ADDIS ABABA UNIVERSITY

SCHOOL OF GRADUATE STUDIES

COLLEGE OF BUSINESS AND ECONOMICS

DEPARTMENT OF BUSINESS ADMINISTRATION

(FINANCIAL SERVICES)

DETERMINANTS OF TRADE BALANCE IN ETHIOPIA: EVIDENCE FROM ARDL MODEL

By

Anbesaw Girma

Supervisor

Abebaw Kassie (PhD)

ADDIS ABABA UNIVERSITY

COLLEGE OF BUSINESS AND ECONOMICS

DEPARTMENT OF MBA PROGRAM

(FINANCIAL SERVICES)

Determinants of Trade Balance in Ethiopia: Evidence from ARDL Model

A Thesis Submitted to the School of Graduate Studies of Addis Ababa University in Partial Fulfillment of the Requirements for the Degree of Masters of Business Administration

(Financial services)

By: Anbesaw Girma

June, 2020

Addis Ababa, Ethiopia

Addis Ababa University

School of Graduate Studies

This is to certify that the thesis prepared by Anbesaw Girma entitled with: ***The Determinants of Trade Balance in Ethiopia: Evidence from ARDL Model***, and submitted in partial fulfillment of the requirements for the Degree of Master of Business Administration complies with the regulations of the University and meets the accepted standards with respect to originality and quality.

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Abstract

This study investigates the determinants of trade balance in Ethiopia, covering the period 1981–2018. Specifically, the study tests the validity of the Marshall-Lerner condition and the J-curve effect and further assess the effect of other macroeconomic variables. Auto-regressive distributed lags (ARDL) and Error correction model (ECM) were applied. Exchange rates, GDP growth, inflation rate, money supply as a percent of GDP, external debt as a percent of GDP and trade openness were used as predicator variables. The estimation result reveals that lagged value of trade balance, inflation rate, exchange rate, external debt and GDP growth are found to have positive statistically significant effect on trade balance in the long run. On the other hand money supply has negative effect. In the short run GDP growth, external debt and money supply have negative significant effect while inflation rate have significant positive effect on trade balance. The ECM coefficient reveals that short run deviation from equilibrium is adjusted towards long run equilibrium by the speed of 56 percent. Based on the results revealed, it is recommended that the government should devaluate the currency coupled aggressive expansion domestic production level. The study concluded that the existence of the Marshall-Lerner condition in Ethiopia since in the long run there is a positive relationship between the exchange rate and the trade balance. In order to progress towards a favorable trade balance which aimed at reducing persistent deficits, the government should devalue the currency coupled with different export diversification strategy.

Key words & Phrases: Trade balance, exchange rate, ARDL Model, ECM Model

Declaration

I hereby declare that this Msc. thesis entitled " ***Determinants of Trade Balance in Ethiopia: Evidence from ARDL Model,***" was carried out by me for the masters of Business Administration under the guidance and supervision of Dr. Abebaw K, at Addis Ababa University, college of Business and Economics, Department of Accounting and Finance.

The interpretations put forth are based on my reading and understanding of the original texts and they are not published anywhere in the form of books, articles and reports. The other books, articles and websites, which I have made use of are acknowledged at the respective place in the text.

For the present thesis, which I am submitting to the University, no degree or diploma or distinction has been conferred on me before, either in this or in any other University.

Declared by:

Name Anbesaw Girma

Signature _____

Date _____

Acknowledgements

First of all I would like to forward my acknowledgement to my advisor Dr. Abebaw Kassie because without his endless support this paper would not have been completed. Next I would like to thank World Bank, IMF, NBE, MoF EEA and CSA for making their data available on their public website. Lastly I would like to say thank you my friend Ermiyas Tefera for providing me his technical and material support.

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List of Acronyms

AIC	Akaike Information Criterion
ARDL	Auto-regressive Distributed Lags
BOP	Balance of Payment
BOT	Balance Of Trade
CPI	Consumer Price Index
CUMSUMSQ	Cumulative Sum Square
DW	Durban Watson
EAC	East African Countries
ECM	Error Correction Model
ED	External Debt
FDI	Foreign Direct Investment
FMOLS	Fully Modified Ordinary Least Square
GDP	Gross Domestic Product
GE	Government Expenditure
HCD	Human Capital Development
HCEXP	Household Consumption Expenditure
HIPC	Heavily Indebted Poor Countries
IDA	International Development Association
IMF	International Monetary Fund
INF	Inflation
LM	Lagrange Multiplier
MoF	Ministry of Finance
NBE	National Bank of Ethiopia
NRA	Natural Resource Availability
OLS	Ordinary Least Square
OER	Official Exchange Rate
RGDP	Real Gross Domestic Product
SSA	Sub Saharan Africa

TB	Trade Balance
TLB	Trade Liberization
TOP	Trade Opnness
UNCTAD	United Nations Conference on Trade And Development
USD	United States Dollar
VECM	Vector Error Correction Model
WB	World Bank

CHAPTER ONE

INTRODUCTION

1.1 Background of the study

Balance of Trade (BOT) is the large share of the balance of payment of a country and refers to the difference between exports and imports of a country made during a specific period of time. In the case of the value of its exports reporting an excess over the value of its imports over a period, that economy is accounted to have a favorable balance of trade. In opposition to the above scenario it is accounted an unfavorable (deficit) balance of trade. In general, it is believed that a favorable BOT indicates better economic conditions in a country by promoting an economic growth as BOT surplus may bridge the financial gap in the overall balance of payment. The fluctuations of BOT become major concerns especially for developing countries (Weerasinghe and Ravinda, 2019).

The current account deficit is one of the main indicators of external imbalance of global economies. In the recent years the continuous growth of global imbalances is in the center of debate among economists and policymakers. Actually, global imbalances refer to the large deficits and surpluses of the current account positions in the global economy Sadiku et al. (2015).

Interestingly, the increased role of international trade in African economies has been accompanied by significant and growing trade and current account deficits in many countries on the continent. There are concerns that the increasing current account deficits will increase Africa's future debt burden and make the continent vulnerable to financial crises. Experience has shown that growing current account deficits often presage disruptive economic trends such as sudden stops in capital flows, severe decreases in credit and spending, and sharp economic slowdowns, which generate high unemployment and poverty (UNCTAD, 2016).

Over the years, Trade balance in most African countries has performed poorly. Chronic trade deficits have characterized majority of these economies. This is partially attributed to dependence on specific primary agricultural products as their only exports while importing many manufactured goods which results into huge trade deficits (UNCTAD, 2015).

The trade balance of many of the sub-Saharan African countries for many years has been deteriorating. In fact a lot of these countries have still been running trade deficit in their economy for a long period of years. Among others, the main reason for this poor performance is the poor economic strategies that were implemented by those countries in their economic reforms and also these countries are highly dependent on producing of specific primary (agricultural) products for their exports and are highly dependent on imports of manufactured goods. This leads to a widening trade deficit in their economy over time (Africa Economic outlook, 2018).

Ethiopia is one among such group of countries that have formulated and adopted several economic policies with the purpose of improving trade balance and improves its economic performance. Since early 1990's and 2000s the values of Ethiopia's Imports have greatly exceeded exports, resulting in large trade deficits in the economy (Africa economic outlook, 2018).

1.2 Statement of the problem

Many developing countries especially Sub-Saharan African Countries have been experiencing Trade deficits for decades. Ethiopia specifically presents a very good example as one of these countries in which it has been experiencing trade deficit. Ethiopia's systemic trade deficit is the result of the country's dependency on imports of food, fuel, construction materials and manufactured goods. Main exports are: coffee, oilseeds, cereals, chat, horticultural crops, hides and other livestock products. Due to this prolonged trade imbalance then it makes sense to continue reexamining some factors that could be the main determinants of trade balance (AfDB, 2016).

The country has implemented several foreign trade reforms with the objective of encouraging export and liberalizing import since 1992 (Mulu and Tarekgn, 1999). Consequently, the previous restrictive trade policies have been relaxed; various measures have been taken since Oct 1992, subsequent to the initial measures of devaluation of national currency. In spite of these facts, Ethiopia has never experienced surplus trade balance in its history except in 1972 /73 and 1973/74 (NBE reports, various issues).

Ethiopia is among the least developed countries where the economy is primarily agriculture based and quite backward. The rudimentary stage of industrial growth combined with the traditional style of farming force the people to depend on the gifts of nature for their livelihood

and the country has chronically run a negative balance of trade, rendering the country dependent upon foreign aid and loans to finance imports. The imperial, the military and the current government tried to improve Ethiopia‘s balance of trade, the imperial and the current government by encouraging exports and the military government by curtailing imports. Macro-economic reforms and various policies and strategies were adopted but trade balance is still not improving (Zewudie and Alemu, 2017).

According to African economic outlook (2018), Ethiopia’s trade balance deficit widened further from (16 % of GDP) in 2015/16 to 16.8 % of GDP in 2017/18 and, estimated also to be increase to 16.8 % of GDP in 2018/19. In addition, a country has consistently run very high current account deficit for the last thirty five years on average 6.9% of GDP per annum (NBE, 2016). Even though, recently the country achieved consecutive double digit economic growth, the trade balance deficit is still higher and the gap is widened.

Several studies were conducted on the determinants of trade balance both in developing and developed countries. Study by Falk (2008), Mohammad (2010), and Weerasinghe and Ravinda (2019) were conducted in developed countries and concluded that exchange rate devaluation leads to trade balance improvement. Other studies were conducted by Meniago and Hinaunye (2017), Suphian (2017), Ogutu (2014), Moses (2013), Mutana et al. (2018), and Akoto and Sakyi (2019) in developing countries from these studies some of them were concluded that exchange rate has no significant effect on trade balance while the others, there is significant effect on trade balance. More specifically in Ethiopia study by Haile (1994), Befekadu and Kibre (1995), Asmamaw (2008) and Endale (2014) concluded that devaluation of domestic currency is not sufficient to improve the trade balance while Kebede (2017), and Bantegizie and Dawit (2017) found that currency devaluation in the short run and long run has significant effect on trade balance. Therefore, studies conducted in different time and countries concluded based on their findings there was a contradictory result of the effect of exchange rate devaluation to trade balance.

Therefore, this study was tried to analyze the macroeconomic determinants of trade balance using autoregressive distributed lag (ARDL) model. Several empirical studies have been carried out on the relationship between trade balance and on their determinant factors in developed countries. Lack of an empirical study using ARDL approach creates a gap that calls for the need

to fill as the study aims to shed more light on the study under focus. The study aims to cover this gap using Ethiopian data for the period 1981-2018.

The motivations of this study come from the following reasons. Firstly, the existing empirical works have contradicted results on the effect of exchange rate on trade balance. Secondly, the determinant factors of trade balance using ARDL model were limited and received little attention in Ethiopia. Thirdly, timing of the study is significant given the extensive trade balance deficit in the country.

Therefore, this study was particularly aimed at addressing the above research gaps by using 39 years data.

1.3 Objectives of the study

1.3.1 General objective

The main objective of this study is to analyze the determinants of trade balance in Ethiopia. To do this, the following specific objectives are set.

1.3.2 Specific objectives

- To determine the relationship between exchange rate and the trade balance by providing an empirical test of the Marshall-Lerner condition and the J-Curve effect in in Ethiopia using recent data.
- To analyze the impact of other macroeconomic variables on Ethiopian trade balance
- To explain the trend of trade balance in Ethiopia

1.4 Significance of the Study

Trade in general and positive trade balance in particular is fundamental to foster economic growth and in turn economic development (Falk, 2008). The finding of the study might help the concerned bodies, practitioners and academicians to compare and contrast the theory and the reality. Besides, the study will generate and add some information to the existing knowledge for researchers who are going to conduct the research in the same area or related discipline. The result of this study will also assist the responsible bodies by providing knowledge on how to identify the major determinants of trade balance and to set appropriate policy.

1.5 Scope of the study

The study seeks to analyze that determinates of trade balance in Ethiopia. In order to capture the determinants of trade balance in Ethiopia through empirical investigation was conducted with data covering a period of 38 years i.e. from 1981 – 2018. This period was chosen because in order to account recent time data and data availability of the country. The geographical scope of the study has defined to the political boundary of the Federal Democratic Republic of Ethiopia areas and countries other than this boundary are not subject of this study. The data considered for this study covered from 1981 to 2018. The time period for the study was selected based on the data availability.

1.6 Limitations of the study

The research focuses on trade balance and not every variable that influence to trade balance was included. Moreover, data availability and weaknesses remain a major setback in carrying out empirical research in most developing countries, particularly in Ethiopia. The number of time span that was used in this study is the basic limitations of the study. Due to lack of data on important variables like institutional quality and government effectiveness and lack of adequate long time data series on important variable this study was used 38 years data.

1.7 Organization of the study

The remaining parts of the paper are organized as follows. Chapter **II** contains the related theoretical and empirical literatures. In Chapter **III** provides the description of the study area, source of data, methodology of the study and model specification. In chapter **IV** the paper presents trade balance and its determinant variables' trend in the country and also provides empirical analysis and discusses the findings. Lastly, chapter **V** concludes the study with the main findings and forward some policy implications based on the findings.

CHAPTER TWO

LITERATURE REVIEW

2.1 Theoretical Literature review

Theoretical review related to balance of trade is systematically categorized in to four distinct. These are Standard Theory of International Trade, Elasticity Approach, Keynesian Absorption Approach, Monetary Approach and the twine deficit hypothesis.

2.1.1 Standard Theory of International Trade

In the contemporary of 16th to 18th centuries, mercantilism was the leading economic system in most of the developed countries in which its approach to international trade assumed that the nations' wealth highly depends on their possession of precious metals of gold and silver which were used as a medium of exchange during the time. The accumulation of such precious metals was achieved through promoting exports and enhancing such metals' discoveries in the nations in the one hand and by restricting imports through imposing import tariffs and quotas on the other hand (Peukert, 2012). Later on the Mercantilism ideology had faced strong criticism by became to be known later as the Standard Theory of International Trade which was embarked after the publications of AdamSmith's Wealth of Nations (Smith, 1776) and David Ricardo's on the principles of Political Economy and Taxation (Ricardo, 1817).

Standard Trade Theory associates merchandise with the devaluation and revaluation of exchange rate following a simple common sense approach by setting all other variables fixed, a fluctuation in exchange rate affects both the value and volume of trade. If real exchange rate rises in domestically, that is, depreciation, the domestic consumers can get less imported goods in an exchange for a unit of domestic goods and services. Thereby, a unit of imported good or service would give higher number of units of domestic goods. Eventually, domestic households buy fewer imports while foreign households purchase relatively more domestic goods. This situation leads to discourage domestic consumers not to consume more of imports goods in the one hand and to encourage foreign consumers to consume more of domestic products of devaluing country. Ultimately, the higher the devaluation of the home currency in terms of foreign currency

, the more the trade surplus the devaluing country obtains Further, the saving-investment gap was employed to explain the relationship between government expenditure and the trade balance. The saving-investment identity states trade balance as the summation of private savings and government savings which implies that private and government savings determine the existence of imbalances in a country's trade balance. Particularly, all other things remain constant; an increase in investment by the private sector will cause a deficit in the trade balance of an economy. Similarly, an increment in government expenditure will cause deterioration in the trade balance of an economy, ceteris paribus.

2.1.2 The elasticity approach

The elasticity approach provides analysis of what will be the effect on trade balance if a country devaluate its domestic currency which was proposed by Alfred Marshal, Abba Lerner and later on an extension was made to this approach by Joan Robinson in 1947 and Fritz Machlup in 1955. The approach describes that a country's trade balance is determined by exchange rate elasticity of demand for export by foreigners and the exchange rate elasticity of demand for import by domestic consumers. This implies that currency devaluation determines trade balance through the changes in relative prices of goods and services internationally. According to this approach, a a country with trade deficit may be able to improve its trade deficit by lowering its relative prices, so that exports increase and imports decrease. The nation can lower its relative prices by permitting its exchange rate to depreciate in a free market
or by formally devaluing its currency under a system of fixed exchange rates (Pongsak Hoontrakul,1999).

According to the elasticity approach, the ultimate outcome of currency devaluation depends upon the price elasticity of demand for a nation's imports and the price elasticity of demand for its exports. The general rule that determine the actual outcome is the so-called Marshal-Lerner condition. The Marshal-Lerner condition states that (Kaur, 1974):

1. Devaluation will improve the trade balance if the devaluing nation's demand elasticity for import plus the foreign demand elasticity for the nation's export exceed one ($\eta x + \eta m > 1$) then devaluation will improve the trade balance (balance of payments).

2. If the sum of the demand elasticity is less than one, then devaluation will worsen the trade balance. I.e. if $\eta x + \eta m < 1$, then devaluation will lead to deterioration of the current account.
3. If $\eta x + \eta m = 1$, then devaluation will neither improve nor worsen the current account. That is, trade balance will be neither helped nor hurt if the sum of demand elasticity equals unity.

