



SAINT MARY'S UNIVERSITY
SCHOOL of GRADUATE STUDIES
INSTITUTE of AGRICULTURE and DEVELOPMENT STUDIES

DETERMINANTS of TRADE BALANCE
in ETHIOPIA

BY
HENOK GEMECHU

DECEMBER 2018

ADDIS ABABA, ETHIOPIA

**DETERMINANTS of TRADE BALANCE
IN ETHIOPIA**

**BY
HENOK GEMECHU**

**A THESIS SUBMITTED TO ST MARY'S UNIVERSITY, SCHOOL of GRADUATE
STUDIES IN PARTIAL FULLFILLMENT of THE REQUIRMENT FOR THE DEGREE
of MASTER of DEVELOPMENT ECONOMICS**

DECEMBER 2018

ADDIS ABABA, ETHIOPIA

APPROVAL SHEET

**SAINT MARY’S UNIVERSITY
SCHOOL of GRADUATE STUDIES
INSTITUTE of AGRICULTURE AND DEVELOPMENT STUDIES**

As members of board of examining of the final MSc thesis open defense, we certify that we have read and evaluated the thesis prepared by Henok Gemechu under the title “Determinants of Trade Balance In Ethiopia: An ARDL Bound Testing Approach” we recommend that this thesis to be accepted as fulfilling the thesis requirement for the Degree of Master of Science in Development Economics

APPROVED BY BOARD of EXAMINERS

_____ CHAIR PERSON	_____ SIGNATURE	_____ DATE
_____ ADVISOR	_____ SIGNATURE	_____ DATE
_____ INTERNAL EXAMINER	_____ SIGNATURE	_____ DATE
_____ EXTERNAL EXAMINER	_____ SIGNATURE	_____ DATE

DECLARATION

I, the undersigned, declare that this thesis is my original work, prepared under the guidance of Girma Estifanos (PhD). All the sources of materials used for this thesis have been dully acknowledged. I further confirm that the thesis has not been submitted either in part or in full to any other higher learning institution for the purpose of earning any degree.

Name

Signature

St Mary's University, Addis Ababa

December 2018

ENDORSEMENT

This thesis has been submitted to St Mary's University, school of graduate studies for examination with my approval as a University advisor.

Advisor

Signature

St Mary's University, Addis Ababa

December 2018

Table of Contents

ACKNOWLEDGMENT	i
LIST OF TABLES	ii
LIST OF CHARTS	iii
ACRONYMS/ABBREVIATIONS	iv
ABSTRACT	v
CHAPTER ONE.....	1
1. INTRODUCTION	1
1.1. Background of the Study	1
1.2. Statement of the Problem.....	3
1.3. Basic Research Questions.....	6
1.4. Research Objectives	6
1.5. Hypothesis of the Study	6
1.6. Definition of Terms.....	7
1.6.1. International Trade.....	7
1.6.2. Terms of Trade	7
1.6.3. Trade Balance	7
1.6.4. Nominal and Real Exchange Rates	8
1.6.5. GDP, Household Consumption Expenditure and Government Expenditures	8
1.6.6. Trade Liberalization	9
1.6.7. Natural Resource Endowment (Availability) and Utilization.....	10
1.6.8. Money Supply.....	10
1.7. Significance of the Study	11
1.8. Scope and Limitation of the Study	11
1.9. Organization of the Study.....	12
CHAPTER TWO.....	13
2. LITERATURE REVIEW	13
2.1. THEORETICAL LITERATURE	13
2.1.1. Elasticity Approach	13
2.1.2. Absorption Approach	14
2.1.3. Monetary Approach	16

2.1.4.	Structural Approach	18
2.1.5.	Keynesian Model	18
2.1.6.	Gravity Model of International Trade	21
2.1.7.	Trade Liberalization VS Protectionist Policy	21
I.	Trade Liberalization Policy.....	22
II.	Protectionist Policies	22
2.2.	Empirical Literature	24
2.3.	Conceptual Framework	30
CHAPTER THREE		31
3.	RESEARCH METHODOLOGY.....	31
3.1.	Research Design	31
3.2.	Data Type, Sources and Data Collection Methods	31
3.3.	Data Analysis Method	31
3.3.1.	Unit Root Test.....	33
3.3.1.1.	Augmented Dickey Fuller (ADF).....	33
3.3.1.2.	Phillips-Perron Unit Root Test	33
3.4.	Model Specification.....	34
3.4.1.	Determination of Existence of the Long Run Relationship of the Variables	35
3.4.2.	Choosing the Appropriate Lag Length for the ARDL Model/ Estimation of the Long Run Estimates of the Selected ARDL Model	37
3.4.3.	Re-parameterization of ARDL Model into Error Correction Model.....	37
CHAPTER FOUR.....		41
4.	DISCUSSION AND RESULTS.....	41
4.1.	Overview of Recent Trends	41
4.1.1.	Exports.....	41
4.1.2.	Imports	42
4.1.3.	Trade Balance	44
4.2.	Unit Root Test.....	48
4.2.1.	Augmented Dickey Fuller (ADF).....	48
4.2.2.	Phillips Pheron Test	49
4.3.	Diagnostic Tests.....	49

4.4. Existence of Long Relationship (Bound Test)	50
4.5. Long Run Model.....	51
4.6. Short Run Model (ECM).....	53
CHAPTER FIVE.....	55
5. CONCLUSION AND RECOMMENDATION	55
5.1. CONCLUSIONS	55
5.2. RECOMMENDATIONS.....	57
REFERENCES	59
APPENDIX 1	64
APPENDIX 2	65
APPENDIX 3	66
APPENDIX 4	67
APPENDIX 5	68
APPENDIX 6	69

ACKNOWLEDGMENT

I have no words to thank my Almighty God, for giving me the strength, courage to pass all the difficulties that I went through in the pursuit of a course of this studies and the thesis too. In writing this thesis I would like to extend my gratitude to my advisor, Girma Estifanos (PhD) for his constructive comments and support throughout out this research work. I am also extremely indebted to my friends Abdulheni, Addisalem, and Amdemichael for their support in ideas and encouragements they gave me. My deepest gratitude also goes to my friend Zelalem for his support in facilitating for a place to work in addition to providing his Laptop. I also want to thank all my friends and relatives for the concerns, considerations and moral supports they provide me. Finally, I would like to express my deep gratitude to my mother Tsehay Mekonnen, my father Gemechu Demisse and my brother Biniyam Gemechu (PhD) for their encouragements and being concerned as if the paper is theirs.

LIST OF TABLES

Table 1.1: Hypothesis of the study	6
Table 4.1: Total export earnings in millions of USD	41
Table 4.2: Total import bills in millions of USD	43
Table 4.3: Trends of the trade balance in millions of USD	45
Table 4.4: Trade balance, GDP and TB/GDP in millions of Birr	46
Table 4.5: Augmented Dickey Fuller (ADF)	48
Table 4.6: Phillips Pheron test	49
Table 4.7: Breusch-Godfrey Serial Correlation LM Test result	49
Table 4.8: Normality test result	49
Table 4.9: Stability test result	49
Table 4.10: Heteroscedasticity test result	50
Table 4.11: Bound test result	50
Table 4.12: Results of long run model	51
Table 4.13: Short run (ECM) model result	53

LIST OF FIGURES

Chart 4.1: Total export earnings in millions of USD	42
Chart 4.2: Export figures by item 2012/13-2014/15 in million USD	42
Chart 4.3: Total import bills in millions of USD	43
Chart 4.4: Import figures by item 2012/13-2014/15 in million USD	44
Chart 4.5: Export, Import and Trade Balance in millions of USD	45
Chart 4.6: Trade Deficit and GDP in billion birr	46
Chart 4.7: Ratio of trade deficit to the GDP	46
Chart 4.8: Total imports, total exports, and trade balance 2010-2014 in billion USD	47

ACRONYMS/ABBREVIATIONS

ADF	Augmented Dickey-Fuller
AIC	Akaike Information Criteria
ARDL	Auto Regressive Distributive Lag
BOP	Balance of Payment
COMESA	Common Market for Eastern & Southern Africa
DF	Dickey –Fuller
ECM	Error Correction Model
EC	Ethiopian Calendar
EEA	Ethiopian Economic Association
EFY	Ethiopian Fiscal Year
EPRDF	Ethiopian People`s Revolutionary Democratic Front
ERCA	Ethiopian Revenues & Customs Authority
FDI	Foreign Direct Investment
GDP	Growth Domestic Product
HQC	Hannan –Quinn criteria
IMF	International Monetary Fund
LDCs	Least Developed Countries
MoFED	Ministry of Finance and Economic Development
NBE	National Bank of Ethiopia
NEER	Nominal Effective Exchange Rate
OECD	Organization for Economic Cooperation and Development
OLS	Ordinary Least Squares
REER	Real Effective Exchange Rate

ABSTRACT

The study has mainly focused on the determinants of trade balance: an ARDL bound testing approach of co-integration. The time periods from 1984/85 to 2016/17 are covered and the impacts of the variables: Real Effective Exchange Rate (REER), Household Consumption Expenditure (HHCE), Government Expenditure (GEX), Money Supply (MS), openness (OP), natural resource availability (MRX & FLM) have been assessed. According to the results of the short run and long run models, real effective exchange rate appreciation has worsened the trade balance both in the long run and short run which is consistent with the research hypothesis. However, the worsening impact of appreciation is significant in the short run than the long run and the elasticity coefficient of Real Effective Exchange Rate not much indicating the fact that the J curve effect and the Marshal-Lerner condition does not hold in the Ethiopian context. In conformity with the research hypothesis and related theories, increased household consumption expenditure induced by GDP growth has a negative effect on the trade balance. On the other hand, an increase in the government expenditure positively affects the trade balance which is inconsistent with the theories. The impact of liberalization (openness) is as expected and statistically significant, where an increased level of openness has affected the trade balance positively. An increase in the money supply has positively affected the trade balance which is inconsistent with related theories. The findings suggest that measures such as devaluation will not succeed in improving the trade balance. Furthermore, policy measures regarding liberalization have to include the inward looking approach (import substitution) in addition to the outward looking export promotion approach since openness/liberalization might have greater impact on increasing imports over exports. Based on the positive impact of GDP, it is advisable to increase the government expenditure on infrastructural development activities that will promote the export as well as import substituting sectors.

Key words: trade balance, real effective exchange rate, household consumption expenditure, government expenditure, money supply, natural resource availability, ARDL, Ethiopia.

CHAPTER ONE

1. INTRODUCTION

1.1. Background of the Study

International trade which is defined as exchange of capital, and goods and services across international borders or territories is a vital aspect of any given economy. It involves cross border trading activities among countries, where a nation is part of the process both as a supplier and consumer. In the early 19th century, English economist David Ricardo offered an explanation of trade in terms of international differences in labor productivity which is regarded as comparative advantage and labor productivity (Ricardian Model). Specific factors model by Paul Samuelson and Ronald Jones (1971) has indicated that differences in resources can cause countries to have different relative supply curves and thus causes international trade, International Economics Theory & Policy 9th edition (2012).

As it is indicated on International Economics Theory & Policy 9th edition (2012), Heckscher-Ohlin theorem is another theoretical aspect that has emerged in the 1970's emphasizing that the country which is abundant in a factor exports the good whose production is intensive in that factor. Indeed, relative factor endowment and relative factor prices differ among nations further leading to varying commodity price ratios and factor combinations. In this regard, Prebisch-Singer in the 1950's hypothesized that there was and would continue to be a secular (long-term) decline in the terms of trade of primary-commodity exporters due to a combination of low income and price elasticity of demand. Thus, the gains from trade vary among countries based on the nation's specializations and such varying gains can be seen from a given nation's trade balance (net exports), which is the difference between total exports and imports.

Ethiopia, being well endowed with abundant arable land and water resources is mostly dependent on export of primary agricultural products characterized by relatively lower income and price elasticity of demand. As it is indicated in a study by Ethiopian Economic Association (2013), the share of agriculture to total export proceeds increased consistently. Its imports on the other hand include Raw Materials, Semi-finished Goods, fuel (petroleum products and others), Capital

Goods (agricultural, transport and industrial), Consumer Goods (durable and non-durable), and other miscellaneous goods. Consequently, the country has been in deficits in its trade balance throughout the time span of the study. For instance, according to World Bank Report (2017) the country has faced negative net exports that stood at USD 0.07 billion, USD 0.65 billion, USD 0.72 billion, USD 3.3 billion, and USD 14 billion respectively for 1975, 1985, 1995, 2005 and 2014.

Theoretically, there are various responsible factors determining trade balance of a given nation despite the varying characteristics of commodities being exported and imported. These factors include: real exchange rate (Elasticity approach Bickerdike, (1920), Robinson (1947) and Metzler (1948)), Growth Domestic Product (J.M. Keynes (1935) and the Absorption approach: Harberger (1950), Meade (1951), and Alexander (1952, 1959)), money supply (Monetary approach: Polak (1957), Hahn (1959), Pearce (1961), Prais (1961), Mundell (1968, 1971)) trade liberalization (WTO and trade economics: Theory and policy (2013), and natural resource availability (Structural approach). Based on the theories on the trade balance various studies have been conducted on the issue of factors determining the trade balance. For instance, World Bank (2013) has indicated that demography, investment, technology, energy and other natural resources, transportation costs and the institutional framework affects the patterns of international trade. Other studies such as by Rajan (2008), Osoro (2013) and Kiimani (2014) have also been conducted concluding factors such as household consumption expenditure, government expenditure, monetary policy, economic growth, lack of competitiveness are responsible for affecting the trade balance.

Based on the theoretical and empirical reviews, this paper has mainly focused on whether the macro-economic, policy as well as geographical variables determine the patterns of Ethiopian trade deficit and if so the direction of the variables' effects. In doing so, the study is conducted to see if the variables real exchange rate, household and government expenditures induced by GDP growth, money supply, trade liberalization, and natural resource endowments and utilization are the factors determining the nation's ongoing trade deficit.

