



***ADDIS ABABA UNIVERSITY  
COLLEGE OF BUSINESS AND ECONOMICS  
DEPARTMENT OF ACCOUNTING AND FINANCE***

***FACTORS INFLUENCE TAX REVENUE IN ETHIOPIA***

***A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR  
DEGREE OF MASTER OF SCIENCE IN ACCOUNTING AND FINANCE***

***BY:***

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### **Declaration**

I, undersigned, hereby declare that this thesis work entitled, Factors influence tax revenue in Ethiopia (1997-2015), submitted by me for the award of the degree of Master of Science in Accounting and Finance by Addis Ababa University, is original work and it hasn't been presented for the award of any other Degree, Diploma and other titles of any other University or institution and that all sources of material used for the thesis have been duly acknowledged.

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## Statement of Certification

This is to certify that the thesis prepared by Aliye Gebi, entitled factors influence tax revenue in Ethiopia over the period (1997-2015) and submitted in partial fulfillment of the requirement for the degree of Master of Science in Accounting and Finance complies with the regulations of University and meets the accepted standard with respect to originality and quality.

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### ***Abstract***

*Tax revenue to GDP ratio is very low in Ethiopia as compared to some of Sub-Saharan African countries. In this study an attempt is made to analyze empirically factors influence tax revenue such as broad money supply, exchange rate, urbanization, import, foreign remittances, and mining share in GDP so as to assess the response of tax revenue to changes in its factors in Ethiopia. The study is essential because its results can be used to help policymaker take appropriate measure when raising tax revenue and also used in making appropriate tax reform in an event of budget deficit. The study mainly used secondary data collected over the period 1997-2015 from Ministry of Finance and Economic Cooperation (MoFEC), Central Statistical Agency (CSA), and National Bank of Ethiopia (NBE). For the present study, both descriptive statistics and econometric tools were employed to analyze and present the obtained data. The results obtained suggest that broad money supply, and exchange rate are positively significant in influencing tax effort in Ethiopia. But the results indicate that import in GDP is statistically insignificant factor to influence tax effort in Ethiopia. Finally, it is found that Ethiopia's tax revenue is very responsive to change in its factors which create more challenge to the government in creating a stable tax system.*

*Key words: factors; tax revenue; time series*

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## Acronyms

CLRM	Classical Linear Regression Model
CSA	Central Statistical Agency
EU	European Union
FDRE	Federal Democratic Republic of Ethiopia
GDP	Gross Domestic Products
GNP	Gross National Products
IMF	International Monetary Fund
MDGs	Millennium Development Goals
MoFEC	Ministry of Finance and Economic Cooperation
MoFED	Ministry of Finance and Economic Development
NBE	National Bank of Ethiopia
OCED	Organization for Cooperation and Economic Development
OLS	Ordinary least square
SSA	Sub-Saharan Africa countries
UN	United Nations
UNDP	United Nations Development program

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## **Chapter One: Introduction**

Taxation is compulsory contribution to the government. Governments need money so as to finance different sectors such as activities of general government, economic, social, national security and so on. Source of finance can be taxes, gifts and grants, administrative revenue, commercial revenue, borrowings, and issue of currency and etc of which taxation takes sustainable and lion's share in financing those sectors. In this chapter, topics that are discussed include background of the study, statement of the problem, research questions, hypothesis statement, objectives of the study, significance of the study, scope and limitation, and organization of the study.

### **1.1 Background of the study**

Tax revenue is vital for the growth and sustainability of the economy of both developed and developing countries. Firstly, taxation is the main source of central government revenue, even in aid-dependent low income countries. Secondly, taxation aims to meet the social and public needs by providing public goods and services. Thirdly, government need tax revenue to establish armed forces and judicial systems to ensure the secure environment and justice of the society. In many poor developing countries, a low tax-revenue/GDP ratio prevents these nations from undertaking ambitious expenditure programs. Thus a rapid increase in domestic revenue and a corresponding increase in public services is a policy priority. However, one needs to be cautious about increased public spending and increased taxation, as distortionary taxes begin to reduce growth when pushed beyond certain levels: tax bases are not simply 'given' to governments: they can be grown or destroyed (Bird, 2008).

Though it was very difficult to get reliable documentary evidence as to when exactly taxation was introduced, it is believed that history of Ethiopian taxation comes together with the establishment of the government. Taxation was a source of government revenue from early Aksumite Kingdom in Ethiopia around 500AD ( Misrak, 2008).

Taxes during the Derg regime were similar to those imposed during the imperial regime (Haile sellasie-I) except that there was an increase in the coverage of the tax bases and tax rates and tax amendments. Accordingly, land tax, rental income tax and tithe were revoked. The health and

educational taxes were also cancelled and the remaining types of taxes were extensively amended. During the transitional government of Ethiopia, proclamation No 7/1992 was issued for the establishment of regional governments. Accordingly, regional government has powers and duties to borrow money from domestic sources and to levy taxes in the light of fiscal federalism. In this period, amendments have made to employment income tax, business income tax, sales and excise tax, export duties, import duties, and there is also a newly introduced taxes like mining income tax, capital gain tax( Misrak, 2008).

The fiscal system witnessed important changes over time. Government revenue increased during the 1980s and reached a peak of 24.8 percent of GDP in 1988/89 before it declined drastically during the subsequent two years of political turmoil in the country. The fiscal regime was extremely coercive and led to distortions in resource allocation. The prohibitively high marginal tax rate had driven most activities underground and tax evasion and corruption were on the rise. Such a system was indeed unsustainable and the change in the political regime precipitates a collapse in the fiscal system. The decline in revenue was particularly severe from business profit taxes, export taxes and revenue from government investment income. The collection of government revenue collapsed from about a quarter of GDP to about 10.6 percent by 1991/92 (MoFED,2002).

The transitional government introduced a number of fiscal and monetary policy reforms that had mixed implications on the revenue collection. The amendment in the tax codes, devaluation and gradual depreciation of the exchange rate, elimination of taxes on exports (except coffee duties), and the privatization process have had important implications on the amount and structure of government revenue. The average domestic revenue to GDP ratio has recovered gradually and for the period 1991/92 to 2001/02 the average reached about 17.2 percent with a gradual and yet increasing trend. The average tax revenue for the period was about 11.7 percent of GDP (MoFED,2002).

Research on Economic Policy Implementation and Management(2004) stated that the series of tariff and tax reform programs have helped to increase both Federal Government and national revenue. As per the reports of the Ministry of Revenue, the Federal Revenue has increased to

Birr 6.7 billion in 2002/2003 from Birr 2.54 billion in 1993/94 as the result of which federal revenue as percentage of the GDP increased from 8.97% in 1993/94 to 11.87% in 2002/03.

Increase in revenue mainly attributes to the modest increase in both direct and indirect taxes, mainly the foreign trade taxes. As well, national tax revenue as percentage of GDP has increased to 15.1% in 2002/03 from 10.9 in 1993/94. Despite, the series of reforms and increase in revenue, the overall budget deficit with and without grant has been increasing. For example, the overall budget deficit without grants as percent of GDP has increased from -5.2% in 1996/97 to -14.5% in 2002/03. This shows that performance of revenue collection in Ethiopia has been low compared to the rest of Sub-Saharan African countries which is over 23% of the GDP(NBE,2002/03).

There is an increasing dependency on foreign trade, especially import, taxes in recent years. The devaluation of the currency and its subsequent depreciation over time somewhat expanded the domestic currency denominated tax base on imports. The tax revenue-to-GDP ratio for developing countries is about 18 percent and for African countries is about 20 percent. The ratio of tax revenue in GDP for advanced countries is significantly higher than developing countries, at about 38 percent, reflecting the state of economic development, the tax base and the efficiency of tax administration. This pattern could broadly be attributable to the structure and performance of the economy, the administration of the taxation system, and the design of the taxation system ( Yohannes, and Sisay,2009).

For the period 1980/81-2001/02, the government on average extracted about 18 percent of GDP from the public and spent about 28 percent of GDP, of which recurrent spending took more than 19 percent and only 9 percent left for capital spending. This behavior of excessive spending left an average fiscal gap of about 10 percent. Foreigners provided about 3 percent as charity and lent about 4 percent of GDP and the rest was financed mainly from domestic banking system. A longer view of the fiscal resource allocation behavior of the government, despite marginal changes in some aspects of the fiscal components, suggests that there has not been enduring and significant shift in policy over the past two or so decades. The current government in power, except some marginal changes, shares important characteristics and behavior in fiscal policy with

its predecessor. The current regime spends about 26 percent of GDP and extracts from the public about 17 percent of GDP (MoFED,2002).

Foreigners provide about 3 percent as grants and lend about 3.7 percent of GDP. The remainder of about 2.4 percent of GDP has been financed from domestic borrowing. The relative performance of the current fiscal regime shows some improvement and yet it still covers about 23 percent of its spending by borrowing. The result of such features of government revenue and expenditure has been the emergence of persistent fiscal deficits and the accumulation of public debt. Domestic government revenue apparently has been barely enough to cover recurrent government expenditure let alone to generate resources for financing capital expenditure. The level of deficit has increased so much so that in recent years it has been as much as the total tax revenue collection of the government. Such a stance of fiscal policy is unsustainable and the external grants, even if important to partially narrow the gap, would not and could not resolve the problem. The government has increased its appetite for borrowing from foreign sources to bridge the gap and when external borrowing does not satisfy it resorts quite easily to borrow from the domestic banking sector ( Yohannes and Sisay,2009).

As far as the current system of fiscal federalisms and division of revenues in Ethiopia goes, the FDRE Constitution(1995) provides that the Federal Government and the States all collect taxes and shall share revenue, taking the federal arrangement into account(Article 95, FDRE Constitution). By taking into consideration principles such as ownership of revenue, regional character of revenues sources, convenience for administration, population, and wealth distribution, sharing of revenue between the Federal Government and the State Governments serves the following purposes: enhancing the efficiency of the central and the regional governments so as to enable them to carry out their respective duties and responsibilities; helping the regional governments to develop their regions on their own initiatives; narrowing the existing gap in development and economic growth between the regions of the country; and encouraging common interest activities of the regions.

According to Article 96 of the FDRE Constitution the revenues of the Federal Government include customs duties, taxes and other charges levied on the importation and exportation of

goods; income tax collected from employees of the Federal Government and international organizations; income, profit, sales and excise taxes collected from Federal Government owned enterprises; taxes collected from national lotteries and other games of chance; taxes collected from income generated through air, rail, and sea transport services; taxes collected from rent of houses and Federal Government owned properties; charges and fees on licenses issued and services rendered by the Federal Government; taxes on monopolies; and Federal stamp duties.

Gebrie Worku Mengesha(2008) a good tax system should be efficient in that it should be able to waste as little money and resources as possible. Efficiency can be measured against three standpoints: administrative costs, compliance costs and excess costs. These three relate to the cost of operation of the tax system, to its flexibility and certainty. Administrative costs are the costs to the government (and ultimately to the taxpayer) of collecting tax revenue. In order to collect taxes, the government must hire collectors to collect the revenue; data entry clerks to process the tax returns; auditors to inspect questionable returns; lawyers to deal with disputes; and accountants to track the flow of money. All these costs are those that are incurred by the government to administer the tax system. Compliance costs, on the other hand, are the costs (other than the taxes themselves) of making tax payments to the government. In order to comply with their obligation to pay taxes, citizens are bound to incur certain costs. These compliance costs include not only the money that people spend on accountants, tax preparers and/or tax lawyers, but also the time spent in filing tax returns and keeping records. The third aspect of efficiency, excess burden, relates to tax-induced change in behavior displayed by tax payers. When the government levies taxes on goods, it distorts consumer behavior as people are bound to buy less of taxed goods and more of other goods. Thus the intrinsic value of goods is shadowed by the taxes which are imposed on the goods. In general the larger any of these costs get, the worse it is for efficiency.

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 are treated as negative revenue.

Ethiopian Chamber of Commerce and Ethiopian Business Development Services Network (2005) stated in their tax assessment in Ethiopia as nature of consumption of public goods is such that consumption by one does not reduce consumption for others. Besides, consumption of public goods by an agent does not exclude others from doing same. Such nature of public goods therefore makes them impossible for private suppliers to avail them at market prices like the commodities. Government intervention in the supply of public goods is therefore inevitable and can only be done if the public pays taxes for the production and supply of such goods.

In addition, taxes play an essential role in economic planning and development since it is the main source of revenue for government. As a result, domestic revenue mobilization is important to sustainable development. Economic policies are based on expected tax revenue and the tax policy is a fundamental component of economic policies for every country. Aggry (2011) indicated as many Sub-Saharan African countries face difficulty in raising domestic revenue in the form of taxes to finance public projects. This occurred as a result of low per capita income, reliance on subsistence agriculture, poorly structured tax systems, and weak tax and customs administrations.

Toye(1978) indicated that the link between taxation and economic development is a tie between a universal desire and a form of government action that is believed to be the means to an end. When actual tax revenue collected falls short of the projected revenue, it affects developmental plans of that nation. Currently; there is socio-economic pressure on most developing countries government to provide energy, water, waste management and other social services. However, governments find it difficult to raise taxes to carry out these activities. Considerable effort and attention in most developing countries have been committed to policies best suited to the promotion of economic developments, where the major focus of these efforts is the search for desirable fiscal policies with considerable stress being placed on the role of taxation as an

instrument of economic development. Tax policy has always been an important instrument for increase revenue. This is as true in developing countries as in developed countries, where tax revenue is the major source of domestic revenue. By understanding this tax revenue advantages for nations, various studies attempted to investigate the determinants of tax revenue performances Teera (2003); Weiss (1969); Tanzi and Zee (2000) and Imam and Jacobs (2007).

Imam and Jacobs (2007) explained that real per capita income, share of agriculture in GDP, trade openness, inflation and corruption are the most important determinants of a tax collection. Gupta (2007) finds that several structural factors like per capita GDP, share of agriculture in GDP, trade openness, foreign aid, foreign debt and some new institutional variables like corruption and political stability are statistically significant and strong determinants of revenue performance. From this view point, in the last decades nations have been seriously looking for ways to get better on their internally generated funds to carry out public sector expenditure of which Ethiopia is no exception.

Tax revenue to GDP ratio in Ethiopia is very low comparing with some Sub-Saharan African countries. The role of tax revenue is imperative in bringing economic development, where its working is determined by different socio-economic and political factors. Furthermore, the ability to generate adequate fiscal revenue is determined by different socio-economic and political factors, which may have different effects on tax revenue either negatively or positively. Therefore, examining the effects of tax revenue on economic performance relies on identifying the factors influencing tax revenue. Hence, understanding the reason for low level of tax revenue create remedial mechanisms to correct prevailing problems of tax revenue.

There is a persistence of the prevalence of fiscal deficit in Ethiopia of many reasons for such occurrence is a low tax revenue to GDP ratio which is below the average for SSA countries, and also which includes Ethiopia among fragile states that generate ratio less than 14% of GDP level that has been regarded as inadequate by the UN to attain Millennium Development Goals. Hence, to minimize such problem, it is necessitated to identify factors influence tax revenue effort in Ethiopia.

## **1.2. Statement of the problem**

Reaching the Millennium Development Goals (MDGs) will require a concerted effort from both developed and developing countries. Aid from developed countries will have to rise significantly to achieve the MDGs. Although the donors have pledged to increase development aid by US\$18.5 billion (from a 2002 level of US\$58 billion), the World Bank (2004) estimates that developing countries could effectively use at least US\$30 billion initially. The developed countries also need to aim for improved market access for developing countries' exports by eliminating tariffs and domestic subsidies. However, because excessive reliance on foreign financing may in the long run lead to problems of debt sustainability, developing countries will need to rely substantially on domestic revenue mobilization. The experience with domestic resource mobilization of developing countries over the last 25 years has been mixed. In countries such as Botswana, Israel, Kuwait and Seychelles, the central government revenue's share in GDP has been more than 40 percent on average. On the other hand, countries such as Argentina, Niger, Guatemala and Burkina Faso have struggled to raise their revenue above 11 percent (IMF, 2007).