A general consensus accepted by most economists is that elasticity are lower in the short-run, in which case the Marshal-Lerner condition may only hold in the medium to long run. In the short – run it may be difficult to react to price changes by reallocating factors of production .In the long run, however, it is much probable that the production pattern will alter according to the price changes and the demand for import will therefore be more elastic(responds to changes in prices).

The possibility that in the short-run, the Marshal-Lerner condition may not be fulfilled although it generally holds in the long-run leads to the phenomenon of what is popularly called the J-curve effect. The idea underlying the J-curve is that in the short-run export volumes and import volumes do not change much so that the price effect outweighs the volume effects leading to the deterioration in the trade balance. However after a time lag, export volume start to increase and the import volume start to decrease and consequently the trade deficit start to improve (Kaur,1974).

Marshall-Lerner condition

Theoretically, exchange rate has an effect on trade balance through the concept of Marshall-Lerner condition. The elasticity of demand for exports and imports are not only important in determining the trade balance for a country, impact of quotas, tariffs, and economic growth but also plays a key role in assessing how a devaluation (depreciation) aids in improving the trade balance position of an economy. Currency devaluation is mainly aimed at altering relative prices in countless ways that will encourage exports at the country where devaluated the currency and discourage imports to the country where devaluated the currency. Devaluation is the deliberate increase in the domestic currency in terms of foreign currency, hence raising the domestic price of imports (Lerner, 1944).

In line with exports, devaluation of the domestic currency will cause both a reduction in foreign currency price and an increase in local currency prices, with relative elasticity of demand and supply determining the consequences. In a situation where local currency price of exports are held constant, implying an infinitely elastic supply function, as the foreign currency price falls resulting from the devaluation thereby causing foreigners to purchase more of the domestic exports. On the contrary, if foreign currency prices of exports are held fixed instead, implying an infinitely elastic foreign demand for such goods, domestic currency price of exports rises resulting for the devaluation and hence will increase domestic exports on the international market (Ibid).

When the elasticity of the demand for exports and imports are relatively low, devaluation in the domestic currency can deteriorate the trade balance rather than improving it. If the prices of the goods are fixed in the exporters‟ currencies, a condition needs to be satisfied to achieve a desired response of the exchange rate to the trade balance. The condition states that, the elasticity of demand for long-term exports and imports must in summation be more than one. This means that the average of both exports and imports should be more than one. If they add up to exactly one, then there will be no change in the trade balance in case of devaluation. A perverse effect of devaluation on the trade balance occurs if the sum of the demand elasticity of exports and imports is less than one. This condition is what is termed the Marshall-Lerner condition.

J-curve Effect

The link between the exchange rate and the trade balance can also be discussed in terms of the J-curve effect. The logic that behind the J-curve effect is that, a worsening trade balance resulting from a depreciation of a particular currency may be temporary. Likewise, exchange rate instabilities may only be a problem in the short-run. Since the second half of the 1980‟s the J-curve effect has served as an important theory in explaining the temporary problem caused in the trade balance resulting from depreciation in the currency (Krueger, 1983).

According to Krueger (1983), hhen there is depreciation in a currency, causing a consequent increase in prices of imports residents of that particular country may continue to buy foreign goods because they have not adjusted preferences towards locally produced substitutes (an inelastic demand curve) and also because local substitutes might have not been produced (a

domestic inelastic supply curve). Imports can therefore fully decline only after consumers have decided to adjust their preferences by purchasing locally produced goods which are available at the time. Likewise, domestic exports also expand resulting from depreciation if only domestic production increases in order to produce more for export and also if foreign consumers patronize these products. Depreciation will worsen the trade balance of an economy in the short-run but consequently improves if both the import demand and export supply is more inelastic in the short-run as compared to the long-run. The time path changes in trade balance may look as in Figure 2.1. A depreciation is assumed to occur at time 0, and the trade balance worsens immediately after depreciation because individuals temporarily spend more on imports and also because exports do not increase sufficiently. But after some time, when the elasticity of both imports and exports increase, the trade balance eventually improves. This can clearly be seen in Figure 2.1. The shape of the Time path in the figure follows the J-pattern hence the name, J-Curve effect.

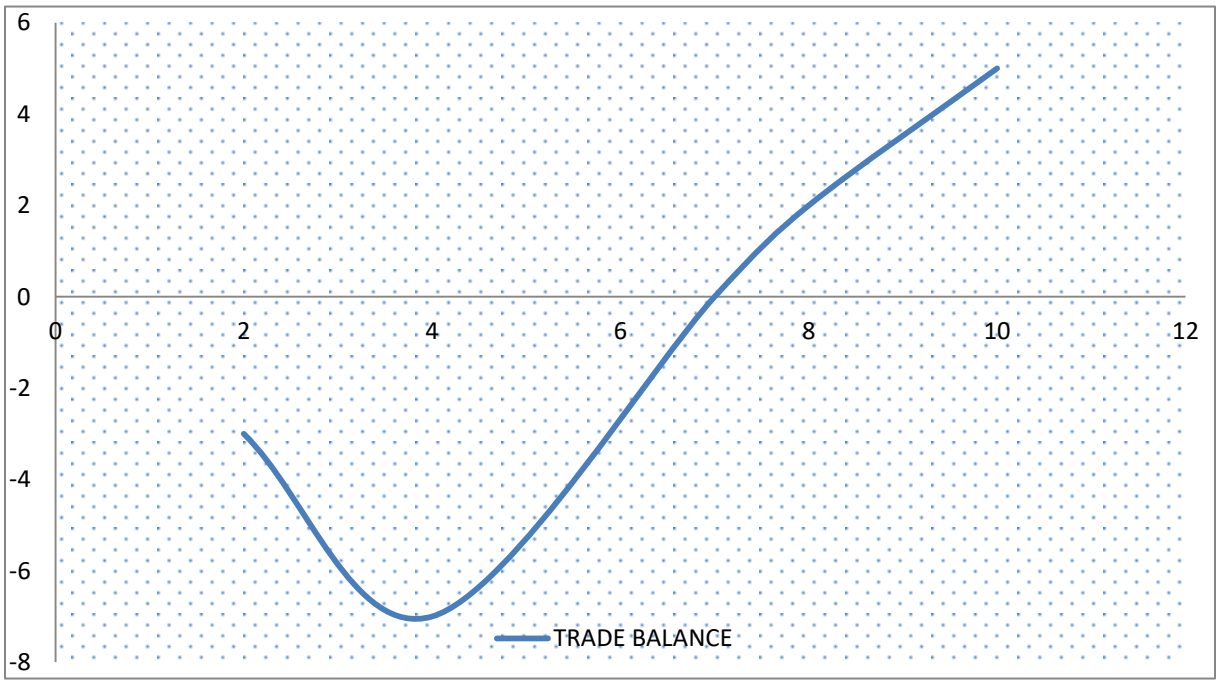


Figure 2.1 Graphical Representation of the J-Curve

The downward sloping part of the J-curve represents the short run decline of trade balance position and the upward sloping of the J-curve represents the long run recovery of the trade balance.

2.1.3 The absorption Approach

According to absorption approach changes in imports and exports will have implication for national income. A different approach to the balance of payments emerged at the beginning of the 1950s when authors such as Harberger (1950), Meade (1951), and Alexander (1952, 1959) shifted the focus of economic analysis to the balance of payments.

The core of this approach is the proposition that any improvement in the trade balance requires an increase of income over total domestic expenditures. In other words, it analyses the economy from the point of view of aggregate expenditures, in particular, the direct effects of exchange rate changes on relative prices, income and absorption, and ultimately on the trade balance. The central tenet of the absorption approach is that a favorable configuration of price elasticity may not be sufficient to produce a positive balance of trade effect resulting from devaluation, if devaluation does not succeed in reducing domestic absorption.

According to Keynes national income represented in the following way

$$\mathbf{Y = C + I + G + (X - M)}$$

Where,Y,C,I,G,X and M are total national incomes (GDP), domestic consumption, investment spending, government purchases and exports and imports respectively. This equation states that domestic supply (Y) in an open economy is given by domestic absorption plus net exports. That means in an open economy, domestic output level equals domestic spending plus trade balance. By substituting A for domestic spending (C, I and G) and (X-M) by TB, we can drive a trade balance equation for an open economy as follow:

$$\mathbf{TB = Y - A}$$

Where, $TB = (X - M)$ is a trade balance or net export, $A = (C + I + G)$ is a domestic expenditure or absorption, and Y is level of GDP. This implies that trade balance can be improved if domestic output level exceeds domestic spending. The above equation helps to determine a number of key variables that have effect on imports and exports and hence trade balance (Keynes, 1936).

2.1.4 The Monetary Approach

According to the elasticity and absorption approaches, the monetary consequences are not associated with the trade balances adjustments. At the end of the 1950s however, the monetary view of the balance of payments emerged. As regard to monetary or global monetarist approach (Polak, 1957; Hahn, 1959; Pearce, 1961; Prais, 1961; Mundell, 1968, 1971), the balance of payments is essentially a monetary phenomenon. Since for an economy the monetary base equals to the sum of the domestic value of international reserves and the monetary asset holdings of monetary authorities, a change in international reserves is reflected in the change in the money supply. The balance of payments behavior is analyzed from the point of view of the supply and demand of money.

According to the monetary approach, any excess demand for goods, services and assets, resulting in a deficit of the balance of payments, reflects an excess supply or demand of the stock of money. In simple terms, if people demand more money than is being supplied by the Central Bank then the excess demand for money would be satisfied by inflows of money from abroad. In this case, the trade balance will improve. On the other hand, if the Central Bank is supplying more money than is demanded, the excess supply of money is eliminated by outflows of money to other countries and this will worsen the trade balance. That is when money holdings exceed the economic agents' desired long-term real monetary balances, spending and acquisition of foreign assets expand, which leads to the worsening of the current account (Harberger, 2008).

The essence of this theory is that the trade deficit and surplus in the balance of payments is denoted as disequilibrium in the money market. So, the trade deficit or surplus or disequilibrium in the money market is a transitory phenomenon which lasts only until government responds by changing money supply. According to the monetary theory, the country's supply of money is given by:

$$\mathbf{H = D + F}$$

Where, H, D and F are the nation's total money supply, domestic components of the nation's monetary base and the foreign components of the nation's monetary base, respectively. This money supply equation can be written as:

$$\mathbf{\Delta NFA = \Delta H - \Delta D}$$

Where, $\mathbf{\Delta NFA}$, $\mathbf{\Delta H}$ and $\mathbf{\Delta D}$ denote the change in net foreign assets, total money supply of a nation, and the central bank's extension of domestic credit. The above equation states that the

change in the central bank's holding of foreign assets is equal to the change in the stock of high powered money minus the change in the domestic credit. The important point about the above equation is that is the balance of payment. The domestic component of the nation's monetary base (D) is the domestic credit created by the nation's monetary authority. Thus, the external balance is given by:

$$\boldsymbol{X - M = (\Delta H - \Delta D) - Fs}\ \textbf{; Since}\ \ \boldsymbol{M - X = Fs - \Delta R}$$

Where, Fs is foreign saving and ΔR change in international reserve. The above equation shows that how the external account and the monetary accounts are related and the monetary theory of trade balance states that change in domestic money supply is negatively related to the trade balance of a country. This means an excess stock of money supply will lead to an out flow of reserves (import increases) or a balance of payment deficit.

2.1.5 The Twine Deficit Hypothesis

The concept of dual-gap analysis, which was pioneered by Hollis Chenery and others, shows that foreign borrowings may also be viewed as a supplement to foreign exchange to achieve a faster rate of growth and development, the trade gap is larger than the saving gap, and foreign resources are not easily substitutable for one another. This study uses GDP identity following Root (1978) to explain the rationale for external borrowing to finance investment in the economy. Following Root (1978), the derivations of two-gap analysis is the following.

Start with the basic macroeconomic identity where Aggregate Output = Aggregate Expenditure. Thus, assuming that there is no government sector and on the assumption of no government influence in the domestic economy. GDP is made up of the sum of expenditures incurred by economic agents in an economy, namely, household consumption of goods and services, and firms' investment (I), and net export of goods and services (X-M) obtained by subtracting imports (M) from exports (X) and also specified as:

$$Y = C + I + (X - M)$$

From the equation above subtracting consumption(C) from both sides we get

$$S = I + (X - M)\ since: S = Y - C \qquad where: S = domestic\ saving$$

Rearranging the equation we get

$$S + M = X + I \implies \text{Withdrawals} = \text{Injections}$$

The relationship can be restated as follows

$$M - X = I - S$$

(*Trade deficit*) = (*Savings deficit*)

These two constitute two separate constraints and totally know as two-gap (dual-gap). Based on equation (4) take the investment to the left and rearrange then we get

$$I = S + (M - X)$$

The implication from the relationship derived from above equation is that when domestic savings are insufficient to finance domestic investment, import balance on the current account which is financed by net borrowing from abroad (M-X), is used to fund the deficit. Thus, the demand for total domestic investment is the sum of domestic savings and net foreign loan.

2.2 Empirical review

A considerable number of empirical studies on the balance of trade and overall balance of payment have been carried out in the developing as well as developed economies during the last three decade. Among these studies the main attention was given to study the relationship between exchange rates and trade balance, determinants of trade and overall BOP balance, J-curve effect and holding of Marshall-Lerner conditions, impact of trade balance on the economic growth of an economy etc. These studies have ended up with different results which supported the existing findings or were contradictory to existing knowledge, depending on the identical economic factors relating to each economy.

2.2.1 Empirical studies from developed countries

Falk (2008) investigated a study on determinants of the trade balance in industrialized countries. He was used a panel data for 32 industrialized and emerging economies for the period 1990–2007. He found that based on fixed effects models and linear mixed models allowing for random slope coefficients, show that the trade balance as a percentage of GDP is significantly positively

related to real foreign GDP per capita of the trading partners. Real domestic GDP per capita has a negative effect on the trade balance. A real depreciation of the exchange rate index leads to an improvement of the trade balance. However, in countries with a negative trade balance and/or a large positive net foreign direct investment position the trade balance is much less sensitive to movements in the real effective exchange rate

Mohammad (2010) conducted a study on determinant of balance of trade in Pakistan. The core object behind this study was to explore the long run as well as short run determinant of trade deficit with reference to Pakistan by using Johansen co integration approach and Error correction model (ECM). The study found that foreign income, foreign direct investment, domestic house hold consumption and real effective exchange rate are significantly affecting the trade deficit. To highlight the short run dynamics VECM (Vector Error correction model) was used. The result of VECM pointed out that there is disequilibrium in the short run which will be adjusted within one year.

Weerasinghe and Ravinda (2019) investigated a research on determinants of balance of trade in the Sri Lankan economy. The study was used time series data and the model used in this study is developed for the first order autoregressive process as used by many research studies carried out in the recent past relating to this area, by using the quarterly data from the 2000Q1 to 2015Q2. They found that gross domestic product; volumes of imports and inflation rate have a significant impact on the balance of trade deficit in the Sri Lankan economy. A nominal exchange rate and direct foreign investments have not influenced the current situation. There is a positive relationship between the exchange rate and the trade balance which is not a significant factor.

2.2.2 Empirical studies from developing countries

Meniago and Hinaunye (2017) investigated a study the impact of exchange rate changes on imports, exports and trade balance in Sub-Saharan Africa (SSA). The study was used panel data for 39 SSA countries from the period 1995-2012. They found that there is a positive relationship between exchange rate changes and imports, albeit the degree of responsiveness was extremely low. These were inconsistent with economic theory and can be attributed to the fact that many African countries largely depend on imports, and tend to be invariant to exchange rate changes. Hence, a depreciation of their exchange rates may have little or no effects on imports.

Suphian (2017) conducted a study on to examine empirically the determinants of trade balance in East African countries. The study was used co-integration regression under the Full Modified Ordinary Least Square (FMOLS) followed by the Vector Error Correction Model (VECM). The finding reveled that there different mixed results were obtained across countries under study. The study found that among all other variables, this study found Foreign Direct Investment (FDI) as the main variable of interest and probable solution in improving the trade balance of EAC countries.

Ogutu (2014) conducted a study on the effects of the exchange rate on the trade balance in Kenya. The main objective of the study was to the long run relationship between the exchange rate and the trade balance in Kenya using annual time series data from 1963 to 2013. The study found that real exchange rate had a positive and significant effect on both the long run period and the short run adjustment mechanisms on trade balance. Therefore, depreciation of the real exchange rate affects trade balance in the long run, even though the deficit continues but depreciation may have played a role to manage the decline.

Moses (2013) investigated a study on the Analysis of the Main determinants that have an impact on trade balance in Tanzania. The study was used time series data from the period 1980 to2012.The study found that the main influencing factors for the case of Tanzania were foreign direct investment (FDI),human capital development (HCD),household consumption expenditure(HCEXP), government Expenditure **(**GEXP),Inflation (INF),Natural Resources Availability (NRA),Foreign Income(WY) and Trade liberalization(TLB).

