JIMMA UNIVERSITY

COLLEGE OF BUSINESS AND ECONOMICS

DEPARTMENT OF ECONOMICS

Determinants of Public Expenditure Growth in Ethiopia: An ARDL Bounds Testing Approach

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A Thesis Submitted to the School of Graduate Studies of Jimma University for Partial Fulfillment of the requirements for the Award of the Degree of Master of Science in

Development Economics

By

MISRAK TADESSE

JULY 29, 2020

JIMMA, ETHIOPIA

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Under the Guidance of

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Co-advisor: Sisay Tolla (Assistant Professor)

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DECLARATION

I, the undersigned, declare that the thesis entitled "Determinants of Public Expenditure Growth in Ethiopia; An ARDL Bounds Testing Approach" has been carried out of me under the supervision of PhD Candidate Alemu Ayele and Assistant Professor Sisay Tolla.

The thesis is my original work and it has not been submitted for the award of any degree or diploma to any university or institutions. All sources of materials used for this work are dully acknowledged.

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Determinants of Public Expenditure Growth in Ethiopia: An ARDL Bounds Testing Approach

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List of Abbreviation

ADF	Agumented Dickey Fuller
ARDL	Auto Regressive Distributive Lags Model
CSA	Central Statistical Agency
ECT	Error Correction Term
EPRDF	Ethiopian People's Revolutionary Democratic Front
FDI	Foreigner Direct Investment
FMOLS	Fully Modified Ordinary Least Square
GMM	Generalized Method of Momentum
GTP I	Growth and Transformation Plan one
GTP II	Growth and Transformation Plan two
HIPC	Highly Indebted Poor Countries
IMF	International Monetary' Fund
MDGs	Millennium Development Goals
MEFF	Macro-Economic and Fiscal Framework
MoF	Ministry of Finance
NBE	National Bank of Ethiopia
OECD	Organization for Economic Co-operation and Development
OECS	Organization of Eastern Caribbean States
OLS	Ordinary Least Squares
PEG	Public Expenditure Growth
PP	Philp-Persion
RGDP	Real Gross Domestic Product
SAPs	Structural Adjustment Programs
SSA	Sub Saharan African
SVAR	Structural Vector Autoregressive
UNDP	United Nation Development Programme
VAR	Vector Autoregressive
VECM	Vector Error Correction Model
WB	World Bank
WDI	World Development Index

ABSTRACT

Ethiopia has been experiencing increasing public spending in the past thirty years, the increased expenditure unmatched by revenue, result fiscal and economic imbalance leading the government running persistent budget deficit and output fluctuation. The growth in public expenditure has been due to certain factors which are assumed to have significant effect on the fiscal stance of the country. These perceived implications of public expenditure growth on the economy necessitate the need to understand factors that are responsible for the increase in the level of real expenditure size. The objective of this paper was to analyze the major determinants of public expenditure growth in Ethiopia. The study used annual time series data for 39 years (1980-2018 inclusive). The data were analyzed using Autoregressive Distributive Lag (ARDL) model, which was applied on the basis of Wagener's law of the increasing income effect on government expenditure using data from ministry of finance, national bank of Ethiopia, and Central statistical agency. Both ADF and PP test for unit root suggest only the natural logarithm of population variable were found stationary at level i.e. time invariant without their first difference, whereas the rest variables stationary at first difference, consequently, the existence of long-run relationship test was carried out by making the use of ARDL bound test. The bound test for co-integration showing that the existence of long run relationship; as a result, ARDL with ECM was used in estimating the long run and short run relationship. The coefficient of ECT is -0.8984 that shows any deviations from the long run equilibrium is corrected at 89.84% annually and converges towards its long run equilibrium. The result of the study revealed that domestic revenue, real GDP, population, aid, public debt and openness are the major determinants public expenditure growth in Ethiopia by exerting strong and significant effect on the level of real expenditure size. Among the determining variables domestic revenue, real GDP, aid and population are the most important variables for public expenditure growth of the country consecutively, while openness and public debt highly deteriorate the growth potential of public expenditure growth. Since real expenditure has a positive response for its growth trend under the influence of domestic revenue, real GDP, aid and population the government of Ethiopia can comfortably extend the growth of public expenditure by controlling those variables. Furthermore, avoiding unnecessary public borrowing and control over trade liberalization take in to consideration in line with other basic macroeconomic variables like deficit and inflation to balance the fiscal gap, so as to achieve a neutral fiscal stance for economy development and poverty reduction. Moreover, internal revenue is the most important determinants of public expenditure growth, so that due

attention should be given in diversifying the revenue base. Population reduction measure should also be take in to consideration to balance the demand and supply of public good with the growing population number in order to build up a parallel movement.

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CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Analysis of public expenditure constitutes a central idea in public sector economics and public finance literature. Since, it is a channel to overcome an aggregate problem in the form of publicly supplied goods, services and other public spending. The costs of offering these items and services are borne by the will of the community and the demand for them is determined collectively (Anomaly, 2015). Under the support of world monetary institutions (IMF and WB) most under developed countries undergo essential macroeconomic and structural adjustment programs addressing public expenditure reform consequently economic expansion and poverty reduction, since fiscal operations of governments, especially for developing countries are crucial due to the fact that public expenditure furnish channels for their economy growth.

The relationship between public expenditure and the increase in RGDP has attracted an interesting attention on the part of economists both at theoretical and empirical levels. In general term, one may also distinguish between two opposing views: On one hand, there is the Keynesian approach according to which government spending is a necessary policy instruments to be used to progress the economy into a certain level, to correct short-term fiscal output fluctuation (Jahan, 2014), and ensure more spending on productive investment, as a result providing socially accepted and community deriving economy growth and development (Babatunde, 2018). The contrary view is that excessive government intervention on economy activities influences total output of the economy in undesired way for two main reason: First, due to the fact that authorities operations are frequently performed less efficiently, they reduce the overall productivity of the economy system; second, as a reason for excessive state expenditure which is usually accompanied through excessive taxation levels can distorts economic incentives and mislead the required output decision (Nyasha and Odhiambo, 2019).

Understanding the reasons for public spending increase has been a central issue on the part of public sector economists going back until Wagner's (1883) and commencing in greater current instances with Downs (1957). A large increase in government expenditure is often presumed to be the cause of many economic problems in both developed and developing countries, including low total output, large government deficits, internal shock, and external shock (Ukwueze, 2015).

Recently, external shocks and internal structural failures have had an unavoidable effect on economies. Government intervention in such cases can play a crucial and impressive role in adjusting a damaging economic condition. However, in choosing between monetary and fiscal policy, especially governments of developing county like Africa, mostly prefer the fiscal policy to ensure a confirmed quick recovery from 'recessionary condition', so that fiscal policy more preferable than monetary policy for implementing and designing macroeconomic policies (Ubi-Abai, Itoro and Ekere, 2019).

Fiscal spending through governments, especially for emerging economies, is necessary given that such expenditure provides channels for better economy growth. Many evident studies such as Esen and Bayark (2015), Choi and Son (2016) and Acikgoz and Cinar (2017) have contributed to the establishment of the positive association between government expenditure and economy growth (Alqadi and Ismail, 2019).

Productive utilization of public expenditure i.e. expenditure on health, education and public infrastructures will increase economy growth, which in addition improves social welfare and has also effects on poverty rate minimization. Such expenditure has a significant effect on the overall productiveness of an economic system as make evident in the seminal paper by Aschauer (1989) in which he formed up a significant relationship between aggregate productivity and the stock and flow of distinct government spending variables. He argued that non-military public capital is very necessary for productiveness and concluded that infrastructure spending (such as on streets, highways, mass transit and sewerage) has the most significant relationship with productivity. Aschauer's conclusions had been particularly essential for developing countries in which public expenditure symbolizes the 'wheels' if no longer the engine of economy activity (Shonchoy,2014).

Interestingly, no consistent trend can be viewed in government expenditure of developing countries over the last three decades. By contrast, in the case of developed nations, the share government expenditure to GDP has tested a steady and increasing trend since 1980 (Yu et al., 2015).

Ethiopian government has also been experiencing increasing public spending in the last 30 years, especially after EPRDF took over powers, public expenditure both in terms of recurrent and capital have stepped up. At the early stage of the regime much of the expenditure was directed toward stabilizing the war affected areas and affirmative action policy was predominantly

applied to bring considerably unprivileged region to benefit from development equally, but recently public expenditure allocated to facilitate the transformation of economic activity and to enhance, promotion of the quality and availability infrastructure and to enhance the productivity of human capital. In order to achieve these total government expenditure within the GTP period (2010/11 - 2014/15) planned to be grow at an average of 23% per annum under the base case scenario (Shahir, 2014).

Ethiopia has experienced government expenditure unmatched by revenues, resulting in fiscal and economic imbalance leading the government running persistent budget deficit and output fluctuation. For example, expenditure to GDP ratio pre-1975 used to be low, possibly even lower than the average of developing countries. Post 1974 development exhibit a marked extend in this ratio, reaching the surprising high rate of 49.2 percent by the latter half of the year 1980s and again decline during the transition period (Mulat, 1993). After a general economic reform taken by current regime since 1992 the public expenditure to GDP ratio rose from about 16.3 percent in 1992 to 28.2 percent in 2002, declined to 18.64 percent in 2014 and 15.32 percent in 2019 while the total government revenues as a proportion of GDP increased from 8.6 percent in 1992 to the maximum of 16.1 percent in 2003 and declined to 11.55 percent in 2019. This shows that a financing gap of about 8 percent of GDP during 1992 – 2002, even though it reduced to 5.46 percent of GDP between 2003 and 2019, as a result government has faced challenge in raising enough finance resources to advance the socio-economic development of the country. On the other hand, a reduction in government expenditure is not as possible since unemployment and poverty are key economic problems and public expenditure has been found to be determinant to the economic growth and welfare of the country (NBE, 2020).

In 2014, Assefa studied the trend and significance of public expenditure in Ethiopia for the period of 1981-2013 using ordinary least square method (OLS). In his finding he suggests that both recurrent and capital expenditure had a positive significant impact on economic growth. Study by (Bayu, 2015) that investigate the relationship between real GDP and government expenditure for the period of 1974 to 2009 using the Engel-Granger Co-integration method for in his test for Wagner's Law hold for Ethiopia, the result of the study show the existence of relationship between real expenditure and real GDP. Study by Berihun (2014), that Investigate the economic growth impact of government sectorial expenditure in Ethiopia over the period from 1975 to 2013 using VECM. The study results also show government spending on education found to be significant effect on economic growth.

Since most previously done research in the area of public expenditure in Ethiopia given due attention on the impact of government expenditure on economy, it is then necessary to investigate the responsible factors for public expenditure growth in Ethiopia. Among the predicted factor that contributed to the high public expenditure and budgetary deficits are including high rate of population growth, government commitment to meet the demands for social services and public sector employment are the basic ones (WB, 2017).

1.2 Statement of the Problem

According to (Lindauer, 1998) over the past thirty to forty years public spending as a share of GDP has grown worldwide. But in comparing developing and developed nations, the value, growth rates, composition and determinants exhibit significant differences. Interestingly, no steady trend can be considered in government expenditure of under developed countries. By contrast in case of developed countries like the united states, the share of GDP devoted to government expenditures has demonstrated a steady and increasing trend since 1980 (Yu et al., 2015).

Public expenditure in Ethiopia was tremendously grown over the past years. In nominal terms, total public expenditure has increased more than nine-fold between 2003/04 and 2015/16. An incredibly increase in spending has been shown in latest years due to rising in spending on poverty reduction sectors. Moreover, public investment has been increasing as a share of total spending, demonstrating the government's commitment to expand social and economic infrastructure and to build the public capital stock (WB, 2017).

The growing fashion of public expenditure has often alleged to be the cause of many economic ill. Among those basic problem born by expenditure growth is budget deficit is the main one, which happen mostly due to an alignment problem of expenditure with finance sources. Like many other developing countries Ethiopia public expenditure faces a budget deficit, due to revenue and expenditure alignment gap and by deliberate action government in attempt to stimulate and boost economic growth. Overall a budget deficit affects output fluctuation, income and unemployment problem, which leads to macroeconomic instability of a country.

Recently in addressing budget deficit various measure have been taken by government like broadening the tax bases, expenditure reduction and borrowing from internal and external sources of financial organization. Public borrowing from domestic and external sources of finance to overcome deficit leads to external debt sustainability problem, inflationary situation

and crowding out of private investment and hence, hindering economic growth. Also getting new loan and lowering interest rates of the existing ones under SAPs need the fulfillment of some pre-condition, which also hinder country development plan option. It is also real that the fulfillment expenditure reduction as a pre-condition mostly a difficult task for the country for the reason that unemployment and poverty reduction are basic economic problems (Eshetu, 2017).

Broadening the tax base is also amongst the fundamental measure taken by the state that enhances domestic revenue collection which enables them to cover public spending with the aid of internal sources of finance. To collect the desired internal revenue, Ethiopia government as an integral part of the general economic reform has launched a sequence of tax policy and administration reform since 1992 and particularly in 2003. After the reform the spending need highly depend on domestic sources of financing, for examples from year 2008-2017 on average 80 percent of the country expenditure cover by tax revenue which has a large progress from the start year of the reform 1995 (NBE, 2017).

The nominal growth and share of revenue and expenditure has shown a dramatic change after the reforms, but the real growth and share in terms of GDP lack consistency in its trend. For example, total revenue improved marginally to 16.1 percent of GDP in 2012/13 from 15.6 percent of GDP in 2011/12. Though declined to 15 percent of GDP in 2013/14 rose again to 16.1 percent of GDP in 2014/15 and again declined to 14.7 in 2018. But the expenditure side available data suggests public spending has consistently exceeded revenues in the past two decades.

The budget deficit statistics show the ratio of budget deficits to GDP was quite high in 2002, accounting for 13.5 percent of GDP. Since 2003, the ratio has been getting lower and reached 3.4 percent in 2017, and its average during this period, which is roughly 4.8 percent, was relatively lower than the 1990s average ratio of 8 percent. However, the nominal value of budget deficit increased from about Birr 2 billion in 1992 to Birr 60.5 billion in 2017. One of the underlying reasons for widening of budget deficits in value term in recent years is due to the sharp increases of government expenditure in attempt to boost the economy growth of the nation (NBE, 2017).

Like other developing countries governments of Ethiopia sometimes even undertake a serious measure beyond the option of external and internal borrowing to overcome the budget deficit load by spending cut or lag annual planned project implementation (Kuncoro, 2014). So, due to fiscal imbalance the government stretched in two sides; in one hand in fulfilling the need for advancing the socio-economic development of the country and poverty reduction; on other hand getting enough finance sources (revenue) to feed the expenditure need for development. Hence,

the basic issues that were addressed in this study was identifying the responsible factors(determinants) and managing of those factors to have healthy and balanced expenditure growth which enable to have stable macro economy for the country by keeping up a sustained fiscal balance for a long period of time.

As Keynesian economics argue, and numerous empirical findings have proven an increase in government expenditures on socio-economic and physical structures encourage economic growth using different methodology, study time and composition of expenditures, but as far as I understand, no studies had been conducted on macroeconomic and demographical variables determinants of public expenditure growth in Ethiopia. Even though expenditure growth being affects the overall economy output and other basic macroeconomic variables stability, so why studies have been ignored? Answer to this question creates motivation for this study. However, there are some studies that show a single factor impact on government expenditure like the impact of external debt on government expenditure done by: Jifar (2002); the impact of foreigner aid on public spending done by: Mohammed Ali (2014) and the relationship between real GDP and government expenditure done by: Bayu (2015).

Therefore, this study is important in identifying of those factors responsible for the public expenditure growth for Ethiopia in order to maintain a neutral fiscal stance or minimizing the deficit gap small as possible, which enable to have a stable macro economy for development and poverty reduction.

In relation to methodological gap, the key limitation of most literature under this topic is omitting basic variables in public expenditure growth model, most studies did not incorporate real effect exchange rate as function of their model, since it assumed to exert negative effect on real expenditure size.

Further, since most previously done research in the area of public expenditure in Ethiopia given due attention on investigating a single fiscal variable like aid, revenue or debt effect on government expenditure, but this study investigated the aggregate effect of macroeconomic variables and demographical variable in one on the level of real expenditure size, which measure the public expenditure growth of the country under this study as reviewed by Facchini (2014).

1.3 Objective of the Study

The study has general and specific objectives. The specific objectives are within the framework of the general objective, in a sense that, they are set up in as such a way to achieve the general objective.

1.3.1 General Objective of the Study

The general objective of this study was analyzing the major determinants of public expenditure growth in Ethiopia.

1.3.2 Specific Objectives of the Study

1. To show the trend and sources of public expenditure during the period of 1980-2018.
2. To identify the major determinants of public expenditure growth in Ethiopia between the periods of 1980 - 2018 through applying the ARDL model.
3. To analyze the long run and short run relationship among the variables.
4. To select factors in order of their importance for public expenditure growth based on their effect.

1.4 Research Questions

There are macroeconomic and demographical factors affecting public expenditure growth in Ethiopia. Therefore, this study basically focuses on the effect of both factors, which include real gross domestic product, domestic revenue, public debt, aid, population, real effect exchange rate and openness; for this reason, the following questions should be addressed under the research work of this study.

☞ What is the trends and sources of public expenditure in Ethiopia?

☞ What are the major determinants of public expenditure growth of Ethiopia?

☞ Is there any long run and short run relationship among the level of real expenditure size and the selected explanatory variables?

☞ Which macroeconomic or demographical variable has more influence on the level of real expenditure size in Ethiopia?

☞ Which factors are more important for public expenditure growth of the country?

1.5 Significance of the Study

Most previously done research on the area of public expenditure in Ethiopia have given focus on the impact government expenditure on economic growth based on different composition of expenditure and sector based classification. Also there are some research papers that analyze the impact of some fiscal variable like revenue, external debt and aid on government expenditure in Ethiopia. But, to the best of my knowledge no studies were carried out on both macroeconomic as well as demographical variables effect at aggregate level on the level of real expenditure size in Ethiopia.

Therefore, the importance of this study is to identify the macroeconomic and demographical determinants of public expenditure growth in Ethiopia. Thus, the result of the study also helps to take appropriate policy measure to maintain neutral fiscal stances in order to have healthy and balanced expenditure growth, which has a positive impact on overall economic activity of the country.

Furthermore, the study also helps to formulate and take proper policy measure in administration and management public expenditure and with finance sources. It also adds literature for the upcoming of other similar study in the area of public expenditure.

1.6 Scope and Limitation of the Study

This research work was designed to conduct a national level analysis that extended to answer; what are the macroeconomic and demographical determinants of public expenditure growth in Ethiopia. The period for this study is covering from 1980-2018 inclusive, based on the availability of relevant data for all series. The data set for this study was limited to annual base. Hence, time series data analysis where carried out based on the nature and objective of this study.

In analyzing the long run effect of the determinant variables, it is important to study beyond 39 years' data, but due to the unavailability of data on some series before the year 1980 and in including year 2019 due to issue related to the dissemination of data by recognized body the researcher forced to restrict the study period from year 1980-2018 inclusive.

1.7 Research Hypothesis

Different study around the globe shows, there are many determinants of public expenditure growth for a given country. With regard to our country Ethiopia more specific variables are assumed to be the major determinants of public expenditure growth. This study need to put the hypothesis on the effect of seven explanatory variables on the level of real expenditure size, thus on public expenditure growth of the country. Therefore, this study expected that.

Ho: RGDP, DREV, PDEB, AID, POP, REER and OPNN have no exert a significant effect on the level of real expenditure size, thus on the public expenditure growth of the country.

H_1: RGDP, DREV, PDEB, AID, POP, REER and OPNN have exert a significant effect on the level of real expenditure size, thus on the public expenditure growth of the country.

1.8 Organization of the Study

The study is organized in to five chapters: Chapter one deals with introduction that includes the background, statement of the problem, objective of the study, scope and significance of the study. The second chapter presents theoretical and empirical literature related to the theories of Public expenditure and the hypothesized conceptual frame work drown for the study. The third chapter presents research method that extended to cover the description of the country profile, data type and sources, theoretical framework, model specification, method of data analysis and estimation strategy. The fourth chapter used methodologies that were explained in the third chapter to identify the major determinants of public expenditure growth in Ethiopia on the basis of empirical evidence. The fifth chapter includes summary, concluding remarks, policy implication and tips for upcoming researchers that are interested in the area of public expenditure.

CHAPTER TWO

LITERATURE REVIEWS

High public expenditure is a feature of most developing countries. Beside it is the causes of many economic problems, developing countries still extend the growth of their public expenditure to enhance and sustain a steady and rapid economic growth. To cover the expenditure need, they need to support their domestic revenue through external and internal financing sources, since their economies cannot generate enough revenue.

The history of the idea of government expenditure began Wagner's (1883), a German political economist who describe first time government spending leads to higher levels of economic development. In his hypothesis, he argues that as the economy grows over time, it is accompanied with an internal and external increase in activities and functions of the government which leads to growth in government expenditure (Jibir and Aluthge, 2019).

In expanding Wagner's law there is no a clear-cut formula and determining variables for the expansion of expenditure for all nations around the world. Previously done studies have linked a rise or fall in public spending to several factors including corruption (Mauro, 1998), political regimes (Persson & Tabellini, 1999; Milesi-Ferretti; Shelton, 2007; Shonchoy, 2010), foreign aid (Heller,1975; Njeru, 2003; Remmer, 2004, Swaroop, Shikha & Rajkurmar , 2000; Quattara, 2006), elections (Vergne, 2009; Eslava, 2005), bureaucratic and administrative process (Hemming, 1998; Nordhaus ,1975; Hibbs, 1977; Alesina, 1987; Brauninger, 2005), information asymmetries about incumbent government competence of public good provisioning (Rogoff, 1990), degree of openness (Rodrik, 1998; Cameron,1978), the increase in populations and urbanizations rate (Shelton, 2007), ethnic fractionalizations, external debt servicing burden (Shonchoy,2010; Mahdavi, 2004), fiscal illusion (Gemmell, Morrissey & Pinar, 1999) and income (Aregbeyen,2006; Akpan, 2011; Henreskon,1993; Sideris, 2007), amongst others (Aregbeyen and Akpan, 2013).

In Ethiopia the above listed factor or any other factors could rightly be held responsible for the short-term and long-term of public expenditure growth remains an empirical question of this study. Variables selected as a determinant for Ethiopian public expenditure growth under this study are real gross domestic product, domestic revenue, population, public debt, aid, real effect exchange rate and openness. Since, there are no more literatures that deals on this topic at aggregate determining variables level, the theoretical as well as the empirical literature reviewed as a relationship between expenditure and each selected explanatory variables, that assumed have a potential influence on the level real expenditure size of Ethiopia. Thus, the chapter is divided in to two parts; theoretical review and empirical review:

2.1 Theoretical Literature

Real GDP versus Expenditure: The effect of real gross domestic product on government expenditure and the direction of relationship was a controversial issue for centuries. Even though, so many studies try to test the validity of Wagner's law and find out public expenditure increased by enhancing economic growth or not, for different country using different methodology.

Wagner's law of the increasing state activities propositions stated that the size of the state is an increasing rate over time for three main reason: Firstly, due to industrialization change for the reason for there is an influence on public sector administrative activities and securing law and order for the community. Secondly, the increased need for social services related to education, health and welfare expenditures are by its nature income elastic, the response from the increase in income is also result the increase for the demand on those sector services. Thirdly, there are sector beyond the control and management of private sectors, in such situation public sector intervention is needed in financing such huge investment projects (Jibir and Aluthge, 2019).

Wiseman and Peacock managed a study of public spending in the United Kingdom for the period of 1890-1955. The theories' basic idea is the change in government expenditure and revenue is not only the result of change income and other macroeconomic factors but, it is also a result of the governing authority and people decision to overcome a problem and to find solution for it. According to their theory the review of the new level of taxation and expenditure also need the decision both party.

The basic idea of the Keynesian economics theories describing that private sector spending doesn't able to hold the increasing trend of unemployment. Reductions of unemployment in the

economy need the increasing of spending by government. The theory basically explains the increase in state size speed up the total output of the country; the theory also suggests high expenditure result the increase in a cumulative need of the society which is also the cause of the increase in economy growth.

Revenue versus Expenditure: Study on the relationship between revenue and expenditure as part of the public finance economy has been controversial over the years. The association of the two variables described using four already existing hypotheses, which are the revenue spend hypothesis; the spend revenue hypothesis; fiscal synchronization hypothesis and fiscal independence hypothesis. The revenue-and-spend hypothesis theorized that the increase in tax revenues will lead to an increase in government expenditures and consequently enhance the governmental budgetary balance. The hypothesis support government to spend all of its revenues; therefore, raising government revenues would lead to higher government expenditures. If it is able to keep this hypothesis, then budget deficits can be minimized.

The spend-and-revenue hypothesis is the opposite of the revenue-and spend hypothesis in which revenue affected by spending changes. This hypothesis recommends that government would raise the funds to cover its spending, and therefore, higher government expenditures lead to higher government revenues. The assumption underlying on this hypothesis is, it may lead capital outflow due to the fear of consumers paying higher taxes in the future.

Fiscal synchronization hypothesis shows two-way relationships between revenue and spending, if this hypothesis cannot hold, then it leads to the imbalance of government expenditure and revenue which is the causes of budget deficits. Fiscal independence hypothesis argue the existence of no causal relation between revenue and spending (Obeng, 2015).