The Doha Declaration confirms the need to step up efforts to enhance tax collection, investment and other private flows, with a view to supporting pro-poor development. Yet half of Sub-Saharan African countries still mobilize less than 17% of their GDP in tax revenues, below the minimum level of 20% considered by the UN as necessary to achieve the Millennium Development Goals(UNDP, 2010).

In Ethiopia the total tax revenue as percentage of GDP is very low compared to its tax capacity. According to International Monetary Fund (2013) over the period 1999/2000 - 2011/12 the average tax revenue was 4.8% of GDP, derived from international transactions. The same report posited that income tax were 3.7% of GDP and SSA's average were 4.79% of GDP. Whereas, domestic tax on goods and services stood at 2.4% of GDP, and SSA's average were 7.2%. This is lower even to its neighbors like Kenya (8.5%), Uganda (6.89%), and Tanzania (6.23%) of GDP. This shows that the percentage share of tax revenue to GDP of Ethiopia is still lower both to its revenue capacity and Sub-Saharan standard.

Fragile states are the ones furthest away from the Millennium Development Goals. They will be home to more than half of the world's poor after 2018. Yet the aid they receive is shrinking, and they have limited access to alternatives for financing development such as remittances and foreign direct investment. The domestic revenues they raise are not enough. Evidence in this report suggests that fragile states mobilise less than 14% of their GDP in tax revenues - a level the United Nations deems to be inadequate to achieve the Millennium Development Goals. Yet accountable tax systems are perhaps more crucial in fragile states than anywhere else. Domestic revenues are not only a way out of aid dependency- they are important for building mutual accountability between citizens and states (OECD, 2014).

For the fiscal years 2011/12, and 2012/13 Ethiopian tax revenue as percent of GDP was 11.6%, and 12.5%, whereas total expenditure and net lending(cash basis) was 16.8%, and 18.1%. This resulted in budgetary deficit discrepancy without grant and non-tax revenue of 5.2%, and 5.6% as percent of GDP respectively. The overall deficit balance excluding grant was 2.9%, and 3.5% for the same period(IMF, 2014).

Despite the government of Ethiopia has carried out various reform measures to boost tax revenue; the efforts did not seem to bring the desired results which resulting in the fiscal deficit. For instance, Ethiopian tax revenue to GDP ratio for the past four years 2011, 2012, 2013, and 2014 was 11.5% , 11.5%, 12.6%, and 12.7% respectively. And the average tax revenue to GDP ratio in Ethiopia for 2000-2014 was 11.1%. This is lower than that of Kenya (16.4%) and the Sub-Saharan average of about 17% for the same period. It is only similar to that of Uganda which recorded 11.4% (NBE, 2014).

In general, there have been studies on factors influence tax revenue in some developing countries; in Ethiopia there are also some studies, for example, Belay Zewude Ayyele ,and Tesfaye Alemayehu Daba(2015) examined the determinants of tax revenue performance in Ethiopia federal government, and determinants of tax revenue in Ethiopia respectively. Despite of these recent empirical results, still there is a prevalence of gap which may be filled gradually through the application of possible resolution. The above studies did not incorporate policy

variables like broad money supply, exchange rate, urbanization, import, foreign remittances, and mining share in GDP.

### **1.3. Research questions**

- What is the impact of broad money supply on tax revenue to GDP ratio in Ethiopia?
- What is the influence of exchange rate on tax revenue to GDP ratio in Ethiopia?
- What is the impact of urbanization on tax revenue in Ethiopia?
- What is the influence of import in GDP on tax revenue in Ethiopia?
- What is the effect of foreign remittances on tax revenue in Ethiopia?
- What is the effect of mining share in GDP on Ethiopia's tax revenue?

### **1.4. Hypotheses statement**

Purpose of the hypothesis statement is to reveal which of the explanatory variables most influences the dependent variable and also statement that may be proved or disproved by the researcher. The following research hypotheses were formulated based on the knowledge gained from reading of both the theoretical and empirical literature regarding factors influence tax revenue.

The hypotheses are:

Broad money supply has positive effect on tax revenue; for example, Chaudhry and Munir(2010), but Mahdavi(2008) found negative relation with tax revenue.

**H<sub>1</sub>**: There is no relationship between broad money supply and tax revenue.

Exchange rate has positive effect on tax revenue; for example, Oyetunji (2012). However; Muibi and Sinbo (2013) found that negative result which shows exchange rate depreciation has negative effect.

**H<sub>2</sub>**: There is no relationship between exchange rate and tax revenue.

Urbanization has positive effect on tax revenue; for example, Mahdavi (2008) found that higher percent of urban population in total population relates with a higher tax to GDP ratio.

**H<sub>3</sub>:** There is no relationship between urbanization and tax revenue.

Import has positive relationship with tax revenue; for example, Eltony(2002), and Velaj and Prendi(2014) revealed tax revenues are directly related to imports and this relationship is positive. However, Teera(2002) showed significant negative impact relationship of import on tax revenue.

**H<sub>4</sub>:** There is no relationship between import and tax revenue.

Foreign remittances have positive effect on tax revenue; for example, Chaudhry and Munir(2010).

**H<sub>5</sub>:** There is no relationship between foreign remittances and tax revenue.

Mining share in GDP has positive relationship with tax revenue; for example, Botlhole(2010), Leuhold(1991) and Stotsky and WoldeMariam(1997), and Alm et al(2004) found positive significant relationship. However, Eltony(2002) found negative significant relation.

**H<sub>6</sub>:** There is no relationship between share of mining in GDP and tax revenue.

## **1.5. Objectives of the study**

### **1.5.1. General objective of the study**

Factors influence tax revenue in general in developing countries in particular has been an open debate. Tax revenue well enhances economic growth in developing countries than other sources of finance; however, the tax revenue performance is poor in these countries. In similar way, in Ethiopia, tax revenue is a crucial source of financing economic and social activities despite its poor performance. Thus, the general objective of this study is to pinpoint out the major factors influence tax revenue in Ethiopia using both descriptive statistics and ordinary least square (OLS) estimation method econometric model.

### **1.5.2. Specific objectives**

In line with the above general objective, the study has the following specific objectives through which the six explanatory variables are involved to determine the effect of each on tax revenue to GDP ratio in Ethiopia:

- I. To assess the relationship between broad money supply and tax revenue to GDP ratio in Ethiopia
- II. To describe the relationship between exchange rate and tax revenue to GDP ratio in Ethiopia.
- III. To measure the impact that urbanization has on tax revenue to GDP ratio in Ethiopia.
- IV. To identify the relationship between import and tax revenue to GDP ratio in Ethiopia.
- V. To elaborate the relationship between foreign remittances and tax revenue in Ethiopia.
- VI. To pinpoint out the relationship between mining share in GDP and tax revenue in Ethiopia.

### **1.6. Scope and limitation of the study**

The study designed to assess factors influence tax revenue in Ethiopia using descriptive statistics ,and ordinary least square (OLS) estimation method econometric model. The present study also delimited to testing the relative significance of the selected variables in explaining tax revenue to GDP ratio in Ethiopia for over the past long period of time (1997-2015). Sample period selected for the study covers only 19 years time series data due to unavailability or lack of organized data for some variables beyond the study period which is the limitation of this paper. And variables selected include six explanatory variables for explaining dependent variable. These are broad money supply, exchange rate, urbanization, import, foreign remittances and mining share in GDP. Software that was used as a regression analysis tool was Eview-8 software program

through which descriptive statistics, and OLS estimation method econometric model analysis as well was applied.

### **1.7. Significance of the study**

Despite the government is aimed at accelerating tax revenue, budget deficit is persistently increasing in Ethiopia. Thus, the importance of this paper is that it may help policymakers take appropriate policy measure when raising tax revenue. This paper may also guide the policymakers on the appropriate fiscal policy measure to overcome the prevalence of budget deficit imbalance. In addition, it helps other researchers as a reference for further study.

### **1.8. Organization of the study**

The remaining chapters of the study are organized as follows: chapter two presents related literature review on tax revenue effort, chapter three discusses research methodology employed and sources of data used in the study, chapter four deals with empirical results and discussion, and chapter five presents conclusion and recommendation.

## **Chapter Two: Related Literature Review**

In this chapter topics that are presented and elaborated include theoretical literature under which principles/canons of taxation, classification of taxes on the basis of different criteria are discussed, and empirical literature; conceptual framework; important variables and gap identified in literature review are also highlighted.

### **2.1. Theoretical literature**

#### **2.1.1. Principles/canons of taxation**

According to (Bhatia, 2003), and (Gupta, 2001) principles of taxation refer to the appropriate criteria to be employed in developing (devising) and evaluating a good tax structure /system of a country.

- I. Equity/fairness principle: it states that similarly situated tax payers should be taxed similarly. This principle takes two forms: horizontal equity and vertical equity.
- II. Certainty principle: states that taxes should not be arbitrary and based on relationship rather it should be based on statutory bases.
- III. Simplicity principle: it states that as complex tax system may result in error ( due to failure to understand the laws), tax evasion( violation of the tax laws) and disrespect for the system, tax laws should be simple and clear to understand by the tax payers and they should not be confronted with accounting, administrative or other difficulties.
- IV. Convenience principle: it also called convenient for payment principle, states that taxes should be due at a time and in a manner which is most likely convenient for tax payers.
- V. Efficiency/Economy of collection principle: states that the costs to collect taxes should be kept as minimum as possible for both the government and tax payers.
- VI. Neutrality principle: it states that a tax system should be free from bias.
- VII. Economic growth/Buoyancy principle: it states that a tax system should not impede or reduce the productive capacity of an economy by over-taxing. For instance, a tax system should not significantly affect international competitiveness, investment, and production like labor supply.
- VIII. Transparency and visibility principle: this principle implies that tax payers should know that a tax exists, why tax exists, and how tax is imposed on them.
- IX. Appropriate government revenue principle: this implies that taxes should be predictable by

the government, meaning, a tax system should enable a government to predict how much tax revenue will likely be collected and when so as to undertake its budgeting and its appropriation process accurately.

- X. Minimum tax gap principle: a tax system should be structured to minimize tax gap/non-compliance. Tax gap exists if the actual tax owed (tax imposed) is not the same as the tax voluntarily paid by the tax payer.

### **2.1.2. Classification of taxes**

The government has constituted a tax mix incorporating both direct and indirect taxes. Direct taxes comprise of personal income tax ( rates progressively increasing from 0 to 35%), rental income tax (30%), business profit tax (35%) and other incomes tax at federal level ,and agricultural income tax, rural and urban land use fee at regional and chartered cities.

Indirect taxes are comprised of domestic taxes and foreign trade taxes, including customs duties, excise tax, value added tax, surtax, and withholding tax. The Ethiopia Revenues and Customs Authority (ERCA), the mandated institution for collecting government revenue, collects customs duty only on imported items as no tax on exports is levied, except on raw skins and hides (150%). Customs duty provides significant revenue to the government (contributed 12% of the gross domestic revenue between 2000 and 2014). The remaining major indirect tax categories include excise tax that is levied on selected goods such as luxury goods and basic goods which are demand inelastic, excise tax is also applied to goods which are considered hazardous to health and may cause social problems(NBE,2014).

In the literature of public finance, taxes have been classified by various economists in various ways in different angles. They classify taxes according to who pays them, who bears the ultimate burden of them, the extent to which the burden can be shifted, and various other criteria. The following are the common dimensions to classify taxes according to (Bhatia,2003), (Gupta,2001), (Mill,1909), and (Taylor,1968):

1. Based on impact and incidence of tax
2. Based on tax bases
3. Based on tax determinant

4. Based on number of taxes
5. Based on sources of taxes

### **1) Based on impact and incidence of tax**

On the basis of impact (immediate burden) and incidence (ultimate burden) of tax, taxes are classified into two broad categories: direct and indirect taxes.

#### I. Direct taxes

Direct taxes are those taxes whose impact (immediate burden) and incidence (ultimate burden) fall on the same person.

#### II. Indirect taxes

Indirect taxes are those taxes whose impact (immediate burden) and incidence (ultimate burden) fall on different persons.

### **2) Based on tax bases**

Taxes based on tax bases are classified into: income tax, property tax, and commodity taxes.

i) **Income taxes:** income taxes are direct taxes which are levied on income of individuals and businesses such as on employment income, business income, rental income, interest income, royalty income, income from rendering technical services and dividend income.

ii) **Property taxes:** are also direct which are levied on property of persons or business such as on wealth, land, estate, and inheritance.

iii) **Commodity/expenditure taxes:** are indirect taxes which are levied on goods and services. Value added tax, turnover tax, excise tax, import duty and export duty are categorized as commodity taxes.

### **3) Based on tax determinants**

Taxes based on tax determinant, that is, what determines the tax amount, value or quantity, are classified in to two: Specific taxes and Ad-valorem taxes.

#### i) Specific taxes

Specific taxes are taxes which are levied on goods and services at a fixed amount based on their weight, size, quantity, or other measurement other than the value of goods and services.

#### ii) Ad-valorem taxes

The word Ad-valorem is derived from a Latin word to say –according to the value.” When taxes are levied on commodities according to their value, they are termed as ad-valorem taxes.

#### **4) Based on number of taxes**

Taxes can also be classified into single and multiple taxes based on number of taxes. Single tax is a tax that occurs in a system in which the taxes are levied only on one object, that is, on one class of people. On the contrary, multiple taxes are taxes whose tax bases are diversified. Multiple tax system consists of many kinds of taxes (both direct and indirect).

#### **5) Based on sources of transaction**

Based on sources of taxable transaction, taxes can also be classified into domestic taxes and international taxes. Domestic taxes are related to transaction executed in the country in which tax payer resides whereas international taxes are related to foreign operations.

### **2.2. Empirical literature**

Chaudhry and Munir (2010) identified the determinants of low tax revenue in Pakistan by employing time series econometric techniques over the period 1973- 2009. The empirical results suggest that openness, broad money, external debt, foreign aid and political stability are the significant determinants of tax efforts for Pakistan economy with expected signs of the estimated coefficient. Agriculture share, manufacturing share and service sector share turn out to be insignificant and the sign of the coefficient of agriculture share deviates from expectations and same as the sign of GDP per capita and urbanization. Exchange rate in this main regression is negatively related which shows that as exchange rate increases, tax revenue decreases. And foreign remittances have positive sign which is not surprising but this is statistically insignificant. The study concludes that Pakistan economy can generate high tax to GDP ratio by boosting the openness, money supply, political stability, level of literacy and by controlling income inequality, tax evasion and tax exemption.

Addison and Levin analyzed the determinants of tax revenue performance in Sub-Saharan Africa by using a dataset which includes 39 countries in SSA over a time period covering the years from 1980 to 2005. Their results significantly suggest that the overall tax to GDP ratio is

higher in more open economies, a relatively smaller size of agriculture sector, less populous and peaceful countries. The introduction of VAT also has a significant positive impact on the total tax-GDP ratio. However, several of these variables affect the different components of total tax revenue in a statistically significant way. They find evidence of fairly strong relationships between some variables and the components of tax revenue. These include the positive effect of openness, per-capita GDP and a negative impact on the trade-tax GDP ratio.

Mahdavi(2008) used the level and composition of tax revenue in developing countries: evidence from unbalanced panel data and his sample is an unbalanced pooled data set which consists of a total of 769 annual observations for 43 countries over the period 1973–2002. His result found that statistical evidence suggesting that the tax to GDP ratio is higher where the size of international trade sector, percent of urban population, adult literacy rate, and per capita income are higher. On the other hand, an increase in aid inflow, percent of “old” population, population density, the degree of monetization, and the rate of inflation were found to be associated with a lower tax to GDP ratio.