Mutana et al. (2018) conducted a study on macro-economic determinants of Kenya's trade balance. The paper applied Vector Error Correction Model on a 54-year period data (1963-2016). We find that terms of trade, trade openness and FDI have a significant and positive long-run relationship with trade balance. Similar results are observed for the case of Gross Domestic Product. Furthermore, we find a negative and a significant long run relationship between real exchange rate and trade balance.

Akoto and Sakyi (2019) conducted a study on empirical analysis of the determinants of trade balance in Post-liberalization Ghana. The study was used time series data covering the period

1984–2015. The bounds testing approach to co-integration and the error correction model within a symmetric and asymmetric autoregressive distributed lag (ARDL) framework was used for the estimation. The results from both symmetric and asymmetric specifications show the absence of the Marshall-Lerner condition and the J-curve effect. Further, the study found that household consumption expenditure, government consumption expenditure and domestic prices are negative and significant in the long and short run, whereas foreign income and money supply are positive and significant in the short run. A key finding of the study suggests that depreciation of the Ghana cedi is not an appropriate step to help in improving the country's trade balance position.

2.2.3 Empirical studies from Ethiopia

Haile (1994) has attempted to estimate the effect of devaluation on the trade balance using the elasticity approach. According to him, the sum of elasticity of export and import is greater than one. Since the Ethiopian trade balance was initially in deficit, the Marshal-Learner condition is not satisfied and is not enough. He concluded that in the Ethiopian case, devaluation is not strong enough to satisfy what the country is in need.

Befekadu and Kibre (1995), in their study on the possible effect of the 1992 devaluation on the Ethiopian trade balance, argued that in the short-to-medium term both imports and import substitute goods are unlikely to respond to price changes given the structure of the Ethiopian economy. According to them if the devaluation of Birr succeeds in decreasing imports, it is likely to reduce capacity utilization and therefore output growth. Thus, the decrease in the current account deficit would be at the cost of the growth of the economy. For them, though the increases in domestic currency prices are necessary, they are definitely not sufficient to increases the volume of exports. Furthermore, they argued that the greater foreign exchange availability from higher exports and from easier access to foreign capital made it possible to translate the increase in demand into actual imports.

Asmamaw (2008) used the OLS, Instrumental variable and Error correction model to investigate the impact of devaluation on the trade balance. He concluded that Ethiopian exports have increased following the devaluation of the Birr during the period under study. This could be due to; first, the amount of money the country receives from a given quantity of exports has

increased in terms of the domestic currency. Second, the domestic consumption of exportable goods may have declined due to the rise in the price of export commodities. On the other side, He revealed that the country's import did not show a declining trend following the devaluation. This may due to the fact that most of the imports are strategic goods, and price elasticity is low. He mainly concluded that the country trade balance has not improved since exports and imports have increased and an increase in exports was not sufficient to overcome the increase in imports.

Endale (2014) assess the effects of exchange rate devaluation on the trade balance of Ethiopia. The data used in this study were from the period 1976-2012. He has been used co-integration and ordinary least square method (OLS). This study found that both export and import are elastic to change in the exchange rate (devaluation in our case), but the import is more elastic compared to the elasticity of export. Based on this clue, He concluded that since the Ethiopian export has a low response for the rise in exchange when compared with import, Devaluation is not sufficient to improve the trade balance.

Kebede (2017) investigated a research on determinants of trade balance in Ethiopia. The study the bound testing approach of cointegration and error correction model, developed within the autoregressive distributed lag, (ARDL) model frame work is applied to annual data for the period of 1970/71 to 2010/11 to investigate whether a long run relationship exists between trade balance and its determinants. The estimated results show that exchange rate appreciation (depreciation) is negatively (positively) related to the trade balance in the long-run and short-run consistent to economic theories. The empirical results provide strong evidence that exchange rate play a weaker role in determining the behavior of trade balance in Ethiopia. Income, budget balance and money supply have a stronger impact on trade balance.

Similarly, Bantegizie and Dawit (2017) conducted a study on attempted to identify the short and long-run determinants of trade balance in the case of Ethiopia's economy for the period 1978 to 2009. The study in order to achieve the stated objective a model of absorption, elasticity and monetary approaches to trade balance was estimated using Engle- Granger two step procedures of co-integration and general to specific error correction model. The found that the most important long run determinants of trade balance are household consumption expenditure, real effective exchange rate and terms of trade while government consumption expenditure, house

hold consumption expenditure, real effective exchange rate and terms of trade are the short run determinants of trade balance

2.3 Summery and research gap

Several empirical studies have been carried out for an individual developing country relating to the determinants of the trade deficit. According to these studies common independent variables have been considered such as exchange rate, trade volumes, foreign direct investments, domestic income, foreign income and inflation rate against the trade deficit.

According to studies conducted in developed countries, the outcome of devaluation is more or less procyclical with what the countries supposed to achieve. However, those study conducted in developing countries discovered that devaluation delivers favorable results for some developing countries while it is worthless for some developing countries. In combination, the significance of devaluation for a developing country is ambiguous. More specifically, most of the studies conducted in Ethiopia exhibited that, devaluation is not the right monetary instrument to improve Ethiopian economic problem.

Several studies were conducted on the determinants of trade balance both in developing and developed countries. Study by Falk (2008), Mohammad (2010), and Weerasinghe and Ravinda (2019) were conducted in developed countries and concluded that exchange rate devaluation leads to trade balance improvement. Other studies were conducted by Meniago and Hinaunye (2017), Suphian (2017), Ogutu (2014), Moses (2013), Mutana et al. (2018), and Akoto and Sakyi (2019) in developing countries from these studies some of them were concluded that exchange rate have no significant effect on trade while the other there is significant effect on trade balance. More specifically in Ethiopia study by Haile (1994), Befekadu and Kibre (1995), Asmamaw (2008), Endale (2014), Kebede (2017), and Bantegizie and Dawit (2017) were conducted in different time and based on their findings there was a contradictory result on the effect of exchange rate devaluation to trade balance.

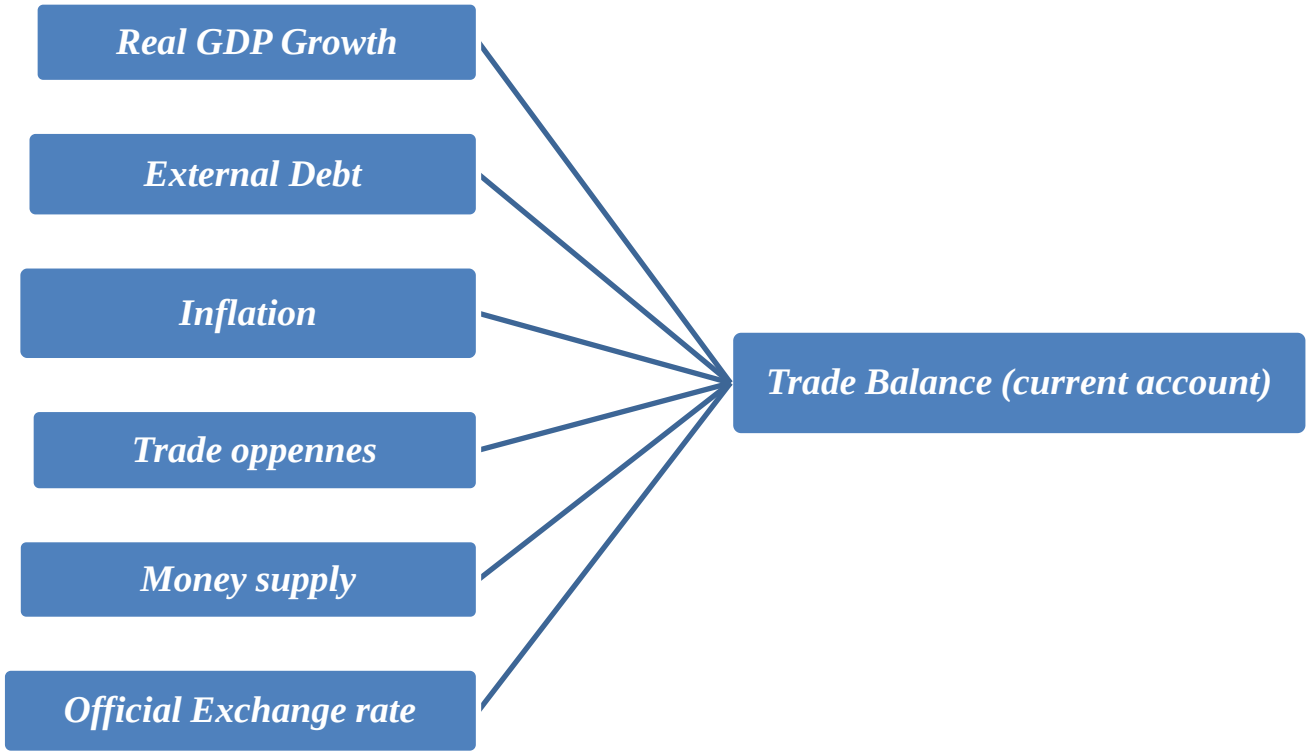
Therefore, this study will try to analyze the macroeconomic determinants of trade balance using autoregressive distributed lag (ARDL) model. Several empirical studies have been carried out on the relationship between trade balance and on their determinant factor in developed. Lack of an empirical study using ARDL approach creates a gap that calls for the need to fill as the study

aims to shed more light on the study under focus. The study aims to cover this gap using Ethiopian data for the period 1980-2018.

The motivations of this study come from the following reasons. Firstly, the existing empirical works have contradicted results on the effect of exchange rate on trade balance. Secondly, the determinant factors of trade balance using ARDL model were limited and received little attention in Ethiopia. Thirdly, timing of the study is significant given the extensive trade balance deficit in the country.

2.4 Conceptual framework

As presented in the above discussion trade balance is determined by different factors. The framework is based on the concept that the macroeconomic variable relationship between trade balance (current account) and their determinant factors. The macroeconomic relationship between trade balance and their determinant factor is based on the trade theory and the related empirical works.



Source: Literature Own formulation

CHAPTER THREE
METHODOLOGY OF THE STUDY

3.1 Introduction

This chapter presents the theoretical framework and empirical model employed in this study to investigate the determinants of trade balance in Ethiopia it also discusses the statistical tools and necessary diagnostic tests within time series regression that are employed in this study.

3.2 Description of the study area

Ethiopia's location gives it strategic dominance as a jumping off point in the Horn of Africa, close to the Middle East and its markets. Ethiopia is the second most populous nation in Africa after Nigeria with about 109 million people in 2018, and the fastest growing economy in the region. However, it is also one of the poorest, with a per capita income of $790. Ethiopia aims to reach lower-middle-income status by 2025. Ethiopia's economy experienced strong, consistent economic growth averaging 10.3% a year from 2007 to 2017, compared to a regional average of 5.4%. Ethiopia's real gross domestic product (GDP) growth decelerated to 6.81% in 2018 (World Bank, 2019).

Higher economic growth brought with it positive trends in poverty reduction in both urban and rural areas. The share of the population living below the national poverty line decreased from 30% in 2011 to 24% in 2016. The government is implementing the second phase of its Growth and Transformation Plan (GTP II) which will run to 2019/20. GTP II aims to continue expanding physical infrastructure through public investments and to transform the country into a manufacturing hub. GTP II targets an average of 11% GDP growth annually, and in line with the manufacturing strategy, the industrial sector is set to expand by 20% on average, creating more jobs (World Bank, 2019). .

3.3 Research Design and approach

A research design is a master plan that specifies the methods and procedures for collecting and analyzing needed information (Zikmund et al, 2009 pp.66). The conceptual structure which a research is conducted; it is the millstone for the collection, measurement and analysis of data.

The study employed both descriptive and explanatory research design with quantitative data approaches to ascertain the secondary data. The main objective of the study is to investigate the determinants of trade balance in Ethiopia. Therefore, to achieve this objective properly explanatory and descriptive research design with quantitative data approaches were used. The reason for using explanatory research is that according to the Kothari (2004, p.19) explanatory research method is very important to explain the cause and effect relationships phenomena.

3.4 Data Source and Scope

The data used for this particular study is secondary data. Data collection instruments conducting appropriate data gathering instruments help researchers to combine the strengths and amend some of the inadequacies of any source of data to minimize risk of irrelevant conclusion. Consistent and reliable research indicates that research conducted by using appropriate data collection instruments increase the credibility and value of the research findings (Koul, 2006). Accordingly, this study completely depending up on secondary data which is obtained from Ministry of Finance (MoF), National Bank of Ethiopia (NBE), World Bank (WB), and International Monetary fund (IMF). The study covers a period of 38 years from the period (1981 – 2018) in Ethiopia.

3.4.1 Data Reliability and validity

Reliability and validity is important to any research design, and an important consideration with secondary data is the extent to which it relates to the research question. In secondary data before proceed to estimation the following things was considered. The secondary data should from published sources and greatly increase the validity and reliability use of secondary data is triangulate with another research method. Generally, the Criteria for evaluating secondary data sources are based on the following basic questions: Who collected the data, What is the data provider's purpose or goal, When was the data collected, How the data was collected, What type of data was collected, Whether the data is consistent with data from other sources.

3.5 Definition of Variables and their measurement

3.5.1 Trade Balance (TB)

It is the difference between the monetary value of a nation's total exports and total imports over a certain period of time. If a country export earning is greater than value than its import payment, the country runs a trade surplus or favorable trade balance. On the contrary, if a country import payment exceeds its export earning, it runs a trade deficit or unfavorable trade balance. If import payment and export earning equal, the country runs balanced trade during that period

3.5.2 Real Gross Domestic Product

The value of all goods and services produced by an economy in a given year, expressed in base-year prices, and is often referred to as "constant-price," "inflation-corrected" GDP or "constant dollar GDP. The data, which is in current Ethiopian birr and is recorded yearly, is transformed into real GDP by dividing with GDP deflator. The study has used real GDP growth rate in its analysis.

3.5.3 External Debt

External debt refers to a country's total external debt that includes the stock of debt owed to non-resident, governments, businesses and institutions. It is repayable in foreign currency, goods and services. The data is in current Ethiopian birr but is converted to real using the GDP deflator and then transformed into the percentage of GDP and the study has used this figure while analyzing its data.

3.5.4 Inflation

Inflation refers to an overall increase in the Consumer Price Index (CPI), which is a weighted average of prices for different goods. The set of goods that make up the index depends on which are considered representative of a common consumption basket. The negative effects of inflation include an increase in the opportunity cost of holding money, uncertainty over future inflation which may discourage investment and savings, and if inflation were rapid enough, shortages of goods as consumers begin hoarding out of concern that prices will increase in the future.

3.5.5 Money supply

The money supply (or money stock) is the total value of money available in an economy at a point of time. There are several ways to define "money", but standard measures usually include currency in circulation and demand deposits (depositors' easily accessed assets on the books of financial institutions). Each country's central bank may use its own definitions of what constitutes money for its purposes.

3.5.6 Official exchange rate

Nominal exchange rate tells us how much of one currency you will receive for another. The real exchange rate it is defined as the nominal exchange rate adjusted for inflation differentials. When the real exchange rate is high or rising, the relative price of goods that the domestic producers receive from foreign consumer is higher and the relative price of goods that domestic consumers pay to foreign producers is higher which implies that a real depreciation/ devaluation encourages export and discourages import and improves trade balance at the end citrus paribus. But due non availability of adequate data the study has used the official exchange rate in analyzing the data.

3.5.7 Trade Openness

Trade openness calculated as the sum of import and export to GDP ratio. Trade openness is a measure of how a country is liberalized to the rest of the world. Trade openness is a measure of economic policies that either restrict or invite trade between countries. For example, if a country sets a policy of high trade tariffs, thus restricting the desirability of international trade, this restrictive policy will inhibit other countries from sending exports and accepting imports from that country. According to dominating economic theory, this restrictiveness, this lack of trade openness, will have an economic effect of slowing economic development/growth.

Table 3.1: Summary of Variables, Expected Signs of their Coefficients and Data Sources

Variables	Indicator	Expected sign	**Data source**
TB% GDP	Trade balance		**NBE**
GDP growth	Real GDP	Positive	**NBE and MoF**
DEBT % GDP	External debt	Negative	**World Bank& IMF**

INF	Rate of CPI	Negative	**NBE**
TOP	Trade openness	Positive	**NBE and MoF**
M2 % GDP	Money supply	Negative	**NBE**
OER	**Official exchange rate**	**Positive**	**NBE**

Source: Source: Author's formulation

3.6 Theoretical model specifications

Autoregressive distributed lag (ARDL) model is one of the most general dynamic unrestricted model in econometric literature. In ARDL model, the dependent variable is expressed as the lag and current values of independent variable and its own lag value. ARDL model normally starts from reasonably general and large dynamic model and progressively reducing its mass and altering variable by imposing linear and non-linear restrictions (Charemza and Deadman, 1997). ARDL methodology follows general to specific approach that is why it could be possible to tackle many econometric problems like, misspecification, autocorrelation, and come up with a most appropriate interpretable model. Therefore, this study was adopted Autoregressive Distributed Lag (ARDL) to estimate the long run and the short run determinants of trade balance in Ethiopia within the study period.

