NTR)$ …… (3)

$GR = \beta 0 + \beta 1IPT + \beta 2GST + \beta 3FTT + \beta 4NTR + \varepsilon$ …..... (4)

Where,

A; or β is the technological shift parameter that generally assumed exogenous.

GR is the level of output or government revenue growth,

IPT is the Income and profit tax for production of GR,

GST is the Goods and service tax for production of GR,

FTT is the foreign trade tax for production of GR,

NTR is the non-government revenue for production of GR

F is the Production function and

ε is an error therm.

Since the equation contains a lagged dependent variable as an explanatory variable called an autoregressive model or a dynamic model, which used to capture the effects of previous tax efforts on present tax efforts and to get rid of autocorrelation.

All variables in the model transformed into logarithm form and hence log linear form of the model used for tax revenue model as opposed to linear model. This is because log linear model is preferred to the linear model in that it helps to control the size of data and results in consistent and reliable estimates (Gebeyehu, 2013). Furthermore, log linear model produces better results than linear form of the model; i.e., logs used in economics because the estimated coefficients in log regressions have a good interpretation. Economists often think in terms of elasticity's, and log regressions have coefficients that estimate elasticity. It helps to interpret as percentage change instead of as a marginal effect (Benoit, 2011).

So to keep the data and results in consistent and reliable estimate periods of 43 years spanning from 1974 to 2016 used for statistical analysis.

Thus, the model from the above relationships, the following stochastic model specified:

$$ln\ \mathrm{GR}_t = \beta_0 + \beta_1 ln\mathrm{IPT}_t + \beta_2 ln\mathrm{GST}_t + \beta_3 ln\mathrm{ITT}_t + \beta_4 ln\mathrm{NTR}_t + \varepsilon_t \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

Where

G R_t = refers to Government revenue growth, ln IPT_t , lnGS T_t , lnIT T_t and $ln\mathrm{NTR}_t$ refers to logarithmvectors of important government revenue growth determinants suggested byTax revenue on

income and profit tax, goods and service tax, international trade tax and none tax revenue respectively.

t defines the time period; t=1 and 2; that means GR_1 before tax reform and GR_2 after tax reform

β_0= the constant or GR_t intercept, $\beta_1, \beta_2, \beta_3$ and β_4 are vectors of Coefficients or the parameters to be estimated; and ε_t = Stochastic term or error term for revenue growth in a country at time t.

From the above equation (2), we check the Impacts of tax reform on government revenue growth in Ethiopia by equation as follows:

We use input data before tax reform; 1974-2001 and model of $ln\ GR_1$

$$ln\ GR_1=\beta_{10}+\beta_{11} ln IPT_{1t} + \beta_{12} ln GST_{1t} + \beta_{13} ln ITT_{1t} + \beta_{14} ln NTR_{1t} + \varepsilon_{1t} \ldots \ldots \ldots \ldots \quad (3)$$

We use input data after tax reform; 2002-2016 and model of $ln\ GR_2$

$$ln GR_2 = \beta_{20} + \beta_{21} ln DT_{2t} + \beta_{22} ln DIT_{2t} + \beta_{23} ln FTT_{2t} + \beta_{24} ln NTR_{2t} + \varepsilon_{2t} \ldots \ldots \ldots \ldots \ldots \quad (4)$$

3.7 Model Assumption test

Time series data needs different tests to be free from fake or false result; those tests are stationarity test, co-integration and error correction model regression diagnostic test that includes Heterosckedasticity test, autocorrelation test, normality test and Multicollinearity test

3.7.1 Test for Stationarity

The concept of stationarity related to the properties of stochastic processes (sequence of random variable indexed by time). Time series data assumed stationary if the mean, variance and covariance of the series are independent of time. On the other hand, non-stationarity in a time series occurs when there is no constant mean, no constant variance or both of these properties. In this case it is no possible to use simple OLS to estimate long run linear relationship between variables .If do so, it would lead to spurious regression/non sense economic analysis were R-square is approximating unity ,t and F-statistics look significant and valid. Hence, we will be obliged to falsely concluding that there is a relationship between two unrelated non-stationary series. This kind of problem (unit root problem) can be solved by differencing the data set (Gujarati, 2004) If the variable is stationary without differencing, then it is integrated of order zero (I (0)). A variable is said to be integrated of order one or I (1), if it is a variable differencing twice or I (2). In order to determine the degree of stationarity, a unit root testing will carried through the Augmented Dickey-Fuller (ADF) test Wooldridge (2005).

Hence the emphasis here will be on using the Augmented Dickey-Fuller (ADF) approach to testing the null hypothesis that a series contains a unit root (i.e. it is non-stationary) against the alternative that it is stationary. We tested a serious including both an intercept and time trend in the regression model used to test the presence of unit root. The null hypothesis rejected only when there is strong evidence against it at the conventional levels of significance. Alternatively, the null hypothesis of the test is that a time series has a unit root, as evidenced by a test statistic that is less than the critical value. The null hypothesis will rejected should the t-statistic be greater than the critical value (CV), thus proving time series to be stationary.

By confirming the stationary of the variables, least squares regression performed as the assumptions above up held.

3.7.2 Unit root test

Several tests usually employed to test whether time series variables are stationary or non-stationary: the Dick-Fuller (DF), the Augmented Dick-Fuller (ADF) test, Auto Correlation Function (ACF) and Phillips-Peron Test. In this study I was employ ADF test to determine the existence of a unit root by incorporating the autoregressive process of order p; this model becomes superior to DF. The general form of the ADF equation where only an intercept is included is as follows:

$ln\Delta GR_t = \beta_0 + \delta lnGR_{t-1} + \sum_{i=2}^{p} \beta_i \, ln\Delta GR_{t-i} + \varepsilon_t$ ..... (5)

The hypotheses of the above equation form are:

H_1: $\delta = 0$; there is a unit root, i.e., the time series is non stationary

H_1: $\delta \neq 0$; there is no unit root, i.e., the time series is stationary (Level stationary)

The Null hypothesis (Ho): Y_t is not I(0), if the calculated ADF statistics are less than their critical values from Fuller's table, then the null hypothesis (Ho) is rejected and the series are stationary or integrated or order one i.e., I(1). If the coefficient of the lag of Y_{t-1} δ is significantly different from zero, then the null hypothesis rejected. If a variable is non-stationery at level, it must be differenced one time to make it stationary; a variable is said to be integrated of order one denoted I(1) if a level stationary series is said to be integrated of order zero, it is denoted by I(0). In general if the series need to be differenced d times before it becomes stationary, it is said to be integrated of order d, denoted I (d).

3.7.3 Lag Selection

Before going deep into the test, there is need for appropriate selection of the lag length used. Estimating the lag length in many econometric analyses is very crucial exercise. The lag length in this study is selected using explicit statistical information criteria obtained through unrestricted VAR estimate. These statistical information criteria include, Akaike Information Criterion, Schwartz Information Criterion, Posterior Information Criterion (PIC) and Final Prediction Error (FPE). The study will use among the lag selection criteria, the Akaike Information Criterion

3.7.4 Co integration tests

Many Economic time series are not stationary at levels and are the most adequate represent first differences. Even though the individual time series are not stationary, a linear combination of these variables could be stationary (i.e. they may be co-integrated). If these variables are co-integrated, then they have a stable relationship and cannot move "too far" away from each other. Co integration exists where the linear combination of the time series integrated of order zero, over the long run, that is, a long run equilibrium relation that connects the individual variables, represented by some linear combination of them, by testing the residuals for stationary. The existence of co integration will indicate the existence of a stable long terms relationship among the variables, where the means and variances of the variables remain stable regardless of time.

There are a number of co integration tests available including Engle and Granger (1987), Stock and Watson (1988) and Johansen. This study testing for the co-integration and estimating the relationship among co-integrated variables using the Engle Granger (1987) methodology, in this methodology the residuals from the long-run relationship are tested for stationary to determine whether the variables are co integrated or not. To create co integration relationship, one needs to run first an OLS regression model for the variables and subject the residuals for stationarity test using perhaps the popular Augmented Dickey Fuller (ADF) or Phillips Perron (PP) unit root tests.