*Public Debt versus Expenditure***:** The relationship between public debt and expenditure is still a controversial issue. Despite the reality that the conceptual positions on the issue are pretty diverse, the conventional knowledge is that large government expenditure is the determinant of public borrowing.

Among the factor that enforce developing country to finance their expenditure with public borrowing are rising interest rate, global unfavorable condition for primary product of export, less revenue collection potential and expanded investment programs are the basic ones. These fiscal deficits further raise the external borrowing and help developing country to make fiscal-over spending which has also effects in raising government expenditure. Similarly the public debt burden affect government expenditure due to the repayment of interest and principal, the

country has less cash to use in financing public needs, in additionally high official exchange rates also has encouraged capital out flow driven external borrowing for nation (Shonchoy, 2014).

The theory of jack and Wiseman and Allan T. Peacock that found in 1961 main idea was government expenditure does not increase in a steady manner but in "Jack or Stepwise" fashion. Their argument was once based on totally a political principle of public determination specifically that governments like to pay taxes, and that government want to furnish public goods for their citizens. At the same time factors which beyond control like social disorder may cause the increase in government expenditure, which cannot be afford by the actual level of revenue that force public borrowing as option to overcome the deficit, leading to increase in public debt (Uguru, 2016).

Study on the determinants of public debt for EU new member state shows maintaining a more balanced budget, enable to decrease a further step up in public debt. In addition, the increase real GDP also help in minimizing the debt burden, which is in line with economic theory, enhancing economic development limit the pressure on internal and external borrowing. It is also real that long-term interest rates on government bonds proved to be significant and positive impact on the public debt growth rate, as well as primary budget balance (Belguith, 2017).

Aid versus Expenditure: According to Ali et al (1999), Foreign aid is a transfer of concessionary resources, usually from foreign state or international organization, to a state or non-governmental organization in a recipient country. It may be donating for a different reason, including diplomatic, commercial, cultural and developmental purposes. It is typically used to fund expenditures for the purpose of facilitating development in the receiving country. In most cases, aid has been used to finance discrete investment projects such as building of road, building of schools, providing training and education, family planning and so on. Resource flows to these projects is in the form of concessionary loans and grants which is known as Official Development Assistance   (Tarekegn, 2002).

The impact of foreign aid flows on government fiscal accounts depend on in its effectiveness. Since most aid inflows are provided directly to the recipient government and it is crucial to determine how these funds are allocated like for investment and consumption purpose, the kind of incentives they produce (tax effort) and the impact that they have on the fiscal balance (debt sustainability).

McGillivray and Morrissey 2001, analyze about the main concern of donor relates to the use of aid flows is financing of non-developmental expenditures. This phenomenon is often known as

'aid fungibility', and occurs when earmarked aid flow finance expenditures that would otherwise be paid for by taxes. Thus, such a process releases domestic funds for 'unintended' (often unproductive) expenditures. Another similar concern is the potential tax displacement effect of aid. It is often argued that an increase in aid inflows will lower the government's incentives to increase its tax effort, or even that tax revenues can be reduced due to policy reforms linked to aid flows. In this case, aid is not additional to domestic resources since it substitutes for tax revenue.

According to McGillivary and Morrissey (2001), Aid can be used to retire onerous domestic debt. This could be a good strategy in countries with a heavy debt burden, but perhaps not generally. It is also important to assess whether aid induces 'extra' domestic expenditures, as some development projects often do not budget for maintenance and recurrent costs, and this would eventually build up government deficits for such purposes. This is commonly known as 'aid illusion' and relates to the miscalculation of the real value of aid (Njeru, 2003). In conclusion, it is difficult to identify a broad consensus (based on generalizations) about the impact of aid on public fiscal accounts. The theoretical predictions relating to the impact of foreign aid on fiscal variables is mixed. This strengthens the argument that results tend to be country-specific, either because economic circumstances are different or simply because governments behave differently (Martins, 2007).

Aid enables developing countries to enhance the socio-economic development growth through creating better domestic institution, assisting poverty reduction spending and by improving the efficiency and effectiveness of governance. In contrast, if Aid by default not used for economically productive activities it might promote rent-seeking behaviour by domestic vested interests that demands tax exemption or seek to avoid paying taxes, which leads to decline in revenue and many other researchers also have found a considerable linkage between aid and the expansion of government spending (Shonchoy, 2014).

Population versus Expenditure: In understanding the relationship between the change in population pyramid and its effect on public spending, population age structure and life expectancy ratio were found out to be a crucial explanatory variable for description of aggregate consumption function and government spending function estimates. According to Stöver (2012), the amount of consumption differs significantly between consumption purposes. Consumption on food and beverages tend to indicate a positive effect of rising share of young and health care goods are affected positively by increasing elder share of population. In addition, implication of

individual consumption output on combination level proved the younger and elder share of population has negative impact on consumption. The shifts in consumption structure have an impact on aggregate demand and manufacturing in the end (Orlická, 2015).

A change in demography of population, result a change in public budget allocation. For example, a population pyramid with a high ratio of 0 to 14 years indicates that the government will be enforced to allocate more budgets to education for the purpose of providing all the necessary educational resources and health spending to provide for the primary health care. But, large share populations above 65 years will incident a shift of the budget to the social services to provide for old age pension and grants. Other condition such as the population size and density and urban population are also key determinant in the allocation budget. Due to public spending, especially for health care and social security likely related with the demographic structure of any economy, so that we need to take into account the variations of dependency relationship of the population. The dependency ratio also measured as a ratio of a percentage of the population that is 65 years of age. The degree of the increase rate of urbanization also assumed to leads to the increase in a general demands for services like promote more government expenditure on infrastructure and public utilities (Shonchoy, 2014).

According to Deno (1988) and Sanz (2002) spending on education and health care also important for developing countries, since the sub-Saharan government are controlled the overall activities of the state. In aggregate today nations need more public health specialist, well-equipped military sub-sectors, more police man, more extension workers, more primary schools' teachers etc. all these need an expanding public sector. In overall demographical changes are positively associated with the government spending on health, education and social security (Tait and Heller (1975) and Heller and dimanod (1990) also concludes demographic change increasing costs of government expenditure (E. Ukwueze, 2015).

Real Effect Exchange rate versus Expenditure: The relationship between real exchange rate and government expenditure evidenced by many studies, study by Corsetti and Müller (2006); Enders et al. (2011) and Monacelli and Perotti (2010) describe that the increase in government expenditure due to unforeseen external event leads to deprecation in the real exchange rate. Kollman (2010), used a two-country model with incomplete imperfect financial market and flexible prices was used to derive the finding on the increase in public spending also has a depreciation effect on real exchange rate brings that labour supply is highly elastic.

A related study by Bouakez and Eyquem (2011) used a small open economy model that features three key ingredients: incomplete and imperfect international financial markets, sticky prices, and a not too-aggressive monetary policy, the study result found out an unpredicted increase in public expenditures leads to a decrease in the risk-adjusted long-term real interest rate resulting the real exchange rate to depreciate. In a similar study, Corsetti et al. (2012) developed a two-country model with entire markets, sticky fees and wages, and spending reversals. The important assumption of this study about is that debt-financed will increase in government spending will motive subsequent spending to fall below its steady state level for some time. Consequently, this lowers the long-term real interest rates and leads to an appreciation of the currency in real terms. Furthermore, Ravn et al. (2011) used a two-country model with complete financial markets and assumed that customers form deep habits and would have an effect on markets in which aggregate demand raises habits at the level of individual varieties of goods, the study asserted that with increases in government spending in the domestic economy, markups on domestically sold goods will be lower than markups abroad. This would in turn make those goods relatively cheaper in the domestic economy and consequently a depreciation of the real exchange rate (Insah and Chiaraah, 2018).

Openness versus Expenditure: The relationship between openness and government expenditure is still a controversial subject of debate in spite of many studies carried out across different countries. This is due to the application of different macroeconomic policies, either monetary or fiscal; to ensure that their economies are protected from the possible negative effects of foreign economic alignments, technically called external shocks, especially from developing countries to developed ones. The basic fact toward for increasing degree of openness is as more exposure to external risk result the increasing demand for more government spending to stabilize the increased level of inequality associated with openness. These in turn results in larger demands for government transfers (social security, pensions, unemployment insurance) which mitigate external risk.

The relationship between trade openness and government expenditure first identified by Cameron 1978, in his study he found evidences that country with greater trade openness experienced large increases in public spending. He also argues that more open economies will have higher rates of industrial concentration, leading to more unionized labour market which, though collective bargaining will influence public spending on social protection and social infrastructure. Rodrik (1998) is other researcher who explained the correlation between openness

and government expenditure as social insurance against external risk. In his agreement more open economies are exposed to greater external risk, such as exchange rate fluctuation, supply or demand variability in the world market so that government mitigate such exposures to risk through increasing the share of domestic output they consume (Shonchoy, 2014).

According to Epifani and Gancia (2009), the degree of economy's openness influences the level of government expenditure of a country by giving different explanation like when goods are imperfect substitutes across countries, an increase in the public sector, which consumes domestic products, leads to an improvement in the terms of trade, passing part of the cost of a larger public sector onto foreign countries. Therefore, trade openness leads to a reduction in marginal cost of public funds, because part of the cost was paid by foreigners: in this case government where inefficiently too large. This can explain why a more robust positive correlation was found particularly when public consumption or general government expenditure considered, while it is weaker or absent if welfare spending was considered: in this case there was no reason a priori to predict a stronger effect on a particular category of public spending other than consumption. Islam and Molana, 2004 also argue in similar direction that openness reduced government expenditure (Oyeleke and Akinlo, 2018).

2.1.1 Theories on Public Expenditure

I. **Wagner's Law**

Wagner's Law is named after the German political economist Adolph Wagner (1835-1917), who developed a "law of expanding state activity" after empirical analysis on Western Europe at the end of the nineteenth century. He argued that the change in state size is a mostly linked with improved industrialization and economic development. Wagner argued that at some point of the industrialization process and economy growth, as the actual income per capita of a nation increases, the share of state expenditure also increases. The law referred to that "The introduction of modern industrial society will end result in increasing political strain for social progress and increased allowance for social consideration by industry."

Wagner (1893) planned three central bases for the expansion in state activities. Firstly, at some point of industrialization process, the role of government will substitute by private sector activity. State roles like administrative and protective features will increase. Secondly, governments desired to provide cultural and welfare services like education, public health, pension or retirement insurance, food subsidy, natural catastrophe aid, environmental security

packages and other welfare functions. Thirdly, extended industrialization will carry out technological alternate and large firms that tend to monopolize. Governments will have to offset these consequences via supplying social and merit goods via budgetary means.

In his Finanzwissenschaft (1883) and Grundlegung der politischen Wissenschaft (1893), Wagner pointed out that government expenditure is an internal factor, which is decided via the expansion of country wide income. Hence, it is country income that causes government expenditure. The Wagner's Law tends to be a lengthy period situation: the longer the time period, the greater the economy implication and statistical inferences. It used to be mentioned that these developments have been to be realized after fifty to hundred years of modern industrial society.

II. **Peacock and Wiseman Theory of public expenditure**

In 1961, Peacock and Wiseman in their study of public Expenditure for England elicited a salient shaft of light about the nature of increase in public expenditure. Peacock and Wiseman (1967) recommend that the increase in the size in public expenditure does not occur in the same way that Wagner theorized. Peacock and Wiseman choose the political will of the nation instead of the organic state where it is deemed that government want more expenditure, but people do not like increasing taxation and the population decide for ever-increasing public services.

There may be difference in concepts about the desirable public expenditure and limits of internal revenue but these gap can be minimized by large-scale instability, such as major wars. According to Peacock and Wiseman, these instabilities will cause displacement effect, changing public revenue and public expenditure to new levels. Government will face shortage of revenue and there will be an upward revision of taxation. Initially, citizens will engender displeasure but later on, will accept the verdict in times of crisis. There is a change in style of tax collection over the society. Individuals resist the new taxation levels, previously thought to be unacceptable. Furthermore, the public expect government to stimulate up the economy and adjust to the new social thinking, or otherwise, there will be the inspection effect.

Peacock and Wiseman showed the duration of change as a decreasing barrier that control local authority and increasing the centralization of power over public spending to the Central authority. During the process of public expenditure concentration, the function of government activities tends to increase larger and larger. This can be referred to the concentration process of increasing public sector activities.

Today, the increase in public expenditure has become a mandatory and thus, the disturbance situations matter little.

III. **The Classical vs. the Keynesian approach of public expenditure**

The classical economists argue that the government involvement brings more damage than good to an economy which the private sector should take more responsibility. In his Wealth of Nations, Adam Smith (1776) advocated much on the "laissez-faire" economy where the profit motive was to be the most explanation for economic developments. consistent with the classical dichotomy, a rise within the total amount of cash results in a proportionate increase altogether money prices, with no change within the allocation of resources or the extent of real GDP, which is understood as money neutrality. The classical economists assumed that the economy was perfect: it's always at full employment level, wage rate and rate of interest is self-adjusting and as a matter of fact, the budget should balance as savings is always equal to investment. Since they believe that the economy was always at its full employment level, their objective was certainty not growth.

Following the 1929-30 Great Depression, the classical economists that opposes government involvement in economy, argued that strong trade unions prevented wage flexibility which resulted in high unemployment. The Keynesians, on the contrary, support government involvement to correct market failures. In 1936, Keynes' (1883-1946) "General Theory of Employment, Interest and Money", criticized the classical economists to put too much emphasis on the long run. According to Keynes, "we are all dead in the long run". Keynes believed the decrease in economy activities needed state involvement as a short period solution. Increasing saving will not help but spending. Government will increase public spending in order to increase aggregate demand and supply of the economy. This is the multiplier effect that shows a linkage of relationship from public expenditure to national income.

Keynes categorized public expenditure as an exogenous variable that can brought economic growth instead of an endogenous phenomenon. Hereby, Keynes believed the function of the state to be crucial as it can avoid economy downturn by increasing aggregate demand and thus, switching on the economy again by the multiplier effect. It is a means that bring normality in the short period of time but this need to be done cautiously as public expenditure increase in continuous manner lead to inflationary situations while a small change leads to unemployment.

IV. **Dalton's Condition**

According to Dalton, "public expenditure in all option must be carried just so far that the advantage for the community due to a small change is just balance by the disadvantage of a corresponding small change in taxation and in receipts from any other source of public income. This gives the concept of both public expenditure and public income".

Hereby, there will be a direction where money collected from the public, directly or indirectly, will go back to them in the form of public expenditure programmes. During this process, taxpayers suffer those advantages from these social welfare programmes gain. For the population to advantage from these continuous transfers of funds, cost must be less than advantage.

However, the practical necessity of this doctrine depends upon how social welfare is to be measured. Dalton laid down the increase in manufacturing, equitable allocation of wealth, political and economic stability, full employment and sustainability of resources as standards of measurement for social welfare. This theory has some limitations. Measurement of variables like marginal social benefit of government expenditure (MSB) and Marginal Social Sacrifice of the citizens in the form of taxation (MSS) are very difficult, public is not long run oriented due to present cost and it is difficult to estimate the burden of taxation.

V. **Pigou's Condition**

In his Economics of Welfare, Pigou (1932) divided welfare economics into two parts, namely, the manufacturing and the allocation. The pigou tax rate is used to accommodate negative externalities and taxes are used as subsidy for positive externalities. Based on Pigou (1928), the condition of high social benefit is that situation in which, "Expenditure should be pushed in a direction to the point at which satisfaction obtained from the last shilling spent is equal to the satisfaction lost in respect of the last shilling paid as taxes to the government."

VI. **Bowen's model of public expenditure**

An interesting point by Howard R. Bowen (1943) is that public goods are not fairly distributed to all voters. According to him, since public goods are consumed by all individuals in a community, each of them needs to contribute for the social goods. But as Bowen rightly says, we must in the case of public goods add different individuals' curves vertically. This is so because the ability to enjoy the public goods is different for different individuals. Since each of them has different valuation of the social goods, we expect them to contribute different amounts. Hereby, the government will produce an amount of social goods equal to the marginal cost of supplying that good, to be equal to the marginal utilities received by the community.

VII. **Solow growth model**

In his classic 1956 article, Robert Solow proposed the analysis of economic process basing itself from a typical neoclassical production function. Neoclassical growth theory focuses mainly on capital accumulation and saving-related topics. Assuming there's no technological change, this is able to imply that the economy has reached the steady-state equilibrium, where per capita income and capital are constant.

Solow found that the critical elements of GDP growth are technical progress, increased labor supply and capital accumulation. More profound research showed other factors also to extend GDP growth: accessibility of natural resources and human capital. As a matter of fact, the income share of human capital is large in industrialized countries. Moreover, the results of high investment ratio (large physical capital stock) might also increase the GDP growth. On the opposite hand, Solow residual is that the change in total factor productivity which is technical change. In other words, it means the quantity by which output would increase as results of progress in methods of production, with all inputs unchanged.

2.2 Empirical Literature

2.2.1 RGDP vs. Expenditure

Nurudeen and Usman (2010), investigate the effect of government expenditure on economic growth for Nigeria using co-integration and error correction method for the period of 1970-2008, the result of the study shows rising government expenditure on transport and communication and health results to an increase in economic growth.

Lotto (2011), study the relationship between sectorial expenditure and economic growth for Nigeria for the period of 1980 to 2008. The result of his study showed in the short-run, expenditure on health and transport and communication was positively related to economic growth. Contrarily, spending on agriculture was negatively related to economic growth. But, the relationship between expenditure on education and economic growth was negative and insignificant.

Musaba, Matchaya and Matchaya (2013), examines the impact of government sectorial expenditure on economic growth in Malawi using a co-integration analysis with error correction model for a period of 1980 to 2007, in order to estimate the growth effects of government expenditures in agriculture, education, health, defense, social protection and transport and communication. The study result indicates no significant relationship between government

sectorial expenditure and economic growth found in the short run whereas the long run results showed a significant and positive effect on economic growth of expenditure on agriculture and defense. On the other hand, expenditures on education, health, social protection and transportation and communication were negatively related to economic growth. The study finally implies to boost economic growth efficient management of resources allocated to all sectors should be emphasized.

Assefa (2014), in his study on the trend and significance of public expenditure for economic growth in Ethiopia for the period of 1981 to 2013 using OLS method, the study results suggest both recurrent and capital expenditure had a positive and significant impact on economy growth for Ethiopia. Furthermore study by Berihun (2014), that investigate the economic growth impact of government sectorial expenditure in Ethiopia over the period from 1975 to 2013 using VECM. The study results also show government spending on education found to be significant effect on economic growth.

The test for Wagner's law on Ethiopia which implies that the increase in income will leads to the increase in expenditure investigated by (Bayu, 2015) using the Engel-Granger Co-integration method for the period of 1974 to 2009. The study result shows the existence of relationship between real GDP and government expenditure.

2.2.2 Revenue vs. Expenditure

Several studies that analyze the causality run between government expenditure and revenue for Nigeria shows different result due to the difference in methodology and time period they employed. Among those studies, Study by Emelogu and Uche (2010) for the period of 1970 to 2007 by Appling the Engel-Granger co-integration technique, the Johansen co-integration method and the Granger causality test within the Error Correction Modeling (ECM) framework discovered that a long-run relationship between the two variables and a unidirectional causality running from revenue to expenditure in Nigeria. Also study by Ali and Shah (2012) using yearly data for the period 1976-2009, by applying the Johansen co-integration and Granger causality techniques discovered that no relationship detected in the study variables both in the long run and the short run which support the institutional separation hypothesis.

Aregbeyen and Taofik (2012) also investigated the long run relationships and dynamic interactions between the government revenues and expenditures in Nigeria over the period 1970 to 2008, using Autoregressive Distributed Lag model, the study result showed that there is a long

run relationship between public expenditures and revenues, and no evidence of a long run relationship was found that tax-spend hypothesis was established.

Analysis on relationship between government revenue and expenditure in Nigeria using data for the period of 1970 to 2011 by employing econometric method of error correlation method of analysis, Granger causality test, regression analysis, lag regression model, vector error correction model and impulse response by Ogujiuba and Abraham (2012) shows the existence of causality runs from revenue to expenditure in Nigeria. The fiscal variables under the study also highly correlated. The study concludes shocks from crude oil price passes through oil revenue affect expenditure (Nwosu and Okafor, 2014).

Study by Mainoma and Aruwa (2015) using Vector Error Correction Model for the period of 1979 to 2008. The causality test of the findings showed that existence of the causality runs from revenue to public expenditure in Nigeria, their causality test and impulse response analysis confirm government revenue has a significant impact on public expenditure in Nigeria.

Study by Abdulrasheed (2017) that investigate the causality run between the two variables for the period of 1986 to 2015 by adopting a VAR model with vector Error correction model (ECM) as a method of analysis. The results from the analyses show that expenditure has long-run unidirectional relationships of Spend-Tax between government revenue and public expenditure in Nigeria. This causality runs from expenditures to revenue.

Nwosu and Okafor (2014) also using yearly data from 1970 to 2011 by employing co-integration techniques and Vector Autoregressive (VAR) models with an Error Correction term. The Co-integration tests showed the presence of long run equilibrium relationships between government revenue and expenditure variables. The VAR results also show that all type of government expenditure without composition difference has long run unidirectional relationships with total revenue, as well as unidirectional hypothesis running from spending to revenue. The outcome aligned with the spend-tax hypothesis in Nigeria implying that changes in government expenditure bring about changes in government revenue (Abdulrasheed, 2017).

Study that analyze the relationship between government revenue and expenditure for Ethiopia during the period of 1981-2015, using annual time series data by employing Engle-Granger co-integration technique and Granger causality test through Error Correction Modeling (ECM) framework. The empirical findings of the study suggest that the existence of long period relationship between revenue and public spending with positive unidirectional causality link. The

result leads support for the revenue-spend hypothesis; implying that the increase in government revenue induces a rise in public expenditure in Ethiopia (Eshetu, 2017).

2.2.3 Public Debt vs. Expenditure

Kanano (2006), studied the determinants of government expenditure growth over 1980-2004 in Kenya using ordinary least square (OLS) estimate method; the finding of the result shows internal debt had a negative impact on government expenditure growth whereas external debt did not exhibit any statistically significant effect on government expenditure. Based on the result debt overhang hypothesis was significant in Kenya.

Cassimon and Van Campenhout (2007) studied the effect of debt relief on government expenditure and revenue in 28 highly indebted poor countries (HIPC) over 1991-2004, using a panel VAR model. The result of the study showed debt relief increased the revenues collection potential of government and increased both the recurrent and development spending. The result also supports a debt overhang hypothesis. In addition, contrary to the debt relief, they stated that rising government expenditure may be due to wasteful expenditure including corruption. In relation to this study, when public debt repayments (principal and interest) are done away with, revenues are channeled to financing government expenditure causing a rise in government expenditure.

Shonchoy (2010) examined a panel data study of 111 developing countries in Africa, South America, Asia and Europe over 1984-2004. He used a country specific fixed effect model and random effects model. The study result showed both balanced and unbalanced datasets the coefficient of debt service was statistically insignificant at all levels of significance. The author concluded that public debt burden may not have a direct impact on government expenditure, so that it would be appropriate for developing Nations to use internal sources of finances (tax revenue) to reduce public debt burden which was fast relatively to cutting pre-planned expenditure.

Stegarescu (2013) studied the long-term relationship between government expenditure composition and sub-national government debt levels using a Pooled OLS regressions estimation method for 10 West-German states over 1974-2010. The debt-to-GDP ratio was regressed on the composition of state and local government expenditure, while controlling for a separate level effect of total expenditure and alternatively, socio economic and political factors, as well as for fixed time and state effects. The study result found out that larger shares of government consumption expenditure were associated with lower debt. The level of total expenditure was

found to have a debt increasing effect. The author recommended a reform of the tax sharing and equalization system, including larger tax autonomy of the federal states.

Eboigbe and Idolor (2013), examine the impact of external debt on public sector investment in Nigerian economy, using the co-integration economic technique on annual time series data for 31 years (1980 – 2011) to test the hypothesized relationship. The study result supports the existence of positive relationship between external debt and public investment, meaning that an increase in debt stock will lead to increase in capital expenditure and public investment in turns.

Analysis on the determinant of public debt for the middle income and high-income group countries using panel data regression by Sinhal et al. (2011) identified that central state expenditures, education expenditures and current account balance affect the debt burden of both middle- and high-income countries. Also, other study that investigate the effect of the Greek expenditure and income on government debt using VECM with a Granger causality test to determine the direction of causality among variables show gross national government expenditure, gross national income, inflation and net foreign direct investment significantly affect the general government debt in Greece. The VAR granger causality results shows causality run from gross national government expenditure and gross national income to general government debt (Mah et al , 2013).

Analyses on the response nature of government expenditure components and public debt through an intertemporal optimization framework for India for the period of 1980-2013 to test the theoretical representation of the relationship between public expenditure and debt with the aid of correlation, co-integration and ECM test shows that real capital expenditure was co-integrated with real public debt of the Central and the General government and in the long run, real capital expenditure adjusts to bring real public debt on a convergent path (Idenyi, 2016).

An empirically study that examines the relationship between public debt and government expenditure in Nigeria by taking consideration of public debt as the dependent variable while the capital expenditure and recurrent expenditure as an independent variables for the period 1980 – 2013, using the ordinary least square regression technique, the t-test statistic results at 5% level of significance, revealed that there is a significant relationship between public debt and government expenditure in Nigeria (Uguru, 2016).