According to Johansen and Juselius (1990), Pesaran and Shin (1995), and Pesaran et al. (1996b) the general ARDL model is specified as follows.

The ARDL (p, q1, q2, q3…….qk) model specification is given as follows.

$$\Phi(L,p)y_t = \sum_i^k B_i(L,q_i)x_{it} + \delta w_t + u_t \qquad 3.1$$

Where, $\Phi(L,p) = 1 - \Phi_1 L - \Phi_2 L^2 - \cdots \ldots\ldots\ldots\ldots - \Phi_P L^P$

$B(L,q) = 1 - \beta_1 L - \beta_2 L^2 - \cdots \ldots\ldots\ldots - \beta_q L^q$, for i = 1, 2, 3……..k, $u_t \sim iid(0,\delta^2)$ and L is the lag operator.

Based on the above equation 3.1, the ARDL model specifications:

$$\Phi(L)y_t = \varphi + \theta(L)x_t + u_t \qquad 3.2$$

With $\Phi(L) = 1 - \Phi_1 L - \cdots \ldots - \Phi_p L^p$,

$$\theta(L) = \beta_0 - \beta_1 L - \cdots \ldots \ldots - \beta_q L^q$$

Hence, the general ARDL(p, q1, q2, q3,……qk) model; where p, q1, q2, q3,……qk is optimal lages.

$$\Phi(L) y_t = \varphi + \theta_1(L) x_{1t} + \theta_2(L) x_{2t} + \theta_k(L) x_{kt} + u_t \qquad 3.3$$

Using the lag operators L applied to each component of vector, $L^k y = y_{t-k,}$ is convenient to define the lag polynomial $\Phi(L, p)$ and the vector polynomial $B(L, q)$. As long as the error term Ut assumed to be, white noise process, or more generally, independent with x_t, $x_{t-1\ldots}$ and y_t, $y_{t-1\ldots,}$ the ARDL model consistently estimated using ordinary least squares.

3.7 Empirical model specification

To analyze the determinants of Trade Balance in Ethiopia, the study follows the model by Frimpong and Marbuah (2010). The specification incorporates the standardized, the Keynesian absorption approach,the elasticity approach, the monetary approach and the Twine Deficit Hypethesis theories of international trade.

$$\mathrm{TB} = \mathrm{f}(\mathrm{RGDP}, \mathrm{INF}, \mathrm{ED}, \mathrm{OPP}, \mathrm{M2}, \mathrm{OER}) \qquad 3.4$$

Where, TB is trade balance , RGDP is real gross domestic product, INF is annual inflation rate, ED is external debt, OPP is trade openness, M2 money supply and OER is Official exchange rate.

Equation 3.4 is the general formulation of trade balance and it transformed in to ARDL model in order to analyze the determinants of trade balance in Ethiopia. The empirical ARDL model specification is shown in following equation.

$$TB_t = C_0 + \sum_{i=1}^{Q} \alpha_i TB_{t-1} + \sum_{j=0}^{J} \beta_j RGDP_{t-j} + \sum_{l=0}^{L} \gamma_l INF_{t-l} + \sum_{n=0}^{N} \zeta_n ED_{t-n} + \sum_{r=0}^{R} \gamma_r OPP_{t-r} + \sum_{y=0}^{Y} \theta_y M2_{t-y} + \sum_{p=0}^{P} \eta_r OER_{t-r} + \varepsilon_t \qquad 3.5$$

Where, TB, RGDP, INF, ED, OPP, M2 and RER are previously defined. C_0 is the drift parameter, Q, J, L, N ,R , Y and P denotes the lag lengths. $\alpha, \beta, \gamma, \eta, \theta, \zeta \; and \; \gamma_r$ are the coefficients to be estimated, i, j, l, n, s, p, n, r, and y denotes the time trend, and ε_t is the error term.

Since it is necessary to understand the long run and short run dynamics of the determinants of trade balance, specification of the long run and short run ARDL models is done after testing for co integration of variables. Therefore, the short run model is specified as the error correction model as shown in the following Equation.

$$\Delta TB_t = C_0 + \sum_{i=1}^{q} \beta_1 \Delta TB_{t-i} + \sum_{i=1}^{q} \beta_2 \Delta RGDP_{t-i} + \sum_{i=1}^{q} \beta_3 \Delta INF_{t-i} + \sum_{i=1}^{q} \beta_5 \Delta ED_{t-i} + \sum_{i=1}^{q} \beta_6 \Delta OPP_{t-i} + \sum_{i=1}^{q} \beta_7 \Delta M2_{t-i} + \sum_{i=1}^{q} \beta_8 \Delta OER_{t-i} + \theta ECM_{t-i} + \varepsilon_t \quad 3.6$$

Where, all the variables previously defined and ECM denotes the error correction term.

3.7.Estimation Technique

To analyze the determinants of trade balance in Ethiopia, the study employed the ARDL model. This model can be used for to determine the long run and the short run determinants of trade balance in the study area. This study was undertaken some diagnostic tests to ensure that the estimated model does not suffer any biases within ARDL regression analysis. Pre-estimation test like unit-root test and lag length determination and post-estimation tests like normality, Multicollinearity, Heterosedasticity, autocorrelation, co-integration test, omitted variable test, model stability test and model misspecification test using different methods.

CHAPTER FOUR

RESULT AND DISCUSSION

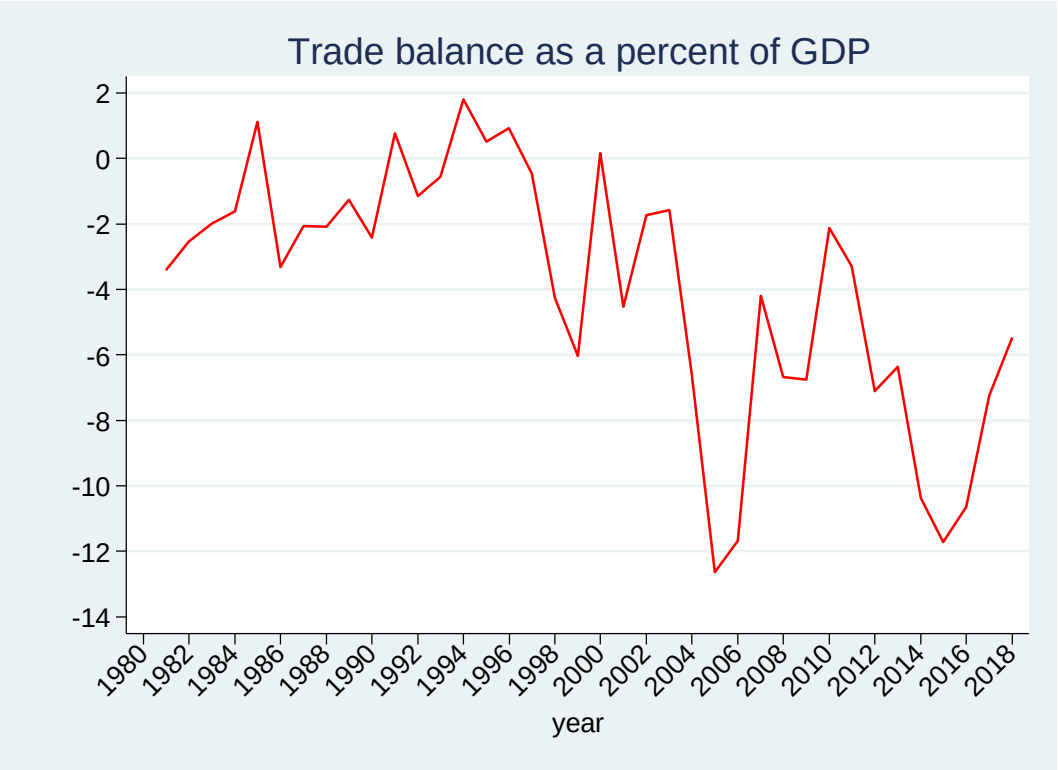
4.1 Introduction

This chapter concerned with analyzing trends of trade balance and its explanatory variable, data analysis and interpretation of the results and its determinants throughout the study period. Based on the statistical data, the trend of relationship between trade balance and its determinants is identified.

4.2 Trend analysis of variables

4.2.1 Trends of Trade Balance

The trends of trade balance as a % of real gross domestic product (RGDP) shows the movement in trade balance throughout the study periods. Looking at the trends would help us to comprehend the changes of trade balance during the study periods over the years. Furthermore it observes that what goes wrong or right at a particular year. The trend analysis depicted in figure 4.1 hereunder implies that trends of trade balance shows a large and frequent ups and downs in different particular years but in general it shows a downward movement starting from around 2% in 1984 and sloping downward reaching at around -12% of RGDP in 2015. Figure 4.1 below also shows that not only a general downward sloping trend of trade balance but also negative trade balance (trade deficit) all over the study periods except in 1984 and 1994 and this is due to that small production of exportable goods and logistic difficulty. Main exports of the country are gold, coffee, live animals and oilseeds. Ethiopia is a net importer of fuel, foodstuffs and textile apparel (NBE annual report of 2017/18).



Source: Own computation using the data from 1981 to 2018

Figure 4.1: Trends of trade balance as a percentage of GDP

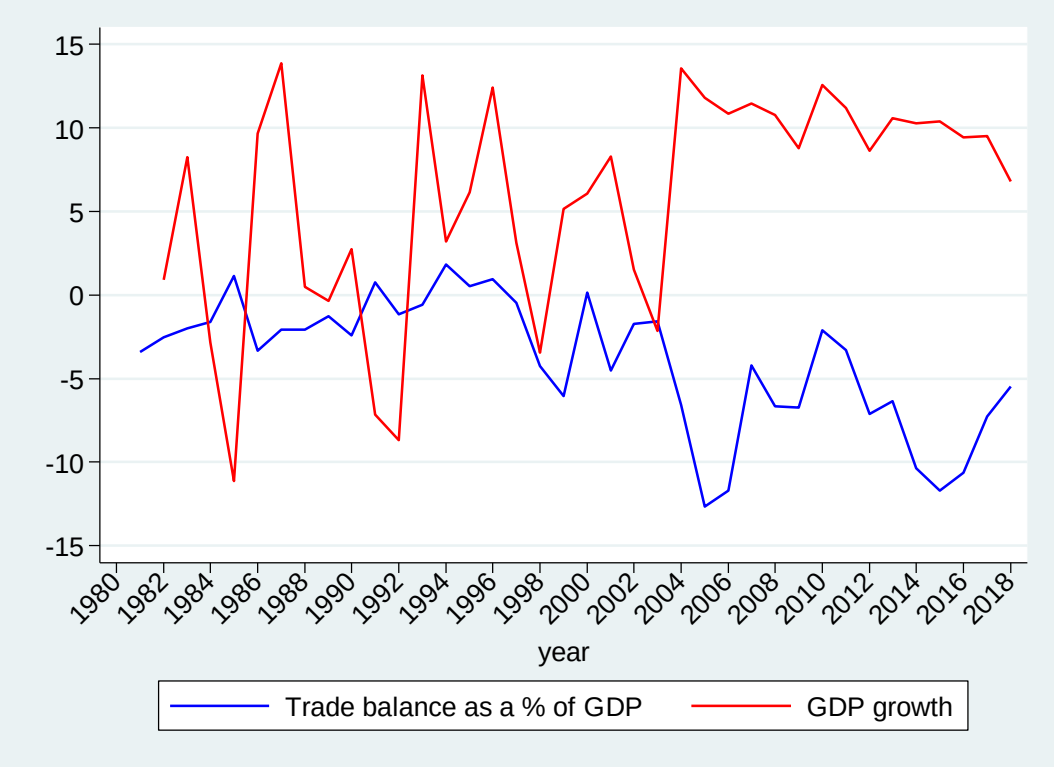
As per the figure 4.1 the level of trade balance as a percentage of GDP showed slightly improvement in the late 1984 to 1994 and 2000s. However, the driver of slight improvement of the trade balance of the late 1984 to 1994 and 2000s are different. In late 1984 to 1994, it was the result of the strong fall in imports in the context of structural adjustment policies that was geared towards increasing trade surpluses through decreasing internal demand, in an attempt to manage the debt crisis. In the 2000s, it was the result of a strong surge in exports thanks to the commodity price boom (UNCTAD, 2016).

4.2.2 Trends of real gross domestic product growth against trade balance

Real gross domestic product is a macroeconomic measure of the value of output produced within a country's territory in a given year adjusted for price changes. RGDP is the main measurement of economic growth since it transforms the money value measured in nominal GDP into total quantity produced by the country. From figure 4.2 below we can understand that RGDP growth showed that high ups and downs in the years between 1981 and 2003 which implies that there

was no sustainable economic growth between such years. But the years after 2003 have showed that there was high and sustainable economic growth in the country.

While RGDP growth showed its ups in 1987, 1993, 1996 and 2005, trade balance as a percentage of RGDP showed its downs in particulars and, in most cases, while the graph of RGDP growth showed a downward slope, trade balance as a percentage of RGDP showed an upward slop in general. This may not necessarily imply that there is a negative relationship between RGDP and trade balance rather it may imply that since RGDP is a denominator in calculating trade balance as a percentage of RGDP, which indicates that when RGDP increases trade balance as a percentage of RGDP decreases if RGDP grows faster than trade balance. From figure 4.2 it seems that it is possible to comprehend that, even though the country's RGDP growth is high and stable since the last two decades, the share of output of exportable goods and services and that of import substitute goods and services from the total output is low which leads to a decreasing trade balance movement.



Source: Own computation using the data from 1981 to 2018

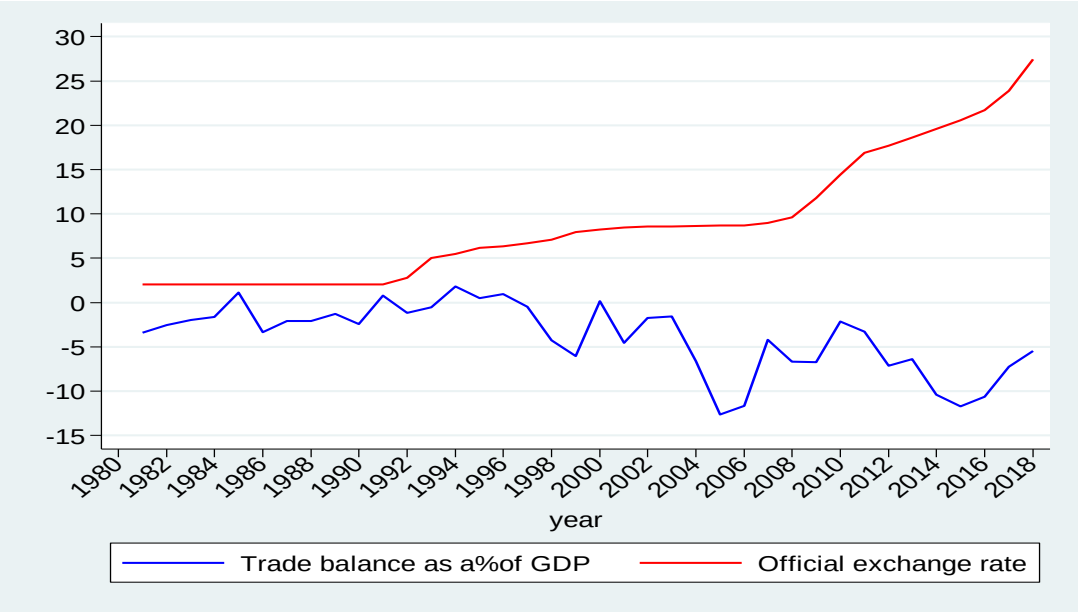
Figure 4.2: Trends of trade balance as a percentage of GDP and GDP growth

In Ethiopia Real GDP increased by 10.9% in 2016/17 from the 8.0% registered in 2015/16. The industry and services sectors continued to drive growth. The continues GDP growth in Ethiopia due to investments in energy, transport, and logistics, and the ongoing reforms to bolster industrialization, particularly through the development of industrial parks; and continued progress in services. Agriculture will benefit from productivity enhancing investments, including irrigation.