1.2. Statement of the Problem

Ethiopia as most of the agrarian economies with larger share of primary agricultural products to the total export earnings is running an ever increasing trade deficit. According to data from National Bank of Ethiopia, the fiscal year 2016/17 has exhibited total export earnings (mostly comprising primary agricultural products) that stood at USD 2.8 billion, whereas the total spending on import bills including capital goods, raw materials, fuel, semi-finished goods and consumer goods has reached USD 15.7 billion. Being an economy heavily dependent on agricultural production, the terms of trade is unfavorable towards Ethiopia. In this regard it is hypothesized that the types of commodities exported and imported will force a country to have unfavorable terms of trade since the average relative export prices of primary agricultural products are by far less than the average relative import prices of capital goods and consumer goods among others Prebisch-Singer (1950's).

According to the data obtained from NBE, being a major component of export sector comprising 81% of the total export earnings for 2016/17, agricultural products export could be assessed in terms of its capacity to pay for the country's imports. In fact, total imports are by far greater than agricultural as well as total exports throughout the period 1984/85-201/17 indicating that earnings were short of imports. While total exports (primary agricultural products export possessing the lion share) grew by about USD 2.5 billion (the highest being USD 3.2 billion in 2013/14), total imports grew by USD 14.9 billion (the highest being USD 16.7 billion for 2015/16) where agricultural products export and total exports could respectively cover only 15% and 18% of the total import bills in 2016/17 causing an ever increasing gap over time between agricultural products export as well as total exports and total imports.

The nation is running an ever widening trade deficit in its trade balance. To this end, data obtained from NBE revealed that the country has run a trade deficit of around USD 12.9 billion for the year 2016/17 whereas running deficits that stood at USD 13.9 billion and USD 13.4 billion for 2015/16 and 2014/15 respectively, showing respective year to year increment/decline of 3.1% & 7.2% for 2014/15-2015/16 and 2015/16-2016/17. Furthermore, according to data obtained from World Bank Report (2017) the nation has faced trade deficits that stood at USD 0.07 billion, USD 0.65 billion, USD 0.72 billion, USD 3.3 billion, and USD 14 billion respectively for the periods

1975, 1985, 1995, 2005, and 2014. Indeed, the deficits in figures and the widening gap of the deficit from time to time reveal the fact that how much the country is suffering in financing its total import bills from proceeds earned through export transactions.

Studies have been conducted on the issue of trade balance in the Ethiopian context. For instance, Alekaw (2012) and Gebe (2015) have assessed the effects of real exchange rate, GDP and money supply. On the other hand, Borena (2013), Abebe (2014), Tamirayehu (2015), and Nega (2015) have studied the impact of exchange rate on the trade balance. The issue of trade liberalization has also been studied by Hailegiorgis (2012). Moreover, there are studies conducted on the issue of export performance. As far as the researcher's knowledge is concerned, however, none of the studies have assessed the joint effects real exchange rate, GDP, money supply and trade liberalization. Moreover, the issue of natural resource availability has not been studied from trade balance point of view.

The studies conducted in the Ethiopian context have not studied household consumption expenditure and government expenditure variables to see the effect of GDP from the Keynesian point of view as far as the literatures reviewed. Besides, the effects of variables such as real effective exchange rate, GDP and trade liberalization are ambiguous based on the results of some studies conducted so far where the contradictions may be attributed to the fact that studies differ in their time periods, estimation techniques, data sets and sources, theoretical models and measures of the variables. The study has also assessed the joint effects of real exchange rate, government expenditure, household expenditure, money supply, trade liberalization, and natural resource availability. Given the dynamics in the patterns of international trade, the study is also an up to date one. It has employed time series data extending from 1984/85 up to 2016/17. Moreover, the variables are purposely selected because of the fact that the country has experienced those determinants during the time span of the study. For instance, the weighted average exchange rate of the Birr in the foreign exchange market has reached Birr 20.0956/USD in 2014/15, depicting 5.4 percent year-on-year depreciation NBE annual report (2014/15). Despite its steady depreciation against the U.S. dollar however, the birr has appreciated sharply in

real effective terms and as of June 2015, the birr was overvalued by over 30 percent in real terms IMF (2015).

The nation's GDP has shown a significant growth of around 10% for the time through 2004-2015. Besides, the nation's absorption has been increasing outpacing the GDP growth witnessing the fact that the nation has been absorbing more than what has been produced domestically. For instance, the nation's absorption to GDP ratio is much significant that stood at 110.4%, 119.3%, and 117.5% for 1999/00, 2005/6, and 2014/15 respectively, whereas the 1999/00-2014/15 average import ratio to the GDP is 30.1%. The private consumption expenditure possesses a significant share in the ratio to the GDP with slight increments through time and stood at 69.1% and 81.5% respectively for 1999/00 and 2009/10, whereas 69.2% for 2014/15 fiscal year. The ratio of government expenditure to the GDP is also significant, despite its slight declines from 19.1% to 9.2% through 1999/00-2009/10 and stood at 9.5% for the year 2014/15, NBE annual report (2014/15). The trend of money supply (broad money) has also shown increasing patterns throughout the time span of the study.

This study unlike other studies conducted so far in the Ethiopian context has assessed the impact of GDP from the Keynesian point of view which states "income increases will encourage citizens to buy more imported goods and thus worsens the trade balance". In so doing the ratios house hold consumption expenditure to the GDP and government expenditure to the GDP are included. Furthermore, results regarding the effect of GDP are ambiguous in the Ethiopian context as well as other nation's experiences. Moreover, the study has employed various proxies based on theories and other related literatures besides the inclusion of other variables and those variables with contradictory results. Openness measured by the ratio of the sum of exports and imports to the GDP is used as a proxy for the variable trade liberalization. Regarding the impact of natural resource availability the ratios: mineral resource exports to total export earnings and fuel imports to total import bills are used as proxies. Finally, Auto Regressive Distributed Lag (ARDL) method of co-integration is employed in order to assess co-integrating relationship existing among the dependent and independent variables.

1.3. Basic Research Questions

This study has assessed the existence and magnitude of trade deficit in Ethiopia, the possible causes and remedial solutions of the deficit, and the possible long run consequences if the trend tends to persist. Specifically, the research questions are:

- What does the trend of trade balance look like?
- Is the nation running trade deficit in its trade balance? If yes, what is the magnitude of the deficit?
- What are the determining factors for the trade balance? In which direction do the factors affect the trade balance? To what extent do the factors affect the trade balance?
- What are the possible remedial solutions if it is proved that the deficit exists?

1.4. Research Objectives

The general objective of the study is to assess what determines Ethiopian overall trade balance. Specifically, the study has aimed to:

- Assess macro-economic, policy and geographical factors that induced the deficit,
- Determine the direction and magnitude of the variables' effects on trade deficit, and
- Assess the possible implications of the deficit.

1.5. Hypothesis of the Study

The directions of the variables' effects are hypothesized based on theoretical and empirical literatures and the specific null hypothesis (H_0) against alternative hypothesis (H_1) are tabulated as follows:

Table 1.1

Null hypothesis (H_0)	Alternative hypothesis (H_1)
Real exchange rate depreciation will not improve trade balance.	Real exchange rate depreciation will improve trade balance.
FDI will not affect the trade balance.	FDI positively affects the trade balance.
Household consumption expenditure will not affect the trade balance.	Household consumption expenditure will negatively affect the trade balance.
Government expenditure will not affect the trade balance.	Government expenditure will negatively affect the trade balance.
Trade liberalization or openness positively affects the trade balance.	Trade liberalization or openness negatively affects the trade balance.
Natural resource availability will not affect the trade balance	Natural resource availability will positively affect trade balance
Money supply will not affect trade balance	Money supply will negatively affect trade balance

1.6. Definition of Terms

The study will mainly focus on the determinants of trade deficit in Ethiopia. Hence, it encompasses the terms international trade, terms of trade, trade balance and the various determinants of trade balance. This section will briefly define the basic terms of the study that are going to be used frequently throughout the paper.

1.6.1. International Trade

International trade is defined as exchange of capital, goods and services across international borders or territories. According to international trade theories, nations will engage in trade of goods where they have an absolute or comparative advantage over production of some commodities and based on the factors they are endowed with as well as the degree of utilization of the factors endowed. In other words, as it is indicated in Macro-economic principles and policies 11th edition (2010) countries will engage in international trade pursuant to the following reasons: firstly, every country lacks some vital resources that it can get only by trading with others. Second, each country's climate, labor force, and other endowments make it a relatively efficient producer of some goods and a relatively inefficient producer of others. Finally, specialization permits larger outputs via the advantages of large-scale production.

1.6.2. Terms of Trade

It is defined as the relationship or ratio between the price of a typical unit of exports and the price of a typical unit of imports Development economics 11th ed. (2012). The commodity terms of trade are said to deteriorate for a country if P_x/P_m (the ratio of price of exports to price of imports) falls, that is, if export prices decline relative to import prices, even though both may rise.

1.6.3. Trade Balance

Trade balance is the name given for net exports in goods and services and it tells how a trade in goods and services of a given nation departs from the benchmark of equal imports and exports. In other words, it is the difference between total exports and total imports of a nation. If a country has positive net exports it is running trade surpluses. Conversely, a nation is said to run trade deficits if total exports are less than total imports Mankiw Ec, 5thed (2001).

1.6.4. Nominal and Real Exchange Rates

The exchange rate between two countries is the price at which residents of those countries trade with each other. In other words, exchange rate which is termed as the nominal exchange rate is the relative price of the currency of two countries. A currency depreciation forces price of exports to decline and price of imports to rise hence raises net exports and conversely a currency appreciation should reduce net exports; Macro-economic principles and policies 11th edition, (2010). The real exchange rate on the other hand is the relative price of the goods of two countries. That is, the real exchange rate tells us the rate at which we can trade the goods of one country for the goods of another. Mathematically, the real exchange rate is formulated as follows:

$$\text{REER} = \text{NEER} * \frac{\text{Price of foreign goods}}{\text{Price of domestic goods}}$$

Where, REER is real effective exchange rate, and NEER stands for nominal effective exchange rate. According to the formula, the rate at which we exchange foreign and domestic goods depends on the prices of the goods in the local currencies and on the rate at which the currencies are exchanged. If the real exchange rate is high, foreign goods are relatively cheap, and domestic goods are relatively expensive. On the other hand, if the real exchange rate is low, foreign goods are relatively expensive, and domestic goods are relatively cheap. Accordingly, the lower the real exchange rate, the less expensive are domestic goods relative to foreign goods, and thus the greater are the net exports. Conversely, the higher the real exchange rate, the more expensive are domestic goods relative to foreign goods, and thus the lesser are the net exports Mankiw Ec, 5thed, (2001).

1.6.5. GDP, Household Consumption Expenditure and Government Expenditures

Gross Domestic Product (GDP):is the market value of all final goods and services produced within an economy in a given period of time. It measures the flow of money in a given economy. Its components comprise Consumption (C), Government expenditures (G), Investment (I) and Net exports (NX), Mankiw Economics 5th ed., (2001). According to Macro Economics principles and policy 11th ed. (2010) higher GDP leads to higher incomes, some of which is spent on foreign goods and thus imports rise as GDP rises and fall as GDP falls, whereas exports are relatively

insensitive to own GDP, but are quite sensitive to the GDPs of other countries. As a measure of total income received from production of goods and services in a given economy, a rise in GDP is expected to induce the demand for imported goods and services by households as well as the government that will decline net exports thereby worsening the trade balance.

Household consumption expenditures: are the consumption (C) component of the GDP consisting goods (nondurable and durable) and services bought by households Mankiw Economics 5th ed., (2001). Household consumption expenditure on both domestic and imported goods is expected to rise with rising national income (GDP), worsening the trade balance due to increased demand for imported goods.

Government expenditures: are the government purchase (G) component of the GDP comprising goods and services bought by federal, state and local governments including such items as military equipment and the services that the government workers provide, Mankiw Economics 5th ed., (2001). It is also expected that a rise in national income (GDP) will induce a rise in government's purchase of imported goods further leading to deteriorating trade balance.

1.6.6. Trade Liberalization

Trade liberalization is defined as any act that would make the trade regime more neutral nearer to a trade system free of government intervention UNCTAD (2005). According to World Bank study liberal trade regimes can be seen as synonymous to neutrality of a trade regime with zero rates of protection for importable and exportable. Trade liberalization is a policy involving measures that called for reducing the level of tariffs, removing quantitative restrictions, introducing uniformity in tariff structures and levels, and reducing the severity of other kinds of taxes on international trade which contrasts protectionist policies (i.e. policies advocating tariffs, quotas, export subsidies and other policy induced trade costs as instruments of trade policy), WTO (2012). Accordingly, it is believed that trade liberalization can help countries to better utilize their resources through specialization and through the exploitation of economies of scale. In this regard, WTO (2012) has indicated that there is a generally positive relationship between openness and income where open and export oriented countries have succeeded in their development efforts, while heavily protected and inward-looking countries have not.

1.6.7. Natural Resource Endowment (Availability) and Utilization

Natural resources comprise both renewable like fish, forest products and renewable energy and non-renewable such as solid fossil energy and uranium as well as solid minerals that must be mined Graham A. Davis, World trade report (2010). In this regard, international trade theories like the Heckscher-Ohlin model views resource differences are the only source of trade and comparative advantage is influenced by the interaction between nations' resources (the relative abundance of factors of production) and the technology of production which influences the relative intensity with which different factors of production are used in the production of different goods International economics 9th edition, (2012). In this regard, World trade report (2013) has revealed that uneven geographical distribution of natural resources affects countries' comparative advantage and hence there exist relationship between countries' endowments of natural resources and their export performance. In general, based on theories and empirical evidences, natural resource availabilities and utilization of same can create comparative advantages and favorable terms of trade thereby leading to better trade balance for those well-endowed with the resources.