The Augmented Dickey-Fuller (ADF) test performed on the residuals to determine their order of integration. Augmented Dickey-Fuller (ADF) test verifying unit roots of the error term and then error terms with I(0) properties the series in question are said to be co-integrated. So if the variables are co-integrated a long-run relationship between these variables exists, i.e., government revenue (GR) and total tax revenue (TR). The existence of a long-run relationship also has its implications for the short-run behavior of I (1) variables, because there has to be some mechanism that drives the variables to their long-run equilibrium relationship.

This mechanism is model by an error-correction mechanism, in which the 'equilibrium error' also drives the short-run dynamics of the series. The error correction model used to examine how the variables adjust the discrepancy from the long run equilibrium.

In time series analysis, we are allowed to model one non-stationary time series (Y_t) as a linear combination of another non-stationary time series (X_{1t},X_{2t},.....X_{nt}). In other words:

$Y_t = \beta_0 + \beta_1 X_{1t} + \beta_2 X_{2t} + \ ... + \beta_k X_{kt} + \varepsilon_t$ ---------- (6)

A regression model like the one above gives spurious (nonsense) results unless their linear combination eliminates the stochastic trend and produces stationary residuals.

$Y_t + \mu_1 X_{1t} + \mu_2 X_{2t} + \ldots + \mu_k X_{kt} \sim \boldsymbol{I}(0)$ ---------- (7)

In principle, testing for co integration is similar to testing the linear regression residuals for stationarity. Thus, we refer to a set of variables as co integrated when the residuals from their linear combination are stationary even though the variables (Y,X_1,$X_{2,}$.....X_k) are individually non stationary. The outcomes from such regression no longer be considered as spurious or nonsense result.

Co integration methods have been very popular tools in applied economic work since their introduction few decades ago. One important test for co integration that is invariant to the ordering of variables is the Augmented Dickey-Fuller (ADF) test of Engle Granger (1987).

3.7.4.1 Long run estimates

Testing for the co-integration and estimating the relationship among co-integrated variables using the Engle Granger (1987) methodology, in this methodology the residuals from the long-run relationship are tested for stationary to determine whether the variables are co integrated or not. The Augmented Dickey-Fuller (ADF) test could perform on the residuals to determine their order of integration. Augmented Dickey-Fuller (ADF) test verifying unit roots of the error term and then error terms with I(0) properties the series in question are said to be co-integrated. So if the variables are co- integrated a long-run relationship between these variables exists, i.e., government revenue (GR) and Tax & tax reform components and non-tax revenue (NTR). The existence of a long-run relationship also has its implications for the short-run behavior of I (1) variables, because there has to be some mechanism that drives the variables to their long-run equilibrium relationship.

This mechanism modeled by an error-correction mechanism, in which the 'equilibrium error' also drives the short-run dynamics of the series. The error correction model used to examine how the variables adjust the discrepancy from the long run equilibrium.

The hypotheses are denoted as follows:

H_0: No long-run relationship exists, i.e. check at p- value of significance level of 0.05 i.e. P - Value less than 0.05.

H_1: Long-run relationship exists, i.e. $H_1$is not H_0

- ❖ Co integrated at level I (0), all independent variables have positive relationship with dependent variable. So null hypotheses are rejecting; it indicates that tax and tax reform variables as well as non-tax revenue growths have impact on the growth of government revenue in Ethiopia.

Based on the results of the co integration analysis, the long-run estimates of the effect of tax revenue on government revenue growth examined with the regression model;

$ln\Delta \quad G \quad R_t = \beta_{01} + \sum_{i=0}^{p} \alpha 1 i(\ln GR_{t-i}) + \sum_{i=0}^{q} \alpha 2i(\ln IPT_{t-i}) + \sum_{i=0}^{p} \alpha 3 i(\ln GST_{t-i}) + \sum_{i=0}^{p} \alpha 4 i(\ln ITT_{t-i}) \sum_{i=0}^{q} \alpha 5i(\ln NTR_{t-i}) + \varepsilon_t$---------- (8)

3.7.4.2 Short run error corrections model (VECM)

The appropriate econometric specification for two or more non-stationary variables found to be co integrated, that is to say, the variables have underlying stochastic trends along which they move together on a non-stationary path, is the Vector Error Correction Model (VECM). To obtain error correction estimates associated with the long-run equilibrium model, the study follows Belloumi (2014), Nkoro and Uko (2016), and Alhassan and Fiador (2014), by specifying the error correction model as;

$Y_t = \alpha_0 + \gamma_0 X_t + \gamma_1 X_{t-1} + \alpha_1 Y_{t-1} + \varepsilon_t$---------- (9)

Where, $Y_t$is dependent variable, and Y_{t-1} are lagged values.

X_tIs independent variable, and $X_{t-1}$are lagged values.

It is expecting that the elasticity parameters (α_0,γ_0, α_1,γ_1) > 0

ε_tIs the error term assumed toε_t~I N (0, δ^2)

$ln\ GR_t = \alpha_0 + \gamma_0 dln IPT_t + \gamma_1 dln GST_t + \gamma_2 dln ITT_t \gamma_3 dln NTR_t + \alpha_1 ln GR_{t-1} + \varepsilon_t$---- (10)

Where $GR_{t-1} = ECT_{t-1}$ the error correction term and all other variables are as defined before. In equations 6, 8 and 9, all models will be estimate by replacing Taxes with IPT, GST and ITT.

In determining the appropriate lag to obtain standard normal error terms, the automatic selection optioned for on Eview 8statistical software based selection on the Akaike Information (AIC), Schwar Bayesian (SBC) and Hanna-Quinn (HQC) selection criteria.

As a rule of thumb for evidence of a short run relationship, the error correction coefficient (cointEq) should be negative and significant as evidenced by the t-statistic and its p-value. According to Nkoro et al (2016), the cointEq referred to as the speed of adjustment parameter, as it shows how much of the disequilibrium in the previous period corrected in the current period. Thus, the cointEq is expected to lie between 0 and -1, with values closer to -1 being considered more significant. Where the cointEq is equal to or beyond -1, it may be indicative of immediate adjustment whereas, at 0.5, the adjustment would be occurring in each period. The coefficients of the first differenced variables indicate the short run impact.

Chapter Four: Research Analysis

4 Introduction

The study employed based on data covering periods of 1974 to 2016 analyze to the impacts of tax revenue and tax reform on government revenue growth in Ethiopia both descriptive and econometric analysis. While the descriptive analysis helps to capture the trend and measure of central tendency dispersion analysis where as an econometric analysis employed to capture the short run and long run relationship between government revenue growth and its determinants. The Stationarity of the data used in the analysis first checked using Augmented Dickey Fuller (ADF) unit root test. The study used Error Correction Mode (ECM) for short run analysis and applied Engel Granger co integration Method for long run equilibrium analysis.

4.1 The Descriptive Analysis

The study used tools of descriptive statistics of the study covers 43 years of time from 1974-2016. It is clear from Table 4.1 that all major components of tax revenue and Tax reforms inincome and profit tax (IPT), goods and service tax (GST) and international trade tax (ITT)) and non tax revenue (NTR) on proxy of government revenue growth variable (GR) in Ethiopia are significantly changed in the time interval. Specifically, the table4.1bellow provides a summary of selected measures of central tendency and dispersion. Thus, measurements of central tendency and dispersion the mean values of all the variables, which show the average values. For example, the mean contributions of government revenue GR 9.04 percent, for direct tax IPT 7.71 percent, for domestic indirect tax GST 7.40 percent, for foreign trade tax ITT 7.74 percent and for non tax revenue NTR 7.58 percent. Among evident average value of independent variables, non-tax revenue (NTR) over time of (7.58 percent) is greater than the average values of other independent variables, which is in accordance with long-term better government revenue growth in the Ethiopian economy.