4.2.3 Trends of Official exchange rate against trade balance.

In Ethiopia both the fixed exchange rate and the flexible exchange rate regimes were applied to manage the current account disequilibrium. The Ethiopian birr was pegged to the United States dollar from its beginning in 1945 until the early 1990s. The birr was valued at 2.48 per USD on July 23, 1945 and after two decades, that is, on January 1, 1964; the Ethiopian birr was slightly devalued to 2.50 per US dollar before the collapse of the Bretton Woods system in 1971, which forced an initial overvaluation to 2.30. Then in 1973 the birr overvalued to 2.07 per USD. But since 1992 the contemporary Ethiopian government has accepted three big exchange rate devaluations proposed by international monetary fund (IMF) in order to manage the current account disequilibrium. These devaluations were made first on October 1992 birr 2.07 to birr 5 per US dollar (141.5%); second on September 2010 from birr 13.62 to birr 16.35 per US dollar (20%) and third on October 10th 2017 from birr 23.4 to birr 26.91 per US dollar (15%) (NBE report)

From figure 4.3 below it is clear that the trend of official exchange rate graph is a horizontal line up to 1992 which means that a fixed official exchange rate during the Derg regime. In between 1992 and 2010 the graph showed an upward and relatively a flatter slop and after 2010 it showed an upward and stepper slop. This figure also showed that the line of official exchange rate and the line of trade balance as a percentage of RGDP are divergent to each other up to the year 2015 and moved together after 2015 which seem that the great devaluation made in 2010 has a positive effect on trade balance after five years.



Source: Own computation using the data from 1981 to 2018

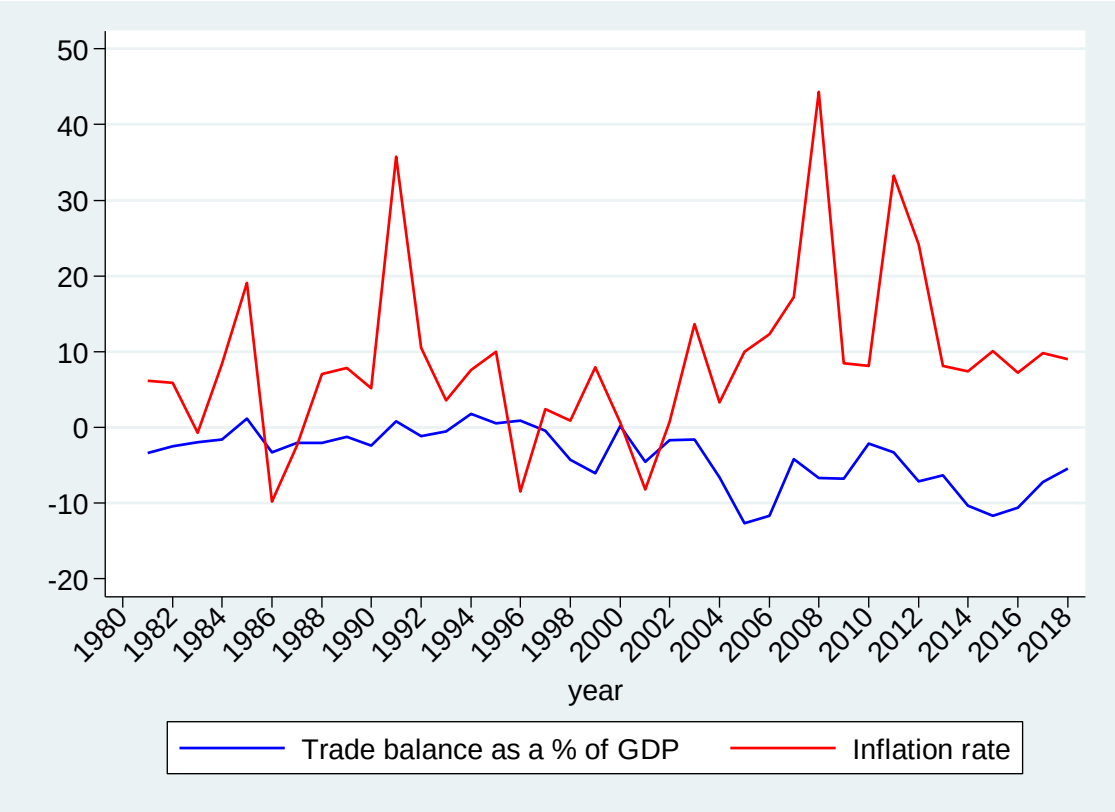
Figure 4.3: Trends of trade balance as a percentage of GDP and Official exchange rate

NBE follows a managed exchange rate system and implements an exchange rate policy to achieve a stable real exchange rate. However, a higher than planned inflation differential and global strengthening of the dollar, especially during 2014/15 is contributed to the overvaluation of the Ethiopian Birr (ETB) in real terms by an estimated 20% during 2016/17. As a result, the Government of Ethiopia devalued ETB by 15% in October 2017 to improve competitiveness. NBE is currently implementing measures to reduce the impact of exchange rate movements on domestic prices by, for example, increasing the minimum deposit rate to promote savings and limiting credit expansion to non-export sectors (African Economic Outlook, 2018).

4.2.4 Trends of Inflation against trade balance

Inflation in its general term refers to a phenomenon in which the country's overall price level is rising continuously over a given periods of time. Among the various objectives of the government one is achieving stable macroeconomic condition manifested by price stability so that maximizing its social welfare through its national bank in Ethiopian case. Does it hold true in Ethiopia? To know this one can look at the following figure. From figure 4.4 below one can understand that the inflation level was below 10% from 1980 to 2005 with the exception of 1991

but it showed high ups and downs which implies that even though it showed single digit inflation level, it seems that un stable during the periods stated above on the one hand and the price level after 1991 showed a price level of double digit and unstable price level until 2013 on the other hand it showed stability after 2013 around 10%. The maximum inflation level was scored in 2008 being 44% which seems associated with the expenditures made to MDG activities. It seems that there was a deterministic relationship between inflation and trade balance after the year 2000 which showed that when the graph of inflation rate moves upward the graph of trade balance shows a downward movement.



Source: Own computation using the data from 1981 to 2018

Figure 4.4: Trends of trade balance as a percentage of GDP and Inflation rate

NBE reduced the 2017/18 base money target to 16.5% to address inflationary pressures that emerged during the second half of 2017 due to rising food prices. Annual headline inflation increased from 9 % in 2017 to 10 % in 2018, with food inflation leaping from 6.2% to 20.9%. In the short term, the Government will increase food imports to cushion the most vulnerable from

the rising food prices while implementing long-term measures such as irrigation to increase agriculture productivity.

4.2.5 Trends of external debt against trade balance

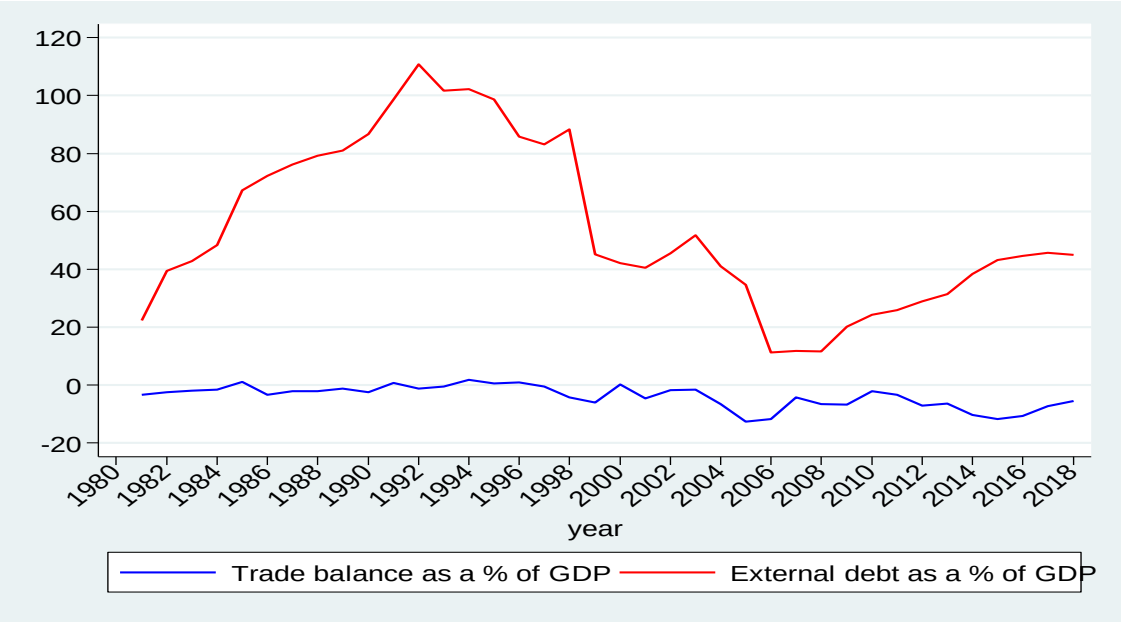
Ethiopia is one of the heavily indebted poor countries nevertheless this fact, the country was low indebted 1970s, since borrowing for the purpose of financing balance of payment, fiscal and saving- investment gap were not prominent features of the country. In addition imperial government had implemented a careful policy in borrowing from external sources and rate of GDP growth was ahead of the cost of borrowing so, debt service obligations were honoured without causing any hindrances on the economy of the country. For example the date burden indicators, debt to GDP and debt to export were 12% and 72% respectively in 1974 (Getahun 1994).

The military government was established in 1974 and unlike the imperial government the outstanding external debt was grown 20 times faster than the GDP growth rate and resulted in heavy borrowing for the purpose of implementing comprehensive development initiatives that could not fully covered by domestic saving. The amount of outstanding debt had increased by more than 10 times when comparing debt position at the time of the establishment of the military government to the end of its regime, i.e. from USD 63 million in 1975 to USD 9.11 billion in 1991 (NBE report 1992).

From figure 4.5 below, we can understand that stock of external debt as a percentage of RGDP was continuously rising during the military government in Ethiopia. After the fall of the military government the stock external debt as a percentage of RGDP started to very slowly decline remaining at its high level until 1998 and then after it showed a radical decline to reach at its lowest level since ever in 2007. This was mainly due to debt cancelation made to the country from various creditors in 1999 and it was the reflection of the impact of HIPC relief assistance made to Ethiopia in 2006 proposed by IMF and IDA.

Besides one can see from figure 4.5 below that while stock of external debt was rising rapidly to reach at its peak the trade balance position was relatively at the safe level which partially implies that the debt from external sources were channeled into the production of exportable goods and

services and import substitute goods. Finally after the fall of military government both trade balance and stock of external debt are continuously declining until recent year.



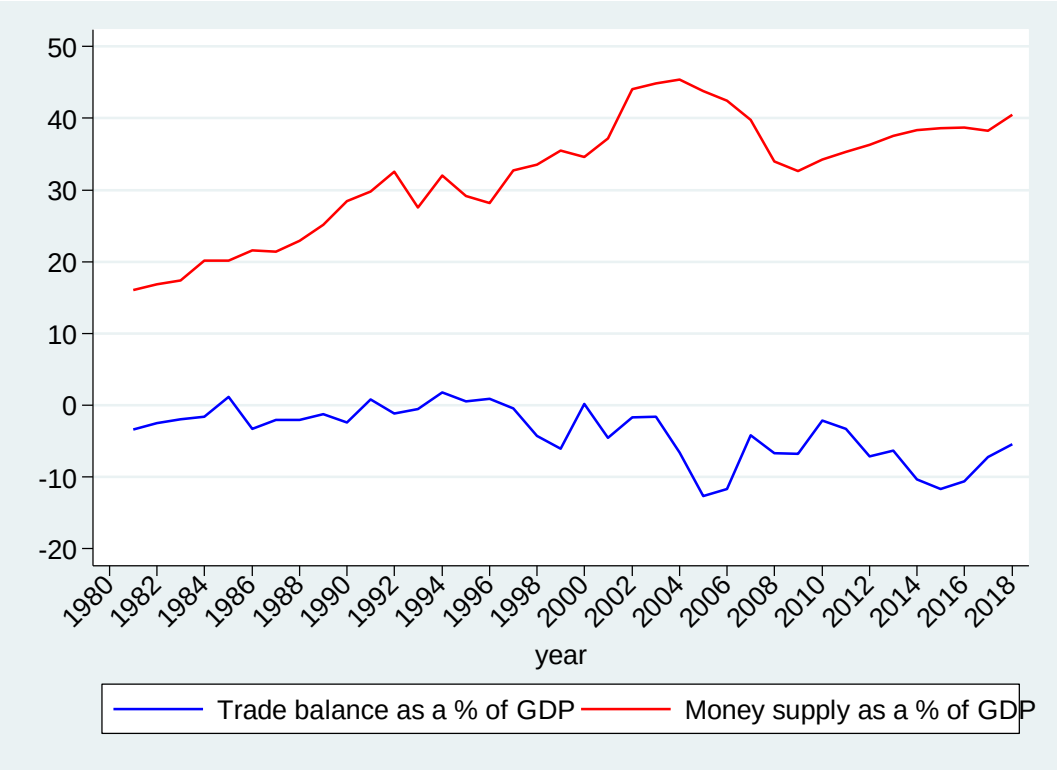
Source: Own computation using the data from 1981 to 2018

Figure 4.5: Trends of trade balance as a percentage of GDP and External debt as a % of GDP

4.2.6 Trends of money supply against trade balance

Broad money supply (M2) is composed of narrow money supply whose components are currency outside banks & demand deposits and quasi money whose components are saving deposits and time deposits.

This study sought to establish the trends of money supply in Ethiopia for the study periods (1980- 2018). As one can understand from figure 4.6 below, the money supply in the country kept on growing from year to year with few peaks and stations. Besides the graph of money supply as a percentage of RGDP was moving against the graph of trade balance i.e. the graph of money supply was raising upward throughout the study periods on the one hand and the graph of trade balance was moving downward throughout the study periods.



Source: Own computation using the data from 1981 to 2018

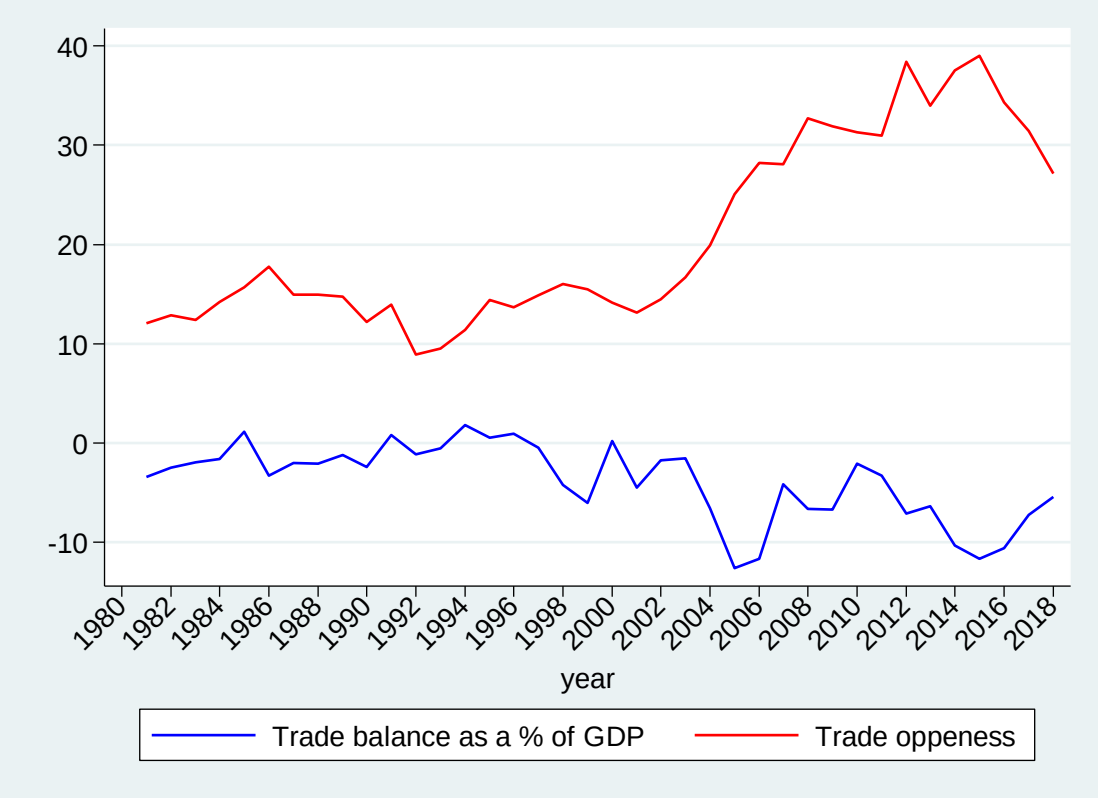
Figure 4.6: Trends of trade balance as a percentage of GDP and Money supply as a % of GDP

Ethiopia's formal financial sector consists of 17 commercial banks (one State-owned and 16 private), a State-owned development bank, 17 insurance companies and about 35 microfinance institutions. Banking dominates the financial sector in terms of value and services offered. As a result of financial development the level of money supply as a percentage of GDP increased over time.

4.2.7 Trends of trade openness against trade balance

Trade openness can play a paramount role in the process of economic development of a country. It can provide access to variety of goods and services, market opportunities and thereby increase domestic production, getting better information and transfer of technology that improve productivity, improve resource allocation and reduce inefficiency (Brooks, 2003).

The trade to GDP ratio is an indicator of the relative importance of an international trade in the economy of the country. Trade openness of a country is the sum of import to GDP ratio and export to GDP ratio.