1.6.8. Money Supply

According to Mankiw Macro Economics 5th edition, Money supply is the total quantity of money available in an economy. In an economy that uses fiat money, such as most economies today, the government controls the supply of money: legal restrictions give the government a monopoly on the printing of money. Just as the level of taxation and the level of government purchases are policy instruments of the government, so is the supply of money. The most obvious asset to include in the quantity of money is currency, the sum of outstanding paper money and coins. Most day-to-day transactions use currency as the medium of exchange. A second type of asset used for transactions is demand deposits, the funds people hold in their checking accounts. Money supply has an effect on the trade balance. According to the monetary approach of balance of payments, the interaction of demand for and supply of stock of money by the monetary authorities of a given economy will affect the overall balance of payments. In very simple terms, if people demand more money than that being supplied by the central bank, then the excess demand for money will 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.

1.7. Significance of the Study

Ethiopia being an agrarian economy exporting primary agricultural products whereas importing capital goods, raw materials, oil and others is suffering a deteriorating trade balance in its current account. Recently, the nation has become vulnerable to a chronic foreign currency crunch which can be reflected by the fact that the country has reached at a point where its foreign currency reserve can only cover imports for less than two months. Given such facts, this study is conducted in order to assess the determining factors of Ethiopia's trade deficit despite the characteristics of the commodities exported and imported. Accordingly, in pursuit of studying the factors responsible for the trade deficit, the paper has incorporated macro-economic variables, policy issues and geographical factors in order to see from which direction does the deficit comes from. Hence, the findings are thought to show factors responsible for the ongoing deficit to those policy makers responsible for the issue under question. In addition policy recommendations that are thought to be vital for overcoming the issue will be forwarded based on the conclusion.

1.8. Scope and Limitation of the Study

The study mainly focuses on determinants of trade deficit in Ethiopia. Although there are various determining factors affecting trade balance, the paper has assessed the effects of variables such as real exchange rate, household consumption expenditure and government expenditure, money supply, trade liberalization, and natural resource availability on the Ethiopian trade deficit. In so doing a time series data encompassing the time through 1984/85 to 2016/17 has been used. The time frame is purposely selected because of the fact that the country has seen two government regimes with different ideologies. Hence, it is able to better see the effects of variables from ex-ante and ex-post points of view. For instance, the former has implemented fixed exchange rate regime and trade policy which was not liberal, whereas the exchange rate is a managed float kind and relatively liberalized trade policy for the later. Furthermore, the trends of GDP, Money

Supply, household consumption expenditure and government expenditure have been changed over time. As a method of empirical analysis, the ARDL co-integration technique is applied.

There are some factors that are thought as limitations while conducting the study. Firstly, the study has tried to include the variable being land locked measured by the ratio of total port service fees to be paid for Djibouti to the total export earnings so as to assess the cost of being landlocked and how much foreign currency Ethiopia is losing because of not owning a sea port. However, it was unable to obtain the relevant data from concerned organs. Secondly, the ratio of mineral resource exports to the total export earnings and fuel imports to total import bills used as proxies for natural resource availability might not clearly reveal the other effects of natural resource endowments such as the inability to effectively utilize domestic endowments as well as getting burdened in financing imports of commodities associated with such resources. Thirdly, the required time series data for some variables is unavailable. Finally, some variations exist between the data obtained from concerned local authorities and international organs.

1.9. Organization of the Study

The study has constituted five chapters, each having corresponding sub sections. Chapter 1 is all about background of the study, statement of the problem, basic research questions, research objectives, significance of the study, hypothesis of the study, definition of terms, scope and limitations of the study. Chapter 2 includes theoretical and empirical literatures, as well as overview of the recent trend of trade balance in the country. Chapter 3 mainly focuses on research methodologies. It incorporates research design, data type, sources and data collection methods, data analysis method, and model specification. Discussion and results of the study has briefly been analyzed in Chapter 4. The last portion chapter 5 includes the conclusions of the findings and recommendations based on the findings.

CHAPTER TWO

2. LITERATURE REVIEW

2.1. THEORETICAL LITERATURE

2.1.1. Elasticity Approach

Elasticity approach Bickerdike, (1920): Robinson (1947) and Metzler (1948) is an approach which focuses on exchange rate as an inducing factor for affecting trade balance. The essence of this view is the substitution effects in consumption and production induced by the relative price (domestic versus foreign) changes caused by a devaluation. For devaluation to improve the trade balance however, the absolute values of the sum of the demand elasticity for exports and imports must exceed unity (Marshall Lerner condition). Assuming that the Marshall-Lerner condition is met, currency devaluation/depreciation will make exports of the devaluing country/the country with depreciating currency/ to get cheaper whereas making imports more expensive. Consequently, devaluation/depreciation will enable a country to have more export earnings through larger export volume and reduced payments for import bills as a result of discouraged imports. Hence, the country with devalued/depreciated currency will get a favorable trade balance in its current account of the Balance of Payment.

Devaluation operates in a way that increases the domestic currency prices and/or reduces the foreign currency price of exports. It will affect the trade balance through generating price incentives which tend to lower domestic demand for imports, raises domestic demand for and supply of import substitutes, as well as increase in foreign demand for exports and production of exports. However, the success of devaluation in improving the trade balance lays on the responses to the price changes that are determined on a range of demand and supply elasticity. Particularly, the relevance of devaluation can be seen from the elasticity of supply of exports point of view since supply inelasticity (i.e. weaker response of supply of exports for the extra foreign demand created as a result of a fall in relative prices of exports initiated by the devaluation) constitutes a major impediment to the efficacy of devaluation as a method of payment adjustment.

Elasticity approach has further pointed out that devaluation/depreciation may deteriorate the trade balance in the short run since it takes time for exports and imports to respond for the relative price changes. However, the elasticity of export and import rise in the long run since the increase in the volume of export and falling quantities of import (substitution effect) results in an improvement in the trade balance of the devaluing economy, a situation known as j-curve phenomenon. The impacts of devaluation can further be seen from the demand for and supply of foreign exchange viewpoints. In doing so, the impact on the demand for foreign exchange depends on the domestic price elasticity of demand for imports. On the other hand, the impact on the supply of foreign exchange depends on the foreign price elasticity of demand for exports if the devaluation causes a change in foreign price and on the elasticity of supply with respect to increased profits in the export sector if it is only domestic prices that change.

2.1.2. Absorption Approach

The elasticity approach has been criticized by its weakness of being partial-equilibrium analysis; it ignores supply conditions and cost changes as a result of devaluation, and it tends to neglect the income and expenditure effects of exchange-rate changes A.P. Thirtwall (1980). The elasticity used by the approach ought to be total elasticity, not partial elasticity and taking the total elasticity of exports and imports is equivalent to examining the relation between the balance of payments and the functioning of the economy as a whole. The weakness of the elasticity approach focusing on a partial equilibrium analysis is the starting point for the absorption approach. The absorption approach which has emerged at the beginning of 1950s by authors such as Harberger (1950), Meade (1951), and Alexander (1952, 1959) shifted the focus of economic analysis to the balance of payments. It states that a country's trade balance will improve if its output of goods and services increases by more than its absorption the expenditure by domestic residents of goods and services.

This approach takes a more macroeconomic view of the balance-of-payments question and looks at production and expenditure for the economy as a whole. It argues that currency devaluation will be successful only if the gap between domestic output and expenditure widens. According to A.P. Thirtwall, the absorption approach regards the balance of payment not simply as the excess of resident's receipts from foreigners over payments to foreigners, but as the excess of total

receipts from foreigners over total payments to foreigners. Mathematically, it is computed as follows:

$$B = R - P \dots\dots\dots 1$$

Where, B stands for balance of payments, R is total receipts by residents and P is total payments by residents.

The approach can be applied for both balance of payment as a whole and to balance of payments on current account as the difference between national income and national expenditure. The national income account is formulated as:

$$Y = C + I + G + X - M \dots\dots\dots 2$$

Where, Y is national income, C is household expenditure, I is domestic investment, G is government expenditure, X is total exports, and M stands for total imports. Domestic absorption denoted by (A) comprises household consumption expenditure, domestic investment and government expenditure, whereas the balance of payment (B) consist exports and imports.

$$A = C + I + G \dots\dots\dots 3$$

$$B = X - M \dots\dots\dots 4$$

Hence, equation 2 can be stated as:

$$Y = A + B \dots\dots\dots 5$$

Or

$B = Y - A$, implying that BOP on current account is the difference between national income (Y) and total absorption (A). Given the above analysis, any policy for BOP correction can be evaluated in terms of whether it raises Y over A, because this is a condition for BOP improvement. Policies to raise Y including devaluation, tariffs, quotas on imports, subsidies for exports, and price and quantity adjustments of all types to increase exports or reduce imports are termed as expenditure switching policies and must not be accompanied by an equal rise in A for the balance of payment to improve. Such policy measures are assumed to raise national income that may further increase national consumption. Thus, the net effect of the increase in national income on the balance of payments is the difference between the total increase in income and the induced increase in absorption. The effects of expenditure switching policies such as devaluation can be stated as follows:

$$DB = DY - DA \dots\dots\dots 6$$

Where, DB is change in BOP, DY is change in income and DA is change in absorption.

Total absorption (DA) depends on the marginal propensity to absorb when there is devaluation and is denoted as (a). Devaluation also directly affects absorption through the change in income which we write as D. Thus

$$DA = a DY + DD \dots\dots\dots 7$$

Substituting equation (7) in (6), we get

$$DB = DY - aDY - DD \dots\dots\dots 8$$

Or,

$$DB = (1 - a) DY - DD$$

Equation (8) points toward three factors which explain the effects of devaluation on BOP. They are: (i) the marginal propensity to absorb (a), (ii) change in income (DY), and (iii) change in direct absorption (DD). It may be noted that since (a) is the marginal propensity (MP) to absorb, (1 - a) is the propensity to hoard or save. These factors, in turn, are influenced by the existence of unemployed or idle resources and fully employed resources in the devaluing country. According to the absorption approach, for an economy with unemployed or idle resources and marginal propensity to absorb (a < 1) expenditure switching policies such as devaluation will increase exports, reduce imports, and output and income will rise and BOP on current account will improve. On the other hand, if MP to absorb (a > 1) the economy is spending more than it is producing and the increase in income due to devaluation will induce higher consumption thereby affecting the BOP adversely. In other words, if resources are fully employed in the economy, devaluation cannot correct an adverse BOP because output and national income cannot rise and prices may rather increase thereby reducing exports and increasing imports, worsening the BOP situation.

2.1.3. Monetary Approach

This is an approach emphasizing on the interaction between the demand and supply of money to determine the overall balance of payments position of the economy and emerged at the end of 1950s by scholars Polak (1957); Hahn (1959); Pearce (1961); Prais (1961); Mundell (1968,

1971). According to the approach, balance of payments is monetary phenomena determined by the interaction of demand for and supply of stock of money by the monetary authorities of a given economy. In very simple terms, if people demand more money than that being supplied by the central bank, then the excess demand for money will 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.

According to Graham Bird (1981), the monetary approach assumes that the nominal demand for money is a stable and linearly homogeneous function of nominal income with the assumption of fixed exchange rate. On the other hand, the nominal supply of money is the product of the money multiplier and the monetary base, where the monetary base comprises domestic credit created by the monetary authority and an international component consisting of domestic holdings of international reserves. Given a tendency toward equilibrium in the monetary sector of the economy and assuming a constant money multiplier, changes in reserves (measure of the state of the balance of payments) strictly reflect any imbalance between the change in domestic demand for money and the change in the supply of domestic credit. Thus, an excess demand for money will be met by a net inflow of reserves i.e. BOP surplus, while an excess creation of domestic credit (money supply) will be reflected by payments deficit. The creation of excess domestic credit at a rate in excess of the growth in demand for money will have the immediate effect of creating excess real cash balance, which may further facilitate increased spending of individuals and firms on foreign real as well as financial assets affecting either the current or capital accounts.

The monetary approach has emphasized that it is the change in reserves which restore monetary equilibrium and once stock equilibrium has been restored the flow of reserves will cease. Hence, the balance of payment problems are viewed as essentially transitory and self-correcting providing only that authorities do not sterilize the effects of changes in reserves by means of compensating changes in domestic credit creation. In other words, BOP policies are not required apart from the strict control of credit creation. Regarding measures such as devaluation and

exchange controls, it is believed that they are viewed as only influencing the BOPs via their monetary repercussions and their positive contribution is only to speed up a corrective process.

2.1.4. Structural Approach

Structural approaches pay due attention for structural causes relating traded goods and the efficiency of producing those traded goods (Graham Bird, 1981). Structural explanation of balance of payment disequilibria specifically in LDC's comprises two central aspects: first, commodity instability and the associated instability of export receipts and import payments and second, adverse movement in terms of trade. Export instability comprises variations in the prices of primary products and the level of export concentration on these products. Most of the LDCs are characterized by relatively high degree of export concentration on fewer primary products where such exports are subject to a high degree of instability. Thus LDCs generally do seem to encounter greater instability in their export earnings than the developed nations do, leading LDCs to have relatively unstable balance of payments.

Concerning the trends of terms of trade there is a commonly held belief that LDCs have been subject to a long run deterioration reflecting the fact that on balance LDCs are exporters of primary products and importers of manufactured final goods and primary product prices have fallen relative to manufactured final goods. Such a fall can be attributed to differential income elasticity of demand for primary products and manufactured goods. Moreover, assuming that the income elasticity of demand for manufactured goods is greater than the primary products counterpart, it might be anticipated that, *ceteris paribus*, the prices of manufactured goods will rise faster than the primary products following world income growth.