Table 4.1: Measures of Central Tendency Dispersion

	LNGR	LNIPT	LNGST	LNITT	LNNTR
Mean	9.037209	7.713256	7.402329	7.743953	7.576893
Median	8.850000	7.470000	7.052375	7.500000	7.715503
Maximum	12.46000	11.31000	11.04329	11.10000	10.74706
Minimum	6.570000	5.160000	5.159055	5.390000	4.802463
Std. Dev.	1.638157	1.685032	1.678442	1.719737	1.538263
Skewness	0.604368	0.626827	0.851664	0.596799	0.157641
Kurtosis	2.366542	2.560034	2.714878	2.062446	2.254257
Jarque-Bera	3.336645	3.162685	5.343866	4.127437	1.174501
Probability	0.188563	0.205699	0.069118	0.126981	0.555854
Sum	388.6000	331.6700	318.3001	332.9900	325.8064
Sum Sq. Dev.	112.7095	119.2519	118.3211	124.2148	99.38261
Observations	43	43	43	43	43

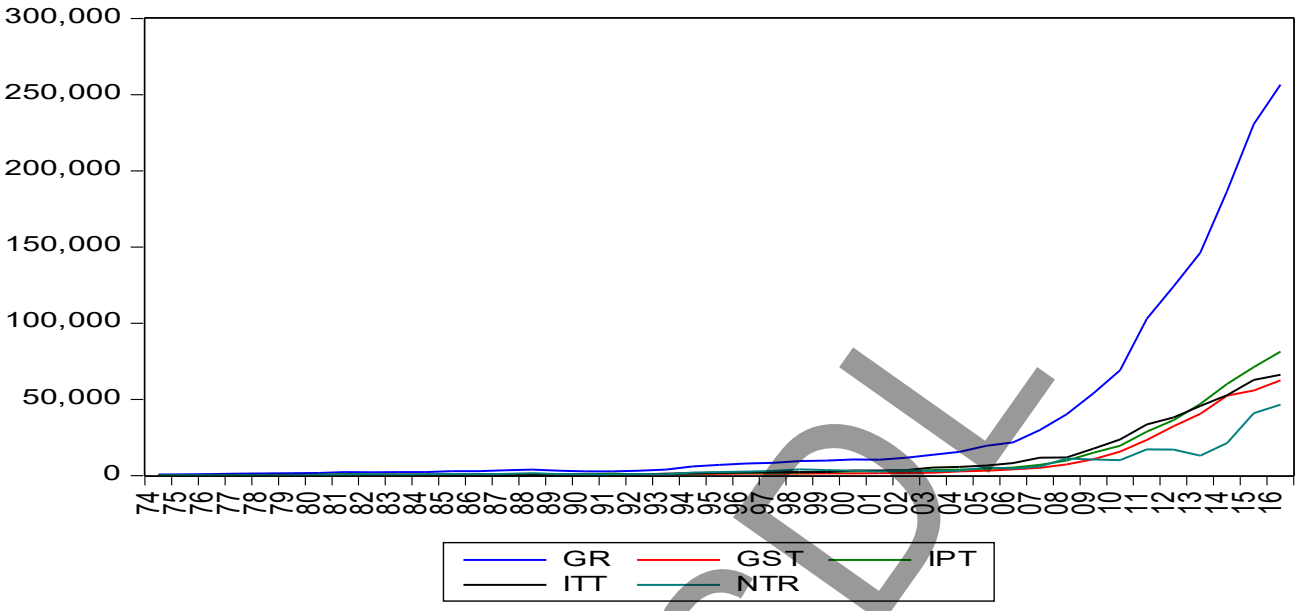
Source: Eviews 8 computed result

The maximum and minimum values of the variables give the range, for example, the minimum value of government revenue (GR) is 6.6 and maximum value is 12.5. Therefore, the range is 5.9. The frequency of noticeable range is displaying large fluctuations in its contribution. Standard deviation also tells us about the scatterings (spread) of the values and it can also be used for comparison purposes off or example as data shows that international trade tax (ITT) has comparatively larger spread than other variables. Moreover, the large difference between maximum and minimum values explained by the large standard deviation for each variable. The descriptions of the dependent and explanatory variables that are including in the model of all the variables are positively skewer and platy kurtic in nature because its kurtosis value is less than three, which is the threshold for normal distribution. Skewness measure of asymmetry of a probability distribution about its mean .While kurtosis is the measure of tallness or flatness of the slope. Hence, from the above table all variables positively skewed.

4.1.1 General Trends of Major components of Tax revenue and Non-Tax revenue growth

Government revenue collected from tax sources in Ethiopia have been significantly increasing in the past 10 years, compared to the preceding decades (Figure 4.1.1) below. Tax revenue annually grew by an average of 30 percent, in government revenue terms, between 2006 and 2015 compared to 12.6 percent in the preceding corresponding decade.

Figure 4.1.1: Growth Trends of GR, GST, IPT, ITT and NTR from row data



As depicted in figure 4.1.1 tax collection has been increasing sharply after 2005 where implementations of the institutional and tax reforms were invigorate.

Figure 4.1.2: Growth Trends of GR, GST, IPT, ITT and NTR from Differenced row data