Bird and Martinez-Vazquez (2008) they analyzed tax effort in developing countries and high income countries: the impact of corruption, voice and accountability (1998 and 2000 unbalanced panel). Improving institutions such as enhancing voice or accountability and reducing corruption may not take longer nor be necessarily more difficult than changing the opportunities for tax handles and economic structure, such as the relative share of the non-agriculture sector in the economy or the weight of imports and exports in GDP. In particular, an improvement in voice and accountability will lead to a higher tax effort.

Botlhole (2010) the study analyzed the determinants of tax effort and constructed a tax effort index for Sub-Sahara Africa over 1990-2007. The main variables; Per Capita GDP, openness and agricultural sector, found to be important determinants of the tax ratio are consistent with those in the literature. Newly employed variables of value added in industry and service are however found to adversely affect tax revenues, while tax compliance is good for raising tax revenue. It is also shown that the quality of institutions is an important determinant. Contrary to previous findings on the impact of mining, the findings imply that resource revenues increase the tax ratio;

furthermore, the positive effect of the interaction term implies that improving quality of institutions would yield more revenue from this source.

Gupta(2007) his primary objective was to investigate revenue performance of a large set of developing countries over the past 25 years. He found that several structural factors like per capita GDP, share of agriculture in GDP and trade openness are statistically significant and strong determinants of revenue performance. He also looked at the impact of foreign aid and foreign debt on revenue mobilization. His results indicate that although foreign aid improves revenue performance significantly, debt does not. Among the institutional factors, he found corruption has a significantly negative effect on revenue performance.

Karagoz(2013) the study is to investigate the determinants of tax revenue in Turkey and the results of the regression equation are in consistent with a priori expectations. Estimation results reveal that tax revenues in Turkey significantly affected by agricultural and industrial sector share in GDP, foreign debt stock, monetization rate of the economy and urbanization rate whereas the sign of the agricultural sector's share is negative as expected. The results suggest that openness to foreign trade has no significant impact on tax revenues in Turkey.

Piancastelli(2001) the study conducted on measuring the tax effort of developed and developing countries. Cross country panel data analysis 1985/95 provides a comprehensive update of the measurement of the tax effort in both developed and developing countries. The results of this update are fully consistent with, and reinforce, earlier patterns. Namely, the role of per capita income, the trade/GDP ratio and the agricultural sector GDP share are still the most consistent variables for explaining tax ratios, although a number of other variables have also been tested. In the cross section estimates, results for the full sample of 75 countries, both the GNP per capita and trade ratios, are significant. Sectoral variables were not always significant. In the middle income results, however, both agriculture and industry show significant results: the first with a robust negative elasticity; the second with a robust positive elasticity.

Muibi and Sinbo (2013) analysed macroeconomic determinants of tax Revenue in Nigeria (1970-2011) and reveal findings from the analysis level and the growth rate of economic activity

impacted positively on tax revenue in Nigeria and that exchange rate depreciation and inflation rate have adverse effect on the tax revenue. Trade liberalization policy seems not to have adversely affected the tax revenue and rather it has positively stimulated revenue generation contrary to expectation. External debt burden also has negative effect on the amount of tax revenue that government can generate. The general conclusion is that macroeconomic instability and level of economic activities are the main drivers of tax buoyancy and tax effort in Nigeria.

Belay Zewude Ayyele investigated the determinants of tax revenue performance in Ethiopian federal government by using time series data from 1992-2013. His results revealed that GDP, foreign direct investment, openness, external debt, as well as inflation, drive positive changes in tax revenues. Foreign aid is affecting tax revenue performance negatively in this study, because as per literature when government gets aid from other country, they are not giving attention for other means of financing. Study displayed Gross domestic product, openness and foreign direct investment are the main variables that government should increase their volume since they are the main contributor for revenue performance in a country.

Oyetunji(2012) conducted study on the determinants of tax revenue in Nigeria discloses co-integration result indicated the presence of co-integration. That is, there is long run equilibrium relationship between the variables in question. He showed that per capita income, share of manufacturing in GDP, share of service sector in GDP, exchange rate of naira in terms of dollar, money supply, inflation rate, and dummy variable for political stability are positively related to tax ratio, whereas agriculture share in GDP, openness, external debt, and foreign aid are negatively confirmed through the investigation of determinants of tax revenue in Nigeria (1986-2010).

Tesfaye Alemayehu Daba(2015) identified determinants of tax revenue in Ethiopia through share of industrial sector, foreign direct investment, inflation rate, interest rate, and per capita income by employing data over the period 1999/00-2013/14. His result reveals that foreign direct investment has significantly negative effect, and inflation rate has negative insignificant effect; whereas per capita income and share of industrial sector in GDP have significantly positive effect; and saving interest rate has insignificant positive effect on tax revenue to GDP ratio.

Rodrik (1998) analysed the question regard as why do more open economies have bigger governments? And he points out that there is a strong positive correlation between trade openness and the size of the government, as societies seem to demand (and receive) an expanded role for the government in providing social insurance in more open economies subject to external risks. The degree of external indebtedness of a country may affect revenue performance as well. To generate the necessary foreign exchange to service the debt, a country may choose to reduce imports. In such a scenario, import taxes will be lower. Alternatively, the country may choose to increase import tariffs or other taxes with a view to generate a primary budget surplus to service the debt. Foreign aid has also been identified as a factor that may affect revenue performance. A key distinction appears to be whether the aid is used productively or simply to finance current consumption expenditures. Moreover, the composition of aid has an important effect on revenue performance. Gupta et al. (2004) find that concessional loans are associated with higher domestic revenue mobilization, while grants have the opposite effect.

Agbeyegbe et al.(2004) examined a panel of 22 Sub-Saharan countries over the 1980-1996 period and found evidence that the relationship between trade liberalization and tax revenue is sensitive to the measure used to proxy trade liberalization, and while the traditional measure of trade liberalization is not strongly linked to aggregate tax revenue or its main components in general, the collected-tariff liberalization measure is linked to higher income tax revenue. The only determinant of total tax revenue that was consistently found significant for both measures of openness was inflation, and it was negatively related to tax revenues.

Eltony (2002) by taking the data of 16 Arab countries for the period 1994-2000, regressed the tax share in GDP on agriculture share, mining share and export share, per capita income, imports, and the outstanding foreign debt. The result showed the negative and significant effect for mining and agricultural share, positive and significant effect for per capita income and import. The study concluded that the main determinants of the tax share in the GDP for Arab Countries are per capita income, share of agriculture and mining.

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) and are not utilizing their full capacity of tax revenue and therefore have the potential for financing budgetary imbalance through raising tax revenue.

Teera (2002) examined the tax system and tax structure of Uganda to investigate the factors effecting tax revenue in the country. He used the time series data of the period 1970 to 2000 and estimated a model. His results showed that agriculture ratio, population density and tax evasion affect all type of taxes. GDP per capita showed the surprising negative sign. Tax evasion and openness (as measured by import ratio) showed the significant negative impact. Aid variable showed positive sign since aid in Uganda always supported imports especially raw material so not surprisingly.

Wawire(2011) assessed determinants of value added tax revenue in Kenya and the determinants of VAT include GDP, institutional, demographic, and structural features of the economy. Among the notable ones that seem to have had positive influences on VAT revenues are introduction of sales tax in 1973, coffee and tea booms, introduction of sales tax on imports in the fiscal year 1984/85, budget rationalization Programme, establishment of KRA in 1995, favourable weather, TMG, and the volume of international trade. VAT revenues respond with lags to changes in their respective tax bases. This means that the previous levels of tax bases (such as GDP, volume of trade, and volume of imports) have significant influence on the present levels of VAT revenues.

Ghura(1998) analysed tax revenue performance in Sub-Saharan Africa, using panel data of 39 countries in the region during 1985-1996. Confirmation is provided of the important role played by the income and elements of the tax bases in influencing the tax revenue-GDP ratio. The latter rises with income and the level of openness of economy, as well as with reductions in the share of the agriculture in GDP. The results also indicate that a number of other factors typically not considered in the empirical literature significantly influence the tax ratio. In particular, the

economic policy environment and the level of corruption matter for the tax revenue-GDP ratio: the latter decline with rising inflation and corruption. Also, there is evidence that countries that have implemented structural reforms on a sustained basis have raised their tax revenue higher than countries that have not. Furthermore, an increase in the level of human capital is associated with an increase in tax revenue. In addition, increases in the level of external grants are associated with lower tax ratio.

Yuksel et al.(2013) analyzed tax revenue and main macroeconomic indicators in Turkey and they have utilized the necessary tools of time series analysis to figure out the nature of prevailing relation among total tax revenue and main macroeconomic indicators in Turkey with emphasis on the Granger causality over 1980-2012 covering the period of serious shocks to the Turkish economy. Regarding the Granger causality of total tax revenue with other macroeconomic variables, no such relation is proven for GDP, domestic credits, short term debt, inflation, trade and population whereas there is bidirectional causality for with tax revenue-real exchange rate, and tax revenue-M2 pairs. In addition, unidirectional causality from tax revenue to foreign direct investment, and external debt stock.

Velaj and Prendi(2014) conducted study on tax revenue-the determinant factors. Revenue from taxes in Albania has a growing trend for the entire study period 1993-2013 except for 2012 where they have a decrease of 1%. It is not associated with the growth rate of imports. There is a positive correlation of percentage growth of revenues from taxes with the rate of inflation and the GDP growth rate, while the link with unemployment is negative. On the other hand, tax revenues are directly related to imports and this relationship is positive.

Mutascu and Danuletiu(2013) examined the literacy impact on tax revenues. The main results show that a very low literacy is associated with reduced tax revenues. Further, the government inputs increase as the literacy level increases, reaching a maximum point. After this level, the tax revenues decrease even if the literacy has an ascendant tendency, registering a minimum level. Finally, the tax revenues increase in parallel manner with the literacy index.

Sharma and Singh (2015) analyzed determinants of tax-revenue in India over the period 1999/2000-2011/2012: a principal component analysis approach. The findings of the PCA revealed that three factors impacts tax revenue generation in India namely; ‘\_Core Developmental Indicators’, ‘\_Growth Boosters’, and ‘\_Sustainable Development Indicators’. Further, results of multiple regression analysis show that all the three factors play a positive role towards tax-revenue generation in India. As per the PCA results the foremost factor that influences tax-revenue in India is the Core Developmental Indicators [incorporate variables like inflation, population density, total expenditure (developmental and non-developmental), GNI per capita and exports]. Next factor that emerged from the PCA is Growth Boosters. It comprises of growth variables (like GDP growth rate, industrial growth rate and services growth rate). Last factor is the Sustainable Development Indicators. India is known to be an agrarian-based economy. However, growth rate of this primary sector has always been a source of concern for the policy-makers.

Gaalya(2015) conducted trade liberalization and tax revenue performance in Uganda. This study has attempted to identify the determinants of tax revenue performance over the past 18 years in Uganda. The study investigates determinants for indirect taxes, direct taxes, international trade tax revenue as well as the aggregate total tax revenue performance. The structural variables show that income (GDP), the share of agriculture to GDP and share of industry to GDP are statistically significant and determine tax revenue performance with expected signs of the estimated coefficients. The international factors such as trade openness, exchange rate and FDI are statistically significant and determine tax revenue performance with expected signs on the estimated coefficients.

Bahl (2003) by using the data of OECD and less developed economies explained the determinants of tax revenue. He used the non-agricultural share of GDP, openness and the rate of population growth all of which showed the positive and statistically significant result. Simple correlation between tax effort and the size of shadow economy showed the negative but statistically significant result.

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.

Ahsan and Wu (2005) examined the tax share in GDP for developed and developing countries for 1979-2002 and found the negative and significant relation of agriculture share, GDP per capita, and population growth to the tax ratio while trade share in GDP has positive and significant relation but corruption has negative and insignificant relation.

Lotz and Morss (1967) used the data of developed and developing countries to find the ratio of tax revenue to GNP. They used per capita GNP and openness for this. Their results showed the positive and statistically significant effect for both per capita GNP and for openness. Tanzi (1987) found only the per capita income effect positive and significant by taking the data of only developing countries.

Ehrhart (2009) assessed the relationship between democracy and domestic taxes in developing countries using a panel of 66 developing countries over 1990 – 2005. He found that democracy matters for achieving higher domestic taxes mobilisation. The constraints on the executive are especially of importance to counter the government's propensity to cave in for special interests and be insufficiently welfare minded. Moreover, democracy is specifically needed in natural resource rich countries to make natural resources rents contribute to higher domestic taxes and no longer an impediment to a sustained tax system.

Li and Lopez-Murphy(2010) studied historical tax revenue downturn episodes where tax revenue to GDP ratios decline sharply and explored the link between tax revenues and imports. They documented that downturn episodes of at least one percentage point of GDP in one year are common. The tax types that account for these episodes are different in advanced, emerging and developing, and oil producing countries. They find that tax revenue downturns and import

contractions have a statistically significant link. Finally, they show that changes in imports are a statistically significant determinant of changes in tax revenues even when controlling for changes in the output gap and in the terms of trade.

Ajaz and Ahmed (2008) analyzed the effect of institutional and structural variables (corruption and governance) on tax revenues using panel data set for 25 developing countries. The Generalized Method of Moments regression results show that institutional variables have significant effect on all taxes. The results show that corruption has adverse effect on tax collection, while good governance contributes to better performance in tax collection.

Bilquees (2004) measured the buoyancy and elasticity of tax revenue system in Pakistan over the period 1974 to 2003 by using the Divisia Index Approach and analyzed the factors responsible for the resulting size of elasticity coefficients. Her estimates of buoyancy suggested that tax changes did not lead to significant revenue augmentation. However, high coefficient of sales tax with respect to GDP base reflected the inclusion of service sector and utilities in sales tax net, which has serious implications for the poor.

Leuhold (1991) and Stotsky and WoldeMariam (1997) examined the tax share for African countries by taking the share of agriculture in income, mining share, per capita income and export ratio as its determinants. Their results showed that agricultural share has negative; mining share has positive while the share of foreign trade and the share of foreign grants and loans have also positive and statistically significant relation.

Ndiaye (2014) examined effect of institutions on tax revenue performance in Senegal over the period 1970-2013. The results reveal that tax revenue performance in Senegal is found to be much higher with institutional reforms than without institutional reforms. The econometric results show that high tax revenue is associated with high quality of institutions. This suggests that the institutional reforms undertaken in the period of the study 1970 to 2013 have contributed to increase significantly tax revenue performance in Senegal. These results are widely consistent with empirical findings from the literature.

Benedek et al.(2012) reexamine the relationship between aid and domestic tax revenues using a more recent and comprehensive dataset covering 118 countries for the period 1980–2009. Analysis of disaggregated tax data shows that the relationship between ODA grants and certain taxes (VAT, income taxes, and excises) is also negative, except in the case of trade taxes. In the latter case, higher ODA grants are associated with rising tax revenue, reflecting increased imports made possible by rising external grants. In addition, they find that in countries with weak institutions, the increase in external grants is associated with an equivalent reduction in tax revenues. In these countries, both ODA grants and ODA loans have a negative impact on tax revenue-to-GDP ratio.

Davoodi and Grigorian(2007) examined a cross-country analysis of Armenia’s stubbornly low tax collection. They document Armenia’s low tax-to-GDP ratio relative to a large number of benchmarks and shows that its persistently lower tax revenue buoyancy—particularly, income tax buoyancy—is a potential contributory factor. The tax-to-GDP ratio can also be increased significantly if Armenia improves its VAT productivity by broadening the base, removing exemptions, and improving its VAT refund mechanism to boost tax morale and reduce the willingness to stay in the informal, shadow economy.