2.2.4 Aid vs. Expenditure

Clist and Morrissey (2011) investigated the relationship between foreign aid, revenue and expenditure in Uganda by using a co-integrated vector autoregressive model over the period

1972-2008. A result of the study indicates that grant was an important element of long-run fiscal equilibrium and it was related with increased tax effort and public spending, and reduced domestic borrowing. Disturbance on tax revenue has the pulling forces, while those to domestic borrowing government spending and aid where the pushing forces of the system. The policy implication of the study was it was crucial for donors to increase the credibility and certainty of aid, secure aid delivery systems and also makes aid more transparent.

Abidemi (2011) studied the effectiveness of foreign aid in Nigeria using Error correction model with Engel Granger econometric method to analysis the co-integration test for the period of 1981 to 2008. The study result shows the existence of a long-run relationship among economic growth, foreign aid and government expenditure in Nigeria.

Morrissey et al., (2011) examined the impact of aid on government expenditure over 1990-2008 using a parsimonious model estimate of a panel data analysis. The finding of the study shows that domestic revenue was a significant driver of government spending; with a significant coefficient close to unity and high explanatory power. Furthermore, Aid was also a significant determinant of government spending, but its effect was smaller for middle income countries.

Bwire et al. (2013) assessed the existence of strong relationship between aid, revenue and expenditure in Uganda over the period of 1972-2008 using aggregated and disaggregated expenditures model respectively. The results of the study indicate that in the long-run, the budget was influenced more by tax revenue than aid; with grant and tax revenue being negatively related with internal borrowing while spending was positively associated with internal borrowing. In the disaggregated model, the expansion of capital spending leads to the enlargement of deficits.

Ali (2014) used a utility model to analyze the government expenditure response to aid flow fluctuations and aid freezes in Ethiopia for the period of 1966-2013 using vector error correction model (VECM) the finding of the result show external sources of finance had stimulated government spending in short as well in the long run and foreign aid leads to increased government spending. The ODA had increased the government spending by more units than others factors of expenditure growth.

Tagem (2017), a panel data analysis on the impact of foreign aid and taxes on public spending for a sample of 69 developing countries over the period of 1980-2013 by using Pesaran (2006) CCE Mean Group estimator. The result of the study shows the existence of long-run relationship between spending, aid and taxes. Furthermore, the coefficient aid was positive but smaller than

the tax coefficients, indicating that in the long-run and short-run taxes has a stronger association with expenditures than aid.

2.2.5 Population vs Expenditure

Pranab Kumar Das and Saibal Kar (2015), describe the effect public expenditure on population by analyzing the share of expenditure on education and health, which are expected to influence the productivity of the working age population in the long run. Analysis made based on estimated SVAR model and the impulse response functions show important roles played by the social sector expenditure affecting the rate of working age population with implications for labor force participation. A rise in the public expenditure in education creates better opportunities for a larger share of the population to enroll for school and colleges leading to lower work force participation (Das and Kar, 2016).

Yashiro et al. (1997) create a general equilibrium model for Japan in order to capture the fiscal implications of demographic aging and propose reforms to mitigate adverse effects. Their results correspond to the theoretical framework as the adverse effect on the public budgets was confirmed. Díaz-Giménez and Díaz-Saavedra (2009) analyzed the impact of demographical change on public pension system using a calibrated OLG model for Spain. The study result indicates that public pension system was unsustainable under the predicted demographic developments.

Kudrna et al. (2015) develop a small open economy, the OLG model with non-stationary demographic paths for Australia. As a result of increases in age-related expenditure, they predict significant adjustments in other government expenditures and taxes to offset the effect of a demographic shift. More interestingly, increases in fertility and immigration are excluded as possible solutions to the fiscal challenges.

King and Jackson (2000) in their empirical research for Canada conclude that population aging alone will not pose major challenges to the public finance. However, they stress the importance of government debt reduction in the short-term, which would enable more room-to-maneuver in the long run. Chawla et al. (1998) analyzed the relationship between health expenditure and population using a multivariate of annual data for Poland spanning the years from 1960 until 1995. The study result found that a positive and weak correlation between a population aged over 65 and health expenditures. Di Matteo and Di Matteo (1998) using a pooled OLS regression for Canada's provinces suggest that an increase in the proportion of the population over 65 will add on average about 1.3% per year to the real per capita provincial government health expenditures.

Di Matteo (2005) expands the previous research by introducing state-level data for the US along with province-level data for Canada. The results confirm the positive impact of an increase in the elderly share in models without time variables. However, when the model includes time variables, which are used as proxy for technological change, a relatively smaller proportion of health expenditures are explained by the age distribution of the population and income per capita.

Martín et al. (2011) analyzed literature on health care expenditure for the period 1998 to 2007 for a sample of 20 studies. The finding of the study shows, six of them emphasize population aging as the key determinant. However, they concluded that there is no solid empirical evidence in favor of attributing population aging as one of the principal determinants, whereas technological advances, closeness to death and territorial decentralization arise as important factors in explaining development of health care expenditures.

Lusky and Weinblatt (1998) run the OLS regression for 127 countries to estimate the fiscal pressures of demographic shifts. They find that the share of elderly population has a positive and significant effect on the share of government health expenditure in GDP, while increases in both young and elderly populations increase social welfare expenditure.

Labrador and Angona (2003) use a one-step first difference GMM estimator to test median voter theory on a sample of 26 OECD countries over the period 1970-1997. They confirm the negative elasticity of the elderly share on public services and housing. On the other hand, they conclude there is a positive impact of an increase in the elderly share on social security and health expenditures. The increase in the younger population positively affects health and education expenditures, while reducing military and other expenditures (Žokalj, 2016).

2.2.6 Real Effect Exchange Rate vs. Expenditure

Monacelli and Perotti (2006) examined the impact of government expenditure disturbance on real effect exchange rate and trade balances for OECS countries using structural VAR technique. The result of the study shows the increase in government spending induces real exchange rate depreciation and a trade balance deficit. In addition, it also indicates that private consumption in all countries rises in response to a government spending shock, and therefore moves positively with the real exchange rate.

Ogwuru (2009) examined the impact of central state expenditure on price stability in Nigeria for the period of 1970 to 1994 using co-integration analysis with Error Correction Model for annual time series data. The result of the study indicates that there was a significant relationship between inflation and government expenditure in Nigeria. Other study by Onwioduokit investigates the causal relationship between inflation and fiscal deficit in Nigeria over 1970 to 1994. The result shows that fiscal deficit causes inflation.

2.2.7 Openness vs Expenditure

A panel data regression analysis for 96 countries for the period of 1970-2000 that examine the relationship and causality run of government expenditure and openness the study result showed that no correlation found between openness and government size. Granger causality tests result also found higher lagged government size leads to lower trade openness which was the opposite of Rodrik's hypothesis (Benarroch and Pandey, 2008).

Shahbaz et al. (2010) explored the impact of trade and financial openness on government size in the case of Pakistan using the FMOLS for co-integration and Ng-Perron for unit root estimation along with ECM for short run dynamics. The study result indicates that trade openness had a positively relationship with government expenditure in Pakistan while financial openness and expenditure where related inversely, thus, support the validity of the compensation and efficiency hypotheses.

Study by Aregbeyen and Ibrahim in Nigeria (2014) investigated the subject matter using the bounds testing approach to cointegration within an ARDL framework. Empirical results show that government size measured by percentage share of total government expenditure in GDP and share of recurrent expenditure in GDP significantly affects trade openness in the long period but percentage share of capital expenditure in GDP for a measure of expenditure does not affect trade openness in the long run. The result was inclined with empirical results obtained by Nwaka and Onifade , 2015   (Kolawole and Temidayo, 2017).

Oyeleke and Akinlo (2018), examined the relationship between trade openness and government expenditure nexus in Nigeria over the period 1980-2013 using ARDL modelling approach to co-integration. The bound testing procedure was used to determine the existence of long run relationships among variables. The results of the study show that there was no co-integration among the study variables. Despite a positive and significant relationship between total

expenditure and exchange rate while Capital expenditure and recurrent expenditure had also a negative and significant effect on openness.

2.3 Conceptual Frame Work Drawn for the Study

The major distinguishing fiscal features of developing countries in general and Ethiopian in particular are low tax to GDP and expenditure to GDP ratios compared to developed countries. Even though countries need more public expenditure, the fiscal stance is often pro-cyclical and the finance resources are more volatile than developed countries. Due to this, countries face great challenge in getting enough finance resources for the growing expenditure need for the purpose of advancing socio-economic development, economy growth and poverty reduction. When there is imbalance growth between expenditure and revenue, budget deficit can possibly happen, this leads to affect the country macro economy in terms of debt burden, inflationary effect and in rise of aggregate demand. In order to reduce economy ill related to budget deficit, in Ethiopia government take different measures like planning the annual expenditure with the expected amount of deficit which they assumed to have a small inflation effect, or as an option without highly expanding the expenditure size by only shifting expenditure to the productive sector for addressing the issue of socio-economic development and economy growth.

Public expenditure growth especially for developing countries is important for economy growth evidenced by many empirical studies, even though it is subjected to finance resources constraint. So, the study basically investigates how to achieve a neutral fiscal stance (balanced expenditure) without affecting other macroeconomic variables and the whole economy.

In this study, it is assumed that determining variables and real expenditure has a forward linkage. The explanatory variables selected for the study that are assumed to have a significant and strong effect on the level of real expenditure size categorized in to four divisions, under fiscal variables, demographical variables, external and economic variables. As part of the fiscal variables; domestic revenue, public borrowing and grant budget are included; as part of the demographical variables, dependent population (Age < -15 + Age > +65) included; as part of external variables, real effect exchange rate, import and export are included and finally as economic variables, nominal GDP and real GDP are included.

The assumption underling on those factors are broading of tax base and making reform on tax administration will enhance tax collection and positively affect the level of real expenditure size of the country. Grant is also another factor that assumed to have a positive effect on the level of

real expenditure size, but due to issues related to the use for intended purpose, sustainability and pre-condition for getting the grant, relaying on this source might have negative effect on the level of real expenditure size. Public borrowing for a certain limit may be useful if country uses the cash for public investment project, otherwise it may affect the real expenditure in terms of paying of debt servicing and interest. Real GDP also assumed to have a positive influence on the level of real expenditure size due to the increase in income of the country based on Wagener's laws. The real effect exchange rate and openness also assumed to have effect on external balances (shock) on the economy and further on the level of real expenditure size in terms of money value and tax duties. The increase in dependent population number also assumed to have effect on the level of real expenditure size due to the increasing need for social service, public institution construction and infrastructure building. Hence, the conceptual framework drawn for the study based on the above assumption put in **Figure 2.1**

Figure 2. 1: Conceptual Framework Drawn for the Study

Source: Own conceptualization for the study, 2019

CHAPTER THREE

RESEARCH METHOD

This chapter basically describes a country profile, data type and source, an econometric model used for the study, definition of terms, methods of data analysis and finally model stability and

diagnostic approaches were presented (unit root, bound test, normality, functional form, serial correlation and heteroscedasticity).

3.1 Description of the Study Area

This study is conducted in national level where Ethiopia is located in the North Eastern part of the African continent or what is known as the "Horn of Africa." Ethiopia is bounded by Sudan on the west, Eritrea and Djibouti on the northeast, Somalia on the east and southeast, and Kenya on the south. Ethiopia lies between the Equator and Tropic of Cancer, between the 30 N and 150N Latitude or 330 E and 480 E Longitude. The country occupies an area of approximately 1,127,127 square km. The total land area is 1,119,683 square km and the area occupied by water bodies is 7,444 sq. km. The Ethiopian border is 5,311 km long. According to NBE (2019), out of the total land, 45 percent is arable land and only 3 percent are irrigated land. With regard to demography, it has a population of 109,957,438 with annual average growth rate of 2.47% in 2018 that make the country the tenth largest nation in the world and the second most populous state in Africa after Nigeria and has density of 104.95/Km^2. Majority of the population (80.07%) lives in rural areas while the rests spread among small peril-urban urban and urban areas of the country. Recent social pointers also described country's life expectance was 65.47 years in 2016 (WDI, 2018).

Economically, Ethiopia has experienced double digit economic growth, averaging 10.8% since 2005 making it as one of the fastest growing economy in the world. Agriculture, industry and service sectors accounted for 33.3%, 28.1% and 39.8% to GDP respectively in 2018/19 (Annual report of NBE, 2019). Macroeconomic indicators show that in the same year's inflation rate was 12.6 percent, while the rate of unemployment was 19.1 percent and exchange rate value of birr against US Dollar was 28.10, regarding the living standard; country's annual Real GDP per capital is 20,360.2 million of Birr in 2019, the major export items are coffee (28.7%), oil seeds (14.5%), gold (1%), chat (11.4%), pulses (10.2%), cut flowers (9.6%) and live animals (1.7%) in the years 2019/20, while imports constitute capital goods (33.3%) , consumer goods (27.9%), semi-finished goods 15.3% and fuel 12.8% (UNDP, 2018) .

GDP per capita is 807 USD in 2015, the major export items are coffee (26.4%), oil seeds (17.9), gold (14.1%), chat (10.5), pulses (6.5%), cut flowers (8.5%) and live animals (4.5%) in the year 2015, while imports constitute capital goods (41.3%), consumer goods (28.3%), semi-finished

goods 18.4% and fuel 17.2 % (NBE, 2018/19).

Available at www.et.undp.org country profile, 2019.

3.2 Data Type and Sources

The study employed time series data set on annual basis. The data has been collected from Ministry of Finance (MoF), National Bank of Ethiopia (NBE) and Central Statistically Agency (CSA) of Ethiopia using CD-ROM. The sample period where covered from the years 1980-2018 inclusive. All the required data used for the study was collected in 2019/20. The period is considered based on the availability of the preferred data for all series.

The data series used in this study take account are Real Expenditure (REXP) measured as the sum of capital and recurrent expenditure valued in Millions of Birr, real gross domestic product(RGDP) measured as the total market value of all final good and services with a constant price of 2010 valued in Millions of Birr, Domestic Revenue(DREV) measured as the sum of revenue collected from tax and non-tax sources valued in Millions of Birr, Public debt (PDEB) measures as sum of internal and external borrowing by government valued in Millions of Birr, Grant(AID) measured as all fund received from foreigner country interims external assistance in Millions of Birr, total population (POP) is a measure the sum of the number of dependent people of the country aged zero to 15 and over the age of 65, real effect exchange rate (REER) measured as the weighted average of a country's currency in relation to an index of other major currencies valued in Birr and Openness(OPNN) measures as countries' exposure to international trade, measured in as the sum of imports and exports of goods and services and divides this sum by real GDP. The larger ratio indicates the more exposure of the country to international trade.

The data for REER, RGDP, Export, Import and PDEB are sourced from NBE. The data for REXP, DREV and AID are sourced from MoF. While the data for POP sourced from CSA.

3.3 Theoretical Framework

In attempt to establish the theoretical framework for the determinants of public expenditure growth, most well-known interaction is the one associated with Wagner's (1883). The Wagner's basic hypothesis is that as the per capital income increases, the share of public expenditure in total expenditure increases. From the postulates of the law we can proceed to estimate using the following equation:

$$G = a + bY + (1-b)P - [1]$$

Where, G stands for real expenditure, Y represents income and P denotes the number of population. Wagner's law has been adopted and modified in various functional forms for the past decades in analyzing the causes of growth in public expenditure. Notably among them are studies by Goffman and Mahar (1971), Gupta (1967), Mann (1980), Musgrave (1969), Peacock and Wiseman (1961) (Jibir and Aluthge, 2019).

The research work adopts to formulate the model of public expenditure by modifying Equation [1] to incorporate other relevant variable selected in the literature. The assumption is that the desired level of public expenditure (G^*) is linearly dependent on level of income (Y).

In addition, we also assume the following adjustment within the spirit of Gafar (1975). Since it takes time for the actual level of real expenditure (G) to adjust in accordance with new income level (Y), then we assume the following adjustment process in the following equation:

$$G_t - G_{t-1} = \varphi(G_t - G_{t-1}), 0 \leq \varphi \leq 1 - [2]$$

Where φ stands for adjustment term, Substituting and rearranging Equation [1] in Equation [2], we get the following equation as: -

$$G_t = \varphi_\alpha + \varphi_b y_t + (1-\varphi)G_{t-1} + (1-\varphi)P = A_0 + A_1 y_t + A_2 G_{t-1} + A_3 P - - - - - - - - - - - - [3]$$

If $\varphi = 1\varphi = 1$ means the adjustment is instantaneous and Equation (3) reduced to

$$G_t = G_t^* i.e\ G_t = \alpha + by_t + (1-b)p - [4]$$

Equation (4) is the functional form that is usually estimated as Wagner's law. We can therefore modify equation (4) by incorporating other relevant variables defined in the literature in order to estimate the determinants of public expenditure growth in Ethiopia.

3.4 Model Specification

Real Expenditure Growth Model Specification

The basic task on this sub-section is attempt to model real expenditure on a vector of relevant explanatory variables nominated in the literature. The functional form of Real expenditure on selected explanatory variable nominated in the literature can be expressed as: -

$$REXP = f(RGDP, DREV, PDEB, AID, POP, REER, OPNN) ------[5]$$

Where $REXP$ is real expenditure, $RGDP$ is real gross domestic product, $DREV$ is domestic revenue, $PDEB$ is public debt, AID is aid, POP is total dependent population. $REER$ is real effect exchange rate and $OPNN$ is openness. Since the current public expenditure depends on the previous year expenditure, introduce time factor, t, and state equation [6] as--

$$REXP_t = f(RGDP_t, DREV_t, PDEB_t, AID_t, POP_t, REER_t, OPNN_t) ------[6]$$

Where (t) is the current time period. Thus, our specific module is stated in the following equation 7

$$REXP_t = \beta_o RGDP_t^{\beta_1} DREV_t^{\beta_2} PDEB_t^{\beta_3} AID_t^{\beta_4} POP_t^{\beta_5} REER_t^{\beta_6} OPNN_t^{\beta_7} ---[7]$$

Transformation of all the variables under study into Log data to avoid heteroscedasticity (Gujarati, 2004) and to show elasticity of the variables; the public expenditure growth as a function of equation [8] using Log - linear model by introducing natural logarithm on both sides of equation. The basic empirical model to estimate is specified as follows;

$$LRGEXP_t = \beta_0 + \beta_1 LRGDP_t + \beta_2 LDREV_t + \beta_3 LPDEB_t + \beta_4 LAID_t +$$
$$\beta_5 LPOP_t + \beta_6 REER_t + \beta_7 OPNN_t + \varepsilon_t --------------[8]$$

β_0 is the coefficient of the dependent variable, it provides the rate of self-perpetuating adjustment of the real expenditure, $\beta_1 - \beta_7$ are coefficients of the explanatory variables expressed in natural logarithm, except for real effect exchange rate and trade openness, which are used to explain the behavior of growth in the level of real expenditure in size that specified for public expenditure growth model as reviewed by Facchini (2014). The error term(ε_t) assumed to be normally independently distributed with zero mean and constant variance, which captures all other explanatory variables influences on the size of real expenditure in a country which are not captured by the model.

3.5 Model Selection Strategy

Applying appropriate methodology for time series data is the most crucial part of the time series analysis as wrong specification of the model or using wrong method provides biased and unreliable estimates. Primarily, the method selection for time series analysis is based on the unit-root test results which determine the stationarity order of the variables. Methods commonly used to analyze stationary time series cannot be used to analyze non-stationary series. If all variables of interest are stationary, the methodology become simple. In such case, ordinary least square(OLS) or vector autoregressive (VAR) models can provide unbiased estimates. If all the variables of interest are non-stationary, OLS or VAR models may not be appropriate to analyze the relationship. Similarly, additional problem arises when variables used in the analysis are of mixed type, i.e., some are stationary and others are non-stationary.

The most basic approach for method selection criteria other than other several considerations in time series models is based on the stationarity nature of the variables. Since there are other several considerations in time series models. The non-stationary variables can be made stationary by taking first difference. Similarly, the non-stationary data with a persistent long-run trend can be made stationary with either i) putting time variables in the regression ii) extracting trends and cycles from the single series by using popular filtering techniques such as Hodrick(HP) filter.

Nevertheless, it should be noted that the long-run relationship or information of the variables may not be lost when we modify them to make stationary such as by differencing, de-trending or filtering.

Model selection for time series data based on the unit root nature of the variable. The unit root test results enable us to determine the stationarity of the variables in the selection of appropriate methodology framework for time series data as presented by Shrestha and Bhatta (2018). The Econometric model selection can be described in the following figure 3.2

Figure 3. 2. ARDL Econometric Model Selection Strategy for this Study
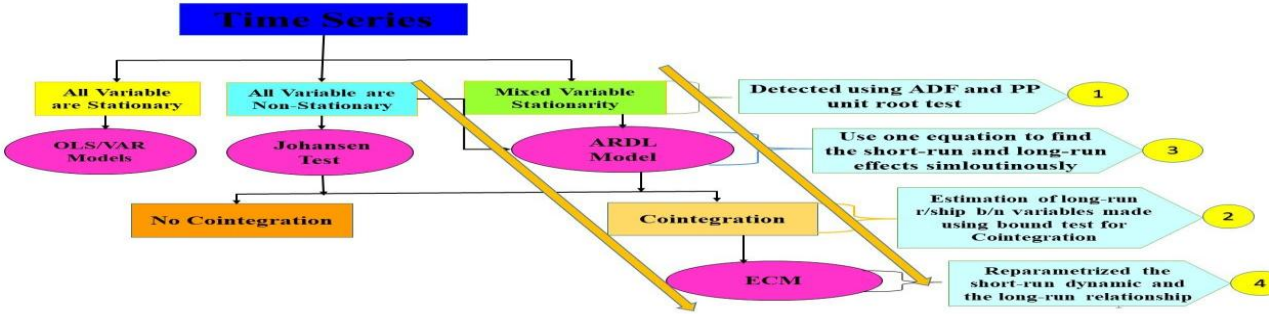
Source: Own model selection strategy for the study

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Different Study on the same topic have used different co-integration techniques to estimate the determinants of public expenditure growth in various countries, but this study further applied the autoregressive distributive lag (ARDL) model approach to co-integration or bound test of co-integration (Pesaran and Shin 1999 and Pesaran et al. 2001) techniques. Since it become the solution to determining the long-run relationship between series that are non-stationary, as well as re-parameterizing them to the Error Correction Model (ECM).

The re-parameterized result gives the short-run dynamics and long run relationship of the underlying variables. Among the basic reason for the adoption this method is other approaches have weaknesses and are not appropriate for this study due to the degree of freedom problem as there are a lot of determinants of public expenditure growth. So, this study uses autoregressive distributive lag model (ARDL) techniques due to the following reasons and major advantages.

First, ARDL approach to co-integration uses one equation to find the short and long run effects simultaneously.

Second, ARDL approach can be applied without taking into account whether the explained variables are I (1) or I (0). This implies that the combination of I (1) and I (0) or mutually co-integrated are possible using ARDL approach.

Third, it yields unbiased and efficient estimates in regression analysis and can be applied on small sample data while the Johansen co-integration requires large sample data for validity (Pesaran and Shin (1999)).

Fourth, ARDL approach to co-integration enables estimation using ordinary least squares method once the lag of the model is identified. Furthermore, Tang (2006) stresses that the ARDL approach is also applicable when the explanatory variables are endogenous and it has power to correct for serial correlation.

Lastly, the approach allows estimation of different variables with dissimilar optimal number of lags.

One criticism that has been leveled at ARDL models is that, if there is a stochastic (random) trend present in the data, the dynamics in an ARDL model will be approximating this trend rather than modeling real dynamics. However, if there is not a stochastic trend in the data, this criticism is not valid.

According to Pesaran and Smith (1997), the ARDL approach to co-integration requires the following two steps: First, to determine the existence of any long-run relationship among the variable of interest using F-test. Second, estimate the coefficients of the long-run relationship and determine their respective values, followed by the estimation of the short-run parameters of the variables with the aid of error correction representation of the ARDL model. The Error correction model (ECM) would also help in understanding the speed of adjustment to equilibrium.

The first step in ARDL approach is to estimate the conditional ARDL which is specified for public expenditure growth model and expressed in the following equation as:

$$\Delta LREXP_t = \beta_0 + \beta_1 LREXP_{t-1} + \beta_2 LRGDP_{t-1} + \beta_3 LDREV_{t-1} + \beta_4 LPDEB_{t-1} + \beta_5 LAID_{t-1}$$

$$+ \beta_6 LPOP_{t-1} + \beta_7 REER_{t-1} + \beta_8 OPNN_{t-1} + \sum_{i=1}^{\rho} \theta_{i1} \Delta LREXP_{t-1} + \sum_{i=1}^{\rho} \theta_{i2} \Delta LRGDP_{t-1} +$$

$$\sum_{i=1}^{\rho} \theta_{i3} \Delta LDREV_{t-1} + \sum_{t=1}^{\rho} \Delta \theta_{i4} \Delta LPDEB_{t-1} + \sum_{i=1}^{\rho} \theta_{i5} \Delta LAID_{t-1} + \sum_{i=1}^{\rho} \theta_{i6} \Delta LPOP_{t-1} +$$

$$\sum_{i=1}^{\rho} \theta_{i7} \Delta REER_{t-1} + \sum_{i=1}^{\rho} \theta_{i8} \Delta OPNN_{t-1} + \varepsilon_t \text{---[9]}$$

Where β_0 is the drift component, ε_t is the stochastic error term, Δ is the first different operator, the parameters $\beta_1 - \beta_8$ denote the long-run parameters, while represents $\theta_1 - \theta_8$ short-run parameters of the model to be estimated through the error correction framework of ARDL, ρ is the optimal lag length and $\beta_1 - \beta_8$ are the coefficients to be estimated in the model.