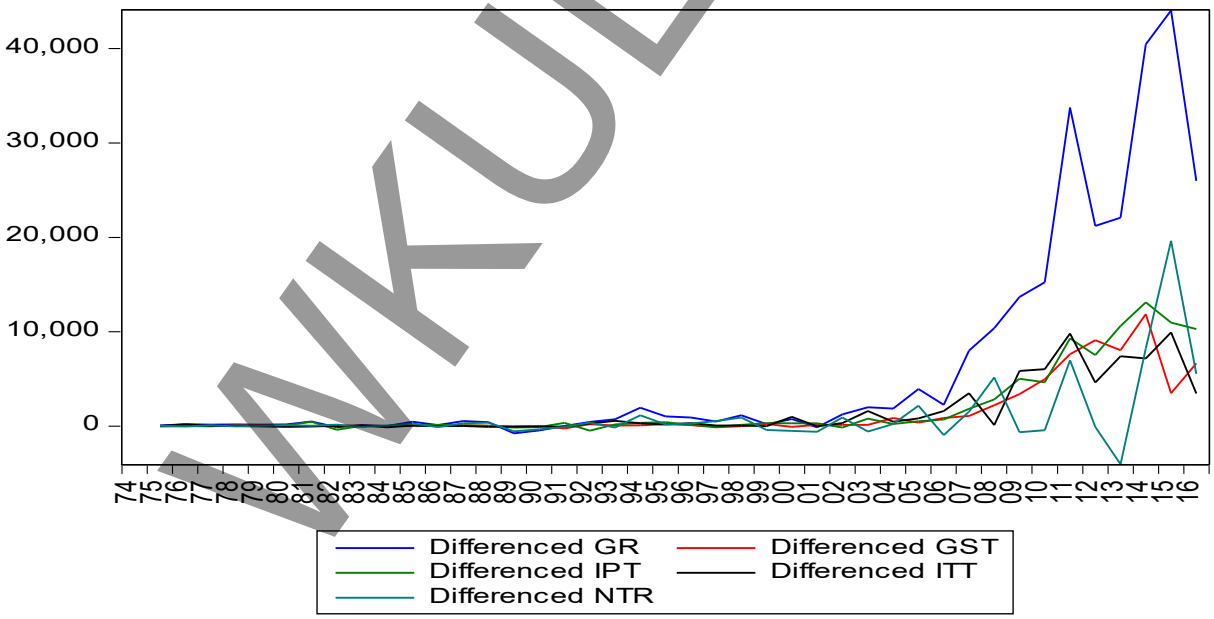


Figure 4.1.3: Growth Trends of GR, GST, IPT, ITT and NTR from Logarithm row data

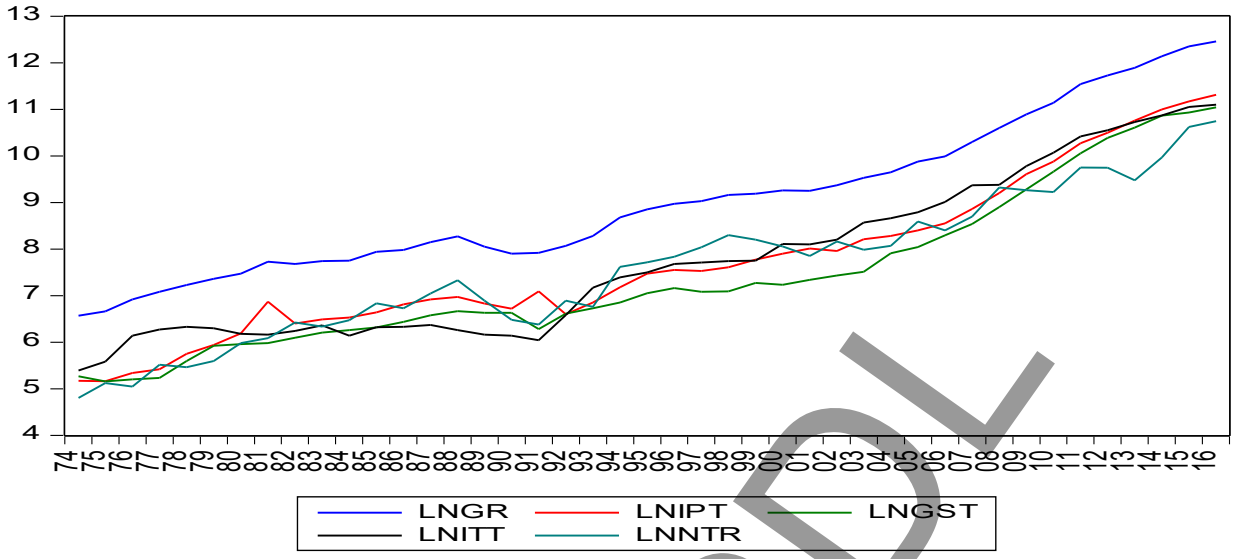
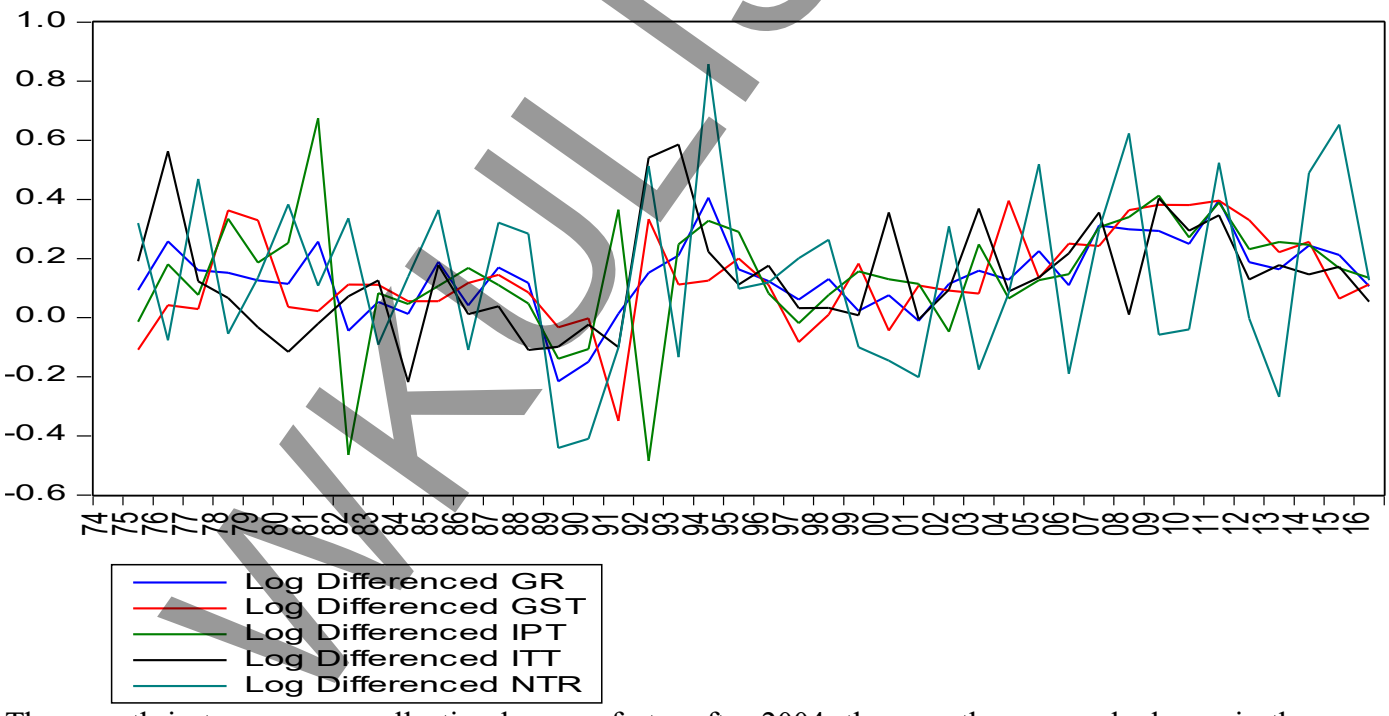


Figure 4.1.1: Growth Trends of GR, GST, IPT, ITT and NTR from Logarithm Differenced data



The growth in tax revenue collection became faster after 2004; the growth was much slower in the preceding two years following the elimination of export taxes. There was a huge jump in the ratio from 7.64 percent in 2009 to 10.33 percent in 2010, due to a massive exchange rate devaluation that happened in the period.

4.2 Results from Econometrics Analysis

This part provides the empirical result of the inferential data that are analyses by co integration order of mechanisms and error correction model (ECM). Using Durbin-Watson d-statistic, Swilk test and testing for stationarity of the time series data.

4.2.2 Unit Root Test

As clearly discussed under methodology chapter, it is necessary to test the nature of stationarity of the variables before running regression analysis. This helps us to avoid the possibility of running a spurious regression, which makes the result to be unreliable and inconsistent. This test can done using the Augmented Dickey-Fuller (ADF) unit root tests. When the ADF test statistics is larger than the critical value in absolute terms at 5 % level of significance the null hypothesis of unit root is reject, and if the ADF test statistics is less than the critical value in absolute terms, we fail to reject the null hypothesis. The time series variables are in log form; LnGR, LnIPT, LnGST, LnITT and LnNTR. They were tested whether they are integrated of order one. The underlying models include a constant and time trend. The essence of the Augmented Dickey-Fuller (ADF) tests is to verify the null hypothesis of non-stationary, the rejection of which requires a negative and significant test statistic. The optimal lag length of the lagged differences of the tested variable is determined by minimizing the Akaike info criterion (AIC).

Table 4.5 Summary of Unit Root Test Results

Variables	Augmented Dickey-Fuller tests								
	level				First difference				Order of integration
	Intercept		Trend and intercept		Intercept		Trend and intercept		
	t-Statistic	Prob.*	t-Statistic	Prob.*	t-Statistic	Prob.*	t-Statistic	Prob.*	
lnGR	0.06541	0.9959	2.12490	0.9999	-3.88102	0.0048	-4.09825	0.0129	I(1)
lnNTR	-0.22260	0.9275	-2.69838	0.2425	-7.24540	0.0000	-7.20630	0.0000	I(1)
lnIPT	1.13960	0.9972	-0.68311	0.9678	-6.93536	0.0000	-7.15864	0.0000	I(1)
lnGST	2.57941	1.0000	-0.06349	0.9939	-4.54129	0.0007	-4.87938	0.0016	I(1)
lnITT	1.12029	0.9971	-0.90875	0.9454	-4.77284	0.0004	-4.96098	0.0013	I(1)

Source: Eviews 8 computed result using NBE data

All the variables are significant at 1%, 5% and 10% critical values.

Each variable has examined to determine if it is stationary or non-stationary employing the unit roots test. If a time series found to be non-stationary, subsequently tests conducted to determine if its first difference is stationary. Using this procedure the order of integration of a time series is determined. Table (4.2 - 4.8) presents the results of Augmented Dickey-Fuller (ADF) test statistics for the log levels and the first differences of the logs of the annual time series data for government revenue growth in Ethiopia for the period 1974 to 2016 G.C. All the variables are non-stationery at levels and stationery at first difference. From Table (4.2 - 4.8) it is evident that all-time series are integrated of the order of one I (1) in the first differences based on the Augmented Dickey-Fuller (ADF) test. The results are compatible with the hypothesis that stationary characterizes the variables in this study.

The results shown in the tables above provide strong evidence that in difference, there is stationary as confirmed by the value of the ADF for each variable whether with trend or no trend. The economic interpretation of co-integration is that two or more variables are link to form an equilibrium or long-run relationship between them. Even thought the series themselves in the short run deviate from equilibrium, they will move together in long run. It implies that the variables are co-integrated.