Source: Own computation using the data from 1981 to 2018

Figure 4.7: Trends of trade balance as a percentage of GDP and Trade openness

Figure 4.7 below shows that what look like the trend of trade openness over the study periods. It shows a general an upward movement of trade openness over the study periods even though it shows some ups and downs while trade balance shows a general downward movement over the study periods even though it shows various ups and downs. This is because since 2000 the demand of imported commodity in Ethiopia was increased and as a result of this the levels of trade balance in the country deteriorating and also the share of trade openness is increased.

Openness to trade (as measured by the ratio of exports plus imports over GDP) has significantly increased in the entire world's regions and SSA at least during the last three decades and Ethiopia is no exception (UNCTAD, 2016): its trade ratio increased from 12 percent in the period 1982 to

38 percent in 1991-2000 and 38 percent in the period 2016. As shown in figure 4.7, Ethiopia has been more open to trade in the past decade compared to the 1980s.

4.3 EMPERICAL RESULTS AND DISCUSSIONS

Results from the estimation of the determinants of trade balance in Ethiopia are presented in this chapter. The empirical analysis uses annual data for Ethiopia for 1981 to 2018. There are three sections under this chapter. The first section presents descriptive statistics of variables used in the model whilst the second section reports the outcome of diagnostic tests conducted. Results from the estimated model are present and discussed in the third section.

4.3.1 Summary statistics and Description

The descriptive statistics considered the mean, standard deviation, maximum and minimum values of the dependent and independent variables. The statistics are based on 38 year data due to the unavailability of data for some relevant variables. The mean represents the average value of the variables whilst standard deviation indicates how variables are distributed around their mean values. Table 4.1 shows the descriptive statistics of the variables.

As per table 4.2, the value of share of trade balance as a percentage of GDP is negative 3.91 percent per annum for the 1981 to 2018. In the same period, the minimum value and the maximum value range from negative 12.64 percent to positive 1.81 percent with standard deviations 3.86 percent. This variation indicates that trade balance as a percentage of GDP differ across time vary in the country since the country highly depend on imported commodities.

The money supply as a percentage of GDP used in the empirical analysis averaged 32.30 percent between 1981 and 2018 ranging from 16.08 percent to 45.35 percent with a standard deviation statistics of 8.28 percent. The real GDP growth rate used in the empirical analysis averaged 5.83 percent between 1981 and 2018 ranging from negative 11.14 percent to positive 13.85 percent with a standard deviation statistics of 6.60. This variation across time in the country may be because of occurrences in domestic and external factors such as continuous deterioration in terms of trade, falling commodity prices, global economic downturn and financial crisis in the

international economies but the variation relatively lower compared to other variables since the standard deviation lower than the mean.

Table 4.1: Summary Statistics

Variables	*Obviations*	*mean*	*Std. Dev.*	*Min.*	*Max.*
Trade balance as a % of GDP	38	-3.91	3.86	-12.64	1.81
Money supply as a % of GDP	38	32.30	8.28	16.08	45.35
GDP growth	38	5.83	6.60	-11.14	13.85
Exchange rate	38	8.98	7.07	2.07	27.42
Inflation rate	38	8.85	11.06	-9.80	44.35
Trade Openness	38	20.74	28.75	8.91	39.01
External debt as a % of GDP	38	54.42	28.75	11.21	110.70

Source: Author's calculations from the various sources.

According to the summary statistics Table 4.1, the mean value of the inflation rate in the country is 8.85 percent for the period 1981 to 2018. The minimum and the maximum value of this variable is negative 9.80 percent and positive 44.35 percent respectively. The variation from the mean for inflation rate is 11.06 percent. This highest variation from the mean is an indication of macro-economic instability in the region through overall price skyrocketing.

The mean value of growth rate of exchange rate in the study period is 8.89 percent. The minimum and the maximum of this variable is 2.07 percent and 27.42 percent respectively with standard dilation of 7.07 percent. The average value of trade openness in Ethiopia from the period 1981 to 2018 is 20.74 percent. The minimum and the maximum value of this variable is 8.91 percent and 39.01 percent respectively with higher variations of 28.75 percent as compared to its mean value and this variation may be due to increasing the demand of imported commodity and also the level of exported items as well over time.

The level of external debt stock as a percent of GDP in the country remains high averaging 54.42 percent for the period 1981 to 2018. The minimum level of external debt stock as a percent of GDP is 11.21 percent whilst the maximum value recorded at 110.70 percent with standard deviation 28.75 percent. The mean value of external debt stock as percent of GDP is an

indication that the country heavily dependent on the external financial source to fill their financial gaps

4.3.2 Pre estimation tests

4.3.2.1 Unit Root Test

Table 4.2: unit root test

Variables	ADF test		Phillips-Perron test	
	t- Statistic	stationary	t- Statistic	Stationary
Trade balance as a % of GDP	-3.658	I(0)**	-30.007	I(0)***
Money supply as a % of GDP	-5.484	I(1)***	-36.368	I(1)***
GDP growth	-4.301	I(0)***	-24.217	I(0)***
Exchange rate	-3.764	I(0)***	-20.14	I(0)***
Inflation rate	-4.680	I(0)**	-28.854	I(0)***
Trade openness	-5.785	I(1)***	-41.341	I(1)***
External debt as a % of GDP	-5.141	I(1)***	-31.594	I(1)***

Source: Author's calculations from various sources. The null hypothesis of non-stationary and the alternative hypothesis are stationary. *, ** and *** indicate statistical significance at 10%, 5% and 1% levels, respectively. I (1) refer to first difference stationary.

As per table 4.2, the result the first two column of ADF test statistics showed that four variables stationary at level i.e. Trade balance as a % of GDP, GDP growth, and exchange rate and Inflation rate whilst the other three variable stationary at first difference i.e. Money supply as a % of GDP, Trade openness and External debt as a % of GDP. According to Phillips-Perron test above out of seven variables four of them are stationary at level i.e Trade balance as a % of GDP, GDP growth, and exchange rate and Inflation rate whilst the other three of them are stationary at first difference i.e Money supply as a % of GDP, Trade openness and External debt as a % of GDP.

4.3.2.2 ARDL optimal lag selection

In order to estimate the determinants trade balance in Ethiopia determining the optimal lag length is necessary. Therefore in this study Akaike information criterion (AIC) is used as optimal lag selection. Trade balance as a percent of GDP, external debt as a percent of GDP, trade openness and GDP growth has optimal lag length of two. Exchange rate has optimal lag length of one. The remaining inflation rate and money supply as a percentage of GDP has optimal lag length of 0 or at level. Test statistics result is summarized below table 4.4 and Stata 14.2 output of each variable lag selection is reported on Appendix 1.

Table 4.3: Optimal lag selection of variables

Optimal Lag selection using AIC					
Variables	0	1	2	3	4
Trade balance	5.66523	5.07532	5.13414*	5.16825	5.21748
External debt	9.6473	7.65204	7.67303*	7.70259	7.73476
Exchange rate	8.26726	8.1573*	8.19313	8.24872	8.30507
Openness	7.36702	. 5.03324	5.09206*	5.101	5.11647
GDP growth	6.74062	6.75425	6.40551*	6.46777	6.45841
Inflation	7.76277*	7.76906	4.84361	7.76529	7.82241
Money supply	4.7464*	4.80293	4.84361	4.90403	4.93123

4.3.3 Post-Estimation Diagnostic Test

To accept this model as a good, it should satisfy the Gauss Markov assumptions or the required criteria of the post estimation test such as normality, serial correlation, and heteroscedasticity and stability tests.

4.3.3.1 Hetroskedasticity

An important assumption of the classical linear regression model is that the disturbance term ui appearing in the population regression function is homoscedastic i.e. all cross sectional error terms have the same variance. But when there exist an outlier observation in relation to the observation in the sample, the assumption of constant variance is violated and this violation is

referred to as hetroskedasticity. Breusch-Pagan or Weisberg test for hetroskedasticity is used which the null hypothesis of constant variance and it is possible to reject this hypothesis when p value is less than 5% significance level. If the problem of hetroskedasticty persists the remedies suggested to correct the problems of hetroskedasticity are transforming the data to the log and deflating the variable by some measures of size (Maddala, 1992). The result presented in the Table 4.4 below and in the estimation result of stata 14.2 is reported Appendix 2.and it implied that since the p value is 0.3434 which is much more from 0.05 we fall to reject the null hypothesis of constant variance. In short there is no hetroskedasticity problem

Table 4. 4: Hetroskedasticity test

Null Hypothesis	**Constant variance / Homosekdastic**
Chi2	0.90
Prob > chi2	0.3434

4.3.3.2 Multi-collinearity

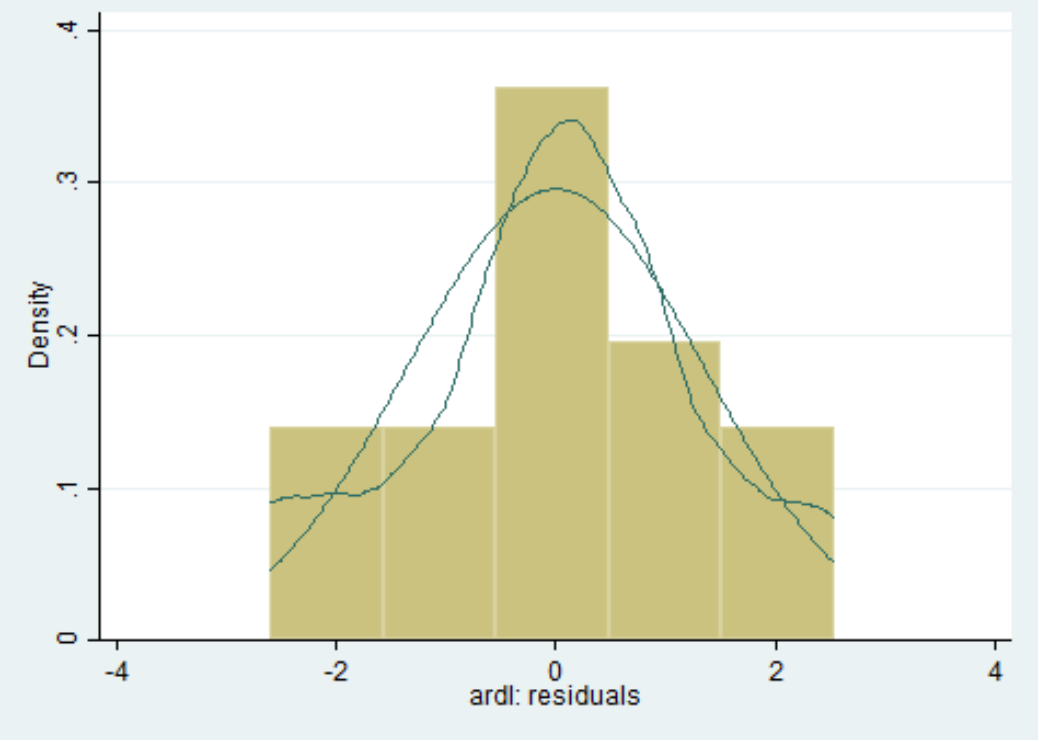
Multi-collinearity refers to the condition that independent variables are inter-correlated and it is the feature of sampler not for the population. The classical linear regression model assumes that there in multi-collinearity among the explanatory variables are indeterminate and there standard errors are infinite. On the other hand if multi-collinearity is less than perfect, the regression coefficient, although determinate, have larger standard error (in relation to the coefficient themselves) which means the coefficient cannot be estimated with greater precision or accuracy. Correlation matrix of independent variables is used to check the existence of multi-collinearity. The estimation result of stata 14.2 is reported Appendix 3. There are some remedial measure suggested to the problem of multi-collinearity such as priori information from previous empirical works, combining both cross section and time series data. One of the simplest things to do is dropping the variables which are highly correlated and specification bias. The variables should also be transformed when they tend to move in the same Direction (Gujarati, 2004). See Appendix 3.

4.3.3.3 Testing for Normality

Normality test is used to determine if the data is well-modeled by a normal distribution and to compute how likely it is random variable is underling the data is set to be normally distributed.

In descriptive statistics terms, one measure of goodness of fit a normal model of the data. The normality of data is tested by Jarque- Bera test. The null-hypothesis that the residuals are normal is rejected in this particular study. However, econometric theory states that the existence of non-normality does not affect and distort the estimator's BLUE and consistency property (Enders 1995). The non-normality of vector in our model doesn't affects the coefficients and t-values. The result presented in the figure below and in the estimation result of stata 14.2 is reported Appendix 4. Thus, in order to test the normality of the data Shapiro-Wilk W test for normal data is used. According to Shapiro-Wilk W test for normal data, the data is normal if the p value is greater than 0.05 and not if p value is less than 0.05. In test Shapiro-Wilk W test the null hypothesis states that the error term of the model is normally distributed and if the P value is greater than 0.05 then the null hypothesis will be accepted.

Based on Shapiro-Wilk W test for normal data and residual plot below the error term is normally distributed since p value is 0.2 which is above 0.05. In this case, we have enough evidence to say error term of the model is normally distributed.



Source: Own computation using the data from 1981 to 2018

Figure 4.8: Normality test

Shapiro -Wilk W test for residuals

```
. swilk r

                    Shapiro-Wilk W test for normal data

    Variable |        Obs        W         V         z       Prob>z
-------------+-------------------------------------------------------
           r |         35    0.95863     1.476     0.813     0.20800
```

4.3.3.4 Autocorrelation

The correlation between residuals is called autocorrelation which is induced by the transformation of the original data and manipulation of the data through interpretation and extrapolation. The simplest and most widely used model is one where the error term u and ut-1 have a correlation ρ. For this model one can think of testing hypothesis about ρ on the base of estimated correlation coefficient between the residuals. A commonly used statistic for this purpose is the Durban-Watson (DW) statistic which is denoted by d. when DW statistic is zero

(d=0) the estimated correlation coefficient is 1 and d=4 when the correlation coefficient which is estimated is -1. If d is closer to 0 or 4, then the residual are highly correlated. The standard d statistic that serves as a rule of thumb is d =2 which indicates that the estimated correlation coefficient is 0 and hence the residual are not correlated. As explained earlier DW test is the most often used test for existence of autocorrelation, and if there exist autocorrelation, it is customary to transform the data on the base of estimated first order autocorrelation and use ordinary least square with the transformed data. If it pure autocorrelation one can use appropriate transformation of the original model so that there we do not have problem of autocorrelation in the transformed model. In this regard we will have to use the generalized least square (GLS) method (Madala, 1992). The Lagrange Multiplier Test (LM test) was applied to prove whether there is autocorrelation between error terms or not. The estimation result of Stata 14.2 is reported Appendix 5.

Table 4. 5: Autocorrelation test

Null Hypothesis	**No Auotcorrelation**

Durbin- Watson d-statistic (16,35)	1.983984

4.3.3.5 Model Specification Test

To see whether the regression model is correctly specified or no specification bias or error, the researcher used link test. Link test is based on a null hypothesis that the predictive value (_hat) is statistically significant at 5 % level of significant and square prediction (_hat sq) is insignificant at 5 % level of significant of the regression model. Therefore, to test this in STATA we generated two variables, predictive value (_hat) and square prediction (_hat sq), from the original regression model. After regressing these two variables with the model, if a predictive value (_hat) is statistically significant at 5 % level of significant and square prediction (_hat sq) is insignificant at 5 % level of significant we do have a good model, unless, the model is wrong (Murteira, 2014). The link test (see Appendices) clearly shows predictive value (_hat) is significant with a p value of While, square prediction (_hat sq) is insignificant at 5 % level of significant with a p value of Therefore, the Link test confirmed that there is no model specification error. See Appendix 6.

4.3.3.6 Omitted Variable test

To see whether in the regression model there is excluded of relevant variable from the model, in this paper a Ramsey RESET Test was used. The result in the following table is show that the P-value is more than 5 percent. Hence, we failed to reject the null hypothesis of Ramsey RESET test. Result proves that the model did not have omitted variable bias and the models are well constructed. Again, with this value, the test result of F statistics reveals that fail to reject the null hypothesis. These stated that the error terms are normally and independently distributed with zero mean and constant variance and the researcher concluded that the model is stable (see Appendix 7)

4.3.3.7 Stability Test for Trade balance model

To test a structural stability of the model, there are also different tests based on recursive residual. The most important is the cumulative sum of squares recursive residuals (CUMSUMSQ) which are recommended by (Pesaran and Shin, 1999, 2001). The CUMSUM squares test based on a plot of the sum of the recursive residual. If this sum square goes outside

the critical bound, one concludes that there was a structural break at the point at which the sum square began its movement towards the bound. Hence, for the stability test the graph plots both the cumulative sum square of residual with 5% critical lines. And, if the cumulative sum square remains inside between the two critical lines or bounds back after it is out of the boundary lines, the null hypothesis of correct specification of the model cannot be rejected. But, if the cumulative sum square goes outside between the two critical bounds there exists series parameter instability problem. (See Appendix 8).The straight lines represent critical bounds at 5% level of significance. As depicted in the figure above, the plot of cumulative sum square of recursive residuals graphical test of stability revealed by oscillation of the calculated statistics between the critical bounds at 5% level of significance and it is the indication of stable parameters under study. This is re-enforced by the same pattern of the plot of cumulative sum square of the squares of recursive residuals shown in the figure below.