2.1.5. Keynesian Model

Is another view by J.M. Keynes (1935), the General Theory of Employment, Interest, and Money which indicates that income increases will encourage citizens to buy more imported goods and thus worsens the trade balance. According to Keynes, when the aggregate volume of output changes, the real income will rise in proportion to the income measured in wage-units, if the wage-unit changes, the expenditure on consumption corresponding to a given level of

employment will change. Hence, in an open system with foreign-trade relations, some part of the multiplier of the increased investment will accrue to foreign countries, since a proportion of the increased consumption will diminish our own country's favorable foreign balance.

J.M. Keynes's most important theoretical contribution is consumption function stating that consumption is a function of income, specifically disposable income.

$$C = C + cY_d \dots\dots\dots 1$$

Where, C is autonomous consumption, c is marginal propensity to consume and Y_d is disposable income.

Let's formulate Y as a function of consumption (C) and investment (I):

$$Y = C + I \dots\dots\dots 2$$

$$Y = C + cY + I \dots\dots\dots 3$$

To solve the multiplier, let's write Y as Y_1 and Y_0

$$Y_1 = C + cY_1 + I_1 \dots\dots\dots 4$$

$$Y_0 = C + cY_0 + I_0 \dots\dots\dots 5$$

Subtracting Y_0 from Y_1

$$dY = c dY + dI \dots\dots\dots 6$$

Where, dY and dI are changes in income and in investment respectively.

$$dY/dI = 1/(1 - c) \dots\dots\dots 7$$

This is the multiplier and is a direct consequence of the Keynesian consumption function. Income increases directly because of a rise in investment. But then very quickly, rising incomes affect consumption through the consumption function by inducing an increase in consumption demand.

The multiplier can further be extended with the inclusion of government and foreign sectors and our model becomes:

$$Y = C + I + G + CA \dots\dots\dots 8$$

$$C = C + cY_d$$

$$Y_d = Y - tY + Tr \dots\dots\dots 9$$

Where, G is government expenditure and CA current account ($X - M$), Y_d is disposable income, t is tax rate and Tr stands for transfers. As components of the current account, export and import functions are:

$$X = E * P_f/P \text{ and } M = m * Y \dots\dots\dots 10$$

Where, X stands for exports, E is nominal exchange rate, P_f is foreign price, P is domestic price, M stands for imports, m is marginal propensity to import and Y is income.

Therefore, equation 8 can be written as

$$Y = C + c(1 - t)(Y + Tr) + I + G + X - mY \dots\dots\dots 11$$

To solve the multiplier let's write Y as Y₁ and Y₀,

$$Y_1 = C + c(1 - t)(Y_1 + Tr) + I_1 + G + qX - mY_1 \dots\dots\dots 12$$

$$Y_0 = C + c(1 - t)(Y_0 + Tr) + I_0 + G + qX - mY_0 \dots\dots\dots 13$$

Then, subtracting Y₀ from Y₁, the multiplier becomes

$$dY/dI = 1/1-c(1-t) + m \dots\dots\dots 14$$

Accordingly, change in income as a result of change in investment will have a multiplier effect on household consumption, tax and imports through marginal propensity to consume (c), tax rate (t), and marginal propensity to import (m) respectively. Therefore, in an open system with foreign-trade relations, some part of the multiplier of the increased investment will accrue to foreign countries, since a proportion of the increased consumption will diminish our own country's favorable foreign balance.

Keynes has also pointed out that the root of all balance of payment crises is negative government savings T – G, where T is all forms of taxation and other government revenue and G is government expenditure including purchase of goods and services. If there is a deficit, government saving is negative and G > T creating an expansionary effect on GDP. Thus, Imports increase as GDP increases and if exports don't increase, we have a foreign deficit. In other words, government deficits will cause foreign deficit in the following manner: while running government deficits, the government is spending more than the tax collected which may have expansionary effect on income (GDP). The increase in income will further create a rise in demand for imports and worsening the foreign deficits henceforth, unless there is proportional increment in exports.

The effect of increase in income or GDP on trade balance can also be seen from the import function $M = m * Y$. Accordingly, for a given level of marginal propensity to import (i.e. change in demand for imports as a result of change in income), citizens demand for foreign goods will increase as total income or GDP (Y) of the economy increases. The more the marginal propensity for imports of a given economy, the more the demand for imported goods induced, thereby leading the trade balance to get worsened given the value of exports as a function of nominal exchange rate, foreign and domestic price levels.

2.1.6. Gravity Model of International Trade

Gravity model Jan Tinbergen (1962) is an international trade flows model that includes macro-economic variables and geographical factor. The model comprises Gross Domestic Product (GDP) of exporting countries, GDP of importing countries, and distance between the two countries as explanatory factors. The model is derived from the analogy to Newton’s law of gravity: Just as the gravitational attraction between any two objects is proportional to the product of their masses and diminishes with distance, the trade between any two countries is, other things equal, proportional to the product of their GDPs and diminishes with distance. In other words, the patterns of bilateral aggregate trade flows between two countries A and B is proportional to the gross national products of those countries and inversely proportional to the distance between them. Mathematically,

$$T_{AB} = K \frac{(GDP_A)(GDP_B)}{(Dist_{AB})} \dots\dots\dots 1$$

Where, K is a constant term, GDP_A is Gross Domestic Product of country A, GDP_B is Gross Domestic Product of country B, and $Dist_{AB}$ is distance between countries A & B. Hence, large economies tend to spend large amounts on imports and also tend to attract large shares of other countries’ spending (i.e. ceteris paribus the trade between any two economies is larger; the larger is either economy) whereas transport costs and geography possesses important roles in determining the volume of trade.

2.1.7. Trade Liberalization VS Protectionist Policy

The WTO and trade economics: Theory and policy (2013) has indicated that there are two types of development policies namely trade liberalization and protectionist policy.

I. Trade Liberalization Policy

These are policies advocating open and liberalized trade strategy. Accordingly, trade liberalization can help countries to better utilize their resources through specialization and exploitation of economies of scale. Hence, more efficient use of resources will provide the potential for a higher level of income and therefore a higher level of development. Trade also fosters the incentive for innovation and the diffusion of technologies. According to the WTO and trade economics (2013), there is a generally positive relationship between openness and income and that open and export oriented countries have succeeded in their development efforts, while heavily protected and inward-looking countries have not.

Trade liberalization policies are synonymous with outward-looking export promotion strategies of industrialization which gained the upper hand in the late 1970s and especially among Western and World Bank economists in the 1980s and early 1990s Economic development 11th edition (2012). Advocates of export promotion of both primary and manufactured goods cite the efficiency and growth benefits of free trade and competition, the importance of substituting large world markets for narrow domestic markets, the distorting price and cost effects of protection, and the tremendous successes of such export-oriented economies as South Korea, Taiwan, Singapore, Hong Kong, China, and others in Asia. In general, it is believed that export oriented economies will learn a great deal from developed economies experiences as a result of liberalized trade.

II. Protectionist Policies

These are development strategies opposing open and liberalized trade policies, whereas advocating protection of domestic producers through mechanisms such as tariffs, quotas and export subsidies as instruments of trade policy. Protectionists are proponents of inward looking import substitution strategies that predominated in to the 1970's Economic development 11th edition (2012). Advocates of import substitution believe that a developing economy should initially substitute domestic production of previously imported simple consumer goods (first-stage IS) and then substitute through domestic production for a wider range of more sophisticated manufactured items (second-stage IS) all behind the protection of high tariffs and quotas on these imports. In the long run, IS advocates cite the benefits of greater domestic industrial

diversification (“balanced growth”) and the ultimate ability to export some previously protected manufactured goods as economies of scale, low labor costs, and the positive externalities of learning by doing cause domestic prices to become more competitive with world prices.

The rationale for protectionist policies lies behind the political economy justification and economic arguments for protection points of view WTO and trade economics (2013). According to the former, such instruments like imposition of tariffs are often a question of political economy that are the consequence of the lobbying activity of industries in the import-competing sectors that wish to be protected against competition from the rest of the world. On the other hand, the economic arguments for protection include the terms of trade argument, infant industry argument and strategic trade policy argument and justify the use of protection from a national welfare point of view.

The Terms of Trade (TOT) argument: follows directly from the cost and benefit analysis of the imposition of a tariff. When a country specially a large country introduces a tariff, there may be positive terms-of-trade effects. The positive TOT effects arise because the introduction of tariffs reduces the demand for imports.

Infant industry argument: relies on the arguments that temporary protection might be needed for a country to develop a comparative advantage in a particular sector when markets fail.

Strategic trade policy argument: favoring government’s strategic interventions such as subsidizing domestic firms so as to deter foreign company and raise the profits of the domestic company by more than the subsidy.

2.2. Empirical Literature

There are various studies conducted on the issue of determinants of trade deficit with the inclusion of macro-economic variables, policy issues and geographical factors. In so doing, World Bank (2013) on fundamental economic factors affecting international trade indicated that demography, investment, technology, energy and other natural resources, transportation costs and the institutional framework affects the patterns of international trade. Moreover a study by Rajan (2008) has been conducted to see the effects of External Shocks, Fiscal Deficit, Monetary Policy, Trade Liberalization, Economic Growth, Lack of Competitiveness, Land-locked ness, Political Instability and Conflict further showing that demand and price shocks in the big economies of the world and internal bottlenecks such as lack of competitiveness, geopolitical aspects, economic policies, bilateral agreement with trading partner are also found responsible in determining the direction of trade balance in Nepal.

A study conducted by Moses and Yao (2013) has assessed the effects of Foreign Direct Investment (FDI), Human Capital Development, Household Consumption Expenditure, Government Expenditure, Inflation, Natural Resources Availability, Foreign Income and Trade Liberalization and concluded that the variables are the main influencing factors for the case of Tanzania. On the other hand a study by Sulaiman (2010) revealed that foreign income, foreign direct investment, domestic house hold consumption and real effective exchange rate have significantly affected the trade deficit of Pakistan.

Studies have been conducted with the inclusion of macro-economic variables such as real exchange rate, GDP and money supply. For instance, Waliullah (et al 2010) has conducted a study using variables RER, GDP, and Money supply and concluded that there is a stable long-run relationship between the trade balance and income, money supply, and exchange rate variables. Similarly, a research by Jarita (2007) has been conducted to see the impacts of RER, GDP and money supply and revealed that there is evidence of long relation-ships between trade balance and income and money supply variables but not between trade balance and real exchange variable in Malaysia. Another study by Cesar A., et al (2002), has concluded a rise in domestic output growth and Shocks that increase the terms of trade or appreciate the real exchange rate are linked with higher current account deficits of developing countries.

Studies have also been conducted on the impacts of trade liberalization on the trade balance revealing contradictory results. Even though theoretically it is believed that trade liberalization can help countries to better utilize their resources through specialization and exploitation of economies of scale, some empirical evidences have concluded conversely. To this end, the World Bank Development Research Group (2000) have indicated that virtually all recent development success stories have been based on strong industrial export growth and relatively low barriers to imports. Similarly, Moses and Yao (2013) have concluded trade liberalization has positive impact on trade balance of Tanzania. Conversely, studies by Santos and Thirlwall (2004) and Muhammad (2014) have concluded that trade liberalization has worsened the trade balance. Similarly, Economic Commission for Africa (2013) also revealed most eastern African countries experienced a worsening trade balance due to trade liberalization. Moreover, Mohammed (et al 2016) indicates protectionist approach works for Bangladesh and as import tariffs goes high trade deficit goes down.

Determinants of trade balance have been studied on various countries experiences with the inclusion of different variables. However, the effects of variables such as the Real Effective Exchange Rate and GDP are contradictory amidst some studies. A study conducted on Pakistan's case by Sulaiman (2010) and Waliullah (et al 2010) have concluded that exchange rate depreciation is positively related to the trade balance in the long and short run, whereas GDP growth has positively affected the trade balance. Moreover, appreciation of real exchange rate and GDP growth are linked with higher current account deficits in developing countries (Cesar A. et al 2002). Conversely, according to a study for Malaysian case by Jarita (2007) there are no long run relationships between RER and trade balance, whereas GDP growth has negatively affected the trade balance. On the other hand, Mohammad and Mohd (2016) have concluded GDP has positively affected Bangladesh's trade balance.

The effect of FDI on the trade balance has also been conducted. In this regard, a study by Sarbapriya (2012) concluded FDI has positive impact on Indian trade balance and the increase in FDI flows may motivate the multinational corporations to produce import substitution

domestically and it can reduce import, hence, a positive impact on balance of trade. Similarly, studies by Chung Chen and Yimin Zhang (1995) and Peter and Sarah (2006) concluded contribution of FDI to the expansion of China's foreign trade is significant and US FDI in Mexico affects trade flows respectively.

Determinants of trade balance have also been conducted in the Ethiopian context with the inclusion of various variables and concluding contradictory results of some variables. For instance Gebe (2015) conducted a study on the Causes of Ethiopian deteriorating trade Balance and concluded the existence of stable long-run relationship between the trade balance and income, money supply, and exchange rate variables. Another study by Alekaw (2012) has revealed exchange rate play a weaker role in determining the behavior of trade balance in Ethiopia whereas Income, budget balance and money supply have a stronger impact on trade balance.

A study by Borena (2013) has been conducted on the effect of exchange rate movement on trade balance in Ethiopia and concluded the effect of real exchange rate is positive and statistically significant confirming that real depreciation succeeds in improving trade balance of Ethiopia in the long run and the sign of the coefficient of government expenditure is positive, although statistically insignificant. Moreover, Effectiveness of devaluation in achieving internal and external balance by Tamerayehu (2015) has discovered that devaluation/depreciation is effective in achieving internal balance (i.e. inflationary situations) but might not be effective in achieving external balance.