The Engle and Orange two-step method employed for the test of co-integration. The result of the co-integration test summarized below

4.2.3 Optimal Lag Length

In the Johansen approach, the first step in testing for co integration and estimation a VAR model is to determine the optimal lag length of the VAR. Johansen co integration analysis is very sensitive to the number of lags included in the model, the more lags we lose. The need for optimal lag is aroused because of the sensitivity of Johansen co-integration analysis to the number of lags included in the model. It appears that, in general, too few lag results in rejection of the null hypotheses too easily, while too many lags decrease the power of the test (Verbeek, 2004). This indicates that there is some optimal lag length. Therefore, selection of optimal lag length helps to avoid loss of initial values. The optimal lag order is determined with sequential modified likelihood ratio (LR) test statistics, the Akaiki Information Criterion (AIC), the Schwarz Information Criterion (SC) and the Hannan-Quinn Information Criterion (HQ).

Table 4.6 VAR lag Order selection criteria

VAR Lag Order Selection Criteria						
Endogenous variables: LNGR LNGST LNIPT LNITT LNNTR						
Included observations: 40						
Lag	LogL	LR	FPE	AIC	SC	HQ
0	-5.791109	NA	1.18e-06	0.539555	0.750665	0.615886
1	171.1994	300.8839*	5.98e-10*	-7.059970*	-5.793311*	-6.601986*
2	188.9407	25.72489	9.13e-10	-6.697036	-4.374827	-5.857398
3	207.1517	21.85319	1.51e-09	-6.357585	-2.979827	-5.136294
* indicates lag order selected by the criterion						

Source: Eviews 8 computed result

Lag that provides the minimum value chosen as the optimal lag length that means among the information criterion that provides majority lag has been choose as optimal lag length. While checking up to three lags order to include the 5% significance level, suggest that lag one would optimum lag length in majority cases. The smaller the value of the information criteria is the better the model. The study employs the optimal lag length of one for estimation techniques thus, it can take to estimate Engle-Granger test of co integration, VAR and VECM models. The next step is to Tests for Engle-Granger Co-Integration and Long Run Relationship.

4.2.4 Tests for Engle-Granger Co-Integration and Long Run Relationship

We now turn to apply the approach proposed by Engle and Granger (1987) methodology to examine whether the empirical evidence is consistent with co-integration relationship implied by the theory. As defined by Engle and Granger (1987), the stationary of a variable determines the degree of integration of the variable. Engle and Granger (1987) have demonstrated that the linear combination integrated at any order less than d, and then these variables are integrated.

The results of the co-integration tests reported in Table 4.7. We reject the null hypothesis of no co-integration at 1%, 5% and 10% level of significance in Augmented Dickey-Fuller (ADF) test which strong evidence of having co-integration among the variables. The rejection of null hypothesis also implies that the empirical preference shocks are I (0) processes. Since the error term of the variables with different combinations is stationary, we can make inference that the variables will move together and never diverge in long run although they might show some divergence from time to time.

Table 4.7 Residual based Single Equation Tests for Co-integration

Null Hypothesis: RESID01 has a unit root				
Exogenous: Constant				
Lag Length: 0 (Automatic - based on AIC, maxlag=0)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-4.085313	0.0027
Test critical values:	1% level		-3.596616	
	5% level		-2.933158	
	10% level		-2.604867	
* MacKinnon (1996) one-sided p-values.				

Source: Eviews 8 computed result

The residual is significant at 1%, 5% and 10% critical value.

The residuals from the ordinary least squires (OLS) regression usually taken as a proxy for the linear combination in the empirical analysis. For example, the variables in the regression equations that have the same integration degree I (1) will co-integrate and have a steady state relationship, if and only if the residual of the OLS regression has the integration degree I (0). From table, using the Engle and Granger co-integration procedure, the Augmented Dickey-Fuller ADF test statistic -4.085313 is less than the critical values of t-Statistics at 1% level (-3.596616), 5% level (-2.933158) and 10% level (-2.604867). This implies that residuals are stationary. Thus, the variables are co-integrated and there form, along-run relationship exists between dependent and independent (regressed) variables used. When it is satisfied co-integrated a steady state relationship, the short-run equation can constructed by using the error correction model (ECM) in order to realize long-run equilibrium.

Table 4.8 Residual Engle-Granger Test

Engle-Granger Test Equation:				
Dependent Variable: D(RESID)				
Included observations: 42 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
RESID(-1)	-0.597569	0.144355	-4.139570	0.0002

Source: Eviews 8 computed result

Using Augmented Dickey-Fuller (ADF) unit root test results, the variables are integrated of order one I (1), then ordinary least square estimation (OLS) results indicate long run relationship among the variables. The long-run static model is estimated (see, Table 4.9) and the residual of the long-run static model tested as to whether it is stationary.

Table 4.9 the Estimated Long-Run Static Model

LNGR = C (1)*LNIPT + C(2)*LNGST + C(3)*LNITT + C(4)*LNNTR + C(5)

Dependent Variable: LNGR				
Method: Robust Least Squares				
Included observations: 43				
Variable	Coefficient	Std. Error	z-Statistic	Prob.
LNIPT	0.311342	0.021497	14.48327	0.0000
LNGST	0.191451	0.018763	10.20386	0.0000
LNITT	0.269535	0.009520	28.31177	0.000
LNNTR	0.225324	0.010300	21.87637	0.0000
C	1.420050	0.018944	74.96112	0.0000
R-squared	0.827640	Adjusted R-squared		0.809497
Rw-squared	0.999866	Adjust Rw-squared		0.999866
Akaike info criterion	61.07448	Schwarz criterion		71.30741
Deviance	0.018073	Scale		0.018554
Rn-squared statistic	196789.2	Prob (Rn-squared stat)		0.000000

Source: Eviews 8 computed result

The regression results effect of major tax and revenue growth on government revenue (1974-2016). The total variation in the observed behavior of Government revenue is jointly explained by variation in income and Profit Tax (IPT), goods and service tax (GST), international trade tax (ITT) and None tax Revenue (NTR).

- From the table above, the (R2) which describes the **strength** of the relationship between the independent variables and the dependent variable is 82.76% which means changes in the dependent variable is explained by the independent variable; the remaining 17.24% is accounted for the stochastic error term or variables not included in the model.

- The coefficient of determination (R2) 80.95% showed a value of of the **variations** in dependent variable explained by the explanatory variables in the model while the other proportion (19.05%) is explained by other factors not considered by this study.

Table 4.9 presents the estimation results of the static model, which represents the long-run model and shows the hypothesis that there exists no relationship between income and profit tax (IPT) and government revenue GR growth rejected. This implies that the growth of tax and tax reform have long run positive impact on government revenue growth in Ethiopia. This gives long-run relationship between government revenue growth and total tax and tax reform (i.e. aggregate of income and profit tax (IPT), goods and service tax (GST), international trade tax (ITT) and non-tax revenue (NTR)). The impact is due to the fact that increase in tax and tax reform of major components raises aggregate demand via national income identity and it also generates revenue in the country which in turn also boosts the economy. The regression result shows that the coefficient of total tax and tax reform of income and profit tax (IPT) affects government revenue GR by 31 percent.

Substituted Coefficients:

LNGR = 0.3113*LNIPT + 0.1915*LNGST + 0.2695*LNITT + 0.2253*LNNTR + 1.4201

- Therefore, the model proved that the relationship between components of tax and tax reform on government revenue growth is strong.
- Have positive and significant impacts of independent variables and dependent variable.

The results indicate and confirm that co-integration exists between the series. The residual integrated of order zero, I (0) therefore can be use in the dynamic equation as an error correction mechanism.

Analysis of Error Correction Results

Error Correction Term bellows in table 4.10 shows the short-term dynamics adjustments with the long-term equilibrium relationship.