The next step is to apply Equation [9] to estimate the hypothesis that there is no co-integration relationship among the variables against the alternative hypothesis that there is long-run relationship between the variables. This is specified as: -

$$H_0 : \beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = \beta_6 = \beta_7 = \beta_8 = 0$$ (The null hypothesis i.e. no co-integration)

$$H_1 : \beta_1 \neq \beta_2 \neq \beta_3 \neq \beta_4 \neq \beta_5 \neq \beta_6 \neq \beta_7 \neq \beta_8 \neq 0$$ (The alternative hypothesis i.e. there is co-integration)

The null hypothesis shows that the parameters of the lagged variables in equations [9] are simultaneously equal to zero indicating no long run relationship or no co-integration. The alternative hypothesis explains that at least one of the parameters of the lagged variables is not equal to zero suggesting long run relationship or co-integration existence. The null hypothesis is tested against the alternative hypothesis using F-statistic. The F statistic has a non-standard

distribution which depends upon whether the variables included in the ARDL model are integrated of order I (0) or I (1) or a mixture of I (0) and I (1).

Pesaran et al. (2001) generate and present appropriate critical values according to the number of independent variables included in the model. In this regard, the calculated F-statistics is compared with two sets of critical values developed on the ground that the explanatory variables are I (d) (where $0 \leq d \leq 1$). The lower critical values assume that all the variables are I (0) while the upper assumed that they are I (1).

The criterion for the F-statistic is if the calculated F-statistic is greater than upper critical value, then null hypothesis of no long-run relationship is rejected. On the other hand, if the F-statistic is less than lower bound, then the null hypothesis of no co-integration would be accepted. Furthermore, if F-statistic lies within the lower and upper critical bounds, then the result is inconclusive (Pesaran and Smith, 1997).

To obtain the long-run coefficient, Equation [9] is specified as

$$LREXP_t = \beta_0 + \sum_{i=1}^{\rho 1} \beta_1 LREXP_{t-1} + \sum_{i=1}^{\rho 2} \beta_2 LRGDP_{t-1} + \sum_{i=1}^{\rho 3} \beta_3 LDREV_{t-1} +$$

$$\sum_{t=1}^{\rho 4} \beta_4 LPDEB_{t-1} + \sum_{i=1}^{\rho 5} \beta_5 LAID_{t-1} + \sum_{i=1}^{\rho 6} \beta_6 LPOP_{t-1} + \sum_{i=1}^{\rho 7} \beta_7 REER_{t-1} +$$

$$\sum_{i=1}^{\rho 8} \beta_8 OPNN_{t-1} + \varepsilon --------------------------------10$$

After establishing the long-run co-integration, the short-run model of the ARDL can be specified in the following equation:

$$\Delta LREXP_t = \beta_0 + \sum_{i=1}^{\rho} \beta_1 \Delta LREXP_{t-1} + \sum_{i=1}^{\rho} \beta_2 \Delta LRGDP_{t-1} + \sum_{i=1}^{\rho} \beta_3 \Delta LDREV_{t-1} +$$

$$\sum_{t=1}^{\rho} \beta_4 \Delta LPDEB_{t-1} + \sum_{i=1}^{\rho} \beta_5 \Delta LAID_{t-1} + \sum_{i=1}^{\rho} \beta_6 \Delta LPOP_{t-1} + \sum_{i=1}^{\rho} \beta_7 \Delta REER_{t-1} +$$

$$\sum_{i=1}^{\rho} \beta_8 \Delta OPNN_{t-1} + \theta ECM_{t-1} + \varepsilon_t --[11]$$

Where $\beta_1 - \beta_8$, remains as previously defined. While Δ represents coefficients of short-run dynamic to be estimated, θ represents the speed of adjustment, ECM is the error correction term and all the remaining variables remain as previously defined. ECM is the error correction term.

3.6 Definition of Variables and their Assumption

Dependent Variables

Real Expenditure (REXP): The real expenditure is a dependent variable for the model specified for this study is a measure for public expenditure growth as reviewed by Facchini (2014). The selected dependent variable for the study has significance on economy growth in many empirical studies. Wagner's (1983) in his basic hypothesis stated that the increase in per capital income is accompanied by increase in government expenditure. Other studies also show it is influenced directly by factors like foreign aid (Negru, 2003), openness (Roderick, 1988), rising population and urbanization (Shelton, 2007), external debt servicing burden (Shonchoy, 2010). For this study it is measured as the sum of capital and recurrent expenditure in Millions of Birr by considering price effect. It also consists of all government utilization i.e. consumption, investment, and transfer payments. The underlying assumption for this study was the level of real expenditure is highly dependent on the selected explanatory variables. Data on real expenditure with different composition for each year for the study period has been taken from the annual statistical bulletin by direct take over from Ministry of Finance (MoF) and National Bank of Ethiopia (NBE) using CD-ROM.

Independent Variables

Real Gross Domestic Product (RGDP): RGDP is used a proxy measure for economic growth as stated by Denison (1962), the rise in real GDP means, a rise of national product. It is measured as the total market value of all final good and services produced annually within the territory of Ethiopia with a constant price of 2010, in Millions of Birrs. The relationship between RGDP and REXP first identified by Wagner's law, in his law of "expanding state activity", he argued that the increase in income leads to the expansion of state activity. In other word, the scope of government tends to improve with the higher level of economy growth (Flaster and Henrekson, 2001). Study in Ethiopia by Bayu (2015), in his test for Wagner's law he find that, the Wagner's law hold for Ethiopia, which shows the existence of relationship between real GDP and real expenditure. The underlying assumption for this study was if real GDP rise, real expenditure also increased i.e. positive relationship. Data on real GDP, nominal GDP for each year in the study period has been taken from the annual base statistical bulletin by direct take over from National Bank of Ethiopia (NBE) using CD-ROM.

Domestic Revenue (REV) is government revenue collected from tax and non-tax sources excluding grant in Millions of Birrs. It is measured as total collected domestic revenue by considering price effect. Eshetu (2017) in his empirical finding provided evidence for long-run relationship between the two-fiscal variable with positive unidirectional causality link from government revenue to public expenditure for Ethiopia. The underlying assumption for the study was if the government domestic revenue increased, real expenditure also increased i.e. a positive relationship. Data on direct tax, indirect tax and non-tax income for each year in the study period has been taken from the annual base statistical bulletin by direct take over from Ministry of Finance (MoF) using CD-ROM.

Grant (AID) is the amount of money transferred from foreigner country in terms of external assistance in Millions of Birrs. It is measured as a real term of total amount of grant received in Millions of Birrs. Empirical study by Ali (2014) evidenced that ODA has increased the government spending by more units than others factors of expenditure growth in Ethiopia. The assumption under in this study was if grant budget flow increased, real expenditure also increased i.e. Positive relationship. Data on grant budget for each year in the study period has been taken from the annual base statistical bulletin by direct take over from Ministry of Finance (MoF) using CD-ROM.

Public Debt (PDEB) is measured as the sum of internal and external debt stock in Millions of Birrs. It is the real total debt stock of government. The effect of public debt on real expenditure depends on the amount of debt stock and interest and principal payment. Sinhal et al. (2011) in his study shows that central government expenditures, education expenditures and current account balance affect the debt rates of both middle-and high-income countries. The underlying assumption of the effect of public debt on real expenditure under this study was positive i.e. as the amount total public borrowing increased through time the real expenditure also increased. The data on internal, external debt and debt services for each year in the study period has been taken from the annual base statistical bulletin by direct take over from National Bank of Ethiopia (NBE) using CD-ROM.

Real Effect Exchange Rate (REER) is measured as the weighted average of a country's currency in relation to an index of other major currency valued in Birr. That is, the real exchange rate tells us the rate at which we can trade the goods of one country for the goods of another country (Mankiw, 2010). Zakarees (2012) study the relationship between capital expenditure and real effect exchange rate, in his study he found that government spending on social and

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community services have a significant impact on exchange rate in Nigeria. The underlying assumption in this study is that real effect exchange rate appreciation would lead to real expenditure reduction i.e. negative relationship. Data on real exchange and nominal exchange rate for each year of in the study period has been taken from the annual base statistical bulletin by direct take over from National Bank of Ethiopia (NBE) using CD-ROM.

Openness (OPNN) is a countries' exposure to international trade. It measured as the sum of imports and exports of goods and services valued in millions of Birr and divide this sum by RGDP. It is used as the proxy measure for openness. The larger the ratio, the more the country is exposed to international trade. Cameron (1978) argued that the more open economies will have the higher rates of industrial concentration, leading to more unionized labor markets which, through collective bargaining, will influence public spending on social protection and social infrastructure. Aregeyen and Ibrahim (2014) in the study for the existence of relationship between government expenditure and openness, they found that a positive relationship between two variables for Nigeria. The underlying assumption in this study is as a degree of openness increased, real expenditure also increased i.e. positive relationship. The data for each year in the study period has been taken from the annual base statistical bulletin by direct take over from Ministry of Finance (MoF) using CD-ROM.

Population (POP) under this study measured as the sum of the number of people of aged zero to 15 and over the age of +65. According to (Sanz and Velzquez 2002; Remmer 2004) government spending, especially for health care and social security, tends to be related to the demographic structure of the economy. Also, Huber et al. (2008) find that health expenditure in Latin American and Caribbean countries rises with a large young population, while in developed countries it rises with a large elderly population. It is assumed that as dependent population number increased the real expenditure also increased i.e. positive relationship. The data for each year in the study period has been taken from the annual base statistical bulletin by direct take over from Central Statistical Agency of Ethiopia (CSA) using CD-ROM.

3.7 Methods of Data Analysis

This study employed both descriptive and econometric method of analysis. The data for analysis where obtained from National Bank of Ethiopia, Ministry of Finance and Central Statistical Agency of Ethiopia using CD-ROM. ARDL model specification and estimation strategy would apply to analyze the major determinants of public expenditure growth in Ethiopia. To achieve the study objective, a time series data for 39 years from 1980-2018 inclusive was used for different

estimation procedures. Finally, E-view 10.0 version has been used as a statistical software package for the entire analyze of running this study.

Further, the stationarity test was done to eliminate the possibility of spurious regression results by making use of typical Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests. Co-integration was used to test for the existence of long run relationship between variables which are individually non-stationary at their level form, but stationary after first difference as suggested by Gujarati (2004). The conducted co-integration test discovered the existence of long run co-integrating relationship between explanatory variables and real expenditure in Ethiopia. The ARDL co-integration technique was used in determining the long run relationship between series with different order of integration (Pesaran and Shin, 1999, and Pesaran et al. 2001). The reparametrized result gives the short-run dynamics and long run relationship of the considered variables as error correction term in the model explains speed of adjustment towards long run equilibrium. ECM technique corrects equilibrium error in one period by next period and used to relax short-run behavior of an economic variable with its long-run behavior (Maddala, 1992).

3.8 Estimation Strategy

In order to avoid spurious regression result and achieving the desired one in applying econometric method of time series data analysis, we have to first check the unit root series of the variables. In fact, it is the unit root pattern of the variables in large extent determines the appropriate techniques to be applied in data analysis.

There are numerous techniques used for the determination of stationarity of time series data, but for the purpose of this study, Augmented Dickey– Fuller (ADF) test developed by Dickey and Fuller (1981) and Philips–Perron (PP) test proposed by Philips and Perron (1988) are applied, because they are the most common and simple among all other techniques. Besides that, they are also robust and have the capacity to remove autocorrelation from the model. Through the work of this study the following basic econometric test for time series data has been employed.

3.8.1 Unit Root Test

It is fundamental to test for the statistical properties of variables when dealing with time series data, since the data are rarely stationary in level forms. Regression involving non-stationary (i.e. variables that have no clear tendency to return to a constant value or linear trend) time series often lead to the problem of spurious regression. This occurs when the regression results reveal a high and significant relationship among variables when in fact, no relationship exist. Moreover, Stock and Watson (1988) have also shown that the usual test statistics (t, F, DW, and R^2) will not

possess standard distributions if some of the variables in the model have unit roots. The other necessary condition for testing unit root test is when we applying ARDL model to check whether the variables enter in the regression are not order two (I.e. I (2)) or greater than I (2), which is precondition in applying ARDL model.

Therefore, it is necessary to test the unit root series for time series variables before running any sort of regression analysis. Non-stationarity can be tested using Augmented Dickey-Fuller (ADF) test, Phillips Perron (PP) test and Kwiatkowski- Phillips-Schmidt-Shin (KPSS) test. However, to ensure reliable result of test for stationarity, the study employs both Augmented Dickey-Fuller (ADF) test and Philip Perron (PP) tests. The testing procedure for the ADF unit root test is specified as follows:

$$\Delta Y_t = \alpha + \delta t + \gamma Y_{t-1} + \sum_{i=1}^{\rho} \lambda \Delta Y_{t-1} + \varepsilon_t -[15]$$

Where Y_t is a time series variables under consideration in this model at time t, t is a time trend variable; Δ denotes the first difference operator; ε_t is the error term; ρ is the optimal lag length of each variable chosen such that first-differenced terms make a white noise. Thus, the ADF test the null hypothesis of no unit root (stationary).

That is: $H_0 : \gamma = 0; \ H_1 = \gamma \tau \neq 0$

If the t value or t-statistic is more negative than the critical values, the null hypothesis (I.e. H_0) is rejected and the conclusion is that the series is stationary. Conversely, if the t-statistic is less negative than the critical values, the null hypothesis is accepted and the conclusion is that the series is non-stationary.

3.8.2 Long Run ARDL Bounds Tests for Co-integration

After checking the stationarity nature of the variables, the next task in the bound test approach of co-integration would be estimated based on the ARDL model specified in equation [9] using the appropriate lag-length selection criterion. The F-test through the Wald-test (bound test) was performed to check the joint significance of the coefficients. The Wald test was conducted by imposing restrictions on the estimated long-run coefficients of real gross domestic product, domestic revenue, Public debt, aid, population, real effect exchange rate and openness. The computed F-statistic value was compared with the lower bound and upper bound critical values provided by Pesaran *et al.* (2001) and Narayan (2004).

3.8.3 Model Stability and Diagnostic Test

To check the verifiability of the estimated long run model, some diagnostic test would be undertaken in order to fulfill the standard property of the estimated model. In this study a number of model stability and diagnostic checking would be carried out, which includes Serial correlation test (Brush & Godfray LM test), Functional form (Ramsey's RESET) test, Normality (Jaque - Bera test), and Heteroscedasticity test. In addition to the above diagnostic tests, the stability of long run estimates also tested by applying the cumulative sum of recursive residuals (CUSUM) and the cumulative sum of squares of recursive residuals (CUSUMSQ) test. Such tests are recommended by Pesaran *et al.* (2001). In order to reject or accept the null hypothesis, decision can be made by looking the p-values associated with the test statistics. That is the null hypothesis rejected when the p-value are smaller than the standard significance level (I.e. 5%).

CHAPTER FOUR

DATA PRESENTATION, ESTIMATION AND ANALYSIS

4.1 DESCRIPTIVE ANALYSIS

4.1.1 Total Real Expenditure

Real expenditure among different regimes of Ethiopia show inconsistent trend in terms of amount, share and growth rate, due to the difference of ideology and policy measures. The real total expenditure of the country during the Derg regime, in the beginning of this study period in the year 1980 was birr 26,861 million Birr then reached its maximum amount of 37,196 million Birr in 1989. Then decline to 33,493 and 26,162 million Birr in the year 1990 and 1991 consecutively. The military period expenditure increased on average rate of 3 percent per annum. Similarly, in the EPDRF regime, the trend of real expenditure from 1992 up to 2018 increased from 20,445 million Birr to 276,544 million Birr drastically, which shows 11.16 percent increase per annum on averaged.

The composition real expenditure (recurrent vs capital) shows large difference in terms of share from total real expenditure among the two regimes. During the Derg regime the recurrent real expenditure had 71 percent share and capital real expenditure had 29 percent share from total on averaged. Whereas during the EPRDF regime recurrent real expenditure has 52 percent share and capital real expenditure has 48 percent share, in both regimes the share of recurrent expenditure decreased and capital expenditures increased across time.

The recent development of real expenditure performance based on GTP I & II indicates, prioritizing allocation of government expenditures to poverty-oriented sectors and for capital investment. During the GTP I period from the total annual government expenditure, on averaged 60% was allocated for capital investment, while the remaining was allocated to recurrent expenditure. Still the share of recurrent expenditure decrease during the GTP II period. The steady increase in capital expenditure also had a significant "crowding out" effect on private investment (Mulat, 1993).

Table 4.1: Composition of Real Expenditure in Terms of Values and Share in (%)

Regime	Period	Real Expenditure Value on Averaged in Millions of Birrs and Share in (%)		
		Recurrent	Capital	Total
DERG	1980-1991	19,663 (71%)	8,221 (29%)	27,884 (100%)
EPRDF	1992-2018	66,270 (52%)	40,708(48%)	127,212 (100%)

| Total | 42,967(62%) | 24,464(38%) | 77,548(100%) |

Figure 4. 3: Trends in Capital and Recurrent Real Expenditure in Different Regimes

Capital, Recurrent and Total Real Expenditure in Derg and EPRDF Regimes
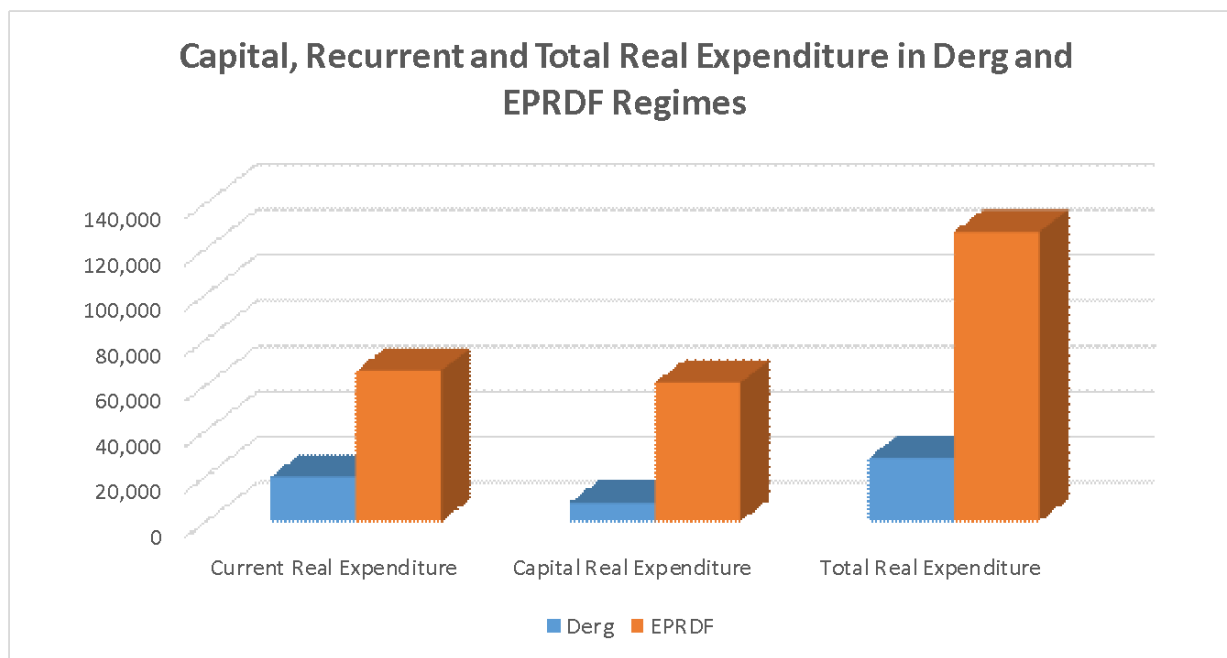
Recurrent Expenditure is expenditure items, which are recurring in the process of delivering government economic and social services. Like wages and salaries, operation and maintenance, pension and price subsidies, and debt servicing are among the major components of recurrent expenditure.

The percentage share of recurrent expenditure from total expenditure decreases across the two regimes consistently. During the Derg regime the share was 71 percent on averaged then declined to 52 percent in EPRDF regime.

The allocation of recurrent expenditure by functional classification during the study period of 1980 to 2018 on averaged show 57 percent channeled to the general services, 18 percent to social services and 15 percent for economy services and the rest 10 percent channeled to other. The general services expenditure decreases from its share on averaged during Derg regime from 59 percent to 55 percent in EPRDF regime while the economy service increases its share from 6 percent to 24 and the other services also decreased from 15 percent to 5 percent.

Table 4.2: Recurrent Expenditure by Functional Classification

Expenditure Categories	Value in Million Birr and share in (%)	
	1980-1991	1992-2018
General services	**1,453(59%)**	**14,592(55%)**
General Government	66(5%)	3,706 (25%)
Internal order and justice	1139 (78%)	3,093(21%)
Defense	151(10%)	4,260(29%)
Other	97(7%)	3,533(25%)
Economic Services	**154(6%)**	**6,258(24%)**
Agriculture	72(46%)	4,456(82)
Industry	16(11%)	858(16)
Mining and energy	13(9%)	50.08(0.93)
Transport & communication	2(1%)	294(5.48)
Construction	51(33)	600(11)
Social Services	**482(20%)**	**4121(16%)**
Education	332(65%)	3251(79%)
Health	100(20%)	785(19%)
Labour & social services	50(15%)	85(2%)
Others	**352(15%)**	**1464(5%)**
Pension	113(25%)	416(28%)
Debt servicing	239(53%)	1048(72%)

Source: Own calculation based on MoF data, 2019.

Capital Expenditure is generally defined as an outlay to development project to build up the capacity of the economy for the production of items and the provision of economic and social services. Such outlays include spending on land development, building of strength plants, building of dams', roads and other construction, and buy of machineries and equipment. It additionally consists of fee for project study and design management, follow-up and direct labor cost.

However, some fees of capital nature that are handled in recurrent finances as some recurrent outlays, also appears in the capital finances (MEDaC 1999).

Capital expenditure is categorized into three groups: economic development, social development, and general development. Economic development includes productive activities and infrastructural facilities such as agriculture, industry, mining and energy, transport and communication etc. Social development includes education, public health and social welfare, while general development includes compensation payments as its component.

The largest share of capital expenditure has been allocated to economic development followed by expenditure to social development in both regimes. The share of economic development to

capital expenditure is 75 percent and social development is 19 percent.

Table 4.3: Capital Expenditure by functional classification

Expenditure Categories	Value in Million Birr and Share in (%)	
	1980-1991	**1992-2018**
General Development	**19(2%)**	**4388(11%)**
Economic Development	**1006(90%)**	**24,264(60%)**
Agriculture	454(45%)	10,178(42%)
Industry	154(15%)	772(3%)
Transport & communication	78(8%)	848 (3%)
Construction	107(11%)	12,112 (50%)
Social Development	**90(8%)**	**11,988(30%)**
Education	39(44%)	6556(54%)
Health	28(32%)	3108(22%)

Source: Own calculation based on MoF data, 2019.

4.1.2 Financing of Expenditure

I) Sources of Finance for Expenditure

The major sources of government expenditure finance are tax revenue, external assistance and domestic bank borrowing. Mostly government takes the option of financing its expenditure using external finance and domestic borrowing, due to fiscal deficit. Ethiopian public expenditure experienced with large share of finance from external assistance and loan, even though recently there is an effort made by government to cover expenditure by internal source of finance. After a current government had launch a reform on tax system and administration since 1992, there has been a marked change in domestic revenue share of expenditure, but still the country expenditure need depends on external sources.

Table 4.4: Total Expenditure Finance Sources Value in Millions of Birrs and Share in (%)

Years	Total Averaged Expenditure	Domestic Tax Revenue	External Assistance	External Loan
1980-1991	3,880	2,578 (66%)	402(10%)	390(10%)
1992-2018	82,357	59,478(71%)	9,581(12%)	6,046(7%)
Total	86,237	62,056(72%)	9,983(12%)	6,436(7%)

Source: Own calculation based on MoF data, 2019.