A research entitled Determinants and Potentials of Foreign Trade in Ethiopia conducted by Alekaw (2016) has revealed Ethiopia's export, import and total trade are positively determined by the size of the economies, per capita GDP differential and openness of the trading countries' economies and the exchange rate has no effect on Ethiopia's export trade. On the other hand, Abebe (2014) has concluded upon real depreciation trade balance deteriorates in the short run and subsequently improves. Another study on Ethiopia's External Trade Performance has been conducted by Alemayehu (2015), concluding Ethiopia has recently achieved a better performance

in the growth of its total merchandise trade however, the country is still expected to achieve better in terms of trade performance indicators such as composition of trade structure by product, geographical concentration of trade and normalized trade balance/export import coverage ratio.

The Impact of Trade Liberalization on the Ethiopian Trade Balance has been studied by Hailegiorgis (2012) concluding that trade liberalization led to the deterioration of the trade balance or too fast of an increase in imports which is against the theoretical belief that trade liberalization can help countries to better utilize their resources through specialization and exploitation of economies of scale. However, a study by Belayneh and Wondaferahu (2013) concluded the coefficient for trade openness/trade liberalization is found to be positive and one percent trade liberalization (openness) affects the Ethiopian export performance to increase by 0.54 percent per year. A study on narrowing trade deficit through import substitution has also been conducted by Samuel and Tarekegn (2011).

Other studies have been conducted on Ethiopian export performance. To this end, Belayneh and Wondaferahu (2013) have concluded in the long run export performance has found to be positively influenced by real effective exchange rate, openness, RGDP of home country, infrastructural development and private credit as a ratio of GDP. Similarly, Nega (2013) has revealed terms of trade, trade openness, gross domestic product, real effective exchange rate, domestic credit and capital expenditure over a period significantly affected export performance in the long run except capital expenditure. Another study by Elias (2011) concluded real exchange rate affects the volume of export of hides and skins. However, Wondemhunegn (2011) has revealed changes in exchange rate have little or no effect on Ethiopia's export growth.

The studies conducted in the Ethiopian context have also concluded ambiguous results regarding the effects of real exchange rate, GDP, and trade liberalization. Concerning real exchange rate for instance, Borena (2013) and Gebe (2015) have concluded the existence of stable long-run relationship between the trade balance and exchange rate. Furthermore, Abebe (2014) has revealed upon real depreciation trade balance deteriorates in the short run and subsequently improves following the J curve pattern. Similarly, Belayneh and Wondaferahu (2013) have

concluded in the long run export performance has found to be positively influenced by real effective exchange rate.

Specifically, a study for the case of exports of hides and skins by Elias (2011) concluded real exchange rate affects the volume of export of such commodities. Nega (2015) has also revealed that the depreciation of the real effective exchange rate improves the export performance and their international competitiveness but does not discourage imports, and it was insufficient to offset the remarkable growth of imports. However, in contrast to the positive impacts of depreciation on the trade balance and export growth, studies by Wondemhunegn (2011) and Alekaw (2012) have revealed that exchange rate play a weaker role in determining Ethiopia's export growth for the former and the behavior of trade balance for the later.

Regarding the effect of GDP, Alekaw (2012) has concluded an increase in GDP deteriorates the trade balance. Another study by Gebe (2015) revealed since 1992 Ethiopian economy experienced high growth in exports contributed by strong growth but still deteriorating net export. On the other hand, Belayneh and Wondaferahu (2013) have concluded one percent change on real GDP of home country results 1.7% increase in total export earnings. Concerning trade liberalization, Hailegiorgis (2012) has discovered that trade liberalization led to the deterioration of the trade balance or too fast of an increase in imports. Conversely, Ghiorgis (2013) concluded that in the post-1974 period, trade performance of Ethiopian economy was poor, and interventionist policies are among determinant factors of the terms and volume of trade. Moreover, Belayneh and Wondaferahu (2013) revealed the effect of trade openness/trade liberalization on export performance has found to be positive.

As far as recent trends are concerned, Ethiopia has shown changes with respect to factors determining the international trade. For instance, Foreign Direct Investment (FDI) inflow has been in progresses recently and a total of USD 4.5 billion worth of FDI projects have been operational between 2001 and 2013, UNDP Ethiopia no. 2 (2015). The government is also striving to attract more FDI and it is constructing Industrial parks (IPs) IMF (2015). Export of mineral resources such as gold is gradually gaining a share in total commodity exports and its

value in figure and percentage share to the total export earnings for the time through 2012/13-2014/2015 stood at USD 578.8 million, USD 456.20 million, USD 318.70 and 18.6%, 13.8%, 10.6% respectively, where the declines are attributed to decline in international price and export volume, NBE annual report (2014/15). The nation's commodity supply has also incorporated ores and metals in its total merchandize exports since 1993, with greatest share being 3% of total merchandise exports in 2007, whereas it stood at 1.16%, 0.62%, 0.06%, 0.3%, and 0.24% of total merchandise exports respectively for the time through 2010-14, World Bank (2015).

Commodities related to natural resource endowments are mainly dependent on import of products such as fuel. For instance, according to NBE report (2015) the nation's fuel import has stood at USD 2.1 billion, USD 2.6 billion and USD 2.04 billion with 19%, 18.8%, and 12.4% share from total import bills respectively for 2012/13, 2013/14 and 2014/15 respectively. Furthermore, import of fuel products which has the largest share from the total imports related to natural resources as well as total imports of the nation is increasing from time to time. For instance, import of fuel products has shown increments of 85% and 22% for the time from 2006/07 to 2007/08 and 2007/08 to 2008/09 respectively, whereas 18% and 21% respectively for the time from 2012/13-2013/14 to 2013/14-2014/15.

Regarding policy issues, the country has made economic reforms and relatively liberalized its trade since 1991 and has implemented packages such as Structural Adjustment Programs (SAP), sponsored by the International Monetary Fund (IMF) and the World Bank (WB). The nation has become a member of the Common Market for Eastern and Southern Africa (COMESA) trade bloc and has signed and ratified the Abuja Treaty that aims to establish African Economic Community (AEC), and Everything but Arms (EBA) preferential trade arrangement with the EU at the inter-regional level. Being land locked a geographical factor is also a bottle neck for the nation's participation in international trade forcing a significant amount of foreign currency payments as port service fees valuing around USD 2 million/day Addis standard (2013).The nation's costs of importing, exporting and time to export are also significant being around USD 3,000/container, USD 2,000/container and 45 days respectively forcing the country to have lower score of non-tariff trade barriers compared to Sub Saharan African countries IMF (2015).

2.3. Conceptual Framework

Countries run deficits in their trade balance for various reasons. The characteristics of commodities being exported and imported is among the factors that determine the terms of trade. In this regard, structural approaches pay due attention for structural causes relating traded goods and the efficiency of producing those traded goods Graham Bird (1981). Despite this fact however, there are other theoretical aspects regarding what determines the trade balance. Balance of payment approaches as well as trade theories, models and policies have indicated that macro-economic, policy and geographical factors are also responsible in determining the trade balance. To this end various literatures have included different variables affecting the trade balance through the variable's effects on the patterns of trade. For instance, World Bank (2013) has indicated that demography, investment, technology, energy and other natural resources, transportation costs and the institutional framework affects the patterns of international trade.

A study by Rajan (2008) has been conducted to see the effects of variables such as External Shocks, Fiscal Deficit, Monetary Policy, Trade Liberalization, Economic Growth, Lack of Competitiveness, being Land-locked, Political Instability and Conflict, geopolitical aspects, economic policies, bilateral agreement with trading partner are also found responsible in determining the direction of trade balance in Nepal. Another study by Moses and Yao (2013) has included the variables Foreign Direct Investment (FDI), Human Capital Development, Household Consumption Expenditure, Government Expenditure, Inflation, Natural Resources Availability, Foreign Income and Trade Liberalization and concluded that the variables are the main influencing factors for the case of Tanzania.

Based on the theoretical and empirical literatures reviewed as well as country specific factors, the study has been conducted to see the effects of Real Effective Exchange Rate, Household Consumption Expenditure, Government Expenditure, Openness/Liberalization (measured by the ratio of total imports and exports to the GDP), Money Supply (broad money), and Natural Resource Availability (by employing the ratios: mineral resource exports to total exports and fuel import to total imports as proxies). It has applied the Auto Regressive Distributed Lag (ARDL) bound testing approach for co-integration and the time frame from 1984/85 to 2016/17 has been covered.

CHAPTER THREE

3. RESEARCH METHODOLOGY

3.1. Research Design

The study is quantitative analytical research type. It has involved testing the effects of variables whose data are expressed quantitatively. It analyzes the factors that determine trade balance of Ethiopia. It has assessed the causes of trade deficit in the Ethiopian context. In so doing, the study has mainly focused on whether the variables real exchange rate, expenditures induced by GDP growth, trade liberalization, and natural resource availability are the causes for the ongoing trade deficit and if they are the causes the magnitudes of the variables impact on the trade balance.

3.2. Data Type, Sources and Data Collection Methods

The study mainly uses secondary time series data. Specifically, time series data of the variables for the time frame through 1984/85-2016/17 is used. In so doing the data have been obtained from concerned local authorities such as NBE, MOFED, EEA, ERCA and CSA and international agencies such as the World Bank and World Trade Organization (WTO). The data from international organs is collected from their respective databases, whereas sources of data from locally concerned authorities is obtained directly from annual reports and surveys of those organs and their respective databases.

3.3. Data Analysis Method

The study has applied both the descriptive and econometric analysis methods. Trends of Ethiopian export and import transactions and the overall trade balance trend are analyzed using the descriptive technique (i.e. comparison among various trends are analyzed using statistical tools such as mean, median, etc.). Moreover, tables, graphs and charts have been incorporated in order to analyze the overall trends of export, import and the trade balance. Furthermore, the Auto Regressive Distributed Lag (ARDL) co-integration technique developed by Pesaran and Shin (1999) and Pesaran et al. (2001) is employed as an econometric analysis method so as to indicate whether causalities exist between the independent variables and trade balance, and if so the directions and magnitudes of the effects.

The study has mainly used time series data which is one of the important types of data used in empirical analysis. However, though such data are frequently used in practice they pose several challenges to econometricians and practitioners for the following reasons Gudjarati (2004):

- First, empirical work based on time series data assumes that the underlying time series is stationary.
- Second, sometimes autocorrelation results because the underlying time series is non-stationary.
- Third, in regressing a time series variable on another time series variable(s), one often obtains a very high R^2 (in excess of 0.9) even though there is no meaningful relationship between the two variables
- Finally, causality tests such as Granger assume that the time series involved in analysis are stationary. Therefore, tests of stationary should precede tests of causality.

Given the challenges regarding time series data, this paper has employed the Auto Regressive Distributed Lag (ARDL) co-integration technique developed by Pesaran and Shin (1999) and Pesaran et al. (2001). The ARDL is employed because of the following advantages:

- ARDL co-integration technique is preferable when dealing with variables that are integrated of different order, $I(0)$, $I(1)$ or combination of both and, robust when there is a single long run relationship between the underlying variables in a small sample size. Hence, there is no need of pre testing for stationary behavior of the time series data and order of integration.
- ARDL enables identification of the co-integrating vectors where there are multiple co-integrating vectors, Nkoro (2016),
- Endogeneity is less likely to be a problem in ARDL because it is free from residual correlation since each of the underlying variables stand as a single equation,
- The Error Correction Model (ECM) can be derived from ARDL model through a simple linear transformation, which integrates short run adjustments with long run equilibrium without losing long run information, and

- Finally, many recent studies conducted on the issue of determinants of trade deficit in particular and on time series data in general have employed the ARDL technique of co-integration.

3.3.1. Unit Root Test

The study has mainly employed time series data which is mostly characterized by exhibiting non stationary behavior. Regression of a non-stationary series on another non-stationary series lead to what is known as spurious regression and sometimes autocorrelation results because the underlying time series is non-stationary. Furthermore, regression of a time series variable on another time series variable(s), one often obtains a very high R^2 even though there is no meaningful relationship between the two variables. Hence, it is necessary to apply tests such as the unit root test so as to check for stationary (non-stationary) behavior. The unit root is tested with techniques such as Augmented Dickey Fuller (ADF) and Phillip-Pheron (PP).

3.3.1.1. Augmented Dickey Fuller (ADF)

Augmented Dickey Fuller (ADF) is a test developed by Dickey and Fuller in cases where the u_t 's are correlated. It involves estimating the following regression:

$$Y_t = \beta_1 + \beta_2 \Delta Y_{t-1} + \sum_{i=1}^m \beta_{i+1} \Delta^i Y_{t-1} - \delta Y_{t-1} + \epsilon_t \dots \dots \dots 3.4.1$$

Where ϵ_t is a pure white noise error term, Δ is the first difference operator while Y_t is non-stationary, its first difference is stationary where $Y_{t-1} = (Y_{t-1} - Y_{t-2})$, $Y_{t-2} = (Y_{t-2} - Y_{t-3})$, etc. The number of lagged difference terms to include is often determined empirically, since it is required to include enough terms so that the error term in equation 3.1 is serially uncorrelated. Determining whether a time series is stationary or not involves testing the null hypothesis $\delta = 0$; (i.e. there is a unit root) the time series is non-stationary against the alternative hypothesis $\delta < 0$; that is, the time series is stationary. If the null hypothesis is rejected, it means that Y_t is stationary Gudjarati (2004).

3.3.1.2. Phillips-Perron Unit Root Test

Phillips and Perron use nonparametric statistical methods to take care of the serial correlation in the error terms without adding lagged difference terms. PP test is robust with respect to

unspecified autocorrelation and heteroscedasticity in the disturbance process of the test equation Gujarati (2004).