Table 4.10: Estimated Results of Dynamic Error Correction Model

D(LNGR) = C(1)*LNGR(-1) + C(2)*LNIPT(-1) + C(3)*LNGST(-1) + C(4)*LNITT(-1) + C(5)*LNNTR(-1) + C(6)

Dependent Variable: D(LNGR)				
Method: Least Squares				
Included observations: 42 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNGR(-1)	-1.475238	0.632223	-2.333415	0.0253
LNIPT(-1)	0.326380	0.213307	1.530094	0.1347
LNGST(-1)	0.364762	0.146658	2.487167	0.0176
LNITT(-1)	0.535967	0.172859	3.100599	0.0037
LNNTR(-1)	0.262463	0.149075	1.760612	0.0868
C	2.117565	0.899329	2.354604	0.0241
R-squared	0.474182	Mean dependent var		0.140238
Adjusted R-squared	0.401152	S.D. dependent var		0.125105
S.E. of regression	0.096813	Akaike info criterion		-1.700517
Sum squared resid	0.337416	Schwarz criterion		-1.452278
Log likelihood	41.71085	Hannan-Quinn criter		-1.609527
F-statistic	6.492952	Durbin-Watson stat		1.681830
Prob(F-statistic)	0.000213			

Source: Eviews 8 computed result

The Coefficient of Error correction model (ECM) is negative (Rightly signed) and significant at an astonishing 1% level, thus its ability to correct long-run deviations is very high. The other variables of the model coefficients are positive and based on the R-Square Criterion of ECM.

The correlation in short runs VCM between independent variables and dependent variable. Every independent variables increase by 1% of the dependent variable.

The analysis of hypothesis reveals as the correlation in short run vectors error correction model VECM, between income and profit tax (IPT) and government revenues growth indicator of GR during the period under review was positive.

The results on Table 4.10 every 1% increase in income and profit tax (IPT) revenue causes about 32.64% increase in government revenue GR keeping other variables constant. Likewise, 1% increase in goods and service tax (GST) revenue will cause about 36.48% increase in government revenue GR. In similar vein, a 1% increase in international trade tax (ITT) will cause about 53.60% increase in government revenue GR and even though non-tax revenue (NTR) was insignificant at 5% level of significance, a 1% increase in non-tax revenue (NTR) will cause about 26.25% increase in government revenue GR keeping other factors constant.

4.2.5 Discussion of the findings

Table 4.9 presents the estimation results of the static model, which represents the long-run model and shows the hypothesis that there exists no relationship between tax and tax reform of income and profit tax (IPT), goods and service tax (GST), international trade tax (ITT) and non-tax revenue (NTR) have positive and significant impact on government revenue GR growth. When all the variables are in log form, the coefficients can interpreted as elasticity. The variables are all significant at 5 percent significant level. This supports the theoretical and empirical findings.

Test for the overall significance of the model; the ANOVA of the F-statistics is used. To test for the individual statistical significant of the parameters, The F-statistic of 6.49 provides a reinforcement of the overall statistical significance at the 1% level. The value of see is small. It shows that the predictive ability of the model is high. The t-statistics of the respective variables considered. Considering their probability values, which automatically generated during the computation process by the computer software, the constant term, is significant at 1 % level.

The vectors error correction term represents a deviation from the long run equilibrium, which corrected gradually through a series of short run partial adjustments. Its coefficient is negative as expected and less than one in absolute value, which is statistically significant at 1% critical value, which implies the existence of co-integration among variables and hence, the presence of stable long run relationship. A stable co-integrating relationship adjusts the short-run deviations by the extent of the error correction term. The regression findings of the study showed that all variables of government revenue (GR), income and profit tax (IPT), goods and service tax (GST), international trade tax (ITT) and non-tax revenue (NTR). All variables have positive relationship or impacts and significant at 5% level of significance with their dependent variable of government revenue GR

growth during the periods under review from above table 4.9 of long run analysis result. The coefficients of each independent variable from the regression model indicate how many percentages each of them make changes for government revenue growth in Ethiopia.

The analysis of hypothesis reveals as the correlation in long run analysis result, between income and profit tax (IPT) and government revenues growth indicator of GR during the period under review was positive. The results shown on Table 4.10 also informs that when no money received fromincome and profit tax (IPT), about 1.42 in terms of logarithm worth of expenditure was made by the country for the government revenue GR.

Moreover, every 1% increase in income and profit tax (IPT) revenue causes about 31.13% increase in government revenue GR keeping other variables constant. Likewise, 1% increase in goods and service tax (GST) revenue will cause about 19.15% increase in government revenue GR keeping other variables constant. In similar vein, a 1% increase in international trade tax (ITT) will cause about 26.95% increase in government revenue GR keeping other variables constant and a 1% increase in non-tax revenue (NTR) will cause about 22.53% increase in government revenue GR keeping other factors constant on long run estimate of econometric model analysis. The level of significance from such result again indicates that income and profit tax (IPT) makes a significant contribution to GDP during the period under review of long run analysis. In nutshell, this finding sufficiently supports the conclusions of Tripathi, et al., (2011) that identify VAT as the real goal maker that fosters growth and prosperity in the country.

Based on the data under study, as it often claimed that taxes on income and profit (IPT) are better for government revenue GR growth, the economy of Ethiopia is highly supported by taxes on income and profit (IPT). This attributed to its exclusions of savings that through the process expected to encourage capital accumulations and leading to increment of investment and economic growth. This provides support for the findings of Ruebling (1973) that shows as the objectives of taxing system was encouraging or at least not impairing the country's potential for economic growth. Therefore, the taxes on income and profit (IPT) system should not impede or reduce the productive capacity of the government revenue GR as well as economy rather; it must encourage national economic goals such as capital accumulations and economic growth in general.

Chapter Five: Conclusion and recommendation

5.1 Conclusion

The main objective of this chapter is to present the conclusion and recommendation of the research result. To answer the objective of the research question, the paper used quantitative research design using Secondary data collected from Ministry of finance and Economic Development (MoFEC), Ethiopian revenue and Customs Authority (ERCA), National Bank of Ethiopia for the period 2002 to 2016. The data was analyzed using descriptive and econometric method in order to examine the relationship between the independent variable, income and profit tax (IPT), goods and service tax (GST), international trade tax (ITT), non-tax revenue (NTR) and the dependent variable of government revenue (GR). Therefore, we conclude that:

- The strength of the relationship between the independent variable, income and profit tax (IPT), goods and service tax (GST), international trade tax (ITT), non-tax revenue (NTR) and the dependent variable of government revenue (GR)over all is strong.
- The coefficient of regression (β) for income and profit tax (IPT) is positive and significant with government revenue (GR) at 5% confidence interval for long run estimation; but for short run estimation coefficient of regression (β) is positive and not significant at 5% CI.
- The coefficient of regression (β) for goods and service tax (GST) is for long run and short run estimation positive and significant with government revenue (GR) at 5% confidence interval.
- The coefficient of regression (β) for international trade tax (ITT) is for long run and short run estimation positive and significant with government revenue (GR) at 5% confidence interval.
- The coefficient of regression (β) for non-tax revenue (NTR) is positive and significant with government revenue (GR) at 5% confidence interval for long run estimation but for short run estimation coefficient of regression (β) is positive and not significant at 5% CI.

5.2 Recommendation

The assessment of this study establishing the idea of tax and tax reform facilitating government revenue growth in line with the development objectives and policies such as the National Development Plan, balancing socio-economic challenges it currently faced with, and advancing towards a more inclusive economy benefitting all its citizenry.

To maintain a balanced budget, governments can either curtail their expenditures and investments or tax reform to increase revenues on major components of tax. In Ethiopia, the majority of revenue is collected from a narrow tax base (both the direct income tax and indirect income tax). So increasing the tax base and widening the tax net are fundamental to increase tax to government revenue ratio. If the tax bases were not growing at the same rate with the government revenue of economic growth rate, it would be difficult to increase the tax to government revenue ratio. Continuously broadening the tax base by improving tax administration, trade facilitation and enhancing capacity is critically important to increase the ratio. Therefore, werecommended that:

- Ethiopian Revenue and Custom Authority should increase the tax base by widening the tax net is fundamental to increase tax to government revenue ratio.
- Ethiopian Revenue and Custom Authority should increase the tax payer awareness by giving trainings to the tax payers in order to comply with the tax policy.
- Government should work (efficient tax administration) around informal sectors, black market and underground economy have the ability to affect the government revenue growth in Ethiopia.
- This research examined only the relationship between major components tax as well as non-tax revenue and government revenue growth in Ethiopia. Therefore, a further study should do to examine the economic impact of tax and tax reform on government revenue growth in Ethiopia.