### **2.3. Conceptual framework**

Conceptual framework elaborates the relationship between tax revenue to GDP ratio and each explanatory variable namely broad money supply, exchange rate, urbanization, import, foreign remittances, and mining share in GDP. Based on literature, the following conceptual framework has been established to guide this particular paper. As per theoretical and empirical literature, the effects of those explanatory variables were discussed and accordingly broad money supply, exchange rate, urbanization, import, foreign remittances, and mining share in GDP have positive effect on tax revenue.

Broad money supply has positive relationship with tax revenue; for example, Chaudhry and Munir(2010), Oyetunji(2012), and Karagoz(2013), but Mahdavi(2008) found negative relation with tax revenue.

Exchange rate has positive effect on the tax revenue; for example, Oyetunji (2012) explored that exchange rate of naira in terms of dollar is positively related to tax ratio. However, prior literature such as Chaudhry and Munir (2010), and Muibi and Sinbo (2013) found results which shows exchange rate depreciation has negative effect.

Urbanization has positive effect on the tax revenue; for example, Mahdavi (2008) found that higher percent of urban population in total population relates with a higher tax to GDP ratio. But prior literature such as Chaudhry and Munir (2010) found negative relationship between urbanization and tax revenue.

Import has positive effect on tax revenue; for example, prior literature such as Li and Lopez-Murphy (2010) studied historical tax revenue downturn episodes where tax revenue to GDP ratios decline sharply and explored the link between tax revenues and imports. They find that tax revenue downturns and import contractions have a statistically significant link. That is, as import accelerates, tax revenue strengthens; as import decelerates tax revenue weakens. But Teera(2002) found negative relationship.

Foreign remittances have positive effect on tax revenue; for example, prior literature such as Chaudhry and Munir(2010) showed the fact that foreign remittances has positive relationship with tax revenue.

Mining share in GDP has positive effect on tax revenue; for example, Alm et al(2004) found statistically significant and positive relationship, and Leuhold(1991) and Stotsky and WoldeMariam(1997). However, empirical literature such as Eltony(2002) found significant negative relationship.

#### **2.4. Important variables and gaps identified in the literature review**

Important variables identified in the literature review in influencing tax revenue are openness, foreign remittance, literacy rate, broad money supply, external debt, foreign aid, political stability, manufacturing share, service sector share, agricultural sector share, GDP per capita, urbanization, conflict, population density, old age population, export, inflation, voice and

accountability, exchange rate, GDP, foreign direct investment, interest rate, trade liberalization, import, institutional factors, the level of corruption, and mining share in GDP, and rate of population growth.

As discussed earlier under the empirical literature review part there are studies in some developing countries on factors influence tax revenue; in Ethiopia also there are some studies, for example, Belay Zewude Ayyele examined the determinants of tax revenue performance in Ethiopia federal government which involving variables such as GDP, foreign direct investment, openness, external debt, inflation, and foreign aid. And Tesfaye Alemayehu Daba(2015) assessed determinants of tax revenue in Ethiopia through share of industrial sector, foreign direct investment, inflation rate, interest rate, and per capita income. They did not include policy variables such as broad money supply, exchange rate, urbanization, import, foreign remittances, and mining share in GDP. This study attempts to fill this knowledge gap in existing literature.

### Chapter Three: Research Methodology

As mentioned earlier, the main objective of this study is to identify the main factors influence tax revenue in Ethiopia using time series data over the past long period of time (1997-2015). Time series data, as the name suggests, are data that have been collected over a long period of time on one or more variables. Topics that are discussed in this chapter include data types and sources of data, method of data collection, description of variables, research approaches, and techniques of data analysis.

#### 3.1 Data types and sources of data

In this study, the researcher used time series secondary data. The data for the present study collected from various sources such as Central Statistics agency (CSA) from which urban population in total population data was obtained, Ministry of Finance and Economic Cooperation (MoFEC) sourced for tax revenue data, and National Bank of Ethiopia (NBE) served as the source for gross domestic product both nominal and real GDP, and broad money supply, exchange rate, import, foreign remittances, and mining share in GDP. For the study time series data over the period 1997-2015 adopted and tax revenue to GDP ratio(TR) is regarded as dependent variable and explanatory variables include broad money supply ( $M_2$ ), exchange rate(EXRATE), urbanization(URN), import(IMP), foreign remittances (REMIT), and mining share in GDP(MINI).

Table-1 Sources of Data from MoFEC, NBE, and CSA summarized by the researcher

Variable	Definition	Unit	Sources	Expected signs
TR	Tax Revenue as percent of GDP	percent	MoFEC	
$M_2$	Broad money supply	percent	NBE	+
EXRATE	Exchange rate	Birr	NBE	+
URN	Urbanization	Percent	CSA	+
IMP	Import	Percent	NBE	+
REMIT	Foreign remittances	percent	NBE	+
MINI	Mining share in GDP	percent	NBE	+

Source: organized by the researcher

### 3.2. Method of data collection

The task of data collection begins after a research problem has been defined and research design/ plan chalked out. While deciding about the method of data collection to be used for the study, the researcher should keep in mind two types of data viz., primary and secondary. The primary data are those which are collected a fresh and for the first time and thus happen to be original in character. The secondary data, on the other hand, are those which have already been collected by someone else and which have already been passed through the statistical process. The researcher would have to decide which sort of data he would be using (thus collecting) for his study and accordingly he will have to select one or the other method of data collection. The methods of collecting primary and secondary data differ since primary data are to be originally collected, while in case of secondary data the nature of data collection work is merely that of compilation (Kothari, 1990). For this paper, secondary data that have been organized by Ministry of Finance and Economic Cooperation, Central Statistics Agency, and National Bank of Ethiopia are used for analysis purpose using Eview-8 software program.

### 3.3. Description of variables

**Dependent variable** is the total tax revenue to GDP ratio. Tax revenue is the amount of money that has been collected by the Ethiopia government from people and organizations during each fiscal year. It is money collected by the government by levying on different goods and services, and on income and so on and it does not include other source of financing such as gift and grant.

#### Explanatory variables

##### 1. Broad money supply ( $M_2$ ):

Broad money supply means the ratio of broad money supply to GDP. Monetization of the economy captured by the variable  $M_2$  is expected to be positively related to the tax revenue collection. Theory also suggests that documentation of the economy increases formal transaction activity and increase tax revenue. According to Anyanwu (1993), money supply is the total amount of money (e.g. currency and demand deposits) in circulation in a country at any given time. Currency in circulation is made up of coins and notes, while demand deposits or current

account are those obligations which are not related with any interest payment and accepted by the public as a means of exchange drawn without notice by means of cheque.

## **2. Exchange rate (EXRATE)**

Economic theory suggests that devaluation of exchange rate- typically brought by the contractionary financial policies- would be expected to have a favourable effect on overall economic activity and thus to increase tax revenue, and same as, an overvaluation of exchange rate typically brought about by expansionary financial policies would be expected to adversely affect overall economic activity, and thus to lower tax revenue.

## **3. Urbanization (URN)**

Urbanization as measured by the share of urban population in total population has expected to have positive estimated coefficient sign. A positive sign is also expected for this to the extent that higher demand for public services *cetris peribus* requires higher tax revenues.

Why are local governments interested in urbanizing their localities, more importantly, how do they benefit from such a process, and with what consequences? In the context of a highly decentralized control rights (both *de jure* and *de facto*) over local resources—including land, fiscal revenue incentives provide an important clue to addressing these questions. Specifically, while the central government has since 1994 reclaimed a substantial share of the tax revenues generated by township-and-village enterprises( TVEs) and subsequently all industrial enterprises regardless of ownership, local governments have been assigned the exclusive right over an increasingly important tax category, viz. the business tax. This tax has been a driving force in China's urbanization process, as nearly half of these revenues are generated from the construction and real estate sectors. In addition, since urbanization helps spur local GDP growth, it also enhances the career prospects of local officials (Xu, 2009).

Urban environments provide high density which has led to growing markets; access to information, capital, and research and development; labor markets with deep pools of talent; high value-added productivity; high and more secure wages and incomes; low unit costs for infrastructure and public services; an increase in taxable capacity, from which additional public

resources can be mobilized and infrastructure services paid for; and increased competition and, paradoxically, reduced risk(Roberts and Kanale, 2006).

#### **4. Import(IMP)**

Import stands for the ratio of import to GDP and import duties are imposed to generate tax revenue in addition to domestic tax revenue collected by the government. Import tariffs are also levied to make domestic industries efficient and to protect them from foreign competition as well. Li and Lopez-Murphy (2010) find that tax revenue downturns and import contractions have a statistically significant link. That is, as import accelerates, tax revenue strengthens; as import decelerates tax revenue also weakens.

#### **5. Foreign remittances(REMIT)**

Foreign remittances implies the ratio of foreign remittances to GDP. And foreign remittances are funds received from workers abroad by persons in recipient country or in the country of origin. Workers' remittances are positively related to tax revenue collection since remittances from abroad increase the paying capacity of receiving people to pay taxes and since remittances also increase the income and wealth of those people. World Bank (2009) has acknowledged in her publication, the fact that remittance accruing to developing countries reached all time rise to \$328 Billion dollars more than double of official development aid(ODA) and over 50 percent of foreign direct investment (FDI) flows.

Some countries such as Morocco tax workers' remittances heavily and therefore workers' remittances should increase tax revenues, it is also possible that growth is increased through remittances and therefore the ratio of tax revenues as a share of GDP may go up or down and other countries provide tax incentives to attract remittances (Ratha, 2004).

Remittances to Sub-Saharan Africa (SSA) are estimated to have increased by 2.2 percent (to \$32.9 billion) in 2014, after a sluggish 0.9 percent growth in 2013. Nigeria alone accounts for around two-thirds of total remittance inflows to the region, but its remittances are estimated to have remained flat, at roughly \$21 billion in 2014. The regional growth in remittances in 2014 largely reflected strong growth in Kenya (10.7 percent), South Africa (7 percent) and Uganda

(6.7 percent). The level of remittance dependency varies across countries. Remittances in the Gambia, Lesotho, Liberia and Comoros equal about 20 percent of GDP. Remittances also finance a substantial share of imports in some of the larger countries; for example, remittances financed one-third of imports in Nigeria in 2013. The growth of remittance flows to the region is projected to slow to 0.9percent in 2015, and then recover to 3.4 and 3.8 percent in 2016 and 2017. Remittances will be critical in supporting domestic economic activity in Nigeria as its credit rating continues to decline. Nigeria also is likely to benefit from diaspora financing, in response to a recent increase of the proposed diaspora bond issuance from \$100 million to \$300 million(Ratha et al.,2015).

## **6. Mining share in GDP(MINI)**

Mining share in GDP is expected to have positive relationship with tax revenue because as minerals are developed and marketed mining income tax is imposed by the government.

Diaz, Z.A.M(2014) suggests that for every dollar of mining exports, the Gross Domestic Production (GDP) of Peru increases by an additional 0.56 dollars. The additional mining production could represent in 2015 3.32% of real GDP and with the multiplier effect of the construction and operating phases, 24.4% of GDP. The effects on employment are different during construction than in the operating phase. In 2015, during the construction phase, 23.1% of the economically-active population will have a certain relationship, either direct or indirect, with mining activity, while during the operating phase only 1.4% will. The balance of trade of additional mining production will probably be negative until 2020, the final year of mining investment. The additional government revenues due to copper production in 2015 will represent 22.1% of total mining tax in 2013 and will be 100% higher by 2019.

### **3.4. Research approaches:**

There are two basic approaches to research, viz., quantitative approach and the qualitative approach. The former involves the generation of data in quantitative form which can be subjected to rigorous quantitative analysis in a formal and rigid fashion. Qualitative approach to research is concerned with subjective assessment of attitudes, opinions and behaviour. Research in such a situation is a function of researcher's insights and impressions. Such an approach to research generates results either in non-quantitative form or in the form which are not subjected

to rigorous quantitative analysis. Generally, the techniques of focus group interviews, projective techniques and depth interviews are used (Kothari, 1990).

In this paper the researcher adopted quantitative research approach via the application of Eview-8 software program through which descriptive statistics, and ordinary least square (OLS) estimation method economic model was applied to solicit objective results. This research is engaged in the determination of the relationship between tax revenue to GDP ratio (dependent variable) and the explanatory variables such as broad money supply, exchange rate, urbanization, import, foreign remittances, and mining share in GDP.

### **3.5 Techniques of data analysis**

The following model has been adopted from Brooks,2008 p.89.

$$Y = \beta_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5 + \beta_6X_6 + \beta_7X_7 + U_t$$

*Where : Y is tax revenue to GDP ratio*

$\beta_1$  is Y intercept

$\beta_2$  is the slope of the broad money supply

$X_2$  is Broad money supply

$\beta_3$  is the slope of the exchange rate

$X_3$  is the exchange rate

$\beta_4$  is the slope of the urbanization

$X_4$  is urbanization

$\beta_5$  is the slope of import

$X_5$  is the import

$\beta_6$  is the slope of foreign remittances

$X_6$  is foreign remittances

$\beta_7$  is the slope of mining share in GDP

$X_7$  is mining share in GDP

$U_t$  is unexplained variable

### 3.5.1. Classical linear regression model assumptions and diagnostic tests

The five assumptions are made relating to the classical linear regression model (CLRM). These are required to show that the estimation technique, ordinary least squares (OLS), had a number of desirable properties, and also so that hypothesis tests regarding the coefficient estimates could validly be conducted. Specifically, it is assumed that:

- (1)  $E(U_t) = 0$
- (2)  $\text{var}(U_t) = \sigma^2 < \infty$
- (3)  $\text{cov}(U_i, U_j) = 0$
- (4)  $\text{cov}(U_t, X_t) = 0$
- (5)  $U_t \sim N(0, \sigma^2)$

These assumptions will be studied further, in particular looking at the following:

- How can violations of the assumptions be detected?
- What are the most likely causes of the violations in practice?
- What are the consequences for the model if an assumption is violated but this fact is ignored and the researcher proceeds regardless? The answer to the last of these questions is that, in general, the model could encounter any combination of three problems:
  - the coefficient estimates ( $\hat{\beta}$ 's) are wrong
  - the associated standard errors are wrong
  - the distributions that were assumed for the test statistics are inappropriate (Brooks,2008).

#### **Assumption 1: $E(U_t)=0$**

The first assumption required is that the average value of the errors is zero. In fact, if a constant term is included in the regression equation, this assumption will never be violated. But what if financial theory suggests that, for a particular application, there should be no intercept so that the regression line is forced through the origin? If the regression did not include an intercept, and the average value of the errors was non-zero, several undesirable consequences could arise.

**Assumption 2:  $\text{var}(u_t) = \sigma^2 < \infty$**

It has been assumed thus far that the variance of the errors is constant,  $\sigma^2$ - this is known as the assumption of homoscedasticity. If the errors do not have a constant variance, they are said to be heteroscedastic. Its prevalence is tested using Breusch-pagan-Godfrey, white and other diagnostic tests and correction measures are taken accordingly if there is deviation from expectation.

**Assumption 3:  $\text{cov}(u_i, u_j) = 0$**

Assumption 3 that is made of the CLRM's disturbance terms is that the covariance between the error terms over time (or cross-sectionally, for that type of data) is zero. In other words, it is assumed that the errors are uncorrelated with one another. If the errors are not uncorrelated with one another, it would be stated that they are autocorrelated or that they are serially correlated. A test of this assumption is therefore required. To test for autocorrelation we have two methods. If the test is to compare this year error term to that of last year, Durbin Watson stat is applied. But if the test is to compare this year error to so many years, Breusch Godfrey is implemented.