3.4. Model Specification

Trade balance is a term given for the difference of total exports and total imports. It can also be computed as a ratio of total exports to the total exports. This study will employ the ratio of total exports to total imports as a measure of trade balance. This ratio is preferable because it is not sensitive for units of measurement and can be interpreted in nominal as well as real trade balance Mohsen Bahmani-Oskooee (1991). As have been done in empirical investigations such as Mohsen Bahmani-Oskooee (1991), Anil K. Lal and Thomas C. Lowinger (2002), Cesar A. Calderon (et al 2002), Mohsen Bahmani-Oskooee and Artatrana Ratha (2007), Jarita Duasa (2007), Waliullah (et al 2010), and Moses Joseph Shawa and Yao Shen (2013) this paper will employ the log of the ratio of total exports to total imports for trade balance and all the explanatory variables in log form.

Similarly, studies conducted in the Ethiopian context such as by Alekaw (2014), Abebe (2014) and Gebe (2015) have also used the log-log functional form. Beside the fact that various studies have used such a functional form, the log-log model is preferable in that the slope coefficient measures the elasticity of the dependent variable with respect to the independent variable, (i.e. the percentage change in dependent variable for a given (small) percentage change in the independent variable) Gujarati 2004.

The mathematical computation of the model is formulated as:

$$TB = X - M \dots \dots \dots 3.5.1$$

Based on the theoretical and empirical reviews, as well as country specific characteristics of the nation under investigation, the factors that are thought to affect the trade balance are: real effective exchange rate (REER), household consumption expenditure (HHE), government expenditure (GEX), foreign direct investment (FDI), trade liberalization or openness (TRL), and natural resource availability (NRA).

Therefore, trade balance is stated as a function of the aforementioned variables as:

$$TB = f(\text{REER}, \text{GEX/GDP}, \text{HHE/GDP}, \text{MS}, \text{FDI}, \text{TRL}, \text{NRA}, e) \dots \dots \dots 3.5.2$$

Writing equation 1 in log form,

$$\ln TB = \ln X - \ln M \dots \dots \dots 3.5.3$$

Or,

$$\ln TB = \ln X / \ln M$$

$$\ln TB = \ln f(\text{REER}, \text{GEX/GDP}, \text{HHE/GDP}, \text{MS}, \text{FDI}, \text{TRL}, \text{NRA}) \dots \dots \dots 3.5.4$$

The paper has employed the Auto Regressive Distributed Lag (ARDL) co-integration technique developed by (Pesaran and Shin 1999 and Pesaran et al. 2001) in order to assess co-integrating relationship existing among the dependent and independent variables. In so doing, the following steps are followed, Emeka and Aham (2016).

3.4.1. Determination of Existence of the Long Run Relationship of the Variables

This is a stage where the long run relationship existing between variables is assessed. Existence of such a relationship is tested by computing bound test for co-integration (bound F-statistic) in order to establish long run relationship among variables. ARDL is extremely useful because it allows us to describe the existence of an equilibrium/relationship in terms of long-run and short-run dynamics without losing long-run information. The ARDL involves estimating the following equation:

$$\begin{aligned} \Delta \ln \left(\frac{X}{M} \right)_t = & \beta_0 + \sum_{i=1}^k \beta_{1i} \Delta \ln \left(\frac{X}{M} \right)_{t-i} + \sum_{i=0}^k \beta_{2i} \Delta \ln(\text{REER})_{t-i} + \sum_{i=0}^k \beta_{3i} \Delta \ln \left(\frac{\text{GEX}}{\text{GDP}} \right)_{t-i} + \sum_{i=0}^k \beta_{4i} \Delta \ln \left(\frac{\text{HHE}}{\text{GDP}} \right)_{t-i} \\ & + \sum_{i=0}^k \beta_{5i} \Delta \ln \left(\frac{X+M}{\text{GDP}} \right)_{t-1} + \sum_{i=0}^k \beta_{6i} \Delta \ln(\text{MINX/X})_{t-1} + \sum_{i=0}^k \beta_{7i} \ln \left(\frac{\text{FLM}}{M} \right)_{t-1} \\ & + \sum_{i=0}^k \beta_{8i} \Delta \ln(\text{MS})_{t-i} + \alpha_1 \ln(X/M)_{t-1} + \alpha_2 \ln(\text{REER})_{t-1} + \alpha_3 \ln(\text{GEX/GDP})_{t-1} \\ & + \alpha_4 \ln(\text{HHE/GDP})_{t-1} + \alpha_5 \ln((X+M)/\text{GDP})_{t-1} + \alpha_6 \ln(\text{MINX/X})_{t-1} + \alpha_7 \ln(\text{FLM/M})_{t-1} \\ & + \alpha_8 \ln(\text{MS})_{t-1} + V_{it} \dots \dots \dots 3.5.5 \end{aligned}$$

Where;

$\ln(X/M)$: ratio of total export to total imports (trade balance),

ln(REER): Real Effective Exchange Rate,

ln(GEX/GDP): ratio of government expenditure to the GDP,

ln(HHE/GDP): ratio of household consumption expenditure to the GDP,

ln (MS): Money supply,

ln(X+M/GDP): ratio of import and export to GDP (openness or trade liberalization),

ln(MINX/X) & ln(FLM/M):ratio of Mineral resource exports to total export value; and ratio of fuel import to total import bills (proxies for natural resource availability)

The first part of the equation (i.e. $\beta_{1i}, \beta_{2i}, \beta_{3i}, \beta_{4i}, \beta_{5i}, \beta_{6i}, \beta_{7i}, \beta_{8i}$) represents short run dynamics of the model, whereas the second part (i.e. $\alpha_1, \alpha_2, \alpha_3, \alpha_4, \alpha_5, \alpha_6, \alpha_7, \alpha_8$) represents the long run relationship. Determination of existence of long run relationship involves testing the following hypothesis:

- *Null hypothesis (H_0):* $\alpha_1 = \alpha_2 = \alpha_3 = \alpha_4 = \alpha_5 = \alpha_6 = \alpha_7 = \alpha_8 = 0$, no long run relationship
- *Alternative hypothesis (H_1):* $\alpha_1 \neq \alpha_2 \neq \alpha_3 \neq \alpha_4 \neq \alpha_5 \neq \alpha_6 \neq \alpha_7 \neq \alpha_8 \neq 0$, there is long run relationship among variables.

The F test is used for testing the existence of long run relationship among the explanatory variables and the dependent variable. The F test involves testing the null hypothesis (H_0) of no co-integration against the alternative hypothesis (H_1) of there is co-integration. In doing so, the calculated F statistics is compared with the critical values. The critical values are determined in the following manner: One set assuming that all the variables are I(0) (i.e. lower critical bound which assumes all the variables are I(0), meaning that there is no co-integration among the underlying variables) and another assuming that all the variables in the ARDL model are I(1) (i.e. upper critical bound which assumes all the variables are I(1), meaning that there is co-integration among the underlying variables).

The critical values are selected as recommended by Narayan P.K. (2004). According to Narayan, the critical values in Pesaran et al. (2001) cannot be applied for small sample sizes as they are based on large sample sizes, recommending a set of critical values for small sample sizes ranging from 30 to 80 observations: 2.496 - 3.346, 2.962 – 3.910, and 4.068 – 5.250 at 90%, 95%, and 99%, respectively. The decision of existence of long run relationship is determined in the

following manner: If the calculated F value is greater than the upper bound critical value, then the H_0 (no co-integration) is rejected, whereas if the calculated F value is below the lower bound critical value the H_0 will not be rejected. On the other hand, if the computed F statistic falls between the lower and upper bound of the critical value band, the result of the inference is inconclusive and depends on whether the underlying variables are I(0) or I(1) Nkoro and Oku (2016).

3.4.2. Choosing the Appropriate Lag Length for the ARDL Model/

Estimation of the Long Run Estimates of the Selected ARDL Model

The next step in applying the ARDL technique will be choosing the appropriate lag length, given the fact that the existence of long run relationship is assured. Finding the appropriate lag length for each underlying variable is very important. Selection of the appropriate model of the long run equation involves determination of the optimum lag length (K) by using proper model order selection criteria such as the Akaike Information Criterion (AIC), Schwarz Bayesian Criterion (SBC) or Hannan-Quinn Criterion (HQC). Based on the selected appropriate lag length, the ARDL (K) model long run equation will be:

$$\begin{aligned} \ln\left(\frac{X}{M}\right)_t = & \beta_1 + \sum_{i=1}^k \beta_{1i} \ln\left(\frac{X}{M}\right)_{t-i} + \sum_{i=0}^k \beta_{2i} \ln(\text{REER})_{t-i} + \sum_{i=0}^k \beta_{3i} \ln\left(\frac{\text{GEX}}{\text{GDP}}\right)_{t-i} \\ & + \sum_{i=0}^k \beta_{4i} \ln\left(\frac{\text{HHE}}{\text{GDP}}\right)_{t-i} + \sum_{i=0}^k \beta_{5i} \ln\left(\frac{X+M}{\text{GDP}}\right)_{t-i} + \sum_{i=0}^k \beta_{6i} \ln(\text{MINX}/X)_{t-i} \\ & + \sum_{i=0}^k \beta_{7i} \ln\left(\frac{\text{FLM}}{M}\right)_{t-i} + \sum_{i=0}^k \beta_{8i} \ln(\text{MS})_{t-i} + e_i \dots\dots\dots 3.5.6 \end{aligned}$$

3.4.3. Re-parameterization of ARDL Model into Error Correction Model

Regressing non stationery variables may lead to spurious and misleading results and in fact most time series data exhibit non stationery behavior. In order to have stationery variables mechanisms such as differencing the data will be employed. In so doing, the problem of obtaining spurious results will be resolved. However, the regression equation will only reveal the short run dynamics. In this regard, it is imperative to apply the Error Correction Model (ECM) which

positive sign through increasing/reducing the exports/imports respectively, bettering off the trade balance henceforth.

- J.M. Keynes (1935) has indicated an increase income will encourage citizens to buy more imported goods and thus worsens the trade balance. A study by Moses and Yao (2013) has also concluded that increased household expenditure induced by growth in income/GDP has negatively affected trade balance of Tanzania. Household consumption expenditure (HHE) on imported goods is expected to increase as a result of an increase in income (GDP), which will worsen the net export. Hence the expected sign of HE is negative.
- In a similar manner to a study by Moses Joseph Shawa et al (2013), growth in income (GDP) will lead to increased Government Expenditure (GEX) on imported goods leading GE to have negative expected sign.
- Money supply (MS) is expected to have negative sign. The monetary approach by Polak (1957); Hahn (1959); Pearce (1961); Prais (1961); Mundell (1968, 1971) has emphasized that an increase in money supply over money demand will create capital outflow since the surplus will create greater demand for imported goods. Studies have also assured such an effect. For instance Jarita (2007) and Waliullah (et al 2010) have concluded that an increase in money supply has negatively affected the trade balance.
- Trade liberalization ($X+M/GDP$) is believed to help countries to better utilize their resources through specialization and exploitation of economies of scale further leading to export promotion and hence it is expected to have positive sign. Empirically, studies such as by World Bank Development Research Group (2000) as well as Moses and Yao (2013) have concluded trade liberalization has positive impact on trade balance.
- World Bank (2013) has indicated that energy and other natural resources among other things affect the patterns of international trade. Furthermore, Moses and Yao (2013) have concluded that natural resource availability positively affects Tanzania's trade balance. In so doing, the impact of natural resource availability is tried to be reflected from exports and imports of commodities related to mineral resource. The more the availability of natural resources and exploitation of same will increase total export earnings and reduces the dependency on imports of such commodities. Hence, it is believed to improve net exports leading ($MINX/X$) to expected positive sign. On the other hand, being dependent

on imports related to natural resource such as fuel, the nation is forced to spend huge amount of foreign currency for such commodities. Hence, the ratio of fuel imports to total import bills (FLM/M) will have a negative sign.

CHAPTER FOUR

4. DISCUSION AND RESULTS

4.1. Overview of Recent Trends

Ethiopia, an agrarian economy is characterized by higher degree of export concentration of primary agricultural products. On the other hand, its imports comprise capital goods, consumer goods, raw materials and petroleum products. As components of the trade balance, this section will provide an overview of recent export and import trends as well as the trade balance.

4.1.1. Exports

The country's total export proceeds are mainly obtained from primary agricultural and agriculture related products, mineral resource related products and others. The export items include: coffee, oil seeds, leather and leather products, pulses, meat products, fruits and vegetables, sugar, khat, live animals, gold, tantalum and petroleum products. Total proceeds from export earnings have shown a fluctuating trend throughout the time span from 1980/81 to 2016/17. For instance, total export earnings have stood at USD 411.4 mln, USD 359.7 mln, USD 355.9 mln, USD 437.09 mln, USD 486.06 mln, USD 847.36 mln, USD 2.02 bln, and USD 2.97 bln respectively for 1980/81, 1984/85, 1989/90, 1994/95, 1999/00, 2004/5, 2009/10, and 2014/15. The export figure has shown a significant progress from the period 2004/5 (USD 847.36 mln) onwards and stood at (USD 2.97 bln), showing a 257% increment.