Figure 4. 4: Regime Expenditure Sources of Finances during the Period of 1980-2018.
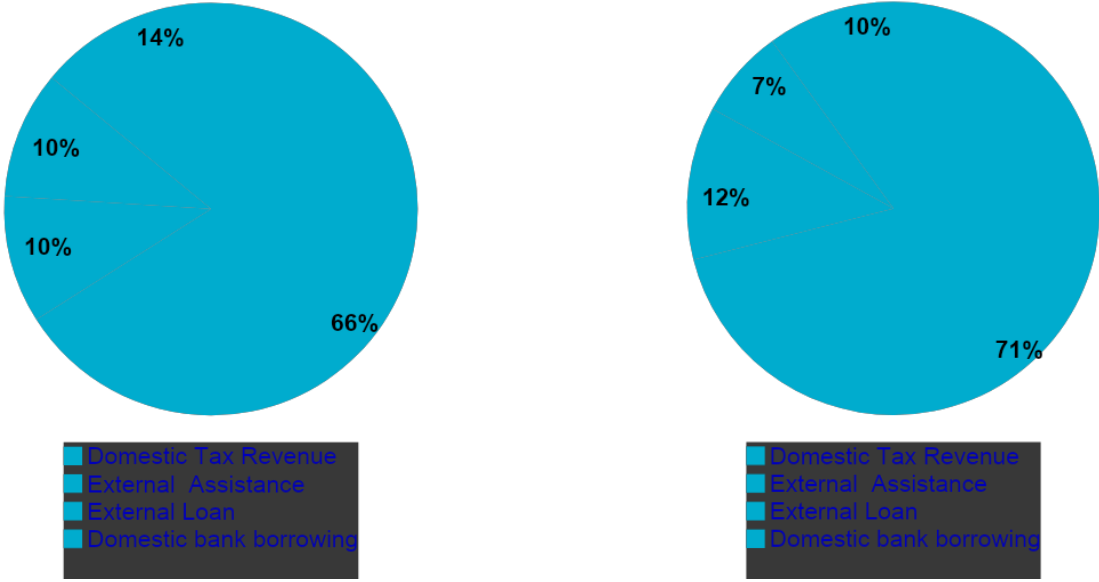
Source: Own sketch based on MoF data, 2019

The lion share of finance source for public expenditure in both regimes was the domestic revenue which accounts an average of 72 percent, external assistance 12 percent and external loan 7 percent and the rest 9 percent cover by domestic bank borrowing on averaged. The recent increase in the share of domestic tax revenue and the decrease of the share of external loan seem like to be the fulfillment of SAPs pre-condition for the country, but the real averaged growth and share didn't support nominal value and share results (Dasgupta, 1997).

Table 4.5: The Real Average Value and (%) Share of Revenue and Expenditure

Period	Real Average Value in Millions of Birr			Average Percentage Share in (%)		
	Real Expenditure	Revenue including Grant	Domestic Tax Revenue	Total Revenue/Real Expenditure	Domestic Tax Revenue /Expenditure	Domestic Tax Revenue/Total Revenue
	1	2	3	2/1	3/1	3/2
1980-1991	27,883	21,559	18,727	77.32	67.16	86.86
1992-2018	127,212	107,043	87,897	84.14	69.10	82.11
Total	155,095	128,603	106,625	82.91	68.74	82.91

Sources: Own calculation based on MoF data, 2019.

Based on above table 4.5 the real average share of domestic tax to expenditure difference was less than two percent between the two regimes, but the Dreg regime was better in domestic tax to total revenue share in more than 4 percent than the EPRDF. The current regime total revenue share of expenditure seems to like larger than the previous regime was due the external assistance effect, the result evidenced that the effort of covering expenditure with internal source of finance still in challenge, when we make comparison in real term.

During the GTP I period, tax revenue has increased largely in nominal term, indicating an averaged growth rate of 31 percent per annum. Even though, tax revenue had increased rapidly over the planning years, the increase where not much with real GDP share. During the planning period target was to collect tax revenues that an amount to 15% of GDP by 2015, but the performance was 13.3% of GDP. This clearly falls short of the GTP target and was much lower than the average of SSA countries. Although under the GTP II period the tax revenue GDP share planned to have a share of 15.2% of GDP in 2017/18 but the performance was 12.26% of GDP which was even lower than base year performance, among the reason for the decline in performance where political instability, erosion of tax base and a marked deterioration in tax administration are the possible main reasons.

II) Domestic Tax Revenue Financing of Expenditure

The share and growth pattern of tax revenue in financing of government expenditure during this study period 1980-2018, had an increasing rate in some years and there has been a marked decline in other years, in general lack of consistency in its growth trend. The decline in tax collection resulted mainly from erosion of tax base and a marked deterioration in tax administration. The domestic tax revenue had an average growth rate of 6.5 percent during the period of 1980-1991 and 21 percent growth rate during the period of 1992-2018.

The real tax revenue accounted for about 72 percent share from the total real domestic revenue in Derg regime and 75 percent share in the current regime, the non-tax revenue accounted a 28 and

24 percent share respectively. The previous regime had a better percentage share on direct, indirect and non-tax sources over the domestic revenue which account a 28.6%, 22.1% and 27.8%, on the other hand the current regime has 26.8%, 18.3% and 24.9% share respectively. The current regime has a better percentage share on import and export duties over the internal revenue collection which is 29.9 percent share whereas the previous regime had 21.5 percent share. As part of the domestic tax revenue share, except the import and export duties source of domestic revenue the previous regime had a better performance on other sources.

Table 4.6: The Sources of Domestic Revenue and (%) Share from Total Revenue

Percentage Share of	Time Period													
	1980	1983	1986	1989	1992	1995	1998	2001	2004	2007	2010	2013	2016	2018
Domestic Revenue/ Total Revenue (1)	90	89	85	86	85	84	81	73	81	73	72	82	88	94
Direct Tax/ Domestic Revenue	24	29	29	29	30	23	24	23	26	24	24	30	33	35
Indirect Tax/ Domestic Revenue	24	21	21	21	25	20	16	13	15	16	17	28	23	23
Export and Import Duties/Domestic Revenue	35	25	22	17	17	28	27	25	34	37	33	32	30	26
Non-Tax/Domestic Revenue (2)	17	25	28	34	27	29	34	39	25	24	26	16	14	16

Source: Own calculation based on MoF data, 2019.

Figure 4. 5: The Direct and Indirect Tax and Non-Tax (%) Share from Domestic Revenue.
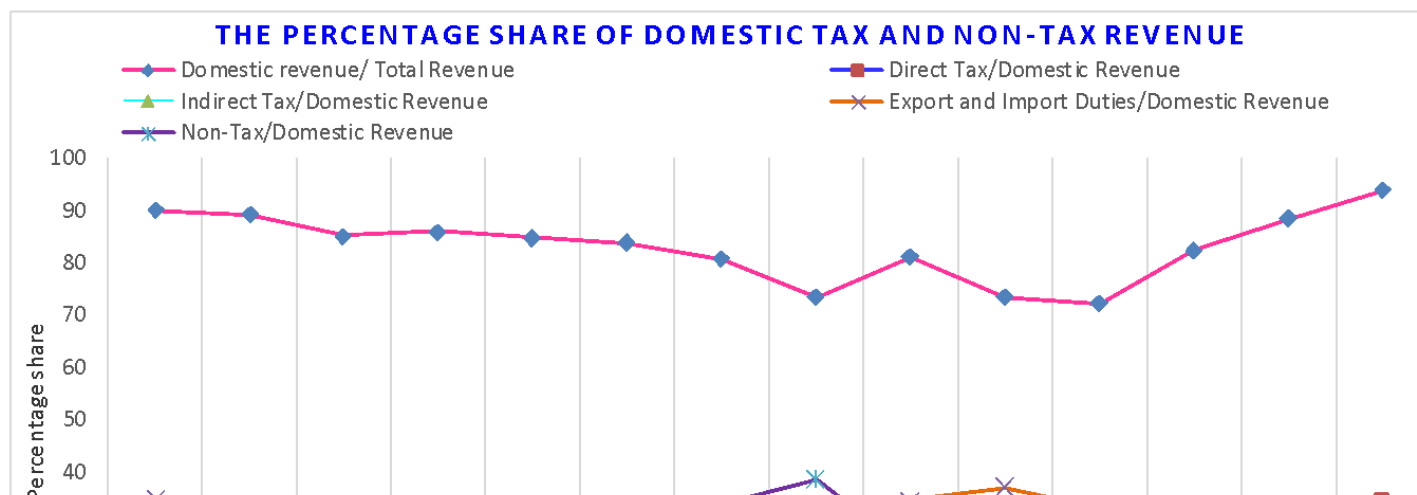
Source: Own sketch based on MoF data, 2019

III) Financing of Capital Expenditure

The relative share of government sources of finance for capital expenditure in the Derg and current regime largely depend on central treasury, which account an average share of 44.17 and 70.54 percent respectively, the two regimes almost similar in the relative averaged share of external assistance. The previous regime financing of capital expenditure highly depends on external loan source of finance next to the treasury source.

Table 4.7: Source of Capital Expenditure Finance

Period	Real Average Value in Millions of Birr and Percentage Share in(%)		
	Central Treasury	External Assistance	External Loan
1980-1991	4,469 (44.17)	1,033 (10.22)	2,717 (26.86)
1992-2018	42,989 (70.54)	7,917 (12.95)	10,035 (16.47)

Sources: Own calculation based on MoF data, 2019.

III) External Debt Financing of Expenditure

Ethiopia like developing countries, its expenditure need depends on external sources of finance. The available statistics indicate that the country's external debt in terms of the level of stock increase through time. According to NBE data, the debt stock as a share of GDP (%) had been large during the period of 1982-2018, which might have a debt overhanging problem. The debt stock as a share of GDP during Derg regime, in the period of 1982-1991 on averaged was 28.4 percent and in the current regime, during the period of 1992-2018 it was 46.02 percent. Recently in line with the increased total debt stock, the debt services also increased through time.

Debt services obligation (amortization and interest repayment) increased largely by 98 percent from 869 Million Birr in 1982 to 55,915 Million Birr in year 2018, which accounts an average of a 65 percent of export, basically due to the increased in investment needs of government for infrastructure development and poverty reduction. The sharp increase in the amount of outstanding of external debt was basically driven by using foremost import intensive public enterprises' new borrowings for implementing infrastructure projects which includes roads and power generation that require large foreign money (National Planning Commission, 2016).

Table 4.8: The Total Debt Stock of the Country in Million Birr

Period	1982	1985	1988	1991	1994	1997	2000	2003	2006	2009	2012	2015	2018
Total Debt stock in millions of Birrs	3,501	4,256	5,846	7,082	17,017	27,109	34,710	52,514	55,447	30,428	117,273	285,045	568,583
Debt services in millions of Birrs	869	1,094	683	738	1,271	2,064	1,379	1,410	1,379	594	4,102	14,005	31,302
Total debt stock in % GDP share	12	16	34	41	64	62	60	83	59	13	21	26	30
Debt Service ratio in % of export	112	133	81	108	197	70	35	36	21	5	9	24	47

Sources: Own calculation based on NBE data, 2019.

Figure 4. 6: Total External Debt Stock in Millions of Birrs

Source: Own sketch based on NBE data, 2019

Based on table 4.8 and figure 4.5 the country's external debt stock increasingly large through time which might have an economic growth retarding potential and reduces the range of economic choices available for planning, due to repayment of interest and principals, the country has less money to use in financing public expenditure needs, also through high tax the repayments of the debt burden might retard future generation economic development advantage.

Recently there are efforts made by government to overcome the problem as part of GTP I & II to finance development projects through domestic revenue sources, which enables to reduce the debt burden, besides there are money challenge in advancing the domestic revenue collection capacity.

4.1.3 Recent Development in Real Growth Trend of Public Finance

The real development of public finance of a country can be shown by the RGDP share of real expenditure, real revenue and budget deficit. During this study period a sustained increase in RGDP share of real expenditure, real revenue and domestic tax, where achieved in the Derg regime from year 1983 up to 1989 and during the EPRDF regime of 1995-2001 on averaged. The expenditure and revenue share decrease consequently and reaches its lower level in the period of 1989 and 1995. The basic causes for the declined in the share where political instability and internal conflict in the previous regime. During the current regime the main cause for decline in share was, the transitional government had been busy in stabilizing the country and in forming of collective new government during that period.

Under the current regime the highest performance of real expenditure to real GDP share achieved in a year 2002 a share of 26.4 percent and real total revenue to real GDP a share of 23.09 percent in the same year, as a result of the increasing value of grant budget in 2001 and domestic tax revenue to real GDP also achieved 16.1 percent share in year 2003, then after it started to declined and reached its lowest point. In general, the Ethiopian public finances development lack consistency in its growth trends and share and also shows cyclical fluctuation in different period, due to regime ideology and policy differences, war and natural disasters effects.

The recent GTP II plan midterm evaluation show the share of total revenue in GDP, which was expected to rise to 17.1 percent in the fiscal year 2016/17, according to the planned target, did not perform as expected. The total revenue (including grants) that was collected during the year amounted to 14.9 percent of GDP, which was not only less than the plan target but also showed a decline from the levels attained in the preceding two fiscal years. The share of domestic revenue in GDP, in particular, which had reached 15.0 percent in the fiscal year 2015/16, dropped to 14.2 percent of GDP in 2016/17, despite the plan target to raise it to 16.2 percent of GDP. In addition, the domestic revenue as a share of GDP not only failed to attain its target for the fiscal year 2016/17, but even declined from the levels it had recorded in the preceding two fiscal years (including the base year). AS a result of short fall of revenue performance a budget deficit occurs due to there was a relative higher growth of expenditure than revenue.

The existence of budget deficit is a real situation in public finance management, but narrowing the gap help from many macroeconomic problems. The trend of budget deficit statistics from the period of 1980 up to 2018 shows, the Derg regime on average had 5.3 percent and the EPRDF regime has on average 3.5 percent deficit share of RGDP. The highest deficit in the Derg regime where in year 1983, which was 9.2 percent and the current regime also scored its highest deficit rate in year 2002 which was 8.6 percent.

During the GTP I & II period the budget deficit planned to have 3 percent of GDP share and achieve 2.6% of GDP in 2014/15 and 3% share in 2017/18, under the two GTP periods the budget deficit plan versus performance was achieved accordingly to its target. This is mainly due to the planned expenditure for each coming year consider a deficit amount to be targeted based previous year expenditure performance, not based on the large development need of a country as fear of its inflationary effect in the economy. Although mostly government cover the deficit gap by making public borrowing from internal and external sources make the planned target of the deficit to achieve its performance, not for the reason of domestic revenue collection target achievement. The main reason for the fluctuation in the growth and share value of revenue and expenditure is, the non-parallel movement, in which it subject to wild fluctuation, lack periodicity and pattern which leads to persistent budget deficit, due to unsustainable financial injections and large expenditure jumps which is the a typical nature of developing country economy, where a small financial assistance from relatively rich source transforms the revenue picture (world bank, 1988).

Table 4.9: Expenditure, Revenue and Domestic Tax Share of Real GDP in (%)

Real GDP Percentage Share of	Time period													
	1980	1983	1986	1989	1991	1994	1997	2000	2003	2006	2009	2012	2015	2018
Real Total Revenue	20.4	16.1	18.8	21.4	13.7	13.9	18.8	21.4	19.5	19.0	17.7	16.6	15.6	13.5
Real Grant	2.0	1.8	2.8	3.1	2.0	2.3	3.7	5.8	3.8	5.1	4.9	3.0	1.8	0.8
Real Domestic Tax	18.4	14.4	16.0	18.3	11.7	11.6	15.1	15.6	15.7	13.9	12.8	13.6	13.7	12.6
Real Expenditure	24.9	21.4	23.7	25.9	20.7	18.6	21.3	25.2	25.3	22.8	19.5	18.6	18.4	17.0
Deficit	4.5	5.2	4.9	4.5	7.0	4.7	2.5	3.9	5.8	3.8	1.8	2.0	2.8	3.6

Sources: Own calculation based on NBE data, 2019.

Figure 4. 7: Trends in Real GDP Share of Real Expenditure, Real Revenue and Domestic Tax
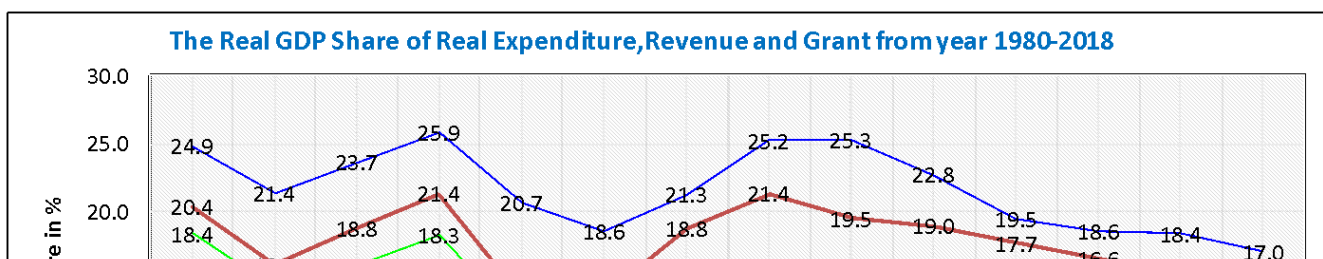
4.1.4 The Trend of Poverty Reduction Sector Expenditure

Recently in line with the overall development policy goals, Ethiopia is investing heavily to reduce poverty and promote social development; as a result, the proportion of public spending on pro-poor sectors has increased drastically.

During the Derg regime poverty reduction sector real expenditure grown on an average of 3.2 percent and during the current regime it grows on an average rate of 11.8 percent. The average share of pro-poor sector expenditure to RGDP, during Dreg regime had 8.6 percent and during the current regime has 12.4 percent share.

The current regime under the GTP I and II plan, set a 65 percent expenditure allocation for poverty reduction sector in the base case scenario and achieved an average of 73 percent expenditure allocation above the average annual plan. Although, the poverty reduction sector expenditure RGDP share targeted to have 14.1 percentage share in 2017/18 and achieved percentage share of 11 percent. As a result, a socio-economic development and Economic growth with two digit achieved by shifting expenditure in to the most effective and productive part for development, which is greater than all SSA countries, which is also witnessed by IMF and WB.

Table 4.10: Poverty Reduction Sector Expenditure Growth Rate and Share (%)

	1980	1983	1986	1989	1991	1994	1997	2000	2003	2006	2009	2012	2015	2018
Pro-poor Real Expenditure														

Average Growth rate	12	15	3	4	(17)	26	4	39	12	14	15	9	7	(1)
% Share from Real Total Expenditure	33	36	42	40	35	50	49	40	53	64	70	76	74	71
Sectorial Percentage Share from Real Total Pro-Poor Sector Expenditure														
Education	29	27	24	24	30	28	27	28	36	31	29	29	31	37
Health	11	11	8	8	11	10	11	10	8	9	12	10	12	12
Agriculture	33	36	39	38	38	32	25	27	26	32	29	23	24	25
Road	23	16	12	13	8	19	20	22	24	20	25	30	25	17
Water	4	2	17	17	13	11	17	14	6	8	5	7	9	9

Sources: Own calculation based on MoF data, 2019.

Table 4.11: Poverty Reduction Sector Real Expenditure Share from Real GDP

Pro-Poor Real Expenditure Share in % from RGDP for	1980	1983	1986	1989	1991	1994	1997	2000	2003	2006	2009	2012	2015	2018
Total Expenditure	8.2	7.7	9.9	10.	7.2	9.3	10	10	13	15	14	14	14	12
Recurrent Expenditure	3.6	2.9	3.5	3.6	3.4	3.8	3.7	4.3	5.9	4.8	4.1	3.9	4.6	5.4
Capital Expenditure	4.6	4.8	6.4	6.7	3.8	5.5	6.6	5.9	7.5	9.8	9.6	10	9.1	6.7
Sectorial Expenditure Percentage Share from Real GDP														
Education	2.4	2	2.3	2.4	2.2	2.5	2.8	2.8	4.8	4.5	3.9	4.2	4.2	4.4
Health	0.9	0.8	0.8	0.8	0.8	0.9	1.1	1.0	1.1	1.3	1.6	1.4	1.6	1.4
Agriculture	2.7	2.9	3.9	3.9	2.7	2.9	2.6	2.7	3.5	4.7	4.0	3.3	3.3	3.1
Road	1.9	1.2	1.2	1.3	0.6	1.8	2.1	2.2	3.2	2.9	3.4	4.2	3.4	2
Water	0.3	0.9	1.7	1.7	0.9	1.1	1.8	1.4	0.8	1.2	0.8	1.0	1.2	1.1

Sources: Own calculation based on MoF data, 2019.

4.1.5 Selected descriptive Statistics for the dependent and independent variables

The general overview of variables under this study can be summarized using a descriptive statistic in table 4.12. The descriptive part basically shows the mean, maximum, minimum, skewness, kurtosis and standard deviation of the variable. Based on table 4.12 the mean value of the dependent variable, real expenditure (REXP) was 96,600 million of Birr. The mean value of independent variables, real GDP (RGDP) was 484,000 million of Birr, the mean value of

domestic revenue (DREV) was found to be 66,600 million of Birr whereas the mean value for aid (AID) and public debt (PDEB) was 14,100 and 1,690 million of Birr respectively. Also, the mean value of the rest fiscal variables which are real effect exchange rate (REER) was 152.6 Birr and the mean value of trade openness was 23.67 percent. The only demographical variable population mean value was 31.86 million of peoples.

The real average expenditure during the period of 1980-1991 was 27,883.82 million of Birr, during this period the maximum real expenditure which was greater than the average record of the period in year 1989 was 37,196.21 million of Birr. The minimum real average expenditure was 19,874.12 million of Birr in year 1981. During the period of 1992-2018 the average real expenditure was 127,212.13 million of Birr. The current regime average real expenditure was 5 folds of the previous regime average real expenditure due to a dramatic increase in spending on pro-poor sectors and capital investment. Annual real expenditure after year 2008 was greater than the average expenditure of the regime. Since, skewness is the measure of the degree of departure from the regularity, the variables REXP, RGDP, DREV, AID, PDEB and REER form a small value in the part of analysis are found positively skewed, while POP and OPNN are found a negative small value and thus, normally distributed. Kurtosis is a measure of departures from normality and its normal distributions is 3. Yet, the Kurtosis of REXP, AID, POP, and OPNN is less than 3 which show Platykurtic distribution. While the value of RGDP, DREV, PDEB and REER, greater than 3 showing leptokurtic distribution.

Table 4.12: Descriptive Statistics for Dependent and Independent Variables

STAT	REXP	RGDP	DREV	AID	PDEB	POP	REER	OPNN
MEAN	96,600	484,000	66,600	14,100	1,690	31.86	152.26	23.67
MAX	287,000	1,720,000	211,000	41,900	11,600	48.37	285	37.26
MIN	19,900	102,000	10,700	1,660	63	2.71	94	8.10
SKEW	0.93	1.20	1.12	0.78	2.55	-0.34	0.73	-0.01
KURT	2.68	3.25	3.02	2.24	9.15	2.60	3.20	2.18
S. D	83,700	475,000	62,200	13,200	2,490	10.74	46.13	7.48
OBSER	39	39	39	39	39	39	39	39

Sources: Own calculation based on MoF, NBE and CSA data, 2019 using E-View 10.0

4.2 Econometric Analysis

4.2.1 Pre-Estimation Test

A) Unit Root Test

Analysis of time series data first need checkup of the stationarity nature of the variables. Stationary variables have a constant variance and covariance, which are not depending on time.

Regressing series that are non-stationary, yields a spurious regression, whose outcome cannot be used for inferences or forecasting. Stationarity nature of time series data detected by unit root test, even though the applied ARDL model does not require the pre-testing of variables, since it work I(0) or I(1) or for mutually co-integrated variables (Chigusiwa et al., 2011), but doesn't not work for I(2). So, whether variables under this study have such problem detected using unit root test. To test unit root ADF and PP test are applied for this study.

Summary of the Augmented Dickey Fuller (ADF) and Phillips-Perron test statistic (PP) for unit root test result is presented in Table 4.13 and 4.14 below.

Table 4.13: Augmented Dicky Fuller

Macroeconomic Variable	Unit Root Test Results			
		t-statistics	Prob*	Integration Level
LREXP	ADF test statistic	-5.620270	0.0000	I(1)
	Test critical values: 1% level	-3.621023		
	5% level	-2.943427		
	10% level	-2.610263		
LRGDP	ADF test statistic	-5.523299	0.0000	I(1)
	Test critical values: 1% level	-3.621023		
	5% level	-2.943427		
	10% level	-2.610263		
LDREV	ADF test statistic	-4.915604	0.0003	I(1)
	Test critical values: 1% level	-3.621023		
	5% level	-2.943427		
	10% level	-2.610263		
LPDEB	AD test statistic	-8.464742	0.0000	I(1)
	Test critical values: 1% level	-3.621023		
	5% level	-2.943427		
	10% level	-2.610263		
LAID	PP test statistic	-7.330329	0.0000	I(1)
	Test critical values: 1% level	-3.621023		
	5% level	-2.943427		
	10% level	-2.610263		

Macroeconomic Variable	Unit Root Test Results			
LPOP	ADF test statistic		-4.355965	0.0071	I(0)
	Test critical values:	1% level	-4.219126		
		5% level	-3.533083		
		10% level	-3.198312		
REER	ADF test statistic		-7.227183	0.0000	I(1)
	Test critical values:	1% level	-3.621023		
		5% level	-2.943427		
		10% level	-2.610263		
OPNN	ADF test statistic		-7.683127	0.0000	I(1)
	Test critical values:	1% level	-3.621023		
		5% level	-2.943427		
		10% level	-2.610263		

Source: Own calculation based on MoF, NBE and CSA data, 2019 using E-view 10.0

Table 4.14: Phillips-Perron Test Statistic (PP)

Macroeconomic Variable	Unit Root Test Results			
		t-statistics	**Prob***	**Integration Level**
LREXP	PP test statistic		-5.925340	0.0000	I(1)
	Test critical values:	1% level	-3.621023		
		5% level	-2.943427		
		10% level	-2.610263		
LRGDP	PP test statistic		-5.498933	0.0001	I(1)
	Test critical values:	1% level	-3.621023		
		5% level	-2.943427		
		10% level	-2.610263		
LDREV	PP test statistic		-4.869489	0.0003	I(1)
	Test critical values:	1% level	-3.621023		
		5% level	-2.943427		
		10% level	-2.610263		
LPDEB	PP test statistic		-11.06461	0.0000	I (1)
	Test critical values:	1% level	-3.621023		
		5% level	-2.943427		
		10% level	-2.610263		
LAID	PP test statistic		-7.477390	0.0040	I(1)
	Test critical values:	1% level	-3.621023		

		5% level	-2.943427		
		10% level	-2.610263		
LPOP	PP test statistic		-4.272793	0.0087	I(0)
	Test critical values:	1% level	-4.219126		
		5% level	-3.533083		
		10% level	-3.198312		
REER	PP test statistic		-7.992861	0.0000	I(1)
	Test critical values:	1% level	-3.621023		
		5% level	-2.943427		
		10% level	-2.610263		
OPNN	PP test statistic		-7.683127	0.0000	I(1)
	Test critical values:	1% level	-3.621023		
		5% level	-2.943427		
		10% level	-2.610263		

Source: Own calculation based on MoF, NBE and CSA data, 2019 using E-view 10.0

The null and alternative hypothesis for the stationarity test is:

H_o: the variables are non-stationary

H_1: the variables are Stationary

On above table 4.13 and 4.14 variables LREXP, LRGDP, LDREV, LPDEB, LAID, LPOP, REER and OPNN are stand for natural logarithm of real expenditure, real GDP, Domestic revenue, public debt, aid, population, real effect exchange rate and trade openness. Among variables under the unit root test LREXP, LRGDP, LDREV, LPDEB, LAID, REER and OPNN are stationary at first difference I (1), whereas LPOP is stationary at level I (0), hence the test statistics values are greater than their critical value at 1%, 5% and 10% level of significance. Thus, the null hypothesis of non-stationarity among the variables rejected, implying that the variables stationary integrated to order one for LREXP, LRGDP, LDREV, LPDEB, LAID, REER, OPNN and stationary integrated to order of zero for LPOP. Hence, Auto Regressive Distributive Lag (ARDL) Model is Applicable for the estimation of the determinants of public expenditure growth in Ethiopia, since we have no I (2) or greater than I (2) variable in the model.