**Assumption 4: the  $X_t$  are non-stochastic**

Fortunately, it turns out that the OLS estimator is consistent and unbiased in the presence of stochastic regressors, provided that the regressors are not correlated with the error term of the estimated equation.

**Assumption 5: the disturbances are normally distributed**

The normality assumption ( $U_t \sim N(0, \sigma^2)$ ) is required in order to conduct single or joint hypothesis tests about the model parameters.

Testing for departures from normality

One of the most commonly applied tests for normality is the Bera-Jarque (hereafter BJ) test. BJ uses the property of a normally distributed random variable that the entire distribution is characterized by the first two moments - the mean and the variance. The standardised third and fourth moments of a distribution are known as its skewness and kurtosis (Brooks, 2008).

### **3.5.2 Multicollinearity**

An implicit assumption that is made when using the ordinary least square (OLS) estimation method is that the explanatory variables are not correlated with one another. If there is no relationship between the explanatory variables, they would be said to be orthogonal to one another. If the explanatory variables were orthogonal to one another, adding or removing a variable from a regression equation would not cause the values of the coefficients on the other variables to change.

In any practical context, the correlation between explanatory variables will be non-zero, although this will generally be relatively benign in the sense that a small degree of association between explanatory variables will almost always occur but will not cause too much loss of precision. However, a problem occurs when the explanatory variables are very highly correlated with each other, and this problem is known as multicollinearity. It is possible to distinguish between two classes of multicollinearity: perfect multicollinearity and near multicollinearity (Brooks, 2008).

To sum up, for the present study the researcher used quantitative research with time series secondary data for Ethiopian context which is one of the developing countries in the world and data were organized by Central Statistics Agency (CSA) which was sourced for urban population in total population commencing from 1997 up to 2015, and Ministry of Finance and Economic Cooperation(MoFEC) which was also used as the source for tax revenue, and National Bank of Ethiopia (NBE) also used as the source for gross domestic product both nominal and real GDP, broad money supply, exchange rate, import, foreign remittances, and mining share in GDP. For the study time series data over the period 1997-2015 adopted and tax revenue to GDP ratio(TR) is regarded as dependent variable and explanatory variables include broad money supply ( $M_2$ ), exchange rate(EXRATE), urbanization (URN), import(IMP), foreign remittances(REMIT), and mining share in GDP(MINI).

## Chapter Four: Empirical Results and Discussion

In this chapter data was analysed through descriptive statistics, the results of classical linear regression model assumptions were tested, and data was also analyzed through multiple regression analysis of ordinary least square(OLS) estimation method econometric model.

### 4.1. Descriptive statistics

Descriptive statistics explains dependent variable tax revenue to GDP ratio and the six explanatory variables namely broad money supply, exchange rate, urbanization, import, foreign remittances, and mining share in GDP in terms of mean, median, maximum observation value, minimum observation value, standard deviation, and sum of observation as shown below in table-2.

Table.2. Descriptive statistics results

	LTR	LM2	LEXRATE	LURN	LIMP	LREMIT	LMINI
Mean	2.375099	3.467072	2.362103	2.797693	3.147988	2.396926	0.506333
Median	2.397895	3.471966	2.174104	2.778819	3.226010	2.452728	0.683097
Maximum	2.595255	3.725693	3.000501	2.970414	3.420771	2.754934	1.196948
Minimum	2.140066	3.210844	1.928866	2.660260	2.805419	1.806648	-0.733969
Std. Dev.	0.129241	0.163480	0.352322	0.095879	0.193760	0.301018	0.587830
Skewness	-0.145629	0.120432	0.778374	0.296402	-0.533326	-0.863756	-0.445591
Kurtosis	1.945821	1.868324	2.004081	1.875781	2.072911	2.489050	1.959093
Jarque-Bera	0.946932	1.059809	2.703792	1.278766	1.581149	2.569251	1.486507
Probability	0.622840	0.588661	0.258749	0.527618	0.453584	0.276754	0.475564
Sum	45.12687	65.87436	44.87995	53.15616	59.81177	45.54159	9.620333
Sum Sq. Dev.	0.300658	0.481065	2.234360	0.165471	0.675773	1.631016	6.219804
Observations	19	19	19	19	19	19	19

Source: Descriptive statistics result from EView-8 run by the researcher

Where abbreviations shown in the above table-2 such as LTR stands for tax revenue to GDP ratio, LM<sub>2</sub> stands for broad money supply, LEXRATE shows exchange rate, LURN stands for urbanization, LIMP reveals import, LREMIT depicts foreign remittances, and LMINI stands for

mining share in GDP. Abbreviation(L) for Logarithm used here to show that data was processed through it.

Mean is computed as the sum of all the observed outcomes from the sample divided by the total number of events, median, maximum observation value, minimum observation value, standard deviation, and sum of observation for dependent variable and all explanatory variables were depicted in the above table-2 on page 39. Accordingly, the average or mean of tax revenue collected over the period 1997-2015 was 2.38% of GDP and its overall performance has been positive, median for dependent variable was 2.40%. And the maximum observation value share for tax revenue collected during the period was 2.6 % of GDP whereas the minimum observation amount collected was 2.14%. Standard deviation of tax revenue for the sample period was amounted to 0.13%. And sum of observation as percentage of GDP for tax revenue for the aforementioned period was 45.13%.

Based on the above table-2 on page 39, the average or mean of share for broad money supply ( $M_2$ ) in GDP was 3.47% and the median for this variable was 3.47%, and maximum observation percentage share also was 3.73% whereas the minimum observation value share was 3.21% of GDP and the discrepancy between them was 0.52%. Its standard deviation stipulated to be at 0.16 % of GDP for the sample period of 1997-2015. Sum of observation for broad money supply as percentage share of GDP for the sample period in discussion was 65.87% which is the highest comparing to sum of observation of other variables under discussion.

As descriptive statistics in table-2 reveals the average or mean amount for exchange rate for the sample period was 2.36%, and median for this variable was 2.17%. And the maximum and minimum exchange rate for the sample period in discussion were 3% and 1.93% respectively. Its standard deviation percentage as share of GDP estimated was 0.35%. Exchange rate has sum of observation which was equal to 44.88% for the sample period in discussion.

As listed in the descriptive statistics table-2 on page 39 mean share percentage of GDP for urbanization was 2.80% and its median was 2.78%. And maximum and minimum observation value share for the aforementioned variable also was 2.97% and 2.66% under the sample period

in discussion respectively. And its standard deviation value was 0.096%. Sum of observation for urbanization as share of GDP for the sample period in discussion was 53.16%.

As depicted above in table-2 in case of import measured as percentage of GDP at constant market price for 1997-2015 period, and its mean value share as percentage of GDP was 3.15% and the median was 3.23%. And maximum and minimum observation value share of import in GDP as estimated above in descriptive statistics was 3.42 % and 2.81% respectively. And also its standard deviation for the aforementioned said period amounted to 0.19%. Import has sum observation as the percentage share of GDP which was equal to 59.81%.

As mentioned above in the table-2 on page 39 the mean for foreign remittances share in GDP was 2.40%, and the median was 2.45%, and maximum and minimum observation value share of foreign remittances in GDP revealed estimation at 2.75 % and 1.81% respectively for the sample period ranged from 1997-2015. And also standard deviation for the mentioned period for the aforementioned said variable estimated to be at 0.30 %. Sum of observation for the sample period under discussion for foreign remittances as percentage share of GDP was 45.54%.

As mentioned above in table-2, the mean for mining share in GDP was 0.51%, and the median was 0.68%, and maximum and minimum observation value for mining share in GDP as percentage of GDP stipulated and estimated to be at 1.20 % and negative 0.73% respectively for the sample period ranged from 1997-2015. And also standard deviation for the mentioned period for the aforementioned said variable estimated to be at 0.59 %. Mining share in GDP has sum of observation that equal to 9.62% which is the smallest share comparing to the other variables under discussion.

#### **4.2. Test for classical linear regression model (CLRM) assumptions**

Tests for CLRM assumptions should be conducted to find out whether there is any violation of them from expectation and remedial actions are taken accordingly. Those assumptions include testing for heteroscedasticity, autocorrelation, normality distribution, and multicollinearity.

## 1. Heteroscedasticity test

$$\text{Var}(u_t) = \sigma^2 < \infty$$

It has been assumed thus far that the variance of the errors is constant,  $\sigma^2$ - this is known as the assumption of homoscedasticity. If the errors do not have a constant variance, they are said to be heteroscedastic. Its prevalence is tested using White, Breusch-pagan-Godfrey, and other diagnostic tests. In this paper both White, and Breusch-pagan-Godfrey diagnostic tests have been adopted.

From table-3 listed below we can observe that p values for F-statistic, Obs\*R-squared, and Scaled explained SS versions of the test statistic which are amounted to 0.8372, 0.7004, and 0.9634 respectively give the same conclusion that there is no evidence for the presence of heteroscedasticity. Since their p values are considerably in excess of 0.05 level which show the fact that no problem of heteroscedastic in this regard that is errors are homoscedastic.

Table-3: White diagnostic test

Heteroskedasticity Test: White

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F-statistic	0.506698	Prob. F(9,9)	0.8372
Obs*R-squared	6.389641	Prob. Chi-Square(9)	0.7004
Scaled explained SS	3.021239	Prob. Chi-Square(9)	0.9634

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Source: White test run by the researcher using Eview 8

As shown below in table-4 on page 43, there is no evidence for the presence of heteroscedasticity via Breusch-pagan-Godfrey test since p-value for F-statistics, Obs\*R-squared, and scaled explain SS version of the tests are amounted to 0.3457, 0.3003, and 0.6299 respectively are greater than 0.05. Therefore, there is no evidence for the prevalence of heteroscedasticity. This means that errors have constant variance that is they are homoscedastic.

Table-4: Breusch-pagan-Godfrey

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	1.193905	Prob. F(3,15)	0.3457
Obs*R-squared	3.662341	Prob. Chi-Square(3)	0.3003
Scaled explained SS	1.731679	Prob. Chi-Square(3)	0.6299

Table-4: Breusch pagan Godfrey test run by the researcher using Eview 8

**2. Autocorrelation:** it is assumed that errors are uncorrelated with one another for the given data. If errors are not uncorrelated to each other, this problem will be regarded as autocorrelation. A test of this assumption is therefore required. To test for autocorrelation we have two methods. If the test is to compare this year error term to errors of last year, Durbin Watson stat is applied. That is, DW is a test only of whether consecutive errors are related to one another. In other words, Durbin--Watson (DW) is a test for first order autocorrelation- i.e. it tests only for a relationship between an error and its immediately previous value. But if the test is to compare this year error to so many years' errors, Breusch-Godfrey diagnostic test is adopted.

Table: 5. Breusch-Godfrey serial correlation LM test

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.904887	Prob. F(2,13)	0.4286
Obs*R-squared	2.321826	Prob. Chi-Square(2)	0.3132

Source: Breusch-Godfrey serial correlation LM test using Eview-8 run by the researcher

As shown in the above table-5, P values for F-statistic and  $Obs \cdot R^2$  are greater than 0.05 which are amounted to 0.4286, and 0.3132 respectively. As indicated above under both Breusch-Godfrey and Durbin-Watson stat, there is no evidence for the prevalence of the problem of autocorrelation that is errors are uncorrelated with each other for the given data. That is, the conclusion from F-statistics and Chi-square versions of the test in this case the null hypothesis of no autocorrelation should not be rejected since the p values are greater than 0.05 level.

### 3. The disturbances are normally distributed

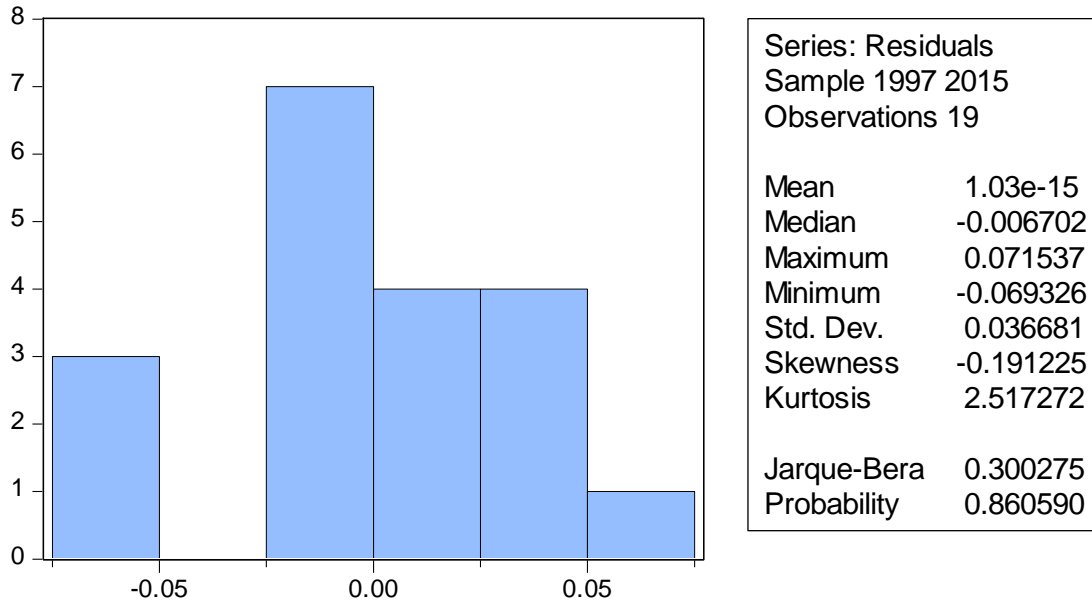
The normality assumption ( $U_t \sim N(0, \sigma^2)$ ) is required in order to conduct single or joint hypothesis tests about the model parameters.

#### Testing for departures from normality

One of the most commonly applied tests for normality is the Bera-Jarque (hereafter BJ) test. BJ uses the property of a normally distributed random variable that the entire distribution is characterised by the first two moments -the mean and the variance. The standardised third and fourth moments of a distribution are known as its skewness and kurtosis. If the residuals are normally distributed, the histogram should be bell-shaped and the Bera-Jarque statistic would not be significant. This means that the p-value given at the bottom of the normality test screen should be bigger than 0.05 to not reject the null of normality at the 5% level (Brooks, 2008. P.163).

As shown in the figure-1 listed below on page 45 there is no evidence for the violation of normality distribution for errors terms since p-value is greater than 0.05 which is amounted to 0.860590 and histogram also is definitely bell-shaped, and with skewness and kurtosis of 0.191225, and 2.517272 respectively. This means that the p-value given at the bottom of the normality test screen should be bigger than 0.05 to not reject the null of normality at 95% confidence interval. And residuals kurtosis value is 2.517272 which approaches to 3 as displayed in the figure-1.

Figure 1.: Normality test by Bera-Jarque



Source: Normality test run by the researcher using EView-8

#### 4. Multicollinearity

An implicit assumption that is made when using the ordinary least square (OLS) estimation method is that the explanatory variables are not correlated with one another. If there is no relationship between the explanatory variables, they would be said to be orthogonal to one another. If the explanatory variables were orthogonal to one another, adding or removing a variable from a regression equation would not cause the values of the coefficients on the other variables to change (Brooks, 2008 p.170).

The final test which was conducted in this study is the multicollinearity test. A correlation is a number that explains the degree of relationship between two variables. In other explanation, multicollinearity reveals the relationship between the independent variables. As stated in the correlation matrix in table-6 listed below on page 46, some of the correlations that have occurred among explanatory variables are weak but there are also high correlations between some variables, namely exchange rate, urbanization, import, foreign remittances, and mining share in GDP which show the existence of a near-multicollinearity problem. As indicated below, some explanatory variables are strongly correlated positively to each other; for example, exchange rate and urbanization correlated at 93.48%; import and foreign remittances correlated at 83.32%. And

mining share in GDP negatively correlated with exchange rate, and urbanization at 83.69%, and 92.18% respectively.