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Appendix

Appendix-A: Tables of Augmented Dickey-Fuller Unit root test and other tests

Table 4.4: Test for LnNTR at level and difference with Intercept and Intercept & Linear Trend

Null Hypothesis: LnGR has a unit root Exogenous: Constant Lag Length: 0 (Automatic - based on AIC, maxlag=0)				Null Hypothesis: LnGR has a unit root Exogenous: Constant, Linear Trend Lag Length: 0 (Automatic - based on AIC, maxlag=0)			
Augmented Dickey-Fuller test statistic		t-Statistic	Prob.*	Augmented Dickey-Fuller test statistic		t-Statistic	Prob.*
		2.124908	0.9999			0.065414	0.9959
Test critical values:	1% level	-3.596616		Test critical values:	1% level	-4.192337	
	5% level	-2.933158			5% level	-3.520787	
	10% level	-2.604867			10% level	-3.191277	
Null Hypothesis: D(LnGR) has a unit root Exogenous: Constant Lag Length: 0 (Automatic - based on AIC, maxlag=0)				Null Hypothesis: D(LnGR) has a unit root Exogenous: Constant, Linear Trend Lag Length: 0 (Automatic - based on AIC, maxlag=0)			
Augmented Dickey-Fuller test statistic		t-Statistic	Prob.*	Augmented Dickey-Fuller test statistic		t-Statistic	Prob.*
		-3.881025	0.0048			-4.098254	0.0129
Test critical values:	1% level	-3.600987		Test critical values:	1% level	-4.198503	
	5% level	-2.935001			5% level	-3.523623	
	10% level	-2.605836			10% level	-3.192902	

* MacKinnon (1996) one-sided p-values.

Source: own computation using NBE data

Table 4.4: Test for LnNTR at level and difference with Intercept and Intercept & Linear Trend

Null Hypothesis: LnNTR has a unit root Exogenous: Constant Lag Length: 0 (Automatic - based on AIC, maxlag=0)				Null Hypothesis: LnNTR has a unit root Exogenous: Constant, Linear Trend Lag Length: 0 (Automatic - based on AIC, maxlag=0)			
Augmented Dickey-Fuller test statistic		t-Statistic	Prob.*	Augmented Dickey-Fuller test statistic		t-Statistic	Prob.*
		-0.222604	0.9275			-2.698385	0.2425
Test critical values:	1% level	-3.596616		Test critical values:	1% level	-4.192337	
	5% level	-2.933158			5% level	-3.520787	
	10% level	-2.604867			10% level	-3.191277	
Null Hypothesis: D(LnNTR) has a unit root) Exogenous: Constant Lag Length: 0 (Automatic - based on AIC, maxlag=0)				Null Hypothesis: D(LnNTR) has a unit root) Exogenous: Constant, Linear Trend Lag Length: 0 (Automatic - based on AIC, maxlag=0)			
Augmented Dickey-Fuller test statistic		t-Statistic	Prob.*	Augmented Dickey-Fuller test statistic		t-Statistic	Prob.*
		-7.245403	0.0000			-7.206305	0.0000
Test critical values:	1% level	-3.600987		Test critical values:	1% level	-4.198503	
	5% level	-2.935001			5% level	-3.523623	
	10% level	-2.605836			10% level	-3.192902	

* MacKinnon (1996) one-sided p-values.

Source: own computation using NBE data

Table 4.5: Test for LnIPT at level and difference with Intercept and Intercept & Linear Trend

Null Hypothesis: LnIPT has a unit root Exogenous: Constant Lag Length: 0 (Automatic - based on AIC, maxlag=0)				Null Hypothesis: LnIPT has a unit root Exogenous: Constant, Linear Trend Lag Length: 0 (Automatic - based on AIC, maxlag=0)			
Augmented Dickey-Fuller test statistic		t-Statistic	Prob.*	Augmented Dickey-Fuller test statistic		t-Statistic	Prob.*
		1.139604	0.9972			-0.683118	0.9678
Test critical values:	1% level	-3.596616		Test critical values:	1% level	-4.192337	
	5% level	-2.933158			5% level	-3.520787	
	10% level	-2.604867			10% level	-3.191277	
Null Hypothesis: D(LnIPT) has a unit root) Exogenous: Constant Lag Length: 0 (Automatic - based on AIC, maxlag=0)				Null Hypothesis: D(LnIPT) has a unit root) Exogenous: Constant, Linear Trend Lag Length: 0 (Automatic - based on AIC, maxlag=0)			
Augmented Dickey-Fuller test statistic		t-Statistic	Prob.*	Augmented Dickey-Fuller test statistic		t-Statistic	Prob.*
		-6.935364	0.0000			-7.158649	0.0000
Test critical values:	1% level	-3.600987		Test critical values:	1% level	-4.198503	
	5% level	-2.935001			5% level	-3.523623	
	10% level	-2.605836			10% level	-3.192902	

* MacKinnon (1996) one-sided p-values.

Source: own computation using NBE data

Table 4.6: Test for LnGST at level and difference with Intercept and Intercept & Linear Trend

Null Hypothesis: LnGST has a unit root Exogenous: Constant Lag Length: 0 (Automatic - based on AIC, maxlag=0)				Null Hypothesis: LnGST has a unit root Exogenous: Constant, Linear Trend Lag Length: 0 (Automatic - based on AIC, maxlag=0)			
Augmented Dickey-Fuller test statistic		t-Statistic	Prob.*	Augmented Dickey-Fuller test statistic		t-Statistic	Prob.*
		2.579412	1.0000			-0.063490	0.9939
Test critical values:	1% level	-3.596616		Test critical values:	1% level	-4.192337	
	5% level	-2.933158			5% level	-3.520787	
	10% level	-2.604867			10% level	-3.191277	
Null Hypothesis: D(LnGST) has a unit root) Exogenous: Constant Lag Length: 0 (Automatic - based on AIC, maxlag=0)				Null Hypothesis: D(LnGST) has a unit root) Exogenous: Constant, Linear Trend Lag Length: 0 (Automatic - based on AIC, maxlag=0)			
Augmented Dickey-Fuller test statistic		t-Statistic	Prob.*	Augmented Dickey-Fuller test statistic		t-Statistic	Prob.*
		-4.541296	0.0007			-4.879383	0.0016
Test critical values:	1% level	-3.600987		Test critical values:	1% level	-4.198503	
	5% level	-2.935001			5% level	-3.523623	
	10% level	-2.605836			10% level	-3.192902	

* MacKinnon (1996) one-sided p-values.

Source: Own computation using NBE data

Table 4.7: Test for LnITT at level and difference with Intercept and Intercept & Linear Trend

Null Hypothesis: LnITT has a unit root Exogenous: Constant Lag Length: 0 (Automatic - based on AIC, maxlag=0)				Null Hypothesis: LnITT has a unit root Exogenous: Constant, Linear Trend Lag Length: 0 (Automatic - based on AIC, maxlag=0)			
Augmented Dickey-Fuller test statistic		t-Statistic	Prob.*	Augmented Dickey-Fuller test statistic		t-Statistic	Prob.*
		1.120297	0.9971			-0.908757	0.9454
Test critical values:	1% level	-3.596616		Test critical values:	1% level	-4.192337	
	5% level	-2.933158			5% level	-3.520787	
	10% level	-2.604867			10% level	-3.191277	
Null Hypothesis: D(LnITT has a unit root) Exogenous: Constant Lag Length: 0 (Automatic - based on AIC, maxlag=0)				Null Hypothesis: D(LnITT has a unit root) Exogenous: Constant, Linear Trend Lag Length: 0 (Automatic - based on AIC, maxlag=0)			
Augmented Dickey-Fuller test statistic		t-Statistic	Prob.*	Augmented Dickey-Fuller test statistic		t-Statistic	Prob.*
		-4.772844	0.0004			-4.960981	0.0013
Test critical values:	1% level	-3.600987		Test critical values:	1% level	-4.198503	
	5% level	-2.935001			5% level	-3.523623	
	10% level	-2.605836			10% level	-3.192902	

* MacKinnon (1996) one-sided p-values.