B) Maximum Lag Selection Criteria

Before estimating ARDL model first we need to identify the maximum number of lag length of dependent and independent variables, since there is no hard and fast rule on the choice of the number lags used in the model, as noted in (Gujarati, 2004) basic econometrics, as the estimate

for successive lags number used there is will be fewer degree of freedom left and make statistical inference somewhat unstable.

Most importantly, in economics time series data, successive values (lags) tend to be highly correlated increasing the likelihood of multicollinearity in the model. As also noted in (Wooldridge, 2013), in order not lose degree of freedom, a modern approach for selection of lag length with annual data the number of lags is typically small 1 or 2 lags, quarterly data, 1 to 8 lags and for monthly data 6, 12 or 24 lags are appropriate data points.

In selecting the lag order, there exist various lag selection criteria used by many researchers, which includes sequential modified likelihood ratio (LR), final prediction error (FPE), Akaike information criteria (AIC), Hannan-Quinn information criteria (HQIC) and Schwarz's Bayesian information criterion (SBIC). Yet, it is fact that different criterion gives different number of optimal lag lengths. In doing so, the decision rule is the lag lengths that can minimize the information criterion become an optimal one. Based on table 4.15, the lag length decision by LR, SC and HQ is similar lag length advising that lag order to be used for co-integration test is one. Thus, this study employed optimal lag length of one for the reason that most information criterion selected similar lag length. The result is described in table 4.15 showing the optimal lag chosen by different criteria in detail

Table 4.15: Result of Lag Length Selection using Different Criterion

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-86.7024	NA	2.31e-08	5.1191	5.4674	5.2418
1	126.3654	322.48*	7.92e-12	-2.9386	0.1961*	-1.8335*
2	200.8290	80.5011	7.53e-12*	-3.5042*	2.4169	-1.4168

* Indicate that lag order selected by the criterion

Source: output by using E-view 10.0

LR: Sequential Modified LR test statistics (each test at 5% level)

FPE: Final Prediction Error

AIC: Akaike Information Criteria

SBIC: Schwarz Information Criterion

HQIC: Hannan-Quinn Information Criterion

The identification of the maximum lag length for the dependent and independent variables for the purpose of ARDL model estimation based on above table criterion indicates, most variables

(LREXP, LRGDP, LDREV, LAID, LPOP, REER and OPNN) have maximum lag length of one whereas, LPDEB has a maximum lag length of two. Therefore, the maximum lag length that could be considered in Autoregressive Distributive lags (ARDL) estimation using E-view 10.0 version could be considered would be the dependent variable takes the maximum lag length of one where as the regressors could take maximum lag length of two (see appendix B).

4.2.2 Auto Regressive Distributive lag (ARDL) Estimation

This study applies Autoregressive Distributive lag (ARDL) model to estimate the macroeconomic and demographical determinants of public expenditure growth in Ethiopia. In this study, as macroeconomic determinant variables: real gross domestic product (RGDP), domestic revenue (DREV), public debt (PDEB), aid (AID), real effect exchange rate (REER) and openness (OPNN) are considered. Also, as a demographical variable population (POP) included for estimation. The estimation of these determinants is shown in table 4.16 below, which was estimated using E-view version 10.0.

Table 4.16: ARDL Estimation (1, 1, 2, 1, 2, 2, 1, 2) Based on AIC

Regressors	Coefficient	Std. Error	t-Statistic	P-value
LREXP(-1)	-0.5123	0.1982	-2.5842	0.0193
LRGDP	0.6669	0.1431	4.6596	0.0002
LRGDP(-1)	-0.2114	0.1368	-1.5451	0.1407
LREV	0.5723	0.1308	4.3761	0.0004
LDREV(-1)	0.4064	0.2275	1.7865	0.0919
LDREV(-2)	0.0746	0.0694	1.0741	0.2978
LPDEB	0.0197	0.0943	0.2087	0.8371
LPDEB(-1)	-0.1423	0.0828	-1.7194	0.1037
LPDEB(-2)	-0.2010	0.0806	-2.4930	0.0233
LAID	0.1262	0.0251	5.0229	0.0001
LAID(-1)	0.0512	0.0311	1.6469	0.1179
LAID(-2)	0.0284	0.0211	1.3463	0.1959
LPOP	0.2663	0.1916	1.3899	0.1825
LPOP(-1)	0.3792	0.1247	3.0404	0.0074
REER	-0.0001	0.0003	-0.2512	0.8047
REER(-1)	-0.0010	0.0004	-2.7152	0.0147
OPNN	-0.0078	0.0042	-1.8225	0.0860
OPNN(-1)	-0.0082	0.4392	-1.8592	0.0804
OPNN(-2)	-0.0093	0.3464	-2.6811	0.0158
C	-8.5090	2.2487	-3.7838	0.0015
R-Squared	0.9989	Adjusted R^2		0.9976
AIC	-3.0755	SBC		-2.2048
HQ	-2.7686	F-statistic		772.1325
DW Stat	2.2847			

Prob(F-statistic)	0.0000

As shown in above table 4.16, the macroeconomic as well as the demographical variables considered in this study significantly determine the public expenditure growth of Ethiopia by exerting a strong and significant effect on the level of real expenditure size. Five explanatory variables are incorporated in natural logarithm form except real effect exchange rate and openness – which are used to explain the behaviour of the growth of real expenditure in size on ARDL model estimation. They are real gross domestic product (LRGDP), domestic revenue (LDREV), public debt (LPDEB), aid (LAID), population (LPOP), real exchange rate (REER) and openness (OPNN). From these explanatory variables real gross domestic product, domestic revenue, aid and population affect the public expenditure growth positively by exerting a significant positive effect on the size of real expenditure, while public debt, openness and real effect exchange rate affect public expenditure growth negatively by deteriorating the growth potential on the level of real expenditure size.

The value of R-square of the model is 0.9989 which indicate about 99.8% variation in the dependent variables is explained by explanatory variables incorporated in to the model. The value of F-statistics is also significant at 1% level of significance which implies the model is good fit as a whole. Since the DW stat has a value of 2.25 which is between the interval of 1.5 and 2.5 show free from autocorrelation problem.

The coefficient of the one-year lag of total real expenditure depicts a negative and significant relationship nexus with current total real expenditure at 5% level of significant. This can be interpreted as the previous year government expenditure leads to a reduction in current year expenditure. This seems contradictory to the general belief that several items of recurrent expenditure of government such as wage and salary payment each year increases due to the expansion of already existing government institutions and creation of new public institution, which assumed to have incremental effect on the next year expenditure. Among the possible reason for this contradictory result is, due to lack of adequate management and control on the part of government authority and officials, in terms of corruption, poor administration and unproductive utilization in Ethiopia each year a huge budget allocated again for the unfinished assignment of the previous year, which is a huge lose. This is also real, especially in huge project implementation like road, irrigation construction and Great Ethiopian Renaissance Dam (GERD) building, in which each year government forced to re budgeted the project again due lack of

effectiveness and efficiency in project management and administration. That has an aggregate reduction effect on the next year growth of real expenditure in the level of size which has an aggregate reduction effect on the country public expenditure growth in general.

The result of this study contradicts the theory of incrementalism which views public expenditure as a continuation of past expenditure with only incremental modification (Lindblom, 1959; Wildavsky, 1964). According to this theory, the government or the policymakers do not have enough time, information or money to investigate all their alternatives into existing policy because there are so many uncertainties involved. To avoid these uncertainties and risk, public spending is made incrementally. That is in making a budget policymakers concentrate their attention on modest changes on previous year's expenditures.

4.2.3 Post Estimation Diagnostic Test

To check the validity of the estimated long run model, some diagnostic test was undertaken in order to accept the model as a good one. In this study we carried out a number of model stability and diagnostic checking, which includes Functional form (Ramsey's RESET) test, Serial correlation test (Brush-Godfray LM test), Normality (Jaque-Bera test), and Heteroscedasticity test.

In addition to the above diagnostic tests, the stability of long run estimates has been tested by applying the cumulative sum of recursive residuals (CUSUM) and the cumulative sum of squares of recursive residuals (CUSUMSQ) test. Such tests are recommended by Pesaran *et al.* (2001). In order to reject or accept the null hypothesis, we can decide by looking the p-values associated with the test statistics. That is the null hypothesis is rejected when the p-value are smaller than the standard significance level (I.e. 5%).

a) Functional Form (Ramsey's Reset Test)

The objective of the functional form of Ramsey's Reset test is to find out the existence of a linear relationship between the natural logarithm of Real Expenditure and the explanatory variables (LRGDP, LDREV, LPDEB, LAID, LPOP, REER and OPNN).

Ho: The model under consideration is linearly or correctly specified.

Table 4.17: Ramsey RESET Test for Omitted Variables

Test Statistics	Value	df	P-value

66

t-statistic	1.5030	16	0.1523
F-statistic	2.2591	(1, 16)	0.1523

Source: output by using E-view 10.0

The null hypothesis for linearity cannot be rejected since the test statistics (t-statistic & f statistic) are not statistically significant, that means no functional form of misspecification in the model exist due to omitting of important variables, which causes bias in the remaining parameter estimators.

b) Serial Correlation Test

The presence of serial correlation in the model can be detected using Brush and God fray LM test. The Breusch–Godfrey serial correlation LM test is a test for autocorrelation in the errors in a regression model. It makes use of the residuals from the model being considered in a regression analysis, and a test statistic is derived from this.

The null hypothesis is that there is no serial correlation of any order up to p Which is a test for autocorrelation in the errors in a regression model.

Ho: there is no serial correlation of any order up to p

Table 4.18: Serial Correlation Test using Brush and God fray LM test

Test Statistics	Value	df	P-value
F-statistic	0.4981	Prob. F (2,18)	0.6648
Obs*R-squared	1.9404	Prob. Chi-Square (2)	0.3753

Source: output by using E-view 10.0

The test statistics show that the P value is greater than 5% level of significance [I.e. 0.6648>0.05] such that the null hypothesis for no serial correlation is failed to rejected.

c) Heteroscedasticity (Breusch-Pagan) Test

Heteroskedasticity (unequal variance) in the error term can happen as a reason of incorrect functional form of the regression model or incorrect transformation of data or mixing of observation with different measure of scale. The detection test for heteroscedasticity can be done by using the Breusch- Pagan (BP) and ARCH test; it is based on the regression of squared residuals on squared fitted values.

H₀: there is no heteroskedasticity in the error term

Table 4.19: Breusch-Pagan-Godfrey and ARCH Test for Heteroskedasticity

Heteroskedasticity Test: Breusch-Pagan-Godfrey

Test Statistics	Value	df	P-value
F-statistic	1.0662	Prob. F (18,18)	0.4503
Obs*R-squared	20.1172	Prob. Chi-Square (18)	0.3876
Scaled explained SS	5.2457	Prob. Chi-Square (18)	0.9992

Heteroskedasticity Test: ARCH

Test Statistics	Value	df	P-value
F-statistic	0.0156	Prob. F (1,34)	0.9015
Obs*R-squared	0.0164	Prob. Chi-Square (1)	0.8979

Source: output by using E-view 10.0

The diagnostic test for Hetroskedasticity from the result in the above table 4.20 indicate, we fail to reject the null hypothesis due to its p-value associated with the test statistics are greater than the standard significance level [*I.e. 0.45 and 0.90 > 0.05*]

d) Normality (Jaque-Bera) Test

The normal distribution of variables is tested using Jaque-Bera Test. The statistical test is necessary for the significance of the parameter estimates and for constructing confidence intervals. If this assumption is violated, the parameters statistical reliability cannot be assessed by the classical tests of significance (t, F, etc.) because they are based on normal distribution. Jarque-Bere test indicated normal distribution in the data, if it is larger than the standard significance level.

H_o: residuals are normally distributed

Figure 4. 8: Normal Distribution

Series: Residuals	
Sample 1982 2018	
Observations 37	
Mean	-6.19e-15
Median	-0.001746
Maximum	0.054378
Minimum	-0.081507
Std. Dev.	0.030698
Skewness	-0.517594
Kurtosis	3.470429
Jarque-Bera	1.993247
Probability	0.369124
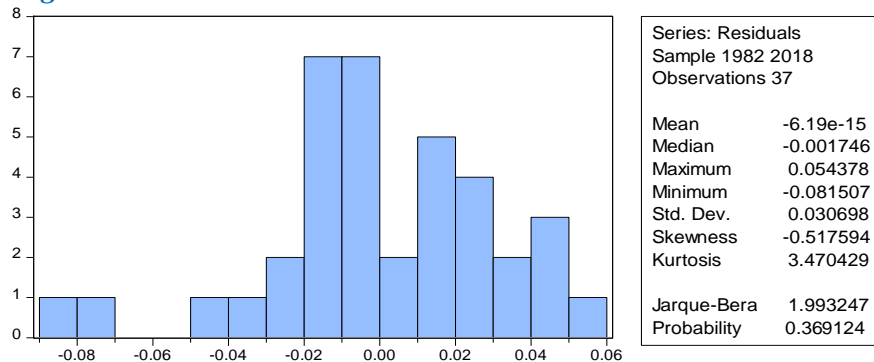
Since, the p-value associated with the Jaque-Berra normality test is larger than the standard significance level [I.e. 0.3691>0.05] we accept the null hypothesis.

e) Diagnostic Test for the long run ARDL

The stability of the model for long run and short run relationship is detected by using the cumulative sum of recursive residuals (CUSUM) and the cumulative sum of squares of recursive residuals (CUSUMSQ) tests. The test finds serious parameter instability if the cumulative sum goes outside the area (never returns back) between the two critical lines.

Figure 4. 9: Testing parameter stability using CUSUM and CUSUMSQ Test
Plot of Cumulative Sum of Recursive Residuals (A)
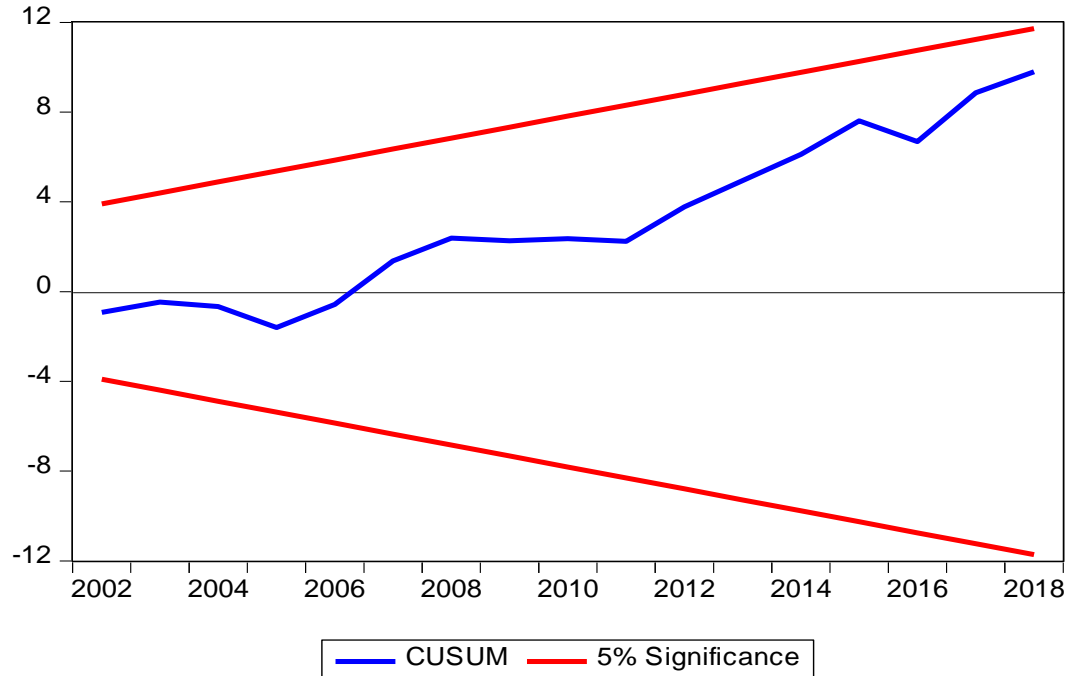
Source: output by using E-view 10.0

The straight lines represent critical bounds at 5% significance level.

Plot of Cumulative Sum of Squares of Recursive Residuals (B)
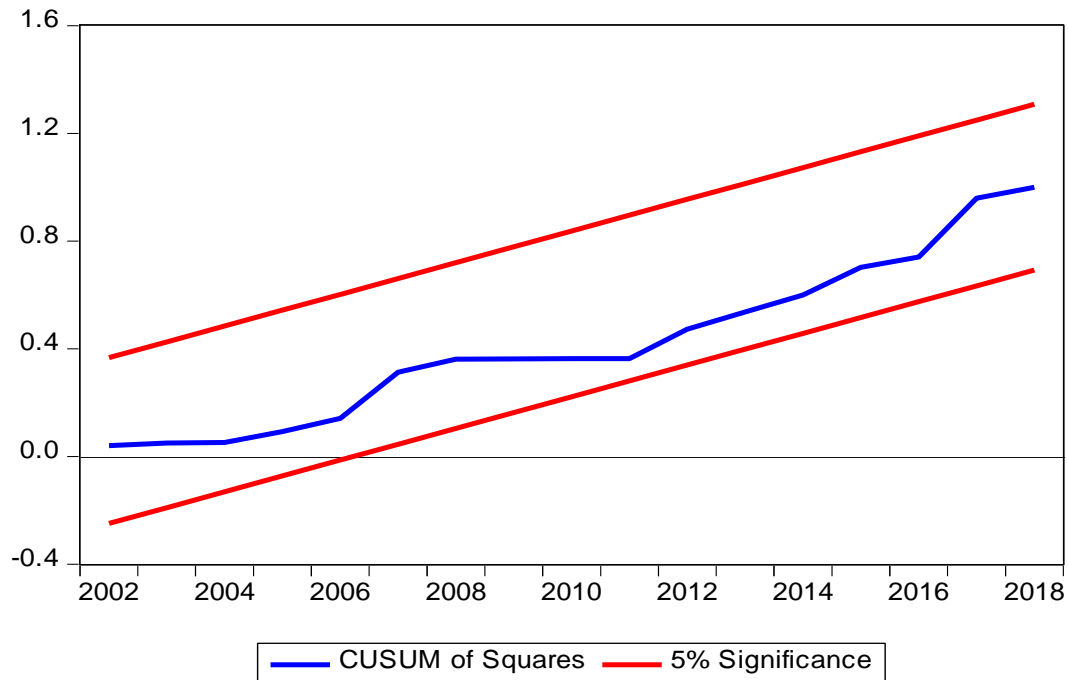
Source: output by using E-view 10.0

The straight lines represent critical bounds at 5% significance level. As can be seen from the above figure, the plot of CUSUM and the CUSUMSQ test do not cross the critical limits. So, we can conclude that long run estimates are stable and there is no any structural break. In addition to the model stability 99.8 percent of the model has been explained by the regressors. Hence the results of the estimated model are reliable and efficient.

4.2.4 Long Run ARDL Tests for Co-integration

I) **Bound Test**

The Test for the presences of Co-integration or long run relationship among the variables, bound test is conducted. The F-test is used for investigating a level of (long run) relationship by comparing with the lower and upper bounds of critical values. The F-statistical value is either less than lower bound (I_o) or between the two critical values or greater than the upper bound (I_1). The decision criteria based on F-statistics is; if the F-statistic is greater than the upper bound, we concluded that there is long run relationship among the variables. Conversely, if the F-statistic is less than the lower bound test we can conclude that there is no long run relationship among the variables under consideration. However, if the F-statistic falls between the upper and lower bound critical values inconclusive result. The null hypothesis and alternative hypothesis are:

$$H_0 : \text{No long run relationship}$$

Table 4.20: Bounds Test Result for Co-integration

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	**Value**	**Significance**	**I(0)**	**I(1)**
F-statistic	9.6285	10%	1.92	2.89
k	7	5%	2.17	3.21
		2.5%	2.43	3.51
		1%	2.73	3.90

Source: Own calculation on MoF, NBE and CSA data, 2019 using E-view 10.0

From above table 4.20, the estimated F-statistic value is 9.6285 which is evidently greater than the upper bound, (I$_1$). Thus, we clearly reject the null hypothesis in favor of the alternative hypothesis. Therefore, it shows the existence of long run relationship between real expenditure size and the explanatory variables (RGDP, DREV, PDEB, AID, POP, REER and OPNN).

II) Wald Test

In order to find out whether the explanatory variables in a model are significant (are they add something to the model) or not, tested using Wald test. Wald test apply when we need to know the existence of long run relationship in unrestricted equilibrium of error correction model. The null hypothesis for the test is, there is no long run co-integration between variables, if the null hypothesis is rejected; it suggests that the variables in questions can be removed without much harm to the model. If the test shows the parameters are not zero, we should include the variables in the model.

The null and alternative hypothesis for the test is: -

H$_o$: There is no long run co-integration between variables.

$$\mathbf{H_o}: \beta_1\beta_1 = \beta_2\beta_2 = \beta_3\beta_3 = \beta_4\beta_4 = \beta_5\beta_5 = \beta_6\ \beta_6 = \beta_7 = \beta_8 = \beta_7 = \beta_8 = 0$$

H$_1$: There is long run co-integration between variables

$$\mathbf{H_1}: \beta_1\beta_1 = \beta_2\beta_2 = \beta_3\beta_3 = \beta_4\beta_4 = \beta_5\beta_5 = \beta_6\beta_6 = \beta_7 = \beta_8 \neq \beta_7 = \beta_8 \neq 0$$

Table 4.21: Wald Test for Co-integration in Unrestricted Equilibrium Correction Model

Wald Test:			
Test Statistic	**Value**	**df**	**Probability**
F-statistic	47.2943	(8, 17)	0.0000
Chi-square	378.3540	8	0.0000

Null Hypothesis: C(2)=C(4)=C(7)=C(9)=C(12)=C(15)=C(17)=C(20)=0		
Null Hypothesis Summary:		
Normalized Restriction (= 0)	**Value**	**Std. Err.**
C(2)	0.6668	0.1431
C(4)	0.5722	0.1310
C(7)	0.2662	0.1916
C(9)	0.0197	0.0944
C(12)	0.1262	0.0251
C(15)	-0.0001	0.0003
C(17)	-0.0078	0.4271
C(20)	-8.5090	2.2487
Restrictions are linear in coefficients.		

Source: Own calculation on MoF, NBE and CSA data, 2019 using E-view 10.0

Based on table 4.21, the prob (chi-square) is statistically significant at 1%. Therefore, we reject the null hypothesis in favor of the alternative. The value of the coefficient of C (2), C (4), C (7), C (9), C (12), C (15), C (17) and C (20) cannot be zero. Correspondingly, their respective coefficients of $\beta_1\beta_1, \beta_2\beta_2, \beta_3\beta_3, \beta_4\beta_4, \beta_5\beta_5, \beta_6\beta_6, \beta_7\beta_7$ and $\beta_8\beta_8$, So it implies that there is long run co-integration between the determining variables and real expenditure size.

4.2.5 Short-run (ECM) and Long-run Dynamics of ARDL Model Estimation Result

The study finds that real gross domestic product, domestic revenue, aid, population and openness are the major determinants of public expenditure growth by exerting a direct, strong and significant effect on the level of real expenditure size both in the short and long run at 1% level of significance. Whereas public debt and real effect exchange rate only determine in the long run.