Table- 6: Correlation matrix for the six explanatory variables

	LTR	LM2	LEXRATE	LURN	LIMP	LEMIT	LMINI
LTR	1.000000	0.214616	0.577046	0.478705	0.283351	0.233878	-0.216622
LM2	0.214616	1.000000	-0.643294	-0.642544	-0.177179	-0.011918	0.774071
LEXRATE	0.577046	-0.643294	1.000000	0.934849	0.400853	0.237482	-0.836967
LURN	0.478705	-0.642544	0.934849	1.000000	0.638394	0.469567	-0.921886
LIMP	0.283351	-0.177179	0.400853	0.638394	1.000000	0.833192	-0.541999
LEMIT	0.233878	-0.011918	0.237482	0.469567	0.833192	1.000000	-0.320024
LMINI	-0.216622	0.774071	-0.836967	-0.921886	-0.541999	-0.320024	1.000000

Source: Correlation matrix run by the researcher using EView-8

Despite there are relatively high positive and negative correlation, that is, near multicollinearity problem displayed between the above listed explanatory variables; mechanisms are available to deal with them.

There are methods for dealing with the possible prevalence of near multicollinearity include Ignore it, if the model is otherwise adequate, that is, statistically and in terms of each coefficient being of a plausible magnitude and having an appropriate sign. And drop one of the collinear variables so that the problem disappears, or transform the highly correlated variables into a ratio and include only the ratio and not the individual variables in the regression, and finally if the problem was not solved collect more additional data as described by Brooks, 2008 p.173.

Based on the aforementioned said theoretical foundation, the researcher has taken the following steps to resolve the prevailed problem of near multicollinearity:

Step-1 dropped variable called foreign remittances. Then the correlation matrix explains the existence of correlation among other variables.

Step-2 dropped variable called urbanization

Step-3 drop variable called mining share in GDP

Finally after these three explanatory variables namely foreign remittances, urbanization, and mining share in GDP were dropped the multicollinearity problem avoided totally since their correlation value is below 64.32% as shown below in the correlation matrix table-7.

Table-7: Correlation matrix for the three explanatory variables

	LTR	LM2	LEXRATE	LIMP
LTR	1.000000	0.214616	0.577046	0.283351
LM2	0.214616	1.000000	-0.643294	-0.177179
LEXRATE	0.577046	-0.643294	1.000000	0.400853
LIMP	0.283351	-0.177179	0.400853	1.000000

Source: Multicollinearity test run by the researcher using Eview-8

Correlation matrix in table-7 for the three explanatory variables depicts that broad money supply negatively correlated with exchange rate, and import respectively at 64.32% and 17.71%. And exchange rate and import positively correlated at 40%. Based on the idea of Cooper and Schindler (2009) and Hailer et al (2006) suggested that multicollinearity problem should be corrected when the correlation extent to be above 0.8 and 0.9 respectively.

### 4.3. Stationary analysis

The use of non-stationary data can lead to spurious regressions. If two stationary variables are generated as independent random series, when one of those variables is regressed on the other, the  $t$ -ratio on the slope coefficient would be expected not to be significantly different from zero, and the value of  $R^2$  would be expected to be very low. This seems obvious, for the variables are not related to one another. However, if two variables are trending over time, a regression of one on the other could have a high  $R^2$  even if the two are totally unrelated. So, if standard regression techniques are applied to non-stationary data, the end result could be a regression that ‘looks good under standard measures (significant coefficient estimates and a high  $R^2$ ), but which is really valueless. Such a model would be termed a ‘spurious regression’ (Brooks,2008 p.319)

For the purpose of the analysis, a stationary series can be defined as one with a constant mean, constant variance and constant autocovariances for each given lag.

While working with time series data, testing for stationarity is needed. As it has been stated in previous paragraph, working with non-stationary leads to spurious output. This means, it indicate a relationship between variable which does not exist. To have reliable result, we have to transform non-stationary to stationary by making it differencing.

Table-8. Unit root test

Variable	ADF				
	Level	1 <sup>st</sup> (d)	2 <sup>nd</sup> (d)	Critical value at 5%	Critical value at 10%
LEXRATE	8.73	2.22	2.12	3.04	2.66
LIMP	1.819	1.62	0.978	3.04	2.66
LM2	1.50	4.50	0.244	3.05	2.66
LTR	5.76	5.55	0.58	3.06	2.67

Source: Unit root test run by the researcher using Eview-8

As observed from the above table, the variable that was not stationary at level is stationary at difference. So, all variable became stationary and can be concluded that, there is no stationarity problem as displayed for this study in table-8.

#### 4.4. Multiple regression analysis between tax revenue and explanatory variables

The multiple regression results shown below in table-9 on page 49 indicates that tax revenue to GDP ratio(LTR) is regarded as dependent variable; whereas broad money supply(LM<sub>2</sub>), exchange rate(LEXRATE), and import(LIMP) are explanatory variables based on multicollinearity results. This part describes the overall empirical results of the regression; that is, effect of those explanatory variables on tax revenue effort in Ethiopia.

Table-9: Multiple regression results

Dependent Variable: LTR

Method: Least Squares

Date: 11/18/16 Time: 11:56

Sample: 1997 2015

Included observations: 19

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LM2	0.793848	0.076174	10.42149	0.0000
LEXRATE	0.453711	0.037970	11.94912	0.0000
LIMP	-0.023033	0.053710	-0.428829	0.6741
C	-1.376433	0.338695	-4.063934	0.0010
R-squared	0.919448	Mean dependent var	2.375099	
Adjusted R-squared	0.903337	S.D. dependent var	0.129241	
S.E. of regression	0.040182	Akaike info criterion	-3.406141	
Sum squared resid	0.024219	Schwarz criterion	-3.207312	
Log likelihood	36.35834	Hannan-Quinn criter.	-3.372492	
F-statistic	57.07149	Durbin-Watson stat	2.270125	
Prob(F-statistic)	0.000000			

Source: Multiple regression results from EView 8 run by the researcher

The following multiple regression model was applied based on the above estimated results.

$$TR = \beta_1 + \beta_2 * M_2 + \beta_3 * EXRATE + \beta_4 * IMP$$

$$TR = -1.3764 + 0.7938 * M_2 + 0.4537 * EXRATE - 0.0230 * IMP$$

#### 4.4.1. Coefficient of Determination (R<sup>2</sup>) and adjusted R<sup>2</sup>

It is desirable to have some measure of how well the regression model actually fits the data. In other words, it is desirable to have an answer to the question, how well does the model

containing the explanatory variables that was proposed actually explain variations in the dependent variable?‘ Quantities known as goodness of fit statistics are available to test how well the sample regression function (SRF) fits the data -that is, how ‘close‘ the fitted regression line is to all of the data points taken together. Note that it is not possible to say how well the sample regression function fits the population regression function. That is, how the estimated model compares with the true relationship between the variables, since the latter is never known (Brooks, 2008.p.106).

Coefficient of determination or  $R^2$  measures what percentage of a change in the dependent variable can be measured or explained by the change in the independent variables. It also explains the level of the explanatory power. If R-squared equals 0, this indicates the fact that no explanatory power. This also implies that none of the change in dependent variable can be described by the change in explanatory variables. If R-squared equals 1, this reveals the fact that all change in the dependent variable can be explained by the change in all explanatory variables. The adjusted R-squared is a modified version of R-squared that has been adjusted for the number of predictors in the model. The adjusted R-squared increases only if the new term improves the model more than would be expected by chance. It decreases when a predictor improves the model by less than expected by chance. As per the regression result in the above table-8 on page 49,  $R^2$  value of 0.919448 shows that 91.94% of the dependent variable was measured by change in the explanatory variables, while the remaining 8.06% are accounted for by variables outside the model. The adjusted R-squared indicates 90.33% that can be measured by explanatory power. As the above regression results depict, F-statistic’s p-value is less than 5% which is very significant for the model and population inference.

#### **4.4.2 Results of multiple regression model**

Based on the above table-9 on page 49, the regression equation can be used to predict the value of the dependent variable based on a set of values for the explanatory variables. For example, if all variables are held constant, an increase in broad money supply, and exchange rate by 1% can increase tax revenue by 79.38%, and 45.37% respectively. And an increase in import in GDP by 1% can decrease tax revenue by 2.30%. As shown above in table-9, broad money supply, and exchange rate have p value of 0.0000, and 0.0000 respectively which are statistically significant

in influencing tax effort for Ethiopia economy at conventional 1% with 99% confidence interval while the other variable called import has p value of 0.6741 which is statistically insignificant in influencing tax effort even at conventional 10% significance level. The detail analysis of each variable is discussed below.

### **Broad money supply( $M_2$ )**

Money is circulated within the economy in exchange for goods and services through the application of appropriate monetary and fiscal policies within the demarcated political boundaries as well as through international trade. Governments release currency annually to the economy so as to regulate and stabilize it through their central banks.

The regression results in the above table-9 on page 49 reveal that broad money supply has positive relationship with tax revenue in Ethiopia. That is, broad money supply has expected estimated coefficient signs 0.7938 and this implies that as broad money supply increases by 1%, tax revenue increases by 79.38%. It has also p value of 0.0000 which is statistically significant in influencing tax effort for Ethiopia economy at conventional 1% significance level with 99% confidence interval. Prior literature such as Chaudhry and Munir (2010) showed the fact that broad money supply is significant determinants of tax efforts for Pakistan economy with expected signs of the estimated coefficient, Lutfunnahar (2007) also found broad money supply to be significantly determinants of tax efforts for Bangladesh along with 10 other developing countries, and Oyetunji (2012) and Karagoz (2013) also found results consistent with this study and regression analysis shows that monetization rate of the economy has a positive impact on tax revenues effort. But Mahdavi (2008) found that degree of monetization related with a low tax to GDP ratio.

Economic theory suggests positive relationship between broad money supply and tax revenue to GDP ratio. According to this study broad money supply promotes investment as investment increases more taxes are paid to the government by people and organizations. It also enhances output in the economy which in turn boosts tax effort as taxes are payable on those goods and services, capital gain, property, and income and the like as well. Further, it creates employment

opportunities which are the precondition for social welfare and incomes from such sources are also taxable and this has positive effect on tax revenue.

### **Exchange rate(EXRATE)**

Per the regression results in the above table-9 on page 49, as exchange rate increases tax revenue also increases which shows positive relationship between the two variables; that is, exchange rate has expected estimated coefficient signs. The results also depict p value of 0.0000 which is statistically significant in influencing tax effort for Ethiopia economy at conventional 1% significance level with 99% confidence interval and determine tax revenue performance with expected estimated coefficient signs shows positive 0.4537 which means as exchange rate increases by 1 unit, tax revenue increase by 0.4537 unit. That is, an increase in exchange rate by 1% can increase tax revenue by 45.37% for Ethiopia economy. Prior literature such as Oyetunji(2012) found exchange rate depreciation relates with a higher tax to GDP ratio. And Gaalya(2015) also showed that tax ratio is significantly affected by the exchange rate. However, Chaudhry and Munir (2010), and Muibi and Sinbo(2013) found negative relation. A positive sign is expected for exchange rate in theory that is economic theory suggests that devaluation of exchange rate- typically brought by the contractionary financial policies- would be expected to have a favourable effect on overall economic activity and thus to increase tax revenue.

### **Import (IMP)**

Per the regression results in the above table-9 on page 49, as import increases tax revenue decreases which indicates negative relationship between the two variables that is import has negative signs of estimated coefficient which deviates from expectation. That is, import has negative estimated coefficient signs of 0.023, and also with the p value of 0.6741 which is statistically insignificant in influencing tax effort even at conventional 10% significance level with 90% confidence interval. As import increase by 1%, tax revenue decreases by 2.3% which is statistically insignificant coefficient in reducing tax revenue collection. Prior literature such as Teera(2002) found significant negative relationship of import on tax revenue. However, Eltony(2002), Li and Lopez-Murphy (2010), and Velaj and Prendi(2014) indicated positive relation.

To summarize, the findings indicate that an increase in broad money supply by 1% can increase tax revenue by 79.38% and determine tax revenue performance with expected signs of estimated coefficient and with p value of 0.0000 which is statistically significant in influencing tax effort at conventional 1% with 99% confidence interval. And exchange rate also has p value 0.0000 which is statistically significant in influencing tax effort at 1% significance level and with expected estimated coefficient signs of 0.4537 which means as exchange rate increases by 1 unit, tax revenue also increases by 0.4537 unit. Import has negative estimated coefficient signs of 0.023 deviate from expectation which implies that as import increases by 1%, tax revenue decreases by 2.3% and with p value of 0.6741 which is statistically insignificant in influencing tax effort even at conventional 10% significance level with 90% confidence interval for Ethiopia economy.

## **Chapter Five: Conclusion and Recommendation**

Having carried out analysis of the data collected and discussion of empirical results, there is a need to summarize this thesis and also make recommendations. In this chapter; therefore, the summary of findings and possible recommendations for better policy and strategy formulations are presented.

### **5.1. Conclusion**

In this study quantitative research approach, descriptive statistics and econometric tools of ordinary least square (OLS) estimation method have been adopted. Attempt has been made to identify factors influence tax revenue based on time series secondary data collected over the past 19 years (1997-2015) and analysed them using both descriptive statistics and OLS estimation method econometric model in Ethiopia. The study is significant in helping policymakers take appropriate measures when raising tax revenue and also used as guidance in making appropriate reform in an event of budget deficit.

Based on the discussion and analysis made in chapter four the researcher concluded his findings as follow: the results obtained suggest that broad money supply, and exchange rate are found to be statistically significant in influencing tax efforts with expected signs of the estimated coefficients at conventional 1% with 99% confidence interval, and import in GDP is found to be statistically insignificant in influencing tax effort even at 10% significance level with 90% confidence interval and with negative sign of estimated coefficient. In other words, broad money supply has significant positive effect; exchange rate also has significant positive effect; whereas import in GDP has insignificant negative effect on tax revenue to GDP ratio.

Further, variable considered as dependent variable called tax revenue to GDP ratio and explanatory variables namely broad money supply, exchange rate, urbanization, import, foreign remittances, and mining share in GDP were described through descriptive statistics in terms of mean, median, maximum observation value, minimum observation value, standard deviation and with their respective sum of observation for all variables.

The first test for classical linear regression model assumptions is heteroscedastic by white and Breusch-Pagan-Godfrey. From the results, researcher concluded that there was no evidence for the presence of heteroscedasticity under both white, and Breusch-Pagan-Godfrey diagnostic tests, since their p-values are considerably in excess of 0.05 level. The second important diagnostic test which was conducted in this paper is the autocorrelation test by using the Durbin-Watson stat and Breusch-Godfrey. Durbin-Watson stat result shows the value of 2 which is equal to 2 when comparing this year error term(with one-period lag ) to that of the previous year. The conclusion from Durbin-Watson stat versions of the test shows no problem of autocorrelation. That is, null hypothesis of no evidence of autocorrelation cannot be rejected. The results from Breusch- Godfrey also depicts no prevalence of the problem of autocorrelation when comparing this period error with the consecutive previous two-periods errors terms (with two-periods lag) since p values for F-statistic and  $\chi^2$  version of tests are in excess of 0.05 level. It is desirable to examine a joint test for autocorrelation that would allow examination of the relationship between residual and several of its lagged values at the same time through Breusch-Godfrey test. The third important diagnostic test that was conducted in this paper is the normality assumption by Bera-Jarque (BJ) test. The p value is in excess of 0.05 so as such no violation of normality distribution assumption for error terms, and Bera-Jarque stat is also insignificant. The fourth diagnostic test that was conducted is multicollinearity test, this helps to identify the correlation between explanatory variables and to avoid double effect of explanatory variable from the model. There is no evidence for the presence of near multicollinearity problem after the three variables called foreign remittances, urbanization, and mining share in GDP were dropped from the model.