Table 4.1: Total export earnings in millions of USD

	1980/81	1984/85	1989/90	1994/95	1999/00	2004/5	2009/10	2014/15
Earnings	411.4	359.7	355.9	437.09	486.06	847.37	2,025.87	2,978.78
% change	–	13.00	(1.00)	23.00	11.00	74.00	139.00	47.00

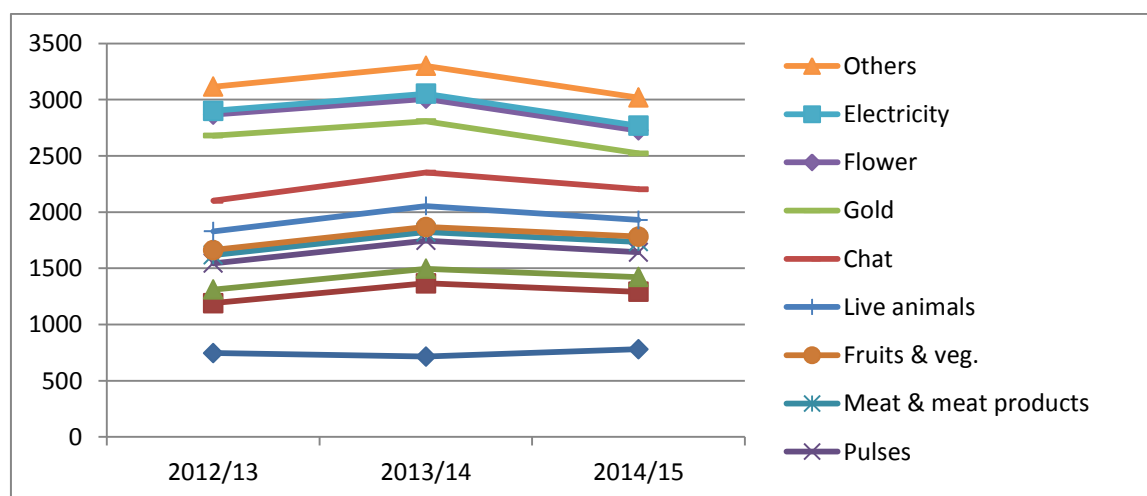
Source: *NBE annual report*

Chart 4.1: Total export earnings in millions of USD



Source: NBE annual report

Chart 4.2: Export figures by item 2012/13-2014/15 in million USD



Source: NBE annual report 2014/15

4.1.2. Imports

Total spending on import bills have shown a significant increment for most of the period throughout the time span of the study. For instance, the total import bills for the time periods 1980/81, 1984/85 and 1989/90 have stood at USD 668.7 mln, USD 855.28, and USD 881.21 mln

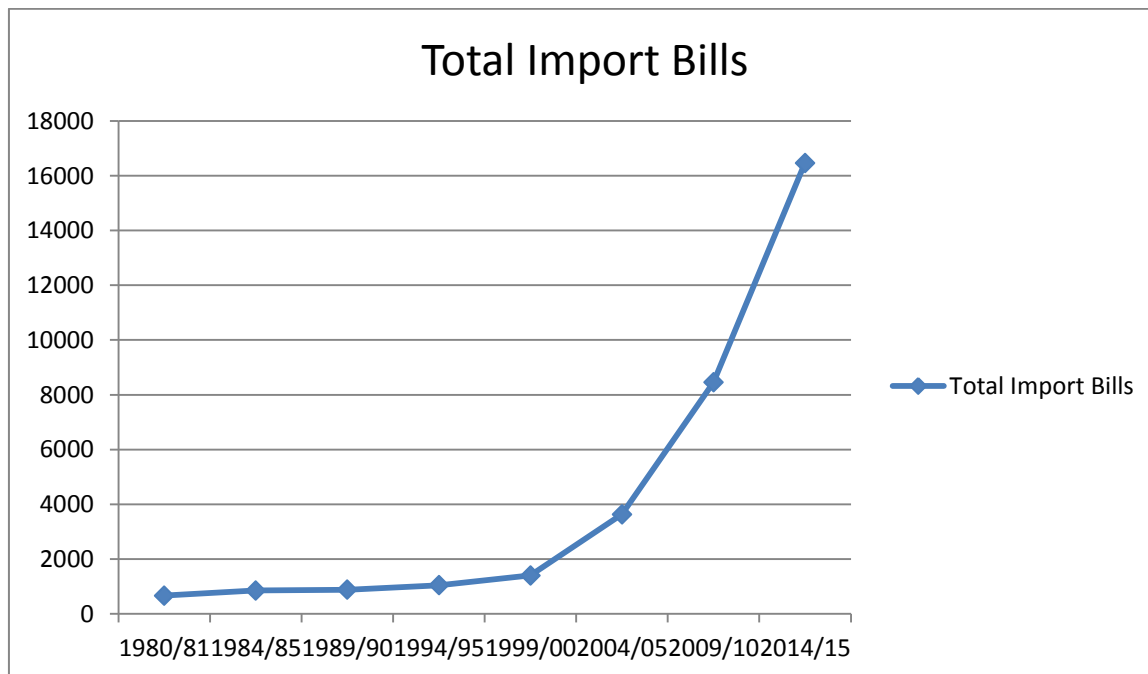
respectively. The country's total import bills have further shown a significant increment from 1994/95 onwards, and stood at USD 1.04 bln, USD 1.4 bln, USD 3.63 bln, USD 8.45 bln and 16.46 bln with 19%, 34%, 159%, 133% and 95% increments respectively for 1994/95, 1999/00, 2004/05, 2009/10 and 2014/15.

Table 4.2: Total import bills in millions of USD

	1980/81	1984/85	1989/90	1994/95	1999/00	2004/5	2009/10	2014/15
Import bills	668.7	855.28	881.21	1,047.32	1,404.8	3,633.2	8,452.18	16,461
% change	–	28.00	3.00	19.00	34.00	159.00	133.00	95.00

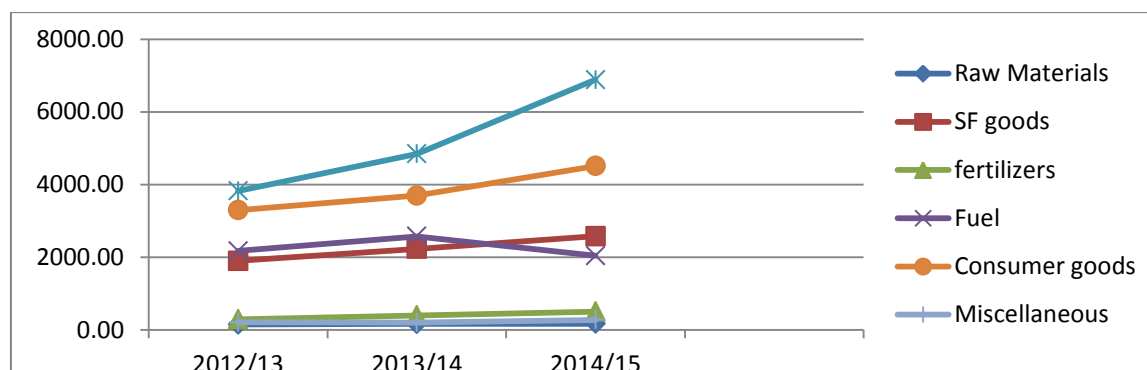
Source: NBE annual report

Chart 4.3: Total import bills in millions of USD



Source: NBE annual report

Chart 4.4: Import figures by item 2012/13-2014/15 in million USD.



Source: NBE annual report 2014/15

4.1.3. Trade Balance

The trade balance which is also called net exports (NX) is defined as the difference between a nation's total earnings from export transactions and total payments made by a nation for import transactions. It can also be computed as the ratio of total export proceeds received from export transactions to the total payments made for import bills. Thus, an economy is said to run surpluses in the trade balance if its total receipts from exports exceed the total payments for import bills. Conversely a nation is said to run deficits in its trade balance if the total payments for import bills exceed the total proceed gained from exports.

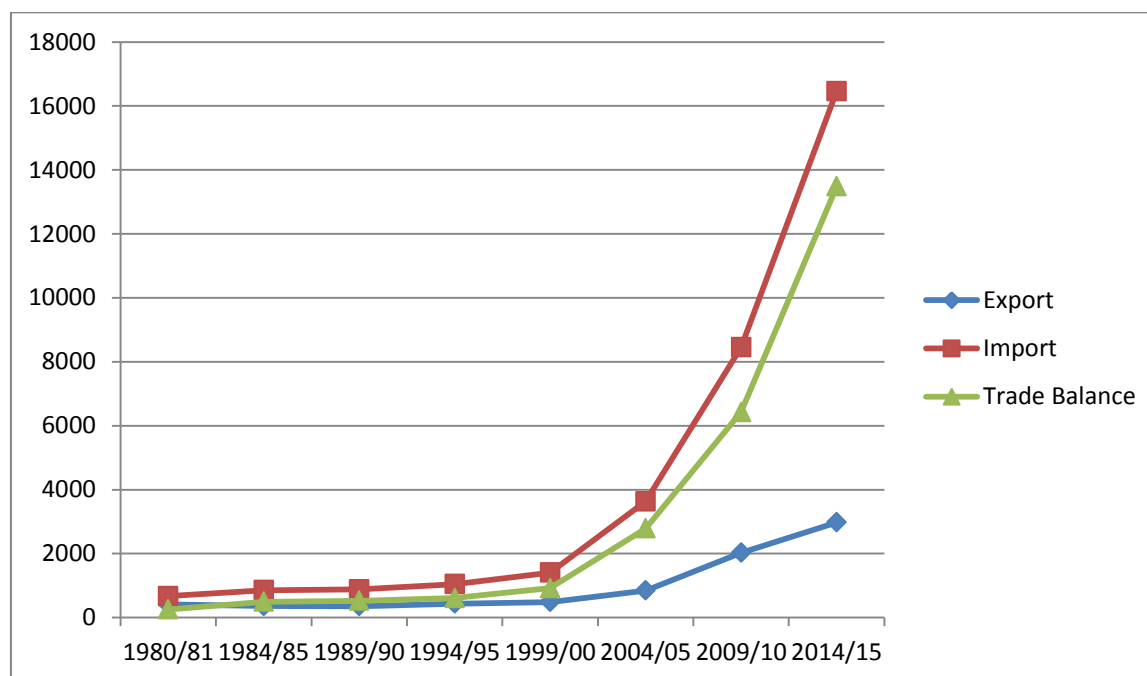
The trade balance trend of Ethiopia shows an ever widening trade deficit. According to reports obtained from National Bank of Ethiopia (NBE) and the World Bank (WB), the nation has encountered deficits in its trade balance throughout the time span of the study. According to NBE's report for instance, the trade deficit has stood at USD 257.35 mln, USD 495.6 mln, USD 525.27 mln, USD 610.22 mln, USD 918.73 mln, USD 2,785.88 mln, USD 6,426.31, and USD 13,482.24 mln respectively for 1980/81, 1984/85, 1989/90, 1994/95, 1999/00, 2004/5, 2009/10, and 2014/15. The trade deficit has shown increments of 92.6%, 6%, 16.17%, 50.6%, 203.23%, 130.67%, and 109.8% respectively for the above stated periods of time.

Table 4.3: Trends of the trade balance in millions of USD

	1980/81	1984/85	1989/90	1994/95	1999/00	2004/5	2009/10	2014/15
Export (A)	411.4	359.7	355.9	437.09	486.06	847.37	2,025.87	2,978.78
% change	–	13.00	(1.00)	23.00	11.00	74.00	139.00	47.00
Import bills (B)	668.7	855.28	881.21	1,047.32	1,404.8	3,633.2	8,452.18	16,461
% change	–	28.00	3.00	19.00	34.00	159.00	133.00	95.00
TB (A-B)	(257.35)	(495.6)	(525.27)	(610.22)	(918.73)	(2,786)	(6,426.31)	(13,482)
% change	–	92.6	6.00	16.17	50.6	203.23	130.67	109.8

Source: NBE annual report

Chart 4.5: Export, Import and Trade Balance in millions of USD



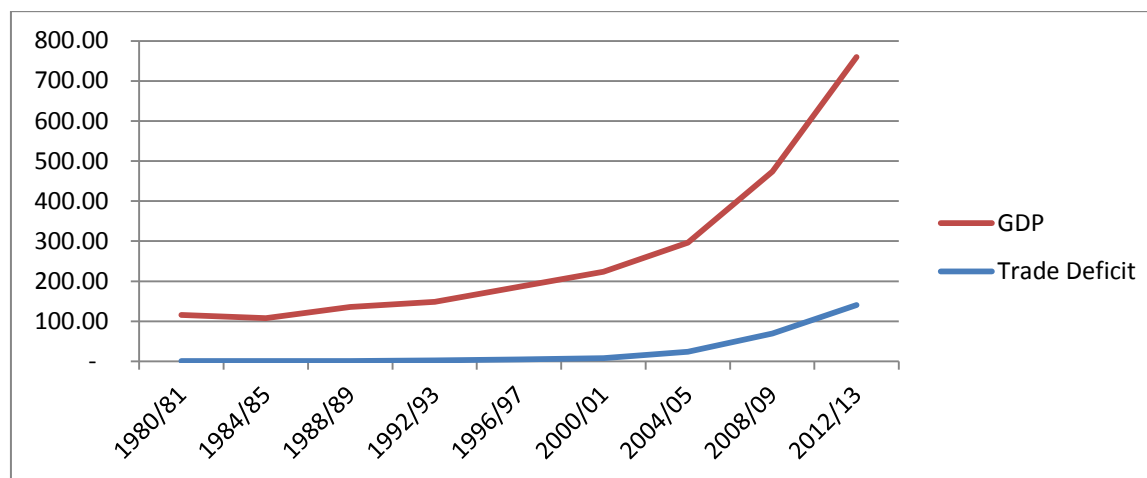
Source: NBE annual report

The trend of trade balance can also be seen in comparison with the GDP trend. In so doing, the ratio of trade deficit to the GDP has shown an increasing trend throughout most of the period through 1980/81 to 2016/17. For instance, the ratio has stood at 0.46% for the period 1980/81 and increased to 1%, 2%, 3%, 4% and 9% respectively for the periods 1988/89, 1992/93, 1996/97, and 2000/01. The ratio has further got significantly increased to 9%, 17%, and 23% for the periods 2004/05, 2008/09, and 2012/13 respectively.