Thus, the plot of CUMSUMSQ stays within the lines, and, consequently, this confirms the long run and the short run equations are correctly specified and the model is stable. Furthermore, the result shows that there is no structural instability in the model during the sample period. Henceforth, the study can precisely conclude that long and short run estimates are quite stable and as well there is no any structural break showing the Results of the estimated model are efficient and reliable. See Appendix 8. The respective null and alternative hypothesis is summarized below for each test.

4.3.3.8 Bounds Tests for the Existence of Co-integration

To identify the presence of co-integration in the long run bound test is conducted. The value of F- statistics is used as identifying the existence of long run relationship between dependent and independent variables. ARDL bound test is based on Null hypothesis (H_O): no long run relationship and alternative hypothesis (H_1): there exists long run relationship. The decision is accept if F < critical value for I (0) independent variables or reject if F > critical value for I (1). As shown Table 4. 6 and Appendix 9, below show the critical value of I (1) at 10%, 5% and 1% are 3.23, 3.31 and 4.43, which are lower than F-statistics 4.87. Thus at 1% level of precision the Null hypothesis is rejected i.e. there is long run co-integration between dependent and independent variables.

Table 4.6: Bound Co-integration test

	Critical value 10%		Critical value 5%		Critical value 1%	
K	**I(0)**	**I(1)**	**I(0)**	**I(1)**	**I(0)**	**I(1)**
6	**2.12**	**3.23**	**2.45**	**3.31**	**3.15**	**4.43**

F statistics = 4.87

Table 4.7: Summery results of the post estimation diagnostic test

Assumptions to be tested	Hypothesis		Type of test applied	Test statistics and critical value	Accept/reject
	Ho	Ha			
Heteroskedasticity	Constant variance	Hetrosckedasitiy	Breusch-Pagan	Chi2 = 0.90 Prob = 0.3434	Accept
omitted variables test	No omitted variables	There exists omitted variables	Ramsey RESET test	F(3, 16) = 3.51 Prob > F = 0.398	Accept
Serial correlation	No autocorrelation	Autocorrelation persists	Durbin-Watson d-statistic	DWDS(16, 35) = 1.983984	Accept
Multi-collineariy	----	------	Corr matrix	------	No multicoll.
Model specification			Link test	Hat sq is insignificant	the model is correctly specified

4.4 Empirical analysis

4.4.1 Auto-regressive distributed lag (ARDL) estimations of Trade balance

To identify the determinants of trade balance ADRL model is used. External debt as a percentage of GDP, exchange rate, trade openness, GDP growth, money supply as a percentage of GDP and inflation are used as independent variables. The estimation result of Stata 14.2 is reported in Table 4.8 and Appendix 10

Table 4.8: Long run estimation of ARDL model

ARDL (2,2,1,2,2,0,0)		**Dependent variable: Trade balance as a % of GDP**		
Independent variables	**Coeff.**	**Std. Err.**	**t-rato**	**P-value**
Trade balance(-2)	**0.378**	**0 .177**	**2.13**	**0.046****
External debt (-2)	**0 .0714**	**0. 0399**	**1.79**	**0.090***
Exchange rate (-1)	**0.1138**	**.0304**	**3.74**	**0.001*****
Trade openness (-2)	**0.264**	**0.148**	**1.78**	**0.091***
GDP growth(-2)	**0.248**	**0.080**	**3.11**	**0.006*****
Money Supply	**-0.1190**	**0.048**	**-2.12**	**0.054***
Inflation	**0.132**	**0.043**	**3.06**	**0.006*****
Constant	**8.961**	**2.937**	**3.05**	**0.07 *****

The first objective was set to provide an empirical test of the existence Marshall-Lerner condition and the J-curve effect in Ethiopia context. Empirically, in order to ascertain the presence of the Marshall-Lerner condition, the necessary condition is that there is a positive and statistically significant effect of exchange rate on trade balance in the long run. The Marshall-Lerner condition as earlier discussed is a long-run phenomenon hence can only be tested from the long-run results whereas to test the J-curve effect both the long-run and short-run results are required.

The results show that in above Table 4.8, in the long-run there is a positive relationship between exchange rate and the trade balance in Ethiopia. This satisfies the a-prior expectation of the coefficient of the exchange rate variable. It shows that a one birr increase in the exchange rate (i.e. depreciation) improves the trade balance in the long-run. Specifically, a unit increase in the

exchange rate will improve trade balance by 0.1138% of GDP in the long-run. The result obtained shows a positive relationship between exchange rate and the trade balance and also statistically significant at 1 percent, the significance of the variable obtained in the long-run result suggests the existence of the Marshall-Lerner condition in Ethiopia. Since the short run coefficient of the exchange rate variable is negative and statistically insignificant in Table 4.9, it can be concluded that there is existence of the J-curve pattern in Ethiopia. The findings of this study is in line with the findings of Falk (2008), Mohammad (2010), Weerasinghe and Ravinda (2019), Meniago and Hinaunye (2017), Ogutu (2014), Akoto and Sakyi (2019), Asmamaw (2008), Endale (2014), Kebede (2017), Bantegizie and Dawit (2017) they concluded that devaluation of currency will improve trade balance in long run as a result of this the Marshall-Lerner condition exist in the economy. Inconsistent with the findings of Mutana et al. (2018) and he argued that currency devaluation will not improve trade balance in the long run particularly in developing countries.

4.4.2 Estimation result of Short run dynamic model (Error Correction Model)

From economic intuition, the error correction term (ECM_t-1) in the ECM measures the speed at which an endogenous variable adjusts to shocks in an explanatory variable in order to converge to its long run equilibrium. After estimating long run co-integrating model, estimating the short run dynamic relationship between variables with in ARDL model is the next step. Thus, the lagged value of all level variables (a linear combination is denoted by the error-correction term, ECMt-1) is retained in the ARDL model. The Table 4.9 below presents the results of the estimated error-correction model of trade balance for Ethiopia using the ARDL technique. The model is selected based on the AIC. The full model estimation result is reported on appendix 11.

Table 4.9: Estimation result of Short run dynamic model (Error Correction Model)

ARDL (2,2,1,2,2,0,0)	**Dependent variable: Trade balance as a % of GDP**			
Independent variables	**Coeff.**	**Std. Err.**	**t-rato**	**P-value**
Trade balance(-2)	**-0.378**	**0.1773**	**-2.13**	**0.046***
External debt (-2)	**-0.071**	**0.0399**	**-1.79**	**0.090**
Exchange rate (-1)	**-0.055**	**0.033**	**-1.68**	**0.110**
Trade openness (-2)	**-0.2645**	**0.1485**	**-1.78**	**0.091**
GDP growth(-2)	**-0.248**	**0.080**	**-3.11**	**0.006****

Money Supply	**-0.1190**	**0. 048**	**-2.12**	**0.048****
Inflation	**0.134**	**0.0503**	**2.68**	**0.016****
ECM(-1)	**-0.560**	**0. 184**	**-3.03**	**0.007****
Constant	8.961	2.937	3.05	0.007**

As we see from long run and short run dynamics in the long run dependent variable is highly sensitive or responsive to change in independent variables. From the above table the coefficient of the error correction model ECM (-1) of the selected ARDL (2,2,1,2,2,0,0) is negative and significant at 5 percent level. The ECM stands for the rate of adjustment to restore equilibrium in the dynamic model following a disturbance. The result shows a high speed of adjustment of convergence to the long run equilibrium every year after a short run shock. The coefficient of the ECM is negative 0.56 and this implies that a deviation from the long-run equilibrium subsequent to a short-run shock is corrected by about 56 % at the end of each year.

The short run result shows a statistically insignificant negative coefficient of exchange rate to the trade balance. The results imply that an increase in the exchange rate leads to a deterioration of the trade balance in the short-run but the result is statistically insignificant. The short-run result satisfies the first condition of the J-curve effect as earlier stated in Ethiopia.

4.4.3 Interpretation of Long and short run ARDL model estimation result

Among the independent variables included in the regression model including lagged value of the dependent variable, external debt as a percent of GDP, exchange rate, trade openness, GDP growth , inflation rate and money supply as a percentage of GDP are statistically significant variables affecting trade balance in Ethiopia at 1 percent, 5 percent and 10 percent level of significance . While in the short run lagged value of trade balance, GDP growth, money supply and inflation rate have statistically significant effect on trade balance.

Lagged value of trade balance as a percentage of GDP :- lagged value of the dependent variable is statistically significant at 5 percent level of significance and the coefficient is positive, which indicates the trade balance before two years positively affect the present trade balance. If the trade balance before two years has been grown by 1 percent current trade balance will grow by 0.378 percent. The findings of this study in line with findings of Mohammad (2010), Akoto and Sakyi (2019) and Kebede (2017), even though they used only one year lag, they argued that

last year trade balance improvement is crucial for current year trade balance through currency inflow and capital inflow then boost the investment.

External debt as a percentage of GDP: - External debt has statistically positive significant effect on trade balance in long run at 10 percent level of significance. A 1 percent increase in external debt may increase trade balance by 0.0714 percent. But external debt in the short run has negative effect on trade balance at 10 percent level of significance. A 1 percent increase in external debt as a percentage of GDP may decrease trade balance by 0.071 percent. The effect of external debt stock on trade balance is explained through debt services. Debt services payments must be made with foreign exchange as a result of this debt services payment will restrict the amount of imported to the economy and expanding the level of export and finally there is trade balance improvement.

Trade openness: - The openness measured as the ratio of, sum of exports and imports to GDP. It measure both trade openness and trade restriction of an economy. Country's trade openness can be expressed through receptiveness of new technology transfers, the ability of the country to pay their external debt through revenue earning from export or could be attribute of liberalized international trade. It has statistically significant positive effect on trade balance in the long run. In the long run a 1 percent increase in trade openness leads to 0.264 percent of GDP increase in trade balance. But in the short run the effect of trade openness on trade balance is negative but statistically insignificant. The positive effect of trade openness on trade balance explained through absorption approach. According to this approach trade openness has positive effect on trade balance when increases export value at a higher rate relative to imports. The finding of this study is in line with the findings of Mutana et al. (2018).

GDP growth: - it has statistically significant positive effect on trade balance in the long run. In the long run a 1 percent increase in GDP growth leads to 0.248 percent of GDP increase in trade balance. But in the short run the effect of GDP on trade balance is negative and statistically significant at 1 percent level of significance. A 1 percent increase in real gross domestic product growth may lead to a 0.248 percent of GDP decrease in trade balance. Results of the long-run model show a positive relationship between GDP and trade balance. The impact of real GDP on trade balance is negative in the short run, because it is obvious that, the growth in Real GDP of a

nation leads to an increase in demand for manufactured goods (which have high income elasticity of demand) and a decline for primary products (Which have low-income elasticity of demand). The result of this study is consistent with the findings of Weerasinghe and Ravinda (2019), Mutana et al. (2018) and Falk (2008) and they argued that when GDP growth increases the consumers demand on foreign good will increased in the short run.

Money supply as a percentage of GDP:- The coefficient of money supply is negative and statistically significant at 5 percent level. A 1 percent increase in the money supply on average results in a 0.1190 percent of GDP decreases in trade balance in the long run. This indicates that monetary expansion deteriorates trade balance deficit in the long run. Similarly, in the short run negative and statistically significant effect on trade balance at 5 % level of significance. An increase in money supply by the monetary authority through influences of interest rate by the financial sector, open market operations and occasionally changes in reserve requirements, relatively to demand for money, causes an increase in individual's money balances. Individuals with excess money balance in turn to increase consumption expenditures comprising of both domestic and foreign goods. Because foreign products dominate local market, which meets the standard, taste and preference of the local demand, foreign products are highly demanded relative to the domestic ones, hence deteriorating the trade balance in the short run. The findings of this study in line with the findings of money supply, Akoto and Sakyi (2019) Kebede (2017). The short run result of this study consistent with the monetary theory of money supply and they argued that increase in money supply tends to increase in real money balance of the individuals; as a result of this the consumer will prefer foreign goods than domestic goods.

Inflation rate:- Inflation rate has statistically positive significant effect on trade balance both in short and long run at 1 percent and 5 percent level of significance. A 1 percent increase in inflation rate may increase trade balance by 0.132 and 0.134 percent of GDP in the long run and short run respectively. The finding of this study is inconsistence with the findings of Moses (2013) and the result consistent with the findings of Weerasinghe and Ravinda (2019) the proposed that inflation will deteriorate the level of trade balances in the economy.

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

This chapter presents the summary of findings, conclusion and policy recommendation based on the findings from the study. Summary of the findings and conclusions from the estimated results is presented in the next section whilst section 5.2 and 5.3 presents policy implications on the basis of the findings of this study.

5.1 Summary

The objective of the study was to investigate the determinants of trade balance in Ethiopian. Based on the literature review discussed in chapter 2, six variables have been established to investigate their effect on trade balance. These variables are GDP growth, money supply as a percent of GDP, annual inflation rate, External debt as a percent of GDP, exchange rate and trade openness.

The main findings of the of ARDL regression analysis of both the short run and the long run model can be summarized as follows; The findings show that R^2 of the model describes that 88.71 % of the long run variation in the dependent variable that means; trade balance is explained by the employed variables but, 11.29 % of the variation unexplained by this model. According to the result, in the short run and in the long run lagged value of the dependent variable has a negative insignificant and positive significance effect on the trade balance. Exchange rate has statistically positive significant effect on trade balance in the long run and negative statistically insignificant effect in the short run. Trade openness has positive and

statistically significant effect on trade balance at 10 percent level of significance in the long run but in the short run negative and statistically insignificant effect. Inflation rate in both short and long run has positive and statistically significant effect on trade balance. GDP growth has statistically positive significant effect on trade balance in the long but negative significant effect in the short run.

Under the study period describes that 81.61 % of the short run variation in the dependent variable that means trade balance is explained by the employed variables but, the 18.39 % of the variation unexplained by short run model. Finally, the negative sign of error correction term shows that the short run trade balance dynamics is above the long run equilibrium level. The coefficient of ECM shows that short run deviations of trade balance is corrected/ adjusted to the long run equilibrium at a rate of 56 % each year.

5.2 Conclusion

Trade balance is the major component of the balance of payment of a country. It is the difference between exports and imports of a country made during a specific period of time. The current account deficit is one of the main indicators of external imbalance of global economies. The main objective of this study is identifying the determinant factors of trade balance in Ethiopia. To identify the determinant factors of trade balance auto- regressive distributed lag (ARDL) estimation technique using annual data from 1981 – 2018 is applied. To use ARDL model variables should be I (0), I (1) or combination of the two orders. In this study among the variables used in this study GDP growth, trade balance, inflation rate and exchange rate are stationary at level while the remaining variables i.e. external debt as a percentage of GDP, trade openness and money supply as a percentage of GDP are stationary at first difference.

ARDL bound test of the model show that there exists long run co-integration between dependent and independent variables. The long run estimation results presented in this study imply that GDP growth, inflation rate, exchange rate and trade openness have statistically significant positive effect on trade balance at 5 percent level of significance. On the other hand, external debt and trade money supply have positive and significant effect on trade balance at 10 percent level of significance. In the short run GDP growth and money supply have negative effect on trade. On the contrary, inflation has positive effect on trade balance.

The study concluded that the existence of the Marshall-Lerner condition in Ethiopia since in the long run there is a positive relationship between the exchange rate and the trade balance. In addition the study also concluded that currency devaluation in Ethiopia leads to deterioration of trade balance in the short run since the coefficient of exchange rate is negative from the short run model but the effect was statistically insignificant. Therefore, the J-curve phenomena exist in Ethiopia but the effect is not significant.

5.3 Recommendations

The persistence of the trade balance deficit in Ethiopia implies that, policies that have been implemented in the past decades to improve the trade balance position were not worked yet. Therefore, in order to progress towards a favorable trade balance which aimed at reducing persistent deficits, different policy options should be pursued.

The empirical results indicated that exchange rate is positively related with trade balance in the long-run which implies that appreciation of currency will deteriorate trade balance. This result is consistent with elasticity approach which revealed that devaluation of currency will improve trade balance when the sum of import and export elasticity greater than one. However, even if devaluation of domestic currency improves trade balance, government should be cautious in taking such measurement since it increases the cost of imported inputs and inflationary pressure on domestic price. In addition, before applying currency devaluation the government should boosts the domestic production level using different policy measures since devaluation without domestic production level will not improve trade balance as much as required.

Since the effect of exchange rate on trade balance in the long run was positive in the study period the monetary authority should devalue the currency to improve trade balance. Such policy can be achieved through price incentives to exporters, and also through the promotion of agricultural export using specialization of the product in different forms. Also, export diversification and the provision of basic infrastructure in the rural areas as well as supply of inputs at affordable prices may provide additional boost to export performance.