The researcher observes differences in the coefficients and the significance of the variables affecting tax revenue. From the regression outcomes broad money supply, and exchange rate have p value of 0.0000, and 0.0000 respectively which are found to be statistically significant in influencing tax effort for Ethiopia economy with expected signs of the estimated coefficient at 1% with 99% confidence interval. And import has p value of 0.6741 which is statistically insignificant in influencing tax effort even at conventional 10% significance level with 90% confidence interval with negative signs of estimated coefficient.

## **5.2. Recommendation**

Monetary policy is the tool through which broad money supply in an economy is regulated by central bank in our case by National Bank of Ethiopia. Accordingly, by controlling the possible inflationary condition that follow through the implementation of those policy(strict/tighten monetary policy, and other policy) monetization of the economy or boosting volume of broad money supply(loose/easy monetary policy) can contribute to tax revenue collection.

As per the regression results exchange rate/currency depreciation rather than appreciation has significant positive effect on the tax revenue to GDP ratio in Ethiopia. This implies that currently the economy is under contractionary financial policies. Therefore, by adopting exchange rate policy, devaluation may have favourable effect on overall economic activity and on tax revenue as well. And policy care may be required by the central bank following devaluation due to the possible emergence of the evil of inflation.

As per the regression results as import in GDP increases tax revenue decreases but it has statistically insignificant coefficient that reduces tax revenue collection. This implies that large amount of tax revenue has been generated from domestic resource mobilization which may be expected to be pursued by policymakers and mandated institution that collect government revenue. As internally generated revenue is the best or sustainable way of financing than other source of finance, priority is required in this regard. And shifting away from import duty towards domestic consumption and income taxes reflects the consensual view that trade taxes are a relatively inefficient way of raising revenue. Tariffs influence trade, production, consumption patterns and welfare of not only the countries that impose them, but also the welfare of their trading partners.

## **5.3. Future research direction**

Attributing to data constraints on some variables, not all essential issues was analyzed. Had it not been these constraints, the research would have covered many other factors influence tax revenue. The author suggests future research on this work, other researchers can extend the study period and include other macroeconomic as well as social variables such as corruption, tax

evasion, tax reform, literacy rate, political stability issues and so on should be seen by someone else who are interested to pursue investigation in this regard. This can help improve tax revenue performance for socio-economic development.

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## Appendices:

### Appendix-A: Diagnostic tests

#### 1-Heteroscedasticity test

Table-3: White test

Heteroskedasticity Test: White

F-statistic	0.506698	Prob. F(9,9)	0.8372
Obs*R-squared	6.389641	Prob. Chi-Square(9)	0.7004
Scaled explained SS	3.021239	Prob. Chi-Square(9)	0.9634

Test Equation:

Dependent Variable: RESID<sup>2</sup>

Method: Least Squares

Date: 11/18/16 Time: 10:07

Sample: 1997 2015

Included observations: 19

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.269850	0.891883	0.302562	0.7691
LM2 <sup>2</sup>	-0.009761	0.033569	-0.290772	0.7778
LM2*LEXRATE	-0.012765	0.027070	-0.471545	0.6485
LM2*LIMP	0.057183	0.053584	1.067166	0.3137
LM2	-0.080306	0.326153	-0.246222	0.8110
LEXRATE <sup>2</sup>	-0.015561	0.012695	-1.225693	0.2514
LEXRATE*LIMP	0.025556	0.027637	0.924698	0.3792
LEXRATE	0.039520	0.110248	0.358465	0.7283
LIMP <sup>2</sup>	-0.023878	0.024498	-0.974673	0.3552
LIMP	-0.111247	0.191447	-0.581083	0.5754
R-squared	0.336297	Mean dependent var	0.001275	

Adjusted R-squared	-0.327406	S.D. dependent var	0.001613
S.E. of regression	0.001859	Akaike info criterion	-9.432640
Sum squared resid	3.11E-05	Schwarz criterion	-8.935567
Log likelihood	99.61008	Hannan-Quinn criter.	-9.348516
F-statistic	0.506698	Durbin-Watson stat	2.575400
Prob(F-statistic)	0.837157		

Table-4:

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	1.193905	Prob. F(3,15)	0.3457
Obs*R-squared	3.662341	Prob. Chi-Square(3)	0.3003
Scaled explained SS	1.731679	Prob. Chi-Square(3)	0.6299

Test Equation:

Dependent Variable: RESID^2

Method: Least Squares

Date: 11/18/16 Time: 10:16

Sample: 1997 2015

Included observations: 19

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.005583	0.013383	-0.417191	0.6824
LM2	0.003278	0.003010	1.089140	0.2933
LEXRATE	-0.000341	0.001500	-0.227217	0.8233
LIMP	-0.001176	0.002122	-0.554197	0.5876
R-squared	0.192755	Mean dependent var	0.001275	
Adjusted R-squared	0.031306	S.D. dependent var	0.001613	
S.E. of regression	0.001588	Akaike info criterion	-9.868427	
Sum squared resid	3.78E-05	Schwarz criterion	-9.669597	

Log likelihood	97.75005	Hannan-Quinn criter.	-9.834777
F-statistic	1.193905	Durbin-Watson stat	2.395421
Prob(F-statistic)	0.345671		

## 2-Autocorrelation

Table-5:

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.904887	Prob. F(2,13)	0.4286
Obs*R-squared	2.321826	Prob. Chi-Square(2)	0.3132

Test Equation:

Dependent Variable: RESID

Method: Least Squares

Date: 11/18/16 Time: 10:23

Sample: 1997 2015

Included observations: 19

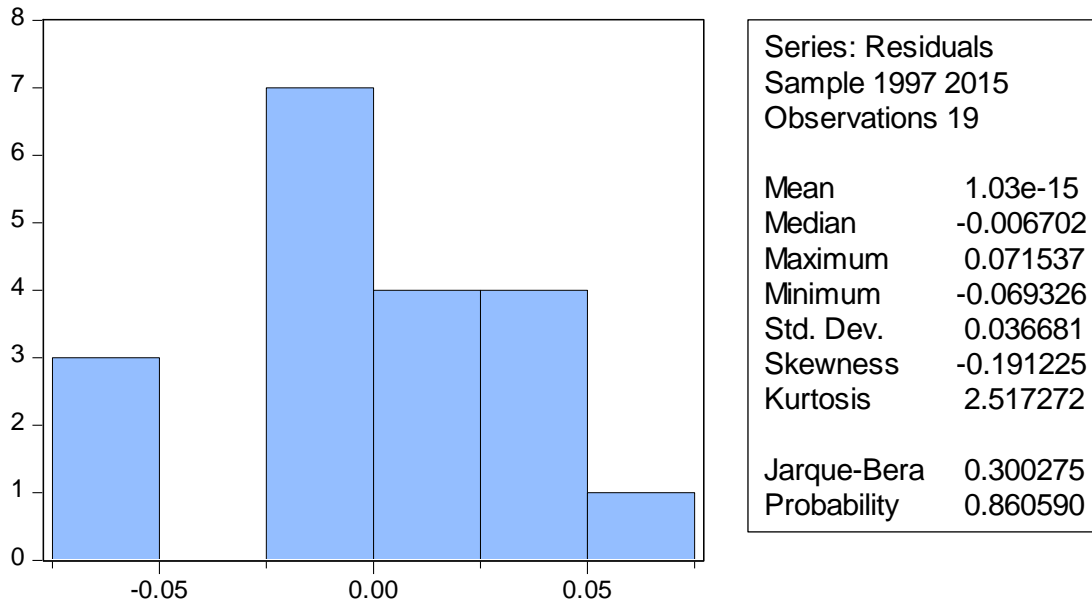
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LM2	-0.003908	0.076718	-0.050934	0.9602
LEXRATE	-0.002593	0.038276	-0.067746	0.9470
LIMP	0.003178	0.054185	0.058646	0.9541
C	0.010229	0.341050	0.029993	0.9765
RESID(-1)	-0.231387	0.266111	-0.869512	0.4003
RESID(-2)	-0.310713	0.266168	-1.167358	0.2640
R-squared	0.122201	Mean dependent var	1.03E-15	
Adjusted R-squared	-0.215414	S.D. dependent var	0.036681	
S.E. of regression	0.040439	Akaike info criterion	-3.325953	
Sum squared resid	0.021259	Schwarz criterion	-3.027709	

Log likelihood      37.59655      Hannan-Quinn criter. -3.275478  
 F-statistic          0.361955      Durbin-Watson stat    2.022572  
 Prob(F-statistic)    0.865503

### 3-Normality test by Bera-Jarque

Figure 1.: Normality test by Bera-Jarque



### 4-Multicollinearity

Table-7: Correlation matrix

	LTR	LM2	LEXRATE	LIMP
LTR	1.000000	0.214616	0.577046	0.283351
LM2	0.214616	1.000000	-0.643294	-0.177179
LEXRATE	0.577046	-0.643294	1.000000	0.400853
LIMP	0.283351	-0.177179	0.400853	1.000000

## 5- Original data used for analysis

Table-10: Summary ratio of tax revenue to GDP and the 6 explanatory variables

Year	Tax revenue /GDP %	Broad money/GDP in %	Exchange rate	Urbanization in %	Import/GDP%	Foreign Remittance /GDP in %	Mining share in GDP in %
1997	10.4	32.2	8.7943	14.3	16.5	6.10	2.76
1998	9.5	33.4	6.8817	14.5	16.8	7.15	2.81
1999	9.1	32.0	7.5111	14.7	19.3	6.09	2.83
2000	9.3	33.6	8.1426	14.9	17.3	7.24	2.84
2001	11.0	36.4	8.3279	15.1	18.3	10.39	2.93
2002	11.9	41.5	8.5425	15.3	22.0	11.41	3.31
2003	11.3	41.4	8.5809	15.5	22.1	13.74	3.12
2004	12.6	40.4	8.6197	15.8	26.0	13.44	2.7
2005	11.4	38.1	8.6518	16.0	29.8	14.55	2.29
2006	10.7	35.6	8.6810	16.2	30.6	13.20	1.98
2007	9.6	33.3	8.7943	16.1	26.5	14.32	1.28
2008	9.2	27.7	9.2441	16.8	25.7	13.85	1.08
2009	8.5	24.8	10.4205	17.2	25.5	12.73	0.9
2010	10.2	27.5	12.8909	17.5	28.7	15.72	1.14
2011	11.5	28.2	16.1178	17.9	25.2	14.57	1.32
2012	11.5	25.3	17.2536	18.2	25.6	11.62	1.03
2013	12.3	27.1	18.1947	18.6	22.7	10.77	0.94
2014	12.5	28.1	19.0748	19.0	24.7	10.05	0.75
2015	13.4	30.0	20.0956	19.5	26.7	10.21	0.48

Source: computation made based on NBE, MoFEC, and CSA reports

Table-11: General government revenue and grants from year 1996/1997 to 2014/15 in million

Year	Tax revenue	Direct taxes	Domestic indirect Taxes	Import duties & taxes	Export taxes	Total revenue & grant
1997	5,358.94	1,903.88	1,291.53	2025.1	138.4	9378.4
1998	5,292.23	1,869.41	1,188.74	2051.0	183.1	9566.6
1999	5,528.89	2,018.37	1,200.90	2155.7	154.0	11195.3
2000	6,130.57	2,360.45	1,442.26	2180.3	147.5	11300.6
2001	7,393.06	2,688.02	1,381.07	3230.6	93.3	13735.7
2002	7,857.94	3,013.61	1,539.38	3278.1	26.8	11754.3
2003	8,194.30	2,873.21	1,687.20	3632.7	1.2	13890.9
2004	10,770.99	3,681.30	1,831.22	5258.5	0.0	19521.9
2005	12,397.00	3,930.00	2,721.00	5780.6	0.0	20967.1
2006	14,158.75	4,460.97	3,110.78	6567.6	0.0	22866.5
2007	17,353.09	5,167.93	3,996.50	8250.1	0.0	32204.7
2008	23,802.00	7,016.00	5,093.00	10980.1	0.0	41501.6
2009	28,997.54	9,858.37	7,325.09	11853.6	0.0	56036.4
2010	43,315.36	14,903.13	10,727.34	13185.0	0.0	61741.0
2011	58,980.78	19,549.70	15,705.31	23726.0	0.0	85612.0
2012	85,739.86	28,857.57	23,326.05	33557.0	0.0	115658.0
2013	107,010.31	36,392.64	32,440.34	38177	0.0	137192
2014	133,118.26	47,020.68	40,498.88	45599	0.0	158077
2015	165,277.50	60,154.40	52,367.90	52790	0.0	199609

Source: Ministry of Finance and Economic Cooperation

Table-12: Pre-analysis data

Year	LTR	LM2	LEXRATE	LIMP
1997	2.341806	3.471966	2.174104	2.805419
1998	2.251292	3.508556	1.928866	2.820605
1999	2.208274	3.465736	2.016382	2.961555
2000	2.230014	3.514526	2.09711	2.852728
2001	2.397895	3.594569	2.119611	2.905972
2002	2.476538	3.725693	2.145054	3.090997
2003	2.424803	3.723281	2.149539	3.095532
2004	2.533697	3.69883	2.15405	3.257558
2005	2.433613	3.640214	2.157767	3.395146
2006	2.370244	3.572346	2.161137	3.420771
2007	2.261763	3.505557	2.174104	3.277182
2008	2.219203	3.321432	2.223986	3.245985
2009	2.140066	3.210844	2.343775	3.238718
2010	2.322388	3.314186	2.556522	3.35822
2011	2.442347	3.339322	2.779924	3.22601
2012	2.442347	3.230804	2.848021	3.243998
2013	2.509599	3.299534	2.901131	3.122761
2014	2.525729	3.33577	2.948368	3.206115
2015	2.595255	3.401197	3.000501	3.286497

Source: Researcher's computation based on real data that converted in to logarithm

## Appendix-B: Stationarity test

1.

Null Hypothesis: LEXRATE has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=1)

---

---

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	0.873099	0.9924
Test critical values: 1% level	-3.857386	
5% level	-3.040391	
10% level	-2.660551	

---

---

2.

Null Hypothesis: LEXRATE has a unit root

Exogenous: Constant, Linear Trend

Lag Length: 0 (Automatic - based on SIC, maxlag=1)

---

---

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-2.222207	0.4505
Test critical values: 1% level	-4.571559	
5% level	-3.690814	
10% level	-3.286909	

---

---

3.

Null Hypothesis: LEXRATE has a unit root

Exogenous: None

Lag Length: 0 (Automatic - based on SIC, maxlag=1)

---

---

	t-Statistic	Prob.*
--	-------------	--------

---

---

Augmented Dickey-Fuller test statistic	2.120335	0.9884
Test critical values: 1% level	-2.699769	
5% level	-1.961409	
10% level	-1.606610	

4.

Null Hypothesis: D(LEXRATE) has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=1)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-4.642131	0.0023
Test critical values: 1% level	-3.886751	
5% level	-3.052169	
10% level	-2.666593	

5.

Null Hypothesis: D(LEXRATE) has a unit root

Exogenous: Constant, Linear Trend

Lag Length: 1 (Automatic - based on SIC, maxlag=1)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-2.363573	0.3814
Test critical values: 1% level	-4.667883	
5% level	-3.733200	
10% level	-3.310349	

6. Null Hypothesis: D(LEXRATE) has a unit root

Exogenous: None

Lag Length: 0 (Automatic - based on SIC, maxlag=1)

---

---

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-3.050451	0.0046
Test critical values: 1% level	-2.708094	
5% level	-1.962813	
10% level	-1.606129	

---

---

7.