Table 4.4: Trade balance, GDP and TB/GDP in millions of Birr

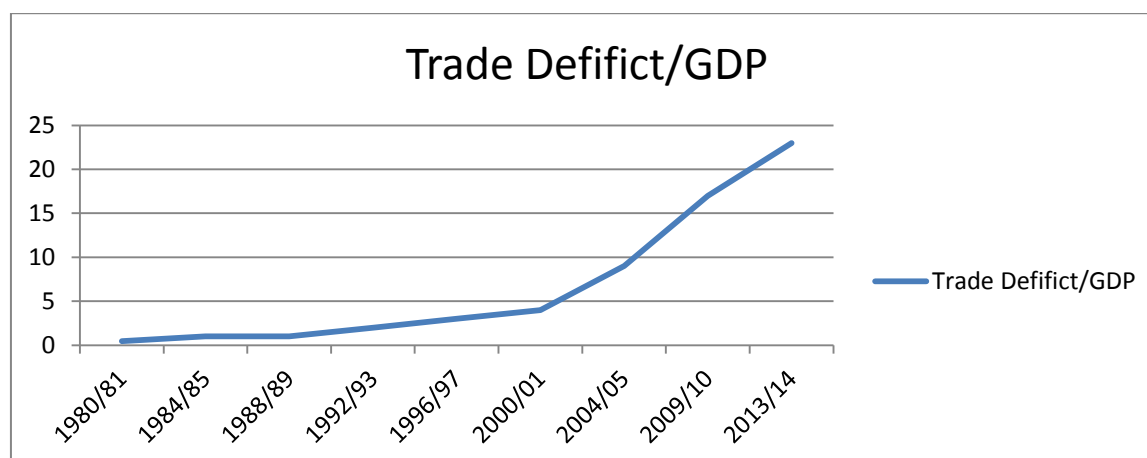
	1980/81	1984/85	1988/89	1992/93	1996/97	2000/1	2004/5	2008/9	2012/13
TB	(532.73)	(1,026)	(1,207)	(2,818)	(5,020)	(8,447)	(24,103)	(69,459)	(140,856)
GDP	115,224	107,221	134,767	145,799	180,911	215,619	272,142	404,338	618,842
TB/GDP	0.46%	1%	1%	2%	3%	4%	9%	17%	23%

Chart 4.6: Trade Deficit and GDP in billion birr



Source: NBE

Chart 4.7: Ratio of trade deficit to the GDP



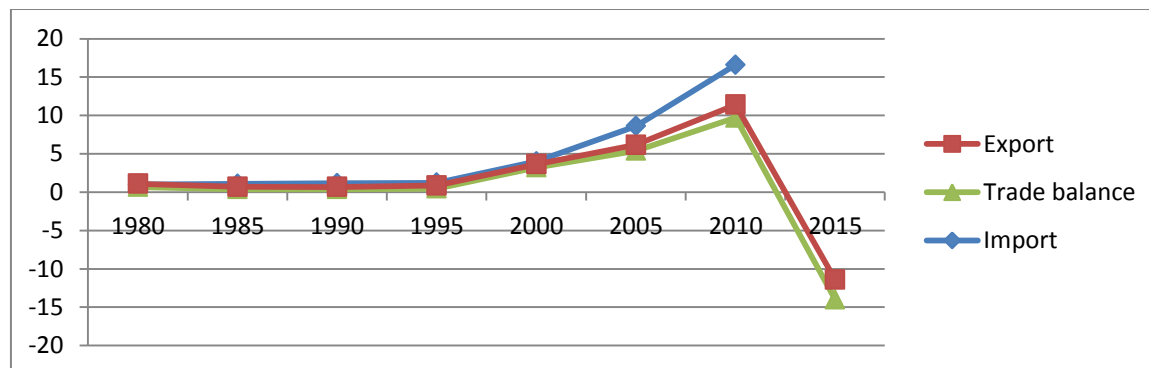
Other sources such as World Bank report have also shown the pattern of Ethiopian trade balance.

In this regard, World Bank report (2015) has revealed that Ethiopia's trade balance has been in

deficit for the time through 1974 to 2014, though the trend of the deficits shows ups and downs. The trends have varied from year to year with some increments/falling of a given year's deficit compared to the preceding one. The deficit has stood below 1 billion USD until 1999 and for the time onwards it has become more than 1 billion USD with the exception of the year 2000 with a deficit of around 787 USD million. For instance, the nation has run deficits that stood at 1.5 billion USD, 1.15 billion USD, 1.63 billion USD, 1.99 billion USD, and 3.30 billion USD for the time from 2001-2005 respectively, whereas the respective percentage increments of the deficits of the period through 2003-2005 from their preceding year counterparts are 42.58%, 21.58%, and 66.07%..

The nation's trade deficit has further got widened for the periods throughout 2002-2014, with the exception of 2009 with a lower deficit that stood at around 5.60 billion USD compared to 5.73 billion USD for 2008. According to the report, total export earnings have increased throughout 2001-2014 from 286 million USD in 2001 to around 2.6 billion USD for 2014 showing a 809% increment. Total import bills have also increased dramatically for the time through 2001-2014 and stood at 1.78 billion USD and 16.6 billion USD respectively for 2001 and 2014 with 834% increment. As a result, the trade deficit has further widened since the increments in total imports by far outpaced that of the total exports. Moreover, recent trends revealed the fact that the gap has increased dramatically and stood at 6.91 billion USD, 7.78 billion USD, 10.6 billion USD, 11.12 billion USD, and 14.05 billion USD respectively for the time through 2010-2014 World Bank report (2015).

Chart 4.8: total imports, total exports, and trade balance 2010-2014 in billion USD



Source: World Bank report 2015

4.2. Unit Root Test

This study has mainly employed time series data which is mostly characterized by exhibiting non-stationary behavior. Regression of a non-stationary series on another non-stationary series lead to what is known as spurious regression and sometimes autocorrelation results because the underlying time series is non-stationary. Furthermore, regression of a time series variable on another time series variable(s), one often obtains a very high R^2 even though there is no meaningful relationship between the two variables. Even though ARDL does not require pre testing, it is necessary to test for Unit root so as to decide whether ARDL should be employed or not. Hence, it is necessary to apply tests such as the Augmented Dickey Fuller (ADF) and Phillip-Pheron (PP).

4.2.1. Augmented Dickey Fuller (ADF)

The results of ADF shows that the variables under consideration exhibits both I(0) and I(1). The variables LNOP, LNMRX, and LNFLM are stationary at level I(0), whereas LNTB, LNREER, LNMS, LNGEXGDP, and LNHHEGDP are stationary at difference I(1). The unit root test result of ADF is tabulated below:

Table 4.5.

Variables	ADF test with trend and intercept	
	Level	First difference
LNTB	2.42	5.72***
LNREER	2.25	5.207***
LNMRX	2.67*	5.95***
LNGEXGDP	1.86	4.3***
LNHHEGDP	1.94	6.26***
LNFLM	3.92***	8.3***
LNOP	5.98***	2.16
LNMS	2.55	3.44*

4.2.2. Phillips Pheron Test

The unit root test results of PP are tabulated below:

Table 4.6.

Variables	PP test with trend and intercept	
	Level	First difference
LNTB	2.47	6.22***
LNREER	1.92	4.69***
LNMRX	2.80	5.96***
LNGEXGDP	1.86	4.2***
LNHHEGDP	2.09	6.27***
LNFLM	3.95***	11.89***
LNOP	0.66	4.62***
LNMS	3.74	3.42*

4.3. Diagnostic Tests

This section has assessed various diagnostic tests such as normality test, serial correlation LM test, and hetroscedasticity test. The results are tabulated as follows:

Table 4.7

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.658867	Prob. F(1,19)	0.2132
Obs*R-squared	2.569537	Prob. Chi-Square(1)	0.1089

The Breusch-Godfrey serial correlation LM test shows that there no serial correlation in the model since the F statistics 1.65 (Prob 0.21) is not significant enough to accept the null hypothesis there is serial correlation.

Table 4.8

Normality test (Histogram)

Jarque-Bera	Probability
0.7412	0.6903

Table 4.9

Stability test- Ramsey

	Value	df	Probability
t-statistic	0.445501	19	0.6610
F-statistic	0.198471	(1, 19)	0.6610

Table 4.10
Heteroskedasticity Test: ARCH

F-statistic	1.426903	Prob. F(1,29)	0.2419
Obs*R-squared	1.453779	Prob. Chi-Square(1)	0.2279

The ARCH test indicates that there is no heteroscedasticity since the F statistics 1.42 is not significant to reject the null hypothesis there is no heteroscedasticity.

4.4. Existence of Long Relationship (Bound Test)

This is a test where existence of long run relationship among variables is examined. Hence, as can be seen from table 1 and 2 above, the variables have exhibited $I(0)$ and $I(1)$, so it is able to proceed with ARDL. The main assumption of ARDL is that the variables in model are co-integrated to the order of $I(0)$ or $I(1)$ or both, and the next step will be examination of existence of long run relationship among variables which is performed by bound test. The bound test is performed based on lag order on the basis of the Schwarz-Bayesian criteria (SBC) because the computation of F-statistics for Co-integration is very sensitive to lag length. The lag length that minimizes SBC is 1 and accordingly the calculated F -statistic (F -statistic = 4.17) which is higher than the upper bound critical value at 2.5% level of significance (3.84) on the eviews. Furthermore, the F value is higher than (3.586 & 4.15) both at 10% significance level using a restricted intercept and no trend as well as restricted intercept and trend as reported by Pesaran et al. (2001). This implies that the null hypothesis of no co-integration is rejected at 10% and therefore, there is a co-integrating relationship among the variables. Results of the bound test are tabulated below:

Table 4.11
Null Hypothesis: No long-run relationships exist

Test Statistic	Value	k
F-statistic	4.169374	7
Critical Value Bounds		
Significance	I0 Bound	I1 Bound
10%	2.03	3.13
5%	2.32	3.5
2.5%	2.6	3.84
1%	2.96	4.26

4.5. Long Run Model

Existence of long run relationship among variables has been confirmed by the bound test. Once such an existence has been confirmed, the next step is running the long run model. The model consist independent variables: LNREER, LNMRX, LNHHEGDP, LNGEXGDP, LNFLM, LNOP, and LNMS. The results of long run model are tabulated below:

Table 4.12

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNREER	0.072372	0.018701	3.870018	0.0010
LNMRX	0.022960	0.097128	0.236386	0.8155
LNHHEGDP	0.351434	0.143510	2.448843	0.0237
LNGEXGDP	-0.355820	0.197729	-1.799532	0.0870
LNFLM	-0.177910	0.117226	-1.517668	0.1447
LNOP	-0.355820	0.038503	-9.241434	0.0000
LNMS	-0.355820	0.024924	-14.276004	0.0000
C	-0.177910	0.292667	-0.607893	0.5501

The impact of real effective exchange rate on the trade balance is negative which is consistent with the elasticity approach indicating that exchange rate devaluation/depreciation will improve the trade balance. As indicated above, a 1% increase (appreciation) in the real effective exchange rate has worsened the trade balance by 0.07%. However, REER has a better deteriorating impact in the short run where a 1% increment (appreciation) in the REER led the trade balance to deteriorate by 0.13%. In other words, real depreciation of currency will improve the trade balance both in the short run and long run, where the impact is significant in the short run than the long run. This indicates the fact that the J curve effect and the Marshal-Lerner condition (because of the fact that trade balance does not significantly reacted to real exchange rate appreciation) does not hold in the Ethiopian context and that devaluation will not improve the trade balance.

Regarding house hold consumption expenditure (LNHHEGDP), a 1% increment in LNHHEGDP will lead to 0.35% deterioration on the trade balance. The result is as expected and is consistent with theories revealing the fact that increments in the house hold consumption expenditure and government expenditure induced by GDP growth will lead to greater demand for imported commodities, leading to deteriorating the trade balance. House hold consumption expenditure has shown an increasing trend outpacing the GDP growth, and the domestic production level is unable to meet the household's extra demand created by an increase in income (GDP). In this regard, the private consumption expenditure has possessed a significant share in the ratio to the

GDP with slight increments through time and stood at 69.1% and 81.5% respectively for 1999/00 and 2009/10, whereas 69.2% for 2014/15 fiscal year. Indeed, household consumption expenditure has shown an increasing trend outpacing the GDP growth, and the domestic production level is unable to meet the house hold's extra demand created by an increase in income (GDP). Furthermore, the nation has relatively liberalized its economy through time which has created greater opportunities for the supply of imported goods.

On the other hand, a 1% increase in LNGEXGDP leads to 0.35% improvement on the trade balance, which is inconsistent with what the researcher has hypothesized. In a similar manner to the finding of this study however, empirical literatures such as Sulaiman (2010) and Waliullah (et al 2010) have concluded that GDP growth has positively affected the trade balance of Pakistan. However, against the theories advocating negative effects of government expenditure on the trade balance, increments in the government expenditure on various infrastructural development activities may have positive effects on export promotion, which will affect the trade balance positively. This can be seen from the fact that the country's GDP has shown increments in the study's time span, so does the export earnings. According to data obtained from NBE for instance, the GDP have stood at birr 134 billion, birr 181 billion, birr 336 billion, and birr 1,699 billion, whereas total export earnings have stood at USD 0.3 billion, USD 0.54 billion, USD 1.2 billion, and USD 2.8 billion respectively for 1986/87, 1996/97, 2006/07 and 2016/17.

The impact of openness (liberalization) is as hypothesized by the researcher and consistent with the theories advocating the notion that such measures will have export promoting impacts. A 1% increment in LNOP has a 0.36% improvement effect on the trade balance. However, the country's trend also shows that increments in total import bills and its share to the GDP are significant. Hence, for the improving effect of openness to sustain, the nation's export share to the GDP has to improve much compared to the share of import to GDP. Moreover, those theories advocating protectionist policy have indicated that policies such as liberalization will further create opportunities for increased level of imported goods. Thus, even though openness creates increased level of export earnings, it will also have an effect in increasing the amount of imported goods. The impact of money supply is positive which is inconsistent