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Appendices

Appendix 1: optimal lag selection of dependent and independent variables

```
. varsoc inflation

   Selection-order criteria
   Sample:  1985 - 2018                              Number of obs      =        34
```

lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	-130.967				137.677*	7.76277*	7.77808*	7.80766*
1	-130.074	1.7862	1	0.181	138.562	7.76906	7.79968	7.85885
2	-130.006	.13639	1	0.712	146.416	7.82387	7.8698	7.95855
3	-128.01	3.9919*	1	0.046	138.173	7.76529	7.82653	7.94486
4	-127.981	.05776	1	0.810	146.45	7.82241	7.89896	8.04688

```
   Endogenous:  inflation
    Exogenous:  _cons

. varsoc d.moneysupply

   Selection-order criteria
   Sample:  1986 - 2018                              Number of obs      =        33
```

lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	-77.3156				6.74326*	4.7464*	4.76166*	4.79175*
1	-77.2484	.13455	1	0.714	7.13635	4.80293	4.83345	4.89363
2	-76.9195	.65765	1	0.417	7.43526	4.84361	4.88938	4.97965
3	-76.9165	.0061	1	0.938	7.90385	4.90403	4.96506	5.08542
4	-76.3652	1.1025	1	0.294	8.13114	4.93123	5.00752	5.15797

```
   Endogenous:  D.moneysupply
    Exogenous:  _cons

. varsoc d.gdpgrowth

   Selection-order criteria
   Sample:  1987 - 2018                              Number of obs      =        32
```

lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	-106.85				49.5392	6.74062	6.7558	6.78643
1	-106.068	1.5639	1	0.211	50.2261	6.75425	6.78461	6.84586
2	-99.4882	13.16*	1	0.000	35.4523*	6.40551*	6.45106*	6.54292*
3	-99.4843	.0078	1	0.930	37.7583	6.46777	6.5285	6.65099
4	-98.3346	2.2995	1	0.129	37.454	6.45841	6.53432	6.68743

```
   Endogenous:  D.gdpgrowth
    Exogenous:  _cons
```

```
. varsoc tradebalance

   Selection-order criteria
   Sample:  1985 - 2018                            Number of obs      =        34
```

lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	-95.3089				16.9009	5.66523	5.68054	5.71012
1	-84.2804	22.057*	1	0.000	9.37062*	5.07532*	5.10594*	5.16511*
2	-84.2803	.00025	1	0.987	9.94151	5.13414	5.18007	5.26882
3	-83.8603	.84006	1	0.359	10.2931	5.16825	5.22949	5.34782
4	-83.6972	.32627	1	0.568	10.8238	5.21748	5.29403	5.44194

```
   Endogenous:  tradebalance
    Exogenous:  _cons

. varsoc debt

   Selection-order criteria
   Sample:  1985 - 2018                            Number of obs      =        34
```

lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	-163.004				906.367	9.6473	9.66261	9.6922
1	-128.085	69.839*	1	0.000	123.261*	7.65204*	7.68266*	7.74183*
2	-127.441	1.2866	1	0.257	125.915	7.67303	7.71895	7.8077
3	-126.944	.9948	1	0.319	129.776	7.70259	7.76383	7.88216
4	-126.491	.90626	1	0.341	134.16	7.73476	7.81131	7.95922

```
   Endogenous:  debt
    Exogenous:  _cons

. varsoc exchange

   Selection-order criteria
   Sample:  1986 - 2018                            Number of obs      =        33
```

lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	-135.41				228.014	8.26726	8.28252	8.31261
1	-132.595	5.6289*	1	0.018	204.296*	8.1573*	8.18782*	8.248*
2	-132.187	.81749	1	0.366	211.825	8.19313	8.23891	8.32918
3	-132.104	.16549	1	0.684	224.089	8.24872	8.30976	8.43012
4	-132.034	.14041	1	0.708	237.353	8.30507	8.38137	8.53182

```
   Endogenous:  exchange
    Exogenous:  _cons
```

```
. varsoc oppeness

   Selection-order criteria
   Sample:  1985 - 2018                        Number of obs      =        34
```

lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	-124.239				92.681	7.36702	7.38233	7.41192
1	-83.5651	81.349*	1	0.000	8.98449*	5.03324*	5.06386*	5.12303*
2	-83.5651	2.2e-05	1	0.996	9.53192	5.09206	5.13799	5.22674
3	-82.7169	1.6963	1	0.193	9.62355	5.101	5.16223	5.28057
4	-81.9801	1.4737	1	0.225	9.78397	5.11647	5.19302	5.34094

```
   Endogenous:  oppeness
    Exogenous:  _cons
```

Appendix 2: Hetroskedasticity test

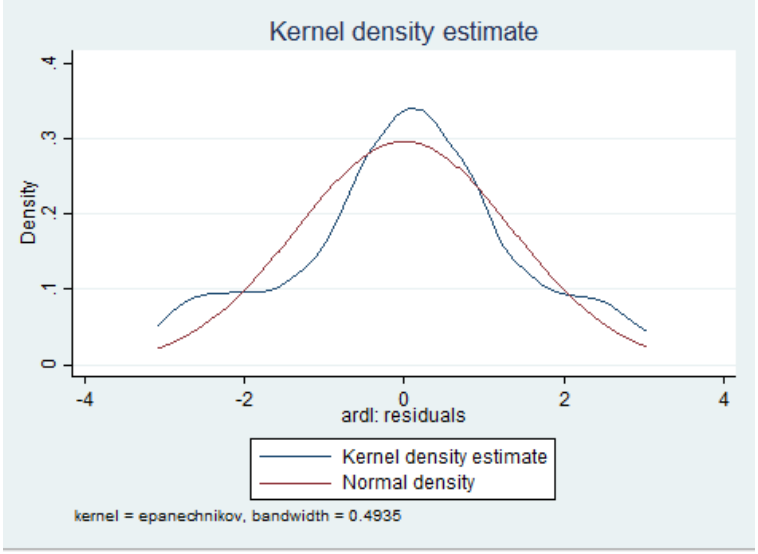
```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of tradebalance

         chi2(1)      =     0.90
         Prob > chi2  =   0.3434
```

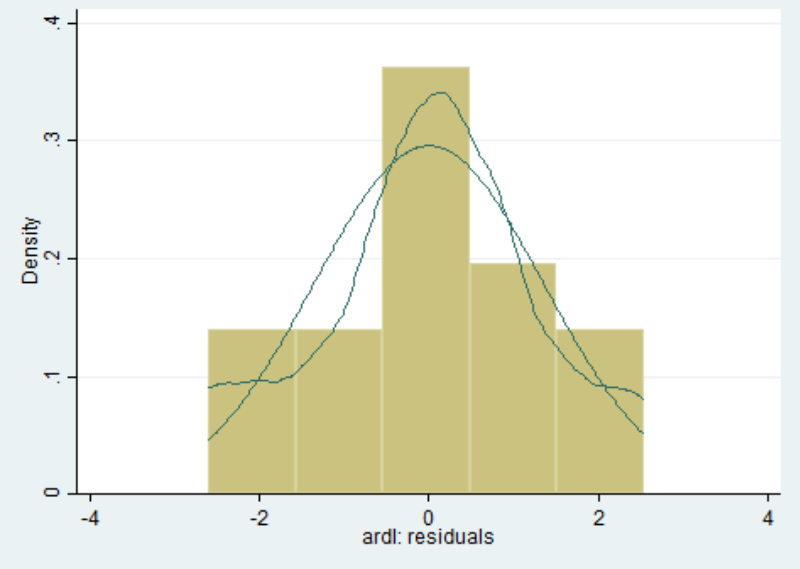
Appendix 3: Multicollinarity test

```
. corr tradebalance moneysupply gdpgrowth inflation oppeness debt exchange
(obs=37)
```

	tradeb~e	moneys~y	gdpgro~h	inflat~n	oppeness	debt	exchange
tradebalance	1.0000						
moneysupply	-0.5537	1.0000					
gdpgrowth	-0.4887	0.3116	1.0000				
inflation	-0.1159	0.1636	-0.1593	1.0000			
oppeness	-0.7560	0.4960	0.5084	0.3993	1.0000		
debt	0.6288	-0.4204	-0.4865	-0.2636	-0.7005	1.0000	
exchange	0.1292	0.0050	0.1481	0.0228	-0.0724	0.2467	1.0000

Appendix 4: Normality test






```
. swilk r
```

Shapiro-Wilk W test for normal data

Variable	Obs	W	V	z	Prob>z
r	35	0.95863	1.476	0.813	0.20800

Appendix 5: Autocorrelation test

```
. estat dwatson

Durbin-Watson d-statistic( 16,    35) =  1.983984
```

Appendix 6: Model specification test

```
. linktest
```

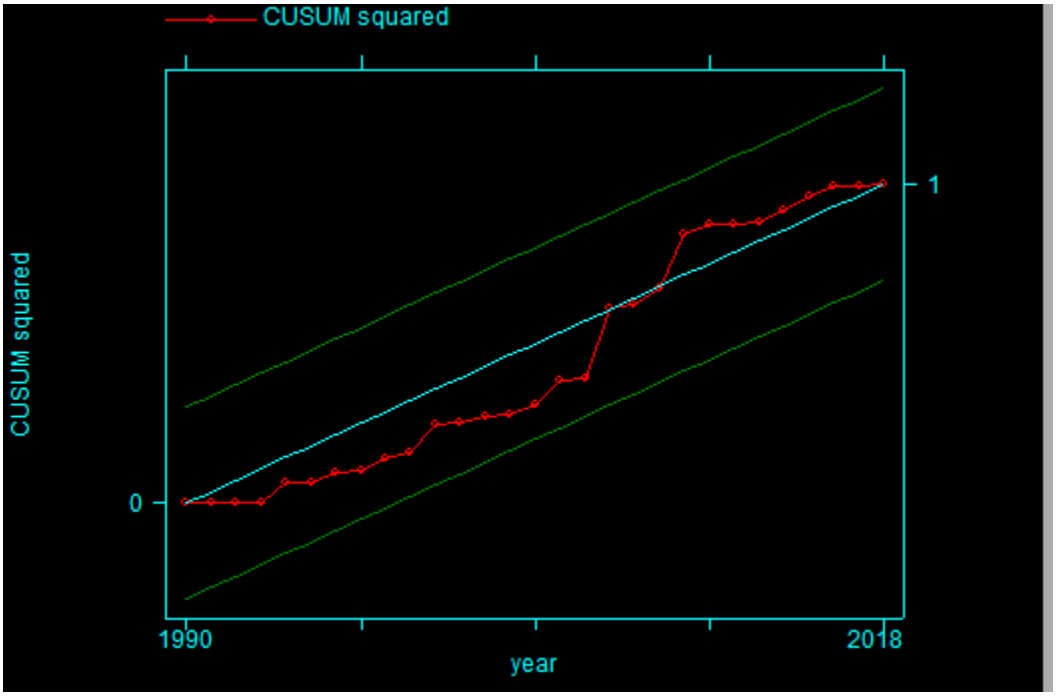
Source	SS	df	MS	Number of obs	=	35
				F(2, 32)	=	143.72
Model	492.911729	2	246.455865	Prob > F	=	0.0000
Residual	54.8728471	32	1.71477647	R-squared	=	0.8998
				Adj R-squared	=	0.8936
Total	547.784576	34	16.1113111	Root MSE	=	1.3095

tradebalance	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
_hat	.6965026	.1616047	4.31	0.000	.3673247	1.025681
_hatsq	-.0314258	.0155619	-2.02	0.052	-.0631243	.0002727
_cons	-.2758648	.3530714	-0.78	0.440	-.9950478	.4433182

Appendix 7: Omitted variable test

```
. ovtest

Ramsey RESET test using powers of the fitted values of tradebalance
       Ho:  model has no omitted variables
                  F(3, 16) =      3.51
                  Prob > F =      0.0398
```

Appendix 8: Model Stability Test



Appendix 9: long run ARDL bound test

```
Pesaran/Shin/Smith (2001) ARDL Bounds Test
H0: no levels relationship              F =  4.876
                                        t = -2.747

Critical Values (0.1-0.01), F-statistic, Case 3
```

	[I_0] L_1	[I_1] L_1	[I_0] L_05	[I_1] L_05	[I_0] L_025	[I_1] L_025	[I_0] L_01	[I_1] L_01
k_6	2.12	3.23	2.45	3.61	2.75	3.99	3.15	4.43

```
accept if F < critical value for I(0) regressors
reject if F > critical value for I(1) regressors

Critical Values (0.1-0.01), t-statistic, Case 3
```

	[I_0] L_1	[I_1] L_1	[I_0] L_05	[I_1] L_05	[I_0] L_025	[I_1] L_025	[I_0] L_01	[I_1] L_01
k_6	-2.57	-4.04	-2.86	-4.38	-3.13	-4.66	-3.43	-4.99

```
accept if t > critical value for I(0) regressors
reject if t < critical value for I(1) regressors
```

Appendix 10: ARDL Long Run Estimation Result

```
. ardl tradebalance debt exchange oppeness gdpgrowth moneysupply inflation, lags(2 2 1 2 2 0 0)

ARDL(2,2,1,2,2,0,0) regression

Sample:       1984 -       2018                 Number of obs     =         35
                                                  F(  15,     19)   =       9.95
                                                  Prob > F          =     0.0000
                                                  R-squared         =     0.8871
                                                  Adj R-squared     =     0.7979
Log likelihood =  -59.63117                       Root MSE          =     1.8045
```

tradebalance	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
tradebalance						
L1.	.0609352	.1665124	0.37	0.718	-.2875793	.4094497
L2.	.3784783	.1773014	2.13	0.046	.0073822	.7495744
debt						
--.	.1074031	.0446847	2.40	0.027	.0138768	.2009293
L1.	-.2142341	.0573423	-3.74	0.001	-.3342528	-.0942153
L2.	.0714754	.0399891	1.79	0.090	-.0122228	.1551736
exchange						
--.	-.0555426	.0331555	-1.68	0.110	-.1249378	.0138526
L1.	.1138097	.0304402	3.74	0.001	.0500976	.1775218
oppeness						
--.	-.8340887	.1792044	-4.65	0.000	-1.209168	-.4590095
L1.	.1753011	.1728099	1.01	0.323	-.1863941	.5369963
L2.	.2645943	.1485882	1.78	0.091	-.0464044	.5755931
gdpgrowth						
--.	.2146928	.100207	2.14	0.045	.0049571	.4244285
L1.	-.1501662	.0782804	-1.92	0.070	-.3140089	.0136766
L2.	.248511	.080008	3.11	0.006	.0810523	.4159698
moneysupply	-.1190221	.0561725	-2.12	0.048	-.2365924	-.0014518
inflation	.1325986	.043354	3.06	0.006	.0418576	.2233396
_cons	8.961641	2.937139	3.05	0.007	2.814138	15.10914

Appendix 11: Estimation Result of Short Run Model (Error Correction Model)

ARDL(2,2,1,2,2,0,0) regression

Sample: 1984 - 2018 Number of obs = 35
R-squared = 0.8161
Adj R-squared = 0.6709
Log likelihood = -59.63117 Root MSE = 1.8045

D.tradebalance	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
ADJ tradebalance L1.	-.5605865	.1849982	-3.03	0.007	-.9477921	-.1733809
LR debt L1.	-.0630689	.050445	-1.25	0.226	-.1686516	.0425137
exchange L1.	.1039396	.0624603	1.66	0.112	-.0267912	.2346705
oppeness L1.	-.7031801	.2361545	-2.98	0.008	-1.197457	-.208903
gdpgrowth L1.	.558411	.32459	1.72	0.102	-.1209636	1.237786
moneysupply L1.	-.2123171	.1128375	-1.88	0.075	-.4484888	.0238545
inflation L1.	.2365355	.1214681	1.95	0.066	-.0177001	.4907711
SR tradebalance LD.	-.3784783	.1773014	-2.13	0.046	-.7495744	-.0073822
debt D1.	.1074031	.0446847	2.40	0.027	.0138768	.2009293
debt LD.	-.0714754	.0399891	-1.79	0.090	-.1551736	.0122228
exchange D1.	-.0555426	.0331555	-1.68	0.110	-.1249378	.0138526
oppeness D1.	-.8340887	.1792044	-4.65	0.000	-1.209168	-.4590095
oppeness LD.	-.2645943	.1485882	-1.78	0.091	-.5755931	.0464044
gdpgrowth D1.	.2146928	.100207	2.14	0.045	.0049571	.4244285
gdpgrowth LD.	-.248511	.080008	-3.11	0.006	-.4159698	-.0810523
moneysupply D1.	-.1190221	.0561725	-2.12	0.048	-.2365924	-.0014518
inflation D1.	.1325986	.043354	3.06	0.006	.0418576	.2233396
_cons	8.961641	2.937139	3.05	0.007	2.814138	15.10914