Among the determining variables domestic revenue, real gross domestic product, aid and population had a strong positive significant effect while openness had a strong negative significant effect in both short run and long-run, the rest variable i.e. public debt had a strong negative significant effect in the long run but a positive and insignificant effect in the short run. Also real effect exchange rate had a less negative effect in comparing to other determinant variable effect in the long run and insignificant effect in the short run. The study results also indicate domestic revenue had been the most significant and important determinant of public expenditure growth by affecting the level of real expenditure size. Next to internal revenue, population number (age < -15 and age > +65) also had been the major influential variable of public expenditure growth in determining the level of real expenditure size. The real gross

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domestic product and aid are the third and fourth consecutive major affecting and important variables for public expenditure growth by increasing the level of real expenditure size in the long run.

Beside the strong positive effect of some of the study variables, other variables under this study like trade openness and public debate are highly deteriorating the growth potential of public expenditure growth by exerting a reduction effect on the level of real expenditure size in the long run.

The real effect exchange rate had a small negative effect on public expenditure growth in the long run; the finding implies that depreciating the value of the Birr will yield a declining purchasing power of real expenditure in terms of dollar. The insignificant effect in the short run might be due to the very small coefficient nature of the determining variable.

The one-year lag coefficient of trade openness shows a positive and significant relationship with public expenditure growth by increasing the level of real expenditure size. The result might be due to the previous year trade imbalance of the state forced government to allocate additional expenditure in order to minimize the external shock, which had an increasing effect on real expenditure size.

The coefficient of the one-year lag of public debt in the short run indicates a positive and significant relationship at one percent level of significance. This might be due to the usage of public borrowing in pervious year for overcoming the budget deficit problem, which has an expansionary effect on public expenditure growth by affecting the size of real expenditure for short period of time.

The coefficient of the one-year lag of total real expenditure depicts a negative and significant relationship nexus with current total real expenditure at five percent level of significance, this might for the reason that a huge loss budget in each year due to a mismanagement of expenditure on the part of public authority and government officials.

I) **Short Run Dynamics (Error Correction Model Estimation) Result**

Since the existence of long-run relationship between variables where discovered by bound and Wald test. It is also important to estimate the speed of adjustment between short-run and long-run dynamics using error correction model (ECM). The error correction model is estimated using equation 11 Chapter three. The ARDL short run dynamics of macroeconomic and demographical variables in explaining Public Expenditure growth of Ethiopia is shown by the following table 4.22.

Table 4.22: Short Run Dynamics (ECM Estimation: ARDL) (1, 1, 2, 1, 2, 2, 1, 2)

Variable	Coefficient	Std. Error	t-Statistic	P-value
D(LRGDP)	0.6668***	0.0828	8.0452	0.0000
D(LDREV)	0.5722***	0.0722	7.9178	0.0000
D (LDREV (-1))	-0.0745	0.0429	-1.7339	0.1010
D(LDEB)	0.0197	0.0510	0.3858	0.7044
D (LDEB (-1))	0.2009***	0.0484	4.1484	0.0007
D(LAID)	0.1262***	0.0152	8.3043	0.0000
D (LAID (-1))	-0.0284*	0.0146	-1.9384	0.0694
D(LPOP)	0.2662***	0.0719	3.7027	0.0018
D(REER)	-0.0001	0.0002	-0.4114	0.6860
D(OPNN)	-0.0078***	0.0024	-3.1796	0.0055
D (OPNN (-1))	0.0093***	0.0021	4.3810	0.0004
CointEq(-1)	-0.8984***	0.0678	-13.2328	0.0000
R-Squared	0.9716	Adjusted R-squared	0.9592	
AIC	-3.5080	DW-Statistic	2.2847	
SBC	-2.9856			
HQC	-3.3238			

Source: Own calculation on MoF, NBE and CSA data, 2019 using E-view 10.0

(a) *D(LRGDP), D(LDREV), D(LPDEB), D(LAID), D(LPOP), D(REER) and D(OPNN) stand for the natural logarithm of real expenditure, natural logarithm of real domestic product, natural logarithm domestic revenue, natural logarithm of public debt, natural logarithm of aid, natural logarithm of population, real effect exchange rate and openness for the short dynamics.*

(b) ** and *** denote significance at 10% and 1% levels.*

Based on table 4.22, the short run dynamics equilibrate to the long run dynamics with the speed of adjustment (ECM). The coefficient of the ECM shows in the event of shock 89.84% of the disequilibrium errors are corrected annually.

The coefficient adjusted R-square depicts a value of 0.9592 implying that about 95.92% of changes in real expenditure size are explained by explanatory variables included in the model while the remaining 4.08% is captured by error term. The ECM equation is shown below.

$$ECM = LREXP - (0.3012 * LRGDP + 0.6964 * LDREV - 0.2140 * LPDEB + 0.1360 * LAID$$

[0.198]   [0.082]   [0.072]   [0.051]   [0.020]

$$0.4268 * LPOP - 0.0007 * REER - 0.0167 * OPNN - 5.6266)$$

[0.072]   [0.000]   [0.002]

II) Long–run Relationship Determinants of Real Expenditure Size

The long run relationship between dependent variables: Real Expenditure and independent variables: Real Gross Domestic Product, Domestic Revenue, Aid, Population, Public Debt, Real Effect Exchange Rate and Openness, their impact magnitude overtime is estimated based on Autoregressive distributive lag (ARDL) model. The long-run estimated result shown by the following table 4.23.

Table 4.23: Estimated long-run Coefficient using ARDL Approach

Model [1, 1, 1, 1, 2, 2, 1, 2] Dependent Variable: LREXP				
Regressor	**Coefficient**	**Std. Error**	**t-Statistic**	**P-value**
LRGDP	0.3012***	0.0560	5.3797	0.0000
LDREV	0.6964***	0.0477	14.5908	0.0000
LPDEB	-0.2140***	0.0570	-3.7511	0.0016
LAID	0.1360***	0.0138	9.8922	0.0000
LPOP	0.4268***	0.1416	3.0140	0.0078
REER	-0.0007***	0.0002	-2.8997	0.0100
OPNN	-0.0167***	0.0024	-7.087	0.0000
C	-5.6266***	1.2894	-4.3636	0.0004

Source: Own calculation based on MoF, NBE and CSA data, 2019 using E-view 10.0

(a) *LRGDP, LDREV, LPDEB, LAID, LPOP, REER and OPNN stand for natural logarithm of real gross domestic product, natural logarithm of domestic revenue, natural logarithm of public debt, natural logarithm of aid, natural logarithm of population, real effect exchange rate and openness for the long run dynamics.*

(b) *** denote significance at 1% levels.*

The long run estimated model presented as follow with figures in the parenthesis indicates the standard error.

$$LREXP = -5.6266 + (0.3012 * LRGDP + 0.6964 * LDREV - 0.2139 * LPDEB$$

[1.2894]   [0.0560]   [0.0477]   [0.0570]

$$+ 0.1361 * LAID + 0.4268 * LPOP - 0.0007 * REER - 0.0167 * OPNN)$$

[0.0138]   [0.1416]   [0.0002]   [0.0024]

4.2.6. Relationship between Real Expenditure and Explanatory Variables

I) Real Gross Domestic Product and Real Expenditure

Among the explanatory variables under this study real gross domestic product next to domestic revenue is the major determinant of the level of real expenditure size both in the short-run and long-run. It is also the second most important variable in determining the real expenditure size. The coefficient of RGDP had a positive and high significant relationship with the level of real expenditure size at one percent level of significance. It implies that a one percent increase in RGDP ignite the increase in size of real expenditure by 0.66 percent in the short run and 0.30 percent in the long run.

The positive coefficient of RGDP tends to reveal that Wagener's Law of ever-increasing government expenditure postulated by Wagener (1883) holds for Ethiopia. This implies that the level of growth and development in Ethiopia has significantly influenced the increase in the size of real expenditure highly in the short run than in the long run.

Recently under the GTP I & II, Ethiopia achieved a two-digit economic growth and development gains that averaged 10.1 percent per annum, which is more than double the SSA average of 5 percent during the same years. The global recognition from independent agencies (IMF and WB) helps the country to build trust and confidence on foreigner investors. Generally, it strength the country investment and trade potentials and opportunities, due to this the FDI flows in number of investors and amount of capital increasingly large through time, which has impact on the country income generation capacity in terms of employment and revenue generation.

During the GTP I period the country income per capital increased from 377 USD in 2009/2010 to 691 USD in 2014/15 and further 985 USD in in 2018/19, this show the alignment of economic growth and real expenditure growth in size in Ethiopia. As the country per capital income increase through time the real expenditure also increases, which has been evidenced by both econometric as well as descriptive analyses results.

Even though, the real expenditure growth in nominal value increased drastically, but the RGDP share of real expenditure shows inconsistency in its growth trend. During the GTP I period the real expenditure share of GDP was targeted to have a 23.7 percent share, but achievement was 18.5 percent, due to lack of mobilizing enough domestic revenue as planed target. Also, during the GTP II period in year 2017/18 the real expenditure RGDP share was 16.1 percent which was short fall of the base year performance. From this we conclude that the income effect (economy growth) on real expenditure has not been in a steady increasing trend rather an up and down

trend which is the feature of most developing countries fiscal stances. The assumption underlying on the bi-directional relationship between real expenditure and proxy measurer of economic growth of RDGP in Ethiopia has not been due to the steady increasing effect of real expenditure, rather a shift in expenditure from unproductive sector to productive sector for economic growth and development (pro-growth and pro-poor sectors).

Since the increase in real gross domestic product has an expansionary effect on real expenditure size thus affect public expenditure growth of the country under this study, the Ethiopian government should give a due attention on full implementation of those strategies under the long term country plan that enable to boost the economic growth. This finding is in conformity with the pervious study like Bayu (2015), Richter and Paparas (2012), Kesavrajah (2012), Argbeyen and Akpan (2013) and Obeng and Sakuz (2017).

II) Domestic Revenue and Real Expenditure

Table 4.23 and 4.24 reveals that domestic revenue had been the most significant and important determinant of public expenditure growth by affecting the level of real expenditure size in Ethiopia. The estimation result shows the existence of a positive and highly significant relationship between the level of real expenditure size and domestic revenue both in the short run and long run. As internal revenue increased by one percent, real expenditure increased by 0.57 percent in short run and 0.69 percent in the long run.

In support of the econometric estimation result, the descriptive analysis result indicate internal revenue had been an average of 70 percent source for government expenditure in the past 39 years, also the recent performance on domestic revenue share as a source of finance for real expenditure on averaged account more than 80 percent. This implies that both the descriptive as well as the econometric method of analysis shows the strong association between size of real expenditure and internal revenue in Ethiopia, which can be a good opportunity for government to influence the economic growth and securing macroeconomic stability using fiscal policy.

The result of this study indicate the increase in tax revenue could further increase governments spending which promote the expansion of spending by keeping neutral fiscal stance. The strong relationships between two variables enable the government in minimizing the budget deficit and advancing of socio-economy development by enhancing the revenue collection in parallel with effective and efficient management and utilization of expenditure.

The recent fiscal policy of the country has been aimed at scaling up tax performance and maintaining budget deficit below three percent of GDP which assumed to have less inflationary

effect, but the NBE statistical data show that the domestic revenue to GDP ratio lack consistency in its growth trend. During the GTP I & II planning period, in most of the planning year, performance was below the base case scenario target, which had been a big challenge in achieving balanced budget. In addition, annually government declared supplementary budget in the end of each year to overcome the budget deficits problem, which indicate the deficit gap has been larger than the expected in the beginning year.

Despite a remarkable growth performance has been achieved in government revenue collection by administrating of tax policy effectively in the past two GTP period, still a need for reform on tax policies and programs should take in to consideration, which enable in improving efficiency in the tax collection system. Since tax revenue to GDP share of the country is less than 15 percent, which is also below all SSA countries introduction on new tax base in order to mobilizing more resources accordingly with the growing expenditure need take in to consideration for achieving a balanced and healthy public expenditure growth for the country. In the expenditure side due attention should be also given for increasing efficiency and effectiveness on utilization, ensuring transparency and accountability, avoiding wastage and maintaining budget optimization that enable to ensure a stable macroeconomic environment within the framework of a narrowing fiscal deficit.

Overall, the finding of this study provides a support for revenue-spend hypothesis developed by Fried man (1978) that expansion in government revenue bring about change in expenditure. The result of the study also in line with the previous studies by Olanipekun and Olanipekun (2015), Awarinde (2013), Mutascu (2016), Mutascu (2017), Saunoris (2015), Oguijuba and Abraham (2012), obeng (2015) and Eshetu (2017).

III) Public Debt and Real Expenditure

The major negative and significant relationship determinant of public expenditure growth next to trade openness under this study is public debt, which exert a reduction effect on the level of real expenditure size. The coefficient of Public debt indicates a negative and significant relationship with a real expenditure size in the long run at one percent level of significance and a positive but insignificant relationship in short run. As public debt increased by one percent real expenditure decreased by 0.21 percent in the long run. This implies that public debt does not help in explaining the growth of public expenditure in Ethiopia. The finding contradicts the theoretical postulation that public debt influences the expansion of public expenditure through debt servicing. The negative coefficient of public debt was a result of the increased total debt stock

and debt services of the country in the past years, which might have a debt overhanging problem in overall economic activity.

The increased payment of amortization and interest for the original debt taken through different time leave the government with limited amount of resources for spending annually.

In contrast to the above result the coefficient of the one-year lag of public debt in the short run indicates a positive and significant association with the size of real expenditure at one percent level of significance. This might be due to the usage of public borrowing in pervious year for overcoming the budget deficit problem, which have an expansionary effect on the size of real expenditure, thus on public expenditure growth of the country for short period of time.

As part of the GTP I & II Ethiopian government has strived to increase external borrowing mainly to finance development project from bilateral and multilateral cooperation and agreements, hence get large amount of finance. As result of the total debt stock of the country increased through time, also the debt services obligation although increased. The debt services payment taken an average of 65 percent of export during this study time, which harm the development expenditure need and hard currency need of the country, since it repaid in terms of dollar. So, reduction on further external borrowing should take in to consideration, unless it has a development and growth impact on economy. The study result support the empirical finding that provide evidence for a negative impact of external debt accumulation on economic growth, which signifying the existence of debt overhanging problem on Ethiopia identified by Eshetu (2018) and in contrast with study conducted by W.rufael (2009), Aregbeye and AKpas (2013), Okafor and Eiya (2011) that found that strong correlation with the growth of government expenditure.

IV) Aid and Real Expenditure

The coefficient of aid also shows a positive and significant relationship with the real expenditure size both in short and long run at one percent level of significance. It is also the third most important determinant variables next to domestic revenue and RGDP for public expenditure growth by exerting an increasing effect on the level of real expenditure size. It indicates that a one percent increase in aid stimulated real expenditure growth by 0.12 percent in the short run and 0.13 percent in the long run.

The external assistance in terms of grant budget during the current regime increases through time, this shown by the GDP share of grant budget in the previous regime was on averaged less than 3 percent whereas under the current regime it had a maximum share of 5 percent, even

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though the government planned during the GTP I & II to cover large share of its expenditure need with internal sources of finance, in attempt to minimize the dependency of public expenditure from external sources.

Study by (Ali, 2014) that investigate the impact of aid on government spending during the period of (1966-2013) shows foreign aid had a positive effect on total government expenditure in Ethiopia; also, other study be Siraj and Tarkegn (2002) and Henok (2010) indicates foreign aid increased government expenditure. All the listed study concluded foreign aid was fungible in Ethiopia. In order to minimize the effect of aid fungblity on real expenditure a strong coordinated monitoring and evaluation on donor program and project need to be implemented.

The recent GTP I performance review remarked the increased flow of foreign aid had a contribution in overall socio-economic development and economy growth of the country, hence under the GTP II also the government set strategies to increases the amount of aid flow. In overall, the descriptive as well as econometric method of analysis of this study indicate that aid flow has positively influence on spending, so that government has to implements effective strategies in its long term country plan that enhances the flow of foreign aid to the capital investment and protecting from spending from unproductive sectors which enable to build trust and confidence from the donor agency and foreigner countries, that has an aggregate effect in terms of the amount of flow and contributions.

V) Population and Real Expenditure

Dependent population numbers under this study identified as a major determinant of public expenditure growth in Ethiopia by exerting a strong and significant relationship with the level of real expenditure size both in the short and long run at 1% level of significance. As a one percent increases in dependent population leads to 0.26 percent increase in the short run and 0.42 percent increase in the long run on level of real expenditure size.

Since Ethiopia is endowed with a large and fast-growing population and is globally acknowledged and included among the populous state in the world. According to the 2020 revised world population prospects, its population number reaches 114.96 million in 2020. These statistics make the country 12th most populous nation in the world. The dependent population numbers also the highest in the world, due the dominancy of young age population. According to the recent census report of 2007 E.C (2015 G.C), 14.6 percent of the total population less than 5 years old, 30.8

percent less than 10 years old, 45 percent less than 15 years old, and 56.9 percent less than 20 years old in 2007 E.C. On the other hand, only 3.2 percent of the total population is above 65 and above years old. The remaining 40 percent of the total population is found between 20 and 64 years old, this shows the dependency ratio was 92.9 percent which is among the highest in the world. The possible implication of this high dependency ratio of the country is, it imposes burden on the working age population and also high young population need the expansion of education, health facility and employment opportunity for large number of children. This overall forced government to incur high expenditure. The finding of this study is in line with Wagner's law of increasing state activity in which he stated that as population number increase the state activity also increase for the reason that government need to provide welfare service like education, public health, old age pension.

Since the young and youth part of population take more than 60 percent share of total population in Ethiopia as this part of population has been increases over the past years, the need for education and health facility also increased. However, the older segment of the population (age 65+) share from total dependent population was less effect, so that it exerts less pressure on government spending, which normally demanded by the youth. This finding agrees with those of Musgrave and Musgrave (1980) and Abang (2005) which say that population is an important determinant of the growth in government expenditure.

In order to secure a balanced fiscal stance in the county, dependent population number and real expenditure should go in parallel i.e. the real expenditure has to have a potential to absorb the need of young part of the society and give social security for the aged one. Hence, to balance population growth with expenditure the rate of population growth should be decrease, so in order to achieve it population reduction policy measure should be taken in to consideration by government.

VI) Real Effect Exchange Rate and Real Expenditure

Among the explanatory variables under this study the effect of real effect exchange rate in determining the public expenditure growth of the country had less effect than all other variables, which has a negative small coefficient. The coefficient of REER which is -0.0007 shows a negative and significant association at 1% level of significance in the long run. A unit increase in real effect exchange rate leads to a -0.07 percent decrease on the level of real expenditure size, but its effect was less in comparing with openness and public debt. The effect of real exchange in the short run is insignificant.

The result indicates currency appreciation is expected to lower the real value of government expenditure growth. Since, currency devaluation is assumed to improve the external imbalance, boost output growth in general and export growth in particular, especially for developing countries like Ethiopia. With this implication different regimes make currency devaluation from birr 2.48 in 1945 to 28.91 in 2018/19 per one USD, but the expected output in terms of trade balance might not achieved its objective. Whether devaluation improves the trade balance of the nation depends on the elasticity of foreign demand for the nation's export and the elasticity of domestic demand for imported goods in that nations based on the elasticity approach. So, instead of balancing the government real expenditure value using currency devaluation it is better to enhance the productive base of the country economy on more export based good and service production, which might have high effect in the real expenditure growth of the country. This finding the study is in line with a result found by Aladejare (2019). This results show that Birr depreciation is likely to reduce the dollar purchasing power of government expenditure.

VII) Openness and Real Expenditure

The most negative and significant determinant for the expansion of public expenditure growth in Ethiopia for this study is trade openness. A unit increase in openness leads to a 0.78 percent in the short run and 1.66 percent in the long run decrease in the level of real expenditure size. But the one-year lag coefficient of trade openness in the short run shows a positive and significant relationship with the real expenditure size, as a unit increase in openness leads to a 0.93 percent increase in real expenditure size at one percent level of significance. This result might be due to the previous year trade imbalance deficit of the state might force government to allocate additional expenditure in order to minimize the external shock effect, which has an increasing effect on the level of real expenditure size.

The basic reason for the high negative relationship between openness and real expenditure size is trade liberalization, which lead to loss of trade tax revenue (import + export duties tax) since it makes a significant share of domestic revenue, thus affect the real expenditure. The import and export duties tax on averaged has more than 30 percent share from domestic tax revenue, such a significant loss of income from this source of revenue will affect the fiscal stance of the country. The other possible reason that openness can negatively affects the real expenditure pattern is the consuming nature of the country economy, since liberalization lead to deterioration of trade balance (more import and less export) that damage the infant industry of the country, due to lack of computation with international market in terms of quality and quantity. This situation forced the

home industry to leave the market, which can also lead a huge loss on domestic direct tax income generation. So before making trade more liberalized, it is essential to transform the consuming nature of the country economy to the productive economy, that enable to export more item and generate more income. Thus, the recent GTP I & II export trade performance remained far below the planned target indicate still the country need time to compute with international trade and to make more open the market. The finding the study result also concede with (Allaro, 2012) that evidenced trade liberalization worsen trade balance of Ethiopia. In contrast, since the finding of this study associated with the reduction of expenditure if the Ethiopian market more opens, it contradicts with Shelton (2007), Rodrick (1998) and Shonchoy (2010) study.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATION

5.1 Summary

An over spending of government expenditure has effect on macroeconomic stability of a given country, including slow economic growth, large government deficits, internal imbalances and external imbalances.

Ethiopian government has been experiencing increasing public spending in the past thirty years, but unmatched by revenue resulting fiscal and economic imbalance leading government persistent budget deficit and output fluctuation. Thus, the aim of this study is to identify the macroeconomic and demographic determinants of public expenditure growth in Ethiopia. The

macroeconomic determinant variables are real gross domestic product (RGDP), domestic revenue (DRVE), public debt (PDEB), aid (AID), real effect exchange rate (REER) and openness (OPNN) whereas the demographical variable is population (POP).

To examine the effect of six macroeconomic variables and one demographical variable on the level of real expenditure size in Ethiopia, a secondary data of 39 years where collected. And, data where analyzed by both descriptive and econometric method of analysis. The descriptive part of data analysis of real expenditure in terms of compositions (capital & recurrent), functional classification (general development, economic, social and others), sources of finances (revenue, aid and loan) and in terms of poverty reduction sectors expenditure, summarized in table as well also described in graph.

Further, econometric method of data analysis with ARDL model was used for model specification, before estimation of the model, pre-test and post estimation test where conducted. Among the pre-test are unit root test based on the Agumented Dick Fuller and Phillips-Person test and maximum lag selection based on the LR, SC and HQ selection criteria where made. Model stability and diagnostic test based on Ramsey; s RESET test, serial correlation and heteroscedasticity test based on the Brush and God fray Lm test and Breusch Pagan test, normality test based on Jaque-Bera test, parameter stability based on CUSUM and CUSUMSQ test where made, all pre-test as well as post estimation tests are failed to reject the null hypothesis. It is clearly showing that there is no normality, serial correlation, heteroscedasticity and model instability problem in its functional form, thus the model (ARDL) is applied to estimate the macroeconomic as well as demographic determinants of public expenditure growth in Ethiopia.

The bounds test for co-integration show that the existence of long run relationship between REXP and the regrossors variables. The Wald test for co-integration also shows the significances of the study variables under the applied model.

In the finding, the ARDL estimation model reveals that domestic revenue (DREV), real gross domestic product (RGDP), Aid (AID), population (POP) and openness (OPNN) are the major determinants of public expenditure growth by exerting a strong and significant effect on the level of real expenditure size at 1% level of significance both in the short run and long run. The real effect exchange rate (REER) and Public debt (PDEB) determine the long run relationship, but insignificant in short run. The one-year lag coefficient of public debt (PDEB (-1)) and trade openness (OPNN (-1)) shows a positive and significant relationship with the level of real

expenditure size. Whereas the one-year lag of total real expenditure (REXP (-1)) indicates a negative significant relationship with current expenditure at 5% level.

The determining variables in terms of importance for public expenditure growth in this study are domestic revenue (DREV), real gross domestic product (RGDP) and aid (AID) influence the positive growth path while openness (OPNN), public debt(PDEB) and real effect exchange rate (REER) deteriorating the expansionary path by negatively affecting the real expenditure size in the long run.

In the short run, real gross domestic product (RGDP), domestic revenue(DREV), population (pop) and aid (AID) are positively affect the level of real expenditure size by the value of 0.66%, 0.57%, 0.26% and 0.12% respectively and also they are statistically significant at 1% level of significance

In the long run real gross domestic product (RGDP), domestic revenue (DREV), aid (AID) and population (POP) have a positive and significant effect at 1% percent level of significance. A one percent increase in real GDP leads to 0.30 percent increase in real expenditure. As revenue increase by one percent the real expenditure increases by 0.69 percent and as aid increase by one percent it leads to 0.13 percent increase in real expenditure and also as population increase by one percent it results 0.42 percent expansion on real expenditure size in the long run. Public debt, openness and real effect exchange rate have a negative and significant effect at 1% by the value -0.21%, -1.66% and -0.07% respectively. The coefficient of the ECM show in the event of shock 151% of the disequilibrium errors are corrected annually. The CUSUM and CUSUM square are indicating that the model is structurally stable within the 5% of critical bounds.