Source: own computation using NBE data

Test Equation:

Dependent Variable: RESID^2

Method: Least Squares

Date: 05/28/19 Time: 03:51

Sample: 1975 2016

Included observations: 42

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.076320	0.082540	0.924651	0.3613
LNGR(-1)	-0.044219	0.058025	-0.762062	0.4510
LNIPT(-1)	0.025655	0.019577	1.310440	0.1983
LNGST(-1)	0.008480	0.013460	0.630042	0.5326
LNITT(-1)	0.003168	0.015865	0.199663	0.8429
LNNTR(-1)	0.006095	0.013682	0.445478	0.6586

R-squared	0.204127	Mean dependent var	0.008034
Adjusted R-squared	0.093589	S.D. dependent var	0.009333
S.E. of regression	0.008885	Akaike info criterion	-6.477256
Sum squared resid	0.002842	Schwarz criterion	-6.229018
Log likelihood	142.0224	Hannan-Quinn criter.	-6.386267
F-statistic	1.846664	Durbin-Watson stat	2.315200
Prob(F-statistic)	0.128417		

Null Hypothesis: RESID01 has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on AIC, maxlag=0)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.081234	0.0027
Test critical values:	1% level	-3.596616	
	5% level	-2.933158	
	10% level	-2.604867	

- MacKinnon (1996) one-sided p-values.

Residual Engle-Granger Test

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(RESID01)

Method: Least Squares

Date: 05/28/19 Time: 00:52

Sample (adjusted): 1975 2016

Included observations: 42 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RESID01(-1)	-0.588756	0.144259	-4.081234	0.0002
C	0.004898	0.003664	1.336656	0.1889

R-squared	0.293991	Mean dependent var	-5.12E-05
Adjusted R-squared	0.276340	S.D. dependent var	0.026343
S.E. of regression	0.022409	Akaike info criterion	-4.712232
Sum squared resid	0.020087	Schwarz criterion	-4.629486
Log likelihood	100.9569	Hannan-Quinn criter.	-4.681902
F-statistic	16.65647	Durbin-Watson stat	1.771530
Prob(F-statistic)	0.000208		

Table of Original data used for analysis

Yr	LNGR	LNIPT	LNGST	LNITT	LNNTR
1974	6.57	5.17	5.267858	5.39	4.802463
1975	6.66	5.16	5.159055	5.58	5.122177
1976	6.92	5.34	5.201256	6.14	5.045809
1977	7.08	5.42	5.230467	6.27	5.514879
1978	7.23	5.75	5.593819	6.33	5.460564
1979	7.36	5.94	5.923186	6.30	5.595826
1980	7.47	6.19	5.959587	6.18	5.979190
1981	7.73	6.87	5.981919	6.16	6.087456
1982	7.68	6.40	6.094021	6.24	6.423896
1983	7.74	6.49	6.205487	6.36	6.332249
1984	7.75	6.53	6.260919	6.14	6.470490
1985	7.94	6.64	6.316804	6.32	6.835077
1986	7.98	6.81	6.434547	6.33	6.725874
1987	8.15	6.92	6.579251	6.37	7.047256
1988	8.27	6.97	6.665047	6.26	7.331650
1989	8.05	6.83	6.632529	6.16	6.891016
1990	7.90	6.72	6.630420	6.14	6.481424
1991	7.92	7.09	6.281332	6.04	6.379614
1992	8.07	6.60	6.614712	6.58	6.893119
1993	8.28	6.85	6.726353	7.17	6.759719
1994	8.68	7.18	6.851714	7.39	7.617858
1995	8.85	7.47	7.052375	7.50	7.715503
1996	8.97	7.55	7.163583	7.68	7.834665
1997	9.03	7.53	7.080649	7.71	8.035642
1998	9.16	7.61	7.090827	7.74	8.299440
1999	9.19	7.77	7.273967	7.75	8.199500
2000	9.26	7.90	7.230614	8.11	8.054234
2001	9.25	8.01	7.339135	8.10	7.852874
2002	9.37	7.96	7.430826	8.20	8.161957
2003	9.53	8.21	7.512738	8.57	7.986529
2004	9.65	8.28	7.908755	8.66	8.069342
2005	9.88	8.40	8.042629	8.79	8.588794

2006	9.99	8.55	8.293174	9.01	8.399249
2007	10.30	8.86	8.535622	9.37	8.698181
2008	10.60	9.20	8.899061	9.38	9.321535
2009	10.89	9.61	9.280551	9.78	9.263500
2010	11.14	9.88	9.661754	10.07	9.224153
2011	11.54	10.27	10.05733	10.42	9.748224
2012	11.73	10.50	10.38716	10.55	9.744909
2013	11.89	10.76	10.60903	10.73	9.476889
2014	12.14	11.00	10.86605	10.87	9.966754
2015	12.35	11.17	10.93074	11.05	10.61987
2016	12.46	11.31	11.04329	11.10	10.74706

Figure Individual Log first order differenced of row data

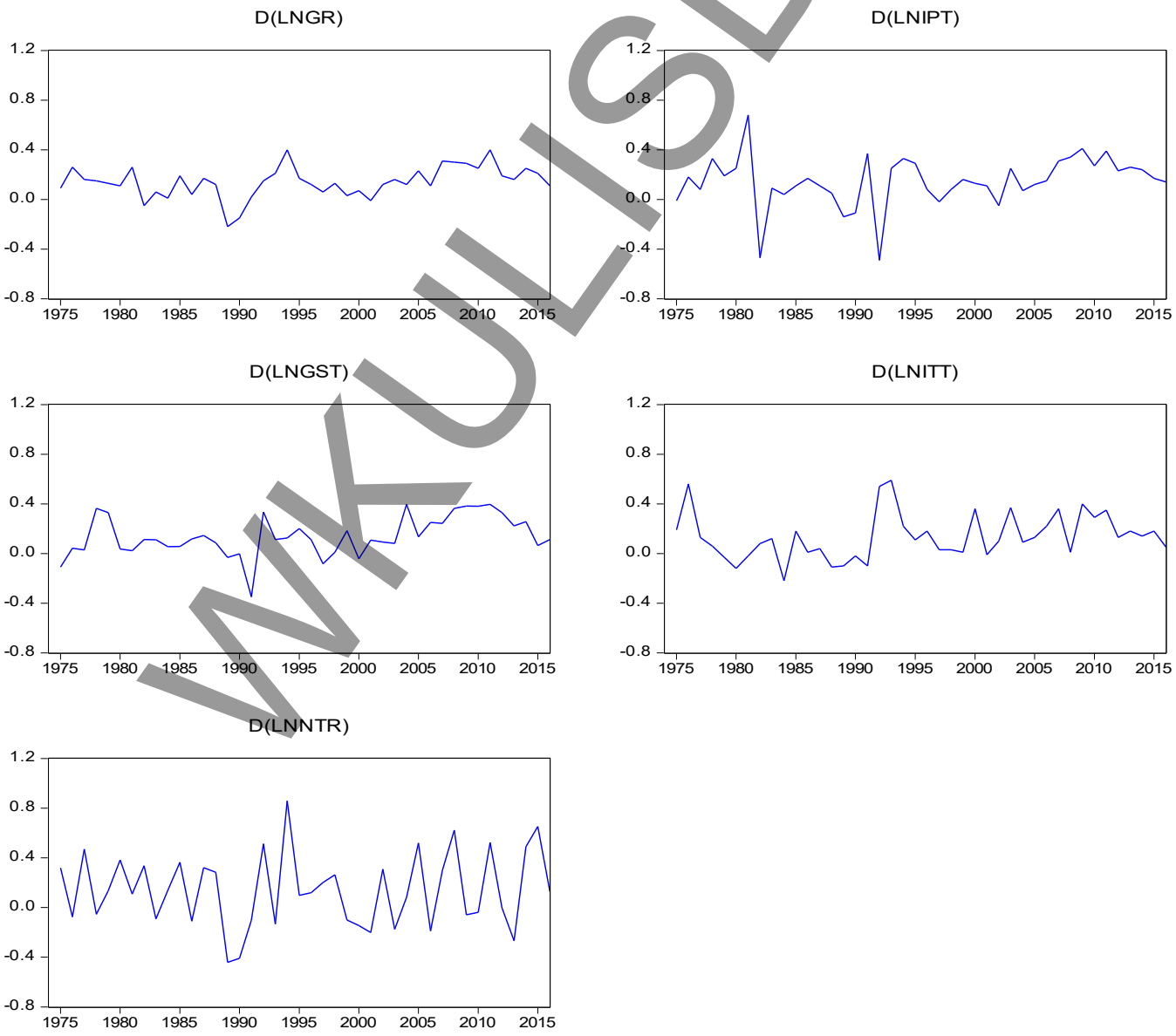

Figure of the fitted value