Null Hypothesis: D(LEXRATE,2) has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=1)

---

---

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-6.529856	0.0001
Test critical values: 1% level	-3.920350	
5% level	-3.065585	
10% level	-2.673459	

---

---

8.

Null Hypothesis: D(LEXRATE,2) has a unit root

Exogenous: Constant, Linear Trend

Lag Length: 0 (Automatic - based on SIC, maxlag=1)

---

---

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-5.826008	0.0014
Test critical values: 1% level	-4.667883	
5% level	-3.733200	
10% level	-3.310349	

---

---

9.

Null Hypothesis: D(LEXRATE,2) has a unit root

Exogenous: None

Lag Length: 0 (Automatic - based on SIC, maxlag=1)

---

---

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-6.912517	0.0000
Test critical values: 1% level	-2.717511	
5% level	-1.964418	
10% level	-1.605603	

---

---

10.

Null Hypothesis: LIMP has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=1)

---

---

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-1.819426	0.3598
Test critical values: 1% level	-3.857386	
5% level	-3.040391	
10% level	-2.660551	

---

---

11.

Null Hypothesis: LIMP has a unit root

Exogenous: Constant, Linear Trend

Lag Length: 0 (Automatic - based on SIC, maxlag=1)

---

---

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-1.627690	0.7404
Test critical values: 1% level	-4.571559	
5% level	-3.690814	
10% level	-3.286909	

---

---

12.

Null Hypothesis: LIMP has a unit root

Exogenous: None

Lag Length: 0 (Automatic - based on SIC, maxlag=1)

---

---

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	0.978530	0.9058
Test critical values: 1% level	-2.699769	
5% level	-1.961409	
10% level	-1.606610	

---

---

13.

Null Hypothesis: D(LIMP) has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=1)

---

---

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-4.206299	0.0053
Test critical values: 1% level	-3.886751	
5% level	-3.052169	
10% level	-2.666593	

---

---

14.

Null Hypothesis: D(LIMP) has a unit root

Exogenous: Constant, Linear Trend

Lag Length: 0 (Automatic - based on SIC, maxlag=1)

---

---

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-4.352916	0.0161
Test critical values: 1% level	-4.616209	
5% level	-3.710482	
10% level	-3.297799	

---

---

15.

Null Hypothesis: D(LIMP) has a unit root

Exogenous: None

Lag Length: 0 (Automatic - based on SIC, maxlag=1)

---

---

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-4.048397	0.0004
Test critical values: 1% level	-2.708094	
5% level	-1.962813	
10% level	-1.606129	

---

---

16

Null Hypothesis: D(LIMP,2) has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=1)

---

---

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-7.130488	0.0000
Test critical values: 1% level	-3.920350	
5% level	-3.065585	
10% level	-2.673459	

---

---

17.

Null Hypothesis: D(LIMP,2) has a unit root

Exogenous: Constant, Linear Trend

Lag Length: 0 (Automatic - based on SIC, maxlag=1)

---

---

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-6.998581	0.0002
Test critical values: 1% level	-4.667883	
5% level	-3.733200	
10% level	-3.310349	

---

---

18.

Null Hypothesis: D(LIMP,2) has a unit root

Exogenous: None

Lag Length: 0 (Automatic - based on SIC, maxlag=1)

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---

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-7.384167	0.0000
Test critical values: 1% level	-2.717511	
5% level	-1.964418	
10% level	-1.605603	

---

---

19.

Null Hypothesis: LM2 has a unit root

Exogenous: Constant

Lag Length: 1 (Automatic - based on SIC, maxlag=1)

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	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-1.503143	0.5078
Test critical values: 1% level	-3.886751	
5% level	-3.052169	
10% level	-2.666593	

---

---

20.

Null Hypothesis: LM2 has a unit root

Exogenous: Constant, Linear Trend

Lag Length: 1 (Automatic - based on SIC, maxlag=1)

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---

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-1.979278	0.5706
Test critical values: 1% level	-4.616209	
5% level	-3.710482	
10% level	-3.297799	

---

---

21.

Null Hypothesis: LM2 has a unit root

Exogenous: None

Lag Length: 0 (Automatic - based on SIC, maxlag=1)

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---

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-0.244148	0.5841
Test critical values: 1% level	-2.699769	
5% level	-1.961409	
10% level	-1.606610	

---

---

22.

Null Hypothesis: D(LM2) has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=1)

---

---

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-2.714573	0.0920
Test critical values: 1% level	-3.886751	
5% level	-3.052169	
10% level	-2.666593	

---

---

23.

Null Hypothesis: D(LM2) has a unit root

Exogenous: Constant, Linear Trend

Lag Length: 0 (Automatic - based on SIC, maxlag=1)

---

---

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-2.565250	0.2975
Test critical values: 1% level	-4.616209	
5% level	-3.710482	
10% level	-3.297799	

---

---

24.

Null Hypothesis: D(LM2) has a unit root

Exogenous: None

Lag Length: 0 (Automatic - based on SIC, maxlag=1)

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---

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-2.795788	0.0082
Test critical values: 1% level	-2.708094	
5% level	-1.962813	
10% level	-1.606129	

---

---

25.

Null Hypothesis: D(LM2,2) has a unit root

Exogenous: Constant

Lag Length: 1 (Automatic - based on SIC, maxlag=1)

---

---

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-4.452298	0.0040
Test critical values: 1% level	-3.959148	
5% level	-3.081002	
10% level	-2.681330	

---

---

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

26.

Null Hypothesis: D(LM2,2) has a unit root

Exogenous: Constant, Linear Trend

Lag Length: 1 (Automatic - based on SIC, maxlag=1)

---

---

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-4.509402	0.0144
Test critical values: 1% level	-4.728363	
5% level	-3.759743	
10% level	-3.324976	

---

---

27.

Null Hypothesis: D(LM2,2) has a unit root

Exogenous: None

Lag Length: 1 (Automatic - based on SIC, maxlag=1)

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---

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-4.629231	0.0002
Test critical values: 1% level	-2.728252	
5% level	-1.966270	
10% level	-1.605026	

---

---

28.

Null Hypothesis: LREMIT has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=1)

---

---

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-2.135073	0.2344
Test critical values: 1% level	-3.857386	
5% level	-3.040391	
10% level	-2.660551	

---

---

29.

Null Hypothesis: LREMIT has a unit root

Exogenous: Constant, Linear Trend

Lag Length: 0 (Automatic - based on SIC, maxlag=1)

---

---

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-1.049044	0.9100
Test critical values: 1% level	-4.571559	
5% level	-3.690814	
10% level	-3.286909	

---

---

30.

Null Hypothesis: LREMIT has a unit root

Exogenous: None

Lag Length: 0 (Automatic - based on SIC, maxlag=1)

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---

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	0.555622	0.8265
Test critical values: 1% level	-2.699769	
5% level	-1.961409	
10% level	-1.606610	

---

---

31

Null Hypothesis: D(LREMIT) has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=1)

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---

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-3.635733	0.0164
Test critical values: 1% level	-3.886751	
5% level	-3.052169	
10% level	-2.666593	

---

---

32.

Null Hypothesis: D(LREMIT) has a unit root

Exogenous: Constant, Linear Trend

Lag Length: 0 (Automatic - based on SIC, maxlag=1)

---

---

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-4.277389	0.0184
Test critical values: 1% level	-4.616209	
5% level	-3.710482	
10% level	-3.297799	

---

---

33.

Null Hypothesis: D(LREMIT) has a unit root

Exogenous: None

Lag Length: 0 (Automatic - based on SIC, maxlag=1)

---

---

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-3.701160	0.0010
Test critical values: 1% level	-2.708094	
5% level	-1.962813	
10% level	-1.606129	

---

---

34.

Null Hypothesis: D(LREMIT,2) has a unit root

Exogenous: Constant

Lag Length: 1 (Automatic - based on SIC, maxlag=1)

---

---

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-4.680340	0.0027
Test critical values: 1% level	-3.959148	
5% level	-3.081002	
10% level	-2.681330	

---

---

35.

Null Hypothesis: D(LREMIT,2) has a unit root

Exogenous: Constant, Linear Trend

Lag Length: 1 (Automatic - based on SIC, maxlag=1)

---

---

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-4.428376	0.0165
Test critical values: 1% level	-4.728363	
5% level	-3.759743	
10% level	-3.324976	

---

---

36.

Null Hypothesis: D(LREMIT,2) has a unit root

Exogenous: None

Lag Length: 1 (Automatic - based on SIC, maxlag=1)

---

---

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-4.842886	0.0001
Test critical values: 1% level	-2.728252	
5% level	-1.966270	
10% level	-1.605026	

---

---

37.

Null Hypothesis: LTR has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=1)

---

---

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-1.047032	0.7125
Test critical values: 1% level	-3.857386	
5% level	-3.040391	
10% level	-2.660551	

---

---

38.

Null Hypothesis: LTR has a unit root

Exogenous: Constant, Linear Trend

Lag Length: 0 (Automatic - based on SIC, maxlag=1)

---

---

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-1.459306	0.8054
Test critical values: 1% level	-4.571559	
5% level	-3.690814	
10% level	-3.286909	

---

---

39.

Null Hypothesis: LTR has a unit root

Exogenous: None

Lag Length: 0 (Automatic - based on SIC, maxlag=1)

---

---

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	0.588602	0.8340
Test critical values: 1% level	-2.699769	
5% level	-1.961409	
10% level	-1.606610	

---

---

40.

Null Hypothesis: D(LTR) has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=1)

---

---

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-3.318723	0.0303
Test critical values: 1% level	-3.886751	
5% level	-3.052169	
10% level	-2.666593	

---

---

41.

Null Hypothesis: D(LTR) has a unit root

Exogenous: Constant, Linear Trend

Lag Length: 0 (Automatic - based on SIC, maxlag=1)

---

---

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-3.224564	0.1126
Test critical values: 1% level	-4.616209	
5% level	-3.710482	
10% level	-3.297799	

---

---

42.

Null Hypothesis: D(LTR) has a unit root

Exogenous: None

Lag Length: 0 (Automatic - based on SIC, maxlag=1)

---

---

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-3.284354	0.0027
Test critical values: 1% level	-2.708094	
5% level	-1.962813	
10% level	-1.606129	

---

---

43

Null Hypothesis: D(LTR,2) has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=1)

---

---

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-5.760003	0.0003
Test critical values: 1% level	-3.920350	
5% level	-3.065585	
10% level	-2.673459	

---

---

44.

Null Hypothesis: D(LTR,2) has a unit root

Exogenous: Constant, Linear Trend

Lag Length: 0 (Automatic - based on SIC, maxlag=1)

---

---

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-5.554271	0.0022
Test critical values: 1% level	-4.667883	
5% level	-3.733200	
10% level	-3.310349	

---

---

45.

Null Hypothesis: D(LTR,2) has a unit root

Exogenous: None

Lag Length: 0 (Automatic - based on SIC, maxlag=1)

---

---

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-5.928095	0.0000
Test critical values: 1% level	-2.717511	
5% level	-1.964418	
10% level	-1.605603	

---

---

46.

Null Hypothesis: LURN has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=1)

---

---

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	1.510835	0.9985
Test critical values: 1% level	-3.857386	
5% level	-3.040391	
10% level	-2.660551	

---

---

47.

Null Hypothesis: LURN has a unit root

Exogenous: Constant, Linear Trend

Lag Length: 0 (Automatic - based on SIC, maxlag=1)

---

---

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-1.216450	0.8754
Test critical values: 1% level	-4.571559	
5% level	-3.690814	
10% level	-3.286909	

---

---

48.

Null Hypothesis: LURN has a unit root

Exogenous: None

Lag Length: 0 (Automatic - based on SIC, maxlag=1)

---

---

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	7.955236	1.0000
Test critical values: 1% level	-2.699769	
5% level	-1.961409	
10% level	-1.606610	

---

---

49.

Null Hypothesis: D(LURN) has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=1)

---

---

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-4.333039	0.0041
Test critical values: 1% level	-3.886751	
5% level	-3.052169	
10% level	-2.666593	

---

---

Null Hypothesis: D(LURN) has a unit root

Exogenous: Constant, Linear Trend

Lag Length: 0 (Automatic - based on SIC, maxlag=1)

---

---

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-5.118656	0.0041
Test critical values: 1% level	-4.616209	
5% level	-3.710482	
10% level	-3.297799	

---

---

51.

Null Hypothesis: D(LURN) has a unit root

Exogenous: None

Lag Length: 1 (Automatic - based on SIC, maxlag=1)

---

---

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-0.463282	0.4983
Test critical values: 1% level	-2.717511	
5% level	-1.964418	
10% level	-1.605603	

---

---

52

Null Hypothesis: D(LURN,2) has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=1)

---

---

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-7.069623	0.0000
Test critical values: 1% level	-3.920350	
5% level	-3.065585	
10% level	-2.673459	

---

---

53.

Null Hypothesis: D(LURN,2) has a unit root

Exogenous: Constant, Linear Trend

Lag Length: 0 (Automatic - based on SIC, maxlag=1)

---

---

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-6.825430	0.0003
Test critical values: 1% level	-4.667883	
5% level	-3.733200	
10% level	-3.310349	

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54.

Null Hypothesis: D(LURN,2) has a unit root

Exogenous: None

Lag Length: 0 (Automatic - based on SIC, maxlag=1)

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	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-7.283574	0.0000
Test critical values: 1% level	-2.717511	
5% level	-1.964418	
10% level	-1.605603	

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55.

Null Hypothesis: MINI has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=1)

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	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	0.996497	0.9944
Test critical values: 1% level	-3.857386	
5% level	-3.040391	
10% level	-2.660551	

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56.

Null Hypothesis: MINI has a unit root

Exogenous: Constant, Linear Trend

Lag Length: 1 (Automatic - based on SIC, maxlag=1)

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	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-2.176693	0.4713
Test critical values: 1% level	-4.616209	
5% level	-3.710482	
10% level	-3.297799	

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57.

Null Hypothesis: MINI has a unit root

Exogenous: None

Lag Length: 1 (Automatic - based on SIC, maxlag=1)

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	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-0.895303	0.3139
Test critical values: 1% level	-2.708094	
5% level	-1.962813	
10% level	-1.606129	

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58.

Null Hypothesis: D(MINI) has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=1)

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	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-2.150564	0.2293
Test critical values: 1% level	-3.886751	
5% level	-3.052169	
10% level	-2.666593	

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59.

Null Hypothesis: D(MINI) has a unit root

Exogenous: Constant, Linear Trend

Lag Length: 0 (Automatic - based on SIC, maxlag=1)

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	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-2.465924	0.3378
Test critical values: 1% level	-4.616209	
5% level	-3.710482	
10% level	-3.297799	

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60.

Null Hypothesis: D(MINI) has a unit root

Exogenous: None

Lag Length: 0 (Automatic - based on SIC, maxlag=1)

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	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-1.608605	0.0995
Test critical values: 1% level	-2.708094	
5% level	-1.962813	
10% level	-1.606129	

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61.

Null Hypothesis: D(MINI,2) has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=1)

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	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-4.708754	0.0022
Test critical values: 1% level	-3.920350	
5% level	-3.065585	
10% level	-2.673459	

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62.

Null Hypothesis: D(MINI,2) has a unit root

Exogenous: Constant, Linear Trend

Lag Length: 0 (Automatic - based on SIC, maxlag=1)

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	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-4.603375	0.0112
Test critical values: 1% level	-4.667883	
5% level	-3.733200	
10% level	-3.310349	

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63.

Null Hypothesis: D(MINI,2) has a unit root

Exogenous: None

Lag Length: 0 (Automatic - based on SIC, maxlag=1)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-4.770284	0.0001
Test critical values: 1% level	-2.717511	
5% level	-1.964418	
10% level	-1.605603	