5.2 Conclusion

Public expenditure in Ethiopia was tremendously grown over the past years. According to MoF statistical data, in nominal terms total expenditure has been increased more than nine-fold between 2003/04 and 2018/19. Even though both capital and recurrent expenditure shows a high increase but, capital expenditure growth rate is higher than the recurrent expenditure.

The steady growth of public expenditure has often alleged to be the causes of many economic ill. As part of these economic problem a budget deficit, output fluctuation, income and unemployment problem are the main one, which leads to macroeconomic instability of a country.

In overcoming problem related to budget deficit which is a result of a steady increase in expenditure, different measure has been taken by government.

Balanced budget i.e. neutral fiscal stance is important for developing country for expanding socio-economic development and furthermore poverty reduction. Owing to this fact, factors selected as macroeconomic and demographical variables as determinants for public expenditure growth in Ethiopia, under this study that assumed to have a positive or negative effect as expected on the level of real expenditure size thus, on public expenditure growth has been a research question to be answered through the work of this study.

Among the determinant variables, domestic revenue, real gross domestic product, aid and population are the strong positive expansionary path determinants of public expenditure growth of Ethiopia by exerting a positive and significant effect on the level of real expenditure size, whereas openness, public debt and real exchange rate has a reduction effect on the growth trend of public expenditure by negatively affecting the level of real expenditure size in the long-run. The short and long run results also provide a strong support for Wagner's law hold for Ethiopia.

The high significant positive relationship between domestic revenue and real expenditure both in the short and long run support the revenue-spend hypothesis; implying that the increase in government revenue induces a rise in real expenditure, which enables government to influence economic growth and macroeconomic stability using fiscal policy. In order to keep a budget deficit to the desired figure the strong positive relation between the two variables both in the short and long run enables government to extend the public expenditure growth for socio-economy development and economy growth by enhancing internal revenue collection in alignment with effective and efficient utilization and management of expenditure.

The positive and high significant relationship between real gross domestic product and real expenditure size indicates that, increasing income of the country in the short run enable for expanding public expenditure growth more than in the long run. The relation indicates that the level of growth and development in Ethiopia significantly influenced the real expenditure size thus on the public expenditure growth. Since it is assumed to have a bi-directional relationship between RGDP and REXP, based on other studies, the effect of REXP on RGDP growth has not been due to the steady increasing effect of REXP rather a shift of expenditure from unproductive sector to productive sector for economy growth. This has been shown by the increased trend of GDP share of pro-poor sectors expenditure for the past recent years.

Dependent population numbers under this study also identified as a major determinant of public expenditure growth in Ethiopia by affecting the level of real expenditure size both in short run and long run. Since this part of population take a high proportion due to the large young age number feature of the country demography. As a result, it imposes burden on the working age population. In addition, the need for the expansion of infrastructure rise, this forced government to incur high expenditure.

The coefficient of aid shows a positive and significant relationship with the real expenditure size, thus it is the major determinant of public expenditure growth. So that it enables to extend socio-economic development by increasing its flow as long as it used for the intended purpose i.e. free from aid fungible problem.

The negative effect public debt on the level of real expenditure size might be a government use of debt as a means to cover the revenue short fall rather than as a means for increasing spending. The Other possible reason for the reduction effect might be due to the increasing repayment for interest and debt service for the past year large public borrowing.

Openness is also other determinant variable which has a high negative effect on the expansion of public expenditure growth by reducing the level of real expenditure size. Since trade liberalization leads to loss of trade tax revenue, which makes a significant share of domestic revenue, thus affect the real expenditure. Other possible reason might be due to the consuming nature of the country economy liberalization lead to the deterioration of trade balance that damaged the infant industry of the country due to lack computation with international market in terms of quality and quantity.

The negative coefficient of real effect exchange rate indicates the appreciation of currency leads to the decline in the growth trend of public expenditure but the effect is not much significant than openness and public debt in the long run.

5.3 Policy Recommendation

Based on the finding of this study the following policy recommendation forwarded

☞ Since the real expenditure has a positive response for its growth trend under the influence of domestic revenue, real gross domestic product, aid and population. Thus, the government of Ethiopia can comfortably extend the growth of the country public expenditure by controlling the so-called variables. Furthermore, avoiding unnecessary additional public borrowing aligned with the control over trade liberalization should take in to consideration with other basic macroeconomic variable like budget deficit and inflation to balance the fiscal gap, so as

to maintain balanced and healthy expenditure growth for economy development and poverty reduction.

☞ In order to achieve a balanced budget with the growing expenditure need, in the expenditure side effective and efficient management; transparency and accountability on utilization and avoiding wastage is also necessary. In the revenue part, advancing the revenue collection enable government in minimizing the budget deficit and securing neutral fiscal stance.

☞ Enhancing the growth of real gross domestic product (RDGP) of the country boost the public expenditure growth of the country by exerting a significantly and strong effect on the level of real expenditure size. Thus, government advised to fully implement all strategies under its long term country strategic plan, which enable to boost the economic growth. Beside from the expected gain from economic growth, due attention also given on expenditure allocation from unproductive sector to productive sector, based on the recent development and economy growth achievement experience and benefit of the country.

☞ Since public borrowing has a reduction effect on the level of real expenditure size, thus on the public expenditure growth of the country in the long-run. So, in order to secure fiscal balance in Ethiopia, the country takes a careful consideration on further additional public borrowing, unless the investment projects which money has been borrowing for it have a short term output in terms of production and income generation, which is effective in the repayment of the borrowed cashes and reducing of the country debt burden.

☞ Since external assistance in terms of grant budget stimulate the level of real expenditure size, thus extend the public expenditure growth of the country under this study, government has to implement effective strategies that enhances the flow of foreign aid. Furthermore, allocation of grant budget for investment project implementation goes through improved project monitoring and evaluation system, which enable to build trust and confidence from the donor agency, organization and foreigner countries, which have an aggregate effect in terms of the amount of grant budget flow and contribution.

☞ Since the increase in population leads to the increase in public expenditure due to more spending on health, education and the expense on infrastructure building. Thus, the real expenditure has to have a potential to absorb the need of the young part of the society and give social security for the aged one. So, beyond the issue of the expansion and accessibility of family planning programs the country population reduction policy, the government also advised in giving more attention on awareness creation and in including on the education

curriculum about the effect of high population growth on overall economy output of the country, which might have a significant effect on the attitude change of the society further on the population reduction of the country.

☞ Because openness has a significant negative association with the level of real expenditures size, thus reduce the public expenditure growth of the country, due to most export goods are primary agricultural product, as result the revenue derived by making the economy more open is less than the revenue collected by making the economy more closed using tariff and quota. So that the Ethiopian government is advised first to transform its export good from primary product manufactured product to be more competent in the world market before making trade more liberalized.

5.4 Directions for upcoming researcher's in the area public expenditure

In fact, this work could not exhaust all determinants of public expenditure growth as only some macroeconomic and demographic variables are selected from all others. Observing the impact of other macroeconomic and demographical factors on public expenditure growth was not observed. As recognized from this study, the determinate effect on public expenditure growth found to be positive for four variables and negative for three variables under this study; likewise,

the effect of other determining variables on expenditure need to be assessed by escaping from being too generic as it become broad and makes difficult in policy executions at one time.

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Appendices

Appendix A: Pre-Estimation Results

A1: Unit Root Test for Stationarity:

REXP is Stationary at I(1), Intercept

Null Hypothesis: D(LREXP) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.620270	0.0000
Test critical values:	1% level	-3.621023	
	5% level	-2.943427	
	10% level	-2.610263	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LREXP,2)
Method: Least Squares
Date: 06/20/20   Time: 09:24
Sample (adjusted): 1982 2018
Included observations: 37 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LREXP(-1))	-0.898813	0.159923	-5.620270	0.0000
C	0.064683	0.031917	2.026614	0.0504

R-squared	0.474375	Mean dependent var	0.007141
Adjusted R-squared	0.459357	S.D. dependent var	0.250083
S.E. of regression	0.183882	Akaike info criterion	-0.496508
Sum squared resid	1.183440	Schwarz criterion	-0.409431
Log likelihood	11.18539	Hannan-Quinn criter.	-0.465809
F-statistic	31.58743	Durbin-Watson stat	1.885403
Prob(F-statistic)	0.000002		

RGDP is Stationary at I(1), Intercept

Null Hypothesis: D(LRGDP) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.523299	0.0000
Test critical values:	1% level	-3.621023	
	5% level	-2.943427	
	10% level	-2.610263	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LRGDP,2)
Method: Least Squares
Date: 06/20/20   Time: 09:25
Sample (adjusted): 1982 2018
Included observations: 37 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LRGDP(-1))	-0.927466	0.167919	-5.523299	0.0000
C	0.069292	0.023760	2.916340	0.0061

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R-squared	0.465705	Mean dependent var	0.001783
Adjusted R-squared	0.450439	S.D. dependent var	0.167183
S.E. of regression	0.123937	Akaike info criterion	-1.285548
Sum squared resid	0.537613	Schwarz criterion	-1.198472
Log likelihood	25.78264	Hannan-Quinn criter.	-1.254850
F-statistic	30.50684	Durbin-Watson stat	1.984687
Prob(F-statistic)	0.000003		

DREV is Stationary at I(1), Intercept

Null Hypothesis: D(LDREV) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.915604	0.0003
Test critical values:	1% level	-3.621023	
	5% level	-2.943427	
	10% level	-2.610263	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LDREV,2)
Method: Least Squares
Date: 06/20/20   Time: 09:26
Sample (adjusted): 1982 2018
Included observations: 37 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LDREV(-1))	-0.769726	0.156588	-4.915604	0.0000
C	0.056226	0.029554	1.902502	0.0654

R-squared	0.408416	Mean dependent var		0.007345
Adjusted R-squared	0.391513	S.D. dependent var		0.217019
S.E. of regression	0.169287	Akaike info criterion		-0.661902
Sum squared resid	1.003036	Schwarz criterion		-0.574825
Log likelihood	14.24518	Hannan-Quinn criter.		-0.631203
F-statistic	24.16316	Durbin-Watson stat		1.911199
Prob(F-statistic)	0.000021			

AID is Stationary at I(1), None

Null Hypothesis: D(LAID) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.330329	0.0000
Test critical values:	1% level	-3.621023	
	5% level	-2.943427	
	10% level	-2.610263	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LAID,2)
Method: Least Squares

Date: 06/20/20   Time: 09:27
Sample (adjusted): 1982 2018
Included observations: 37 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LAID(-1))	-1.190145	0.162359	-7.330329	0.0000
C	-0.012045	0.084254	-0.142962	0.8871

R-squared	0.605561	Mean dependent var		0.015986
Adjusted R-squared	0.594292	S.D. dependent var		0.803781
S.E. of regression	0.511970	Akaike info criterion		1.551438
Sum squared resid	9.173972	Schwarz criterion		1.638514
Log likelihood	-26.70160	Hannan-Quinn criter.		1.582136
F-statistic	53.73372	Durbin-Watson stat		2.102956
Prob(F-statistic)	0.000000			

PDEB is Stationary at I(1), Intercept

Null Hypothesis: D(LPDEB) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-8.464742	0.0000
Test critical values:	1% level	-3.621023	
	5% level	-2.943427	
	10% level	-2.610263	

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LPDEB,2)
Method: Least Squares
Date: 06/20/20   Time: 09:27
Sample (adjusted): 1982 2018
Included observations: 37 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LPDEB(-1))	-1.322935	0.156288	-8.464742	0.0000
C	0.089579	0.028046	3.193945	0.0030

R-squared	0.671829	Mean dependent var	0.009457
Adjusted R-squared	0.662453	S.D. dependent var	0.276410
S.E. of regression	0.160591	Akaike info criterion	-0.767374
Sum squared resid	0.902631	Schwarz criterion	-0.680297
Log likelihood	16.19642	Hannan-Quinn criter.	-0.736675
F-statistic	71.65186	Durbin-Watson stat	2.173655
Prob(F-statistic)	0.000000		

POP is Stationary at I(1), Intercept and Trend

Null Hypothesis: LPOP has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

	t-Statistic	Prob.*

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Augmented Dickey-Fuller test statistic			-4.355965	0.0071
Test critical values:	1% level		-4.219126	
	5% level		-3.533083	
	10% level		-3.198312	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LPOP)
Method: Least Squares
Date: 06/20/20   Time: 09:28
Sample (adjusted): 1981 2018
Included observations: 38 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LPOP(-1)	-0.717586	0.164736	-4.355965	0.0001
C	11.97802	2.742111	4.368176	0.0001
@TREND("1980")	0.020754	0.005031	4.125484	0.0002

R-squared	0.352535	Mean dependent var		0.026742
Adjusted R-squared	0.315537	S.D. dependent var		0.108536
S.E. of regression	0.089794	Akaike info criterion		-1.906932
Sum squared resid	0.282206	Schwarz criterion		-1.777649
Log likelihood	39.23171	Hannan-Quinn criter.		-1.860934
F-statistic	9.528501	Durbin-Watson stat		1.564126
Prob(F-statistic)	0.000497			

OPNN is Stationary at I(1), Intercept

Null Hypothesis: D(OPNN) has a unit root
Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.683127	0.0000
Test critical values:	1% level	-3.621023	
	5% level	-2.943427	
	10% level	-2.610263	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(OPNN,2)
Method: Least Squares
Date: 07/10/20   Time: 09:10
Sample (adjusted): 1982 2018
Included observations: 37 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(OPNN(-1))	-1.171861	0.152524	-7.683127	0.0000
C	0.074124	0.561259	0.132067	0.8957

R-squared	0.627780	Mean dependent var	0.204923
Adjusted R-squared	0.617145	S.D. dependent var	5.515024
S.E. of regression	3.412436	Akaike info criterion	5.345268
Sum squared resid	407.5651	Schwarz criterion	5.432344
Log likelihood	-96.88746	Hannan-Quinn criter.	5.375966
F-statistic	59.03044	Durbin-Watson stat	1.948031
Prob(F-statistic)	0.000000		

REER is Stationary at I(1), Intercept

Null Hypothesis: D(REER) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.227183	0.0000
Test critical values:	1% level	-3.621023	
	5% level	-2.943427	
	10% level	-2.610263	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(REER,2)
Method: Least Squares
Date: 06/20/20   Time: 09:29
Sample (adjusted): 1982 2018
Included observations: 37 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(REER(-1))	-1.199340	0.165949	-7.227183	0.0000
C	-0.329623	5.801082	-0.056821	0.9550

R-squared	0.598772	Mean dependent var	-0.135135
Adjusted R-squared	0.587308	S.D. dependent var	54.92781
S.E. of regression	35.28622	Akaike info criterion	10.01740
Sum squared resid	43579.12	Schwarz criterion	10.10448
Log likelihood	-183.3219	Hannan-Quinn criter.	10.04810
F-statistic	52.23218	Durbin-Watson stat	2.065117
Prob(F-statistic)	0.000000		

Appendix B: Lag-length Selection for dependent and independent variables

Macroeconomic variables	Lag	LogL	LR	FPE	AIC	SC	HQ
LREXP	0	-46.5168	NA	0.8203	2.6398	2.6838	2.6552
	1	10.2398	107.2070*	0.0370	-0.4578	-0.3698*	-0.4271*
	2	10.5476	0.5643	0.0385	-0.4193	-0.2874	-0.3733
	3	12.3834	3.2635	0.0368*	-0.4657*	-0.2898	-0.4043
LRGDP	0	-48.9157	NA	0.9373	2.7731	2.8171	2.7884
	1	25.0256	139.6670*	0.0163*	-1.2792*	-1.1912*	-1.2484*
	2	25.0375	0.0218	0.0172	-1.2243	-1.0923	-1.1782
	3	25.8480	1.4408	0.0174	-1.2138	-1.0378	-1.1524
LDREV	0	-48.3007	NA	0.9058	2.7389	2.7829	2.7543
	1	12.3462	114.5553*	0.0330	-0.5748	-0.4868*	-0.5441*
	2	13.4079	1.9465	0.0328*	-0.5782*	-0.4463	-0.5322
	3	13.8163	0.7260	0.0340	-0.5454	-0.3694	-0.4839
LPOP	0	-6.5790	NA	0.0892	0.4211	0.4650	0.4364
	1	42.3930	92.50271*	0.0062	-2.2441	-2.156082*	-2.213350*
	2	43.4123	1.8687	0.0062*	-2.2451*	-2.1132	-2.1991
	3	43.4195	0.0128	0.0066	-2.1900	-2.0140	-2.1286
LAID	0	-44.6979	NA	0.7415	2.5388	2.5828	2.5541
	1	-25.5523	36.1639*	0.2706*	1.5306*	1.6186*	1.5614*
	2	-25.3693	0.3355	0.2833	1.5761	1.7080	1.6221
	3	-23.8255	2.7445	0.2750	1.5459	1.7218	1.6073
LPDEB	0	-34.4202	NA	0.4189	1.9678	2.0118	1.9831
	1	14.3272	92.0786	0.0295	-0.6848	-0.5969	-0.6541
	2	16.8340	4.5957*	0.0272*	-0.7686*	-0.6366*	-0.7224*
	3	17.7842	1.6892	0.0272	-0.7658	-0.5898	-0.7044
OPNN	0	-123.8420	NA	60.2079	6.9356	6.9796	6.9510
	1	-94.3442	55.7181*	12.3628*	5.3524*	5.4404*	5.3831*
	2	-93.9082	0.7993	12.7598	5.3837	5.5157	5.4298
	3	-92.3818	2.7136	12.3986	5.3545	5.3504	5.4159
REER	0	-189.6397	NA	2329.0900	10.5911	10.6351	10.6065
	1	-176.6439	24.54762*	1196.194*	9.9246*	10.0126*	9.9553*
	2	-176.5800	0.1172	1260.3890	9.9767	10.1086	10.0227
	3	-176.3522	0.4049	1316.3400	10.0196	10.1955	10.0810

Appendix C: Autoregressive Distributive lag (ARDL) Estimation

Dependent Variable: LREXP
Method: ARDL
Date: 07/10/20   Time: 10:52
Sample (adjusted): 1982 2018
Included observations: 37 after adjustments
Maximum dependent lags: 1 (Automatic selection)
Model selection method: Akaike info criterion (AIC)
Dynamic regressors (2 lags, automatic): LRGDP LREV LDEB LAID
    LPOP REER OPNN
Fixed regressors: C
Number of models evalulated: 2187
Selected Model: ARDL(1, 1, 2, 2, 2, 1, 1, 2)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LREXP(-1)	-0.512292	0.198239	-2.584212	0.0193
LRGDP	0.666885	0.143121	4.659577	0.0002
LRGDP(-1)	-0.211370	0.136796	-1.545144	0.1407
LDREV	0.572284	0.130775	4.376084	0.0004
LDREV(-1)	0.406385	0.227473	1.786521	0.0919
LDREV(-2)	0.074549	0.069408	1.074070	0.2978
LPDEB	0.019688	0.094317	0.208745	0.8371
LPDEB(-1)	-0.142335	0.082781	-1.719414	0.1037
LPDEB(-2)	-0.200939	0.080600	-2.493036	0.0233
LAID	0.126188	0.025122	5.022964	0.0001
LAID(-1)	0.051183	0.031078	1.646942	0.1179
LAID(-2)	0.028359	0.021064	1.346317	0.1959
LPOP	0.266292	0.191589	1.389910	0.1825
LPOP(-1)	0.379144	0.124702	3.040405	0.0074
REER	-8.38E-05	0.000334	-0.251207	0.8047
REER(-1)	-0.001039	0.000383	-2.715268	0.0147
OPNN	-0.007784	0.004271	-1.822492	0.0860
OPNN(-1)	-0.008165	0.004392	-1.859185	0.0804
OPNN(-2)	-0.009288	0.003464	-2.681094	0.0158
C	-8.508998	2.248744	-3.783889	0.0015

R-squared	0.998843	Mean dependent var	24.95940
Adjusted R-squared	0.997549	S.D. dependent var	0.902306
S.E. of regression	0.044672	Akaike info criterion	-3.075585
Sum squared resid	0.033924	Schwarz criterion	-2.204819
Log likelihood	76.89832	Hannan-Quinn criter.	-2.768599
F-statistic	772.1325	Durbin-Watson stat	2.284709
Prob(F-statistic)	0.000000		

Appendix D: Estimated Long Run Coefficients using the ARDL Approach

ARDL Long Run Form and Bounds Test
Dependent Variable: D(LREXP)
Selected Model: ARDL(1, 1, 2, 2, 2, 1, 1, 2)
Case 2: Restricted Constant and No Trend
Date: 07/10/20   Time: 10:53
Sample: 1980 2018
Included observations: 37

Conditional Error Correction Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-8.508998	2.248744	-3.783889	0.0015
LREXP(-1)*	-1.512292	0.198239	-7.628626	0.0000
LRGDP(-1)	0.455516	0.103997	4.380069	0.0004
LDREV(-1)	1.053218	0.142259	7.403545	0.0000
LPDEB(-1)	-0.323585	0.084505	-3.829195	0.0013
LAID(-1)	0.205730	0.034414	5.978066	0.0000
LPOP(-1)	0.645435	0.225166	2.866486	0.0107
REER(-1)	-0.001123	0.000389	-2.890698	0.0102
OPNN(-1)	-0.025237	0.004336	-5.820820	0.0000
D(LRGDP)	0.666885	0.143121	4.659577	0.0002
D(LDREV)	0.572284	0.130775	4.376084	0.0004
D(LREV(-1))	-0.074549	0.069408	-1.074070	0.2978
D(LPDEB)	0.019688	0.094317	0.208745	0.8371
D(LPDEB(-1))	0.200939	0.080600	2.493036	0.0233
D(LAID)	0.126188	0.025122	5.022964	0.0001
D(LAID(-1))	-0.028359	0.021064	-1.346317	0.1959
D(LPOP)	0.266292	0.191589	1.389910	0.1825
D(REER)	-8.38E-05	0.000334	-0.251207	0.8047
D(OPNN)	-0.007784	0.004271	-1.822492	0.0860
D(OPNN(-1))	0.009288	0.003464	2.681094	0.0158

* p-value incompatible with t-Bounds distribution.

Levels Equation
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LRGDP	0.301209	0.055990	5.379734	0.0000
LDREV	0.696438	0.047731	14.59087	0.0000
LPDEB	-0.213970	0.057043	-3.751057	0.0016
LAID	0.136038	0.013752	9.892256	0.0000
LPOP	0.426793	0.141605	3.013964	0.0078
REER	-0.000743	0.000256	-2.899726	0.0100
OPNN	-0.016688	0.002355	-7.087124	0.0000
C	-5.626559	1.289407	-4.363678	0.0004

EC = LREXP - (0.3012*LRGDP + 0.6964*LDREV -0.2140*LPDEB + 0.1360*LAID + 0.4268*LPOP - 0.0007*REER -0.0167*OPNN -5.6266)

Appendix E: Error Correction Representation for the Selected ARDL Model

ARDL Error Correction Regression

Dependent Variable: D(LREXP)

Selected Model: ARDL(1, 1, 2, 2, 2, 1, 1, 2)

Case 2: Restricted Constant and No Trend

Date: 07/10/20   Time: 10:55

Sample: 1980 2018

Included observations: 37

ECM Regression

Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LRGDP)	0.666885	0.082892	8.045197	0.0000
D(LDREV)	0.572284	0.072278	7.917833	0.0000
D(LDREV(-1))	-0.074549	0.042995	-1.733903	0.1010
D(LPDEB)	0.019688	0.051030	0.385815	0.7044
D(LDEB(-1))	0.200939	0.048438	4.148351	0.0007
D(LAID)	0.126188	0.015195	8.304292	0.0000
D(LAID(-1))	-0.028359	0.014629	-1.938487	0.0694
D(LPOP)	0.266292	0.071917	3.702746	0.0018
D(REER)	-8.38E-05	0.000204	-0.411350	0.6860
D(OPNN)	-0.007784	0.002448	-3.179591	0.0055
D(OPNN(-1))	0.009288	0.002120	4.381041	0.0004
CointEq(-1)*	-0.898400	0.067800	-13.2328	0.0000

R-squared	0.971658	Mean dependent var	0.071161
Adjusted R-squared	0.959188	S.D. dependent var	0.182344
S.E. of regression	0.036837	Akaike info criterion	-3.508017
Sum squared resid	0.033924	Schwarz criterion	-2.985558

Log likelihood	76.89832	Hannan-Quinn criter.	-3.323826
Durbin-Watson stat	2.284709		

Appendix F: ARDL Bound Test

ARDL Long Run Form and Bounds Test

Dependent Variable: D(LREXP)

Selected Model: ARDL (1, 1, 2, 1, 2, 2, 1, 2)

Case 2: Restricted Constant and No Trend

Date: 05/21/20   Time: 08:31

Sample: 1980 2018

Included observations: 37

F-Bounds Test			Null Hypothesis: No levels relationship	
Test Statistic	Value	Signif.	I(0)	I(1)
		Asymptotic: n=1000		
F-statistic	9.628518	10%	1.92	2.89
k	7	5%	2.17	3.21
		2.5%	2.43	3.51
		1%	2.73	3.9
Actual Sample Size	37	Finite Sample: n=40		
		10%	2.152	3.296
		5%	2.523	3.829
		1%	3.402	5.031
		Finite Sample: n=35		
		10%	2.196	3.37
		5%	2.597	3.907
		1%	3.599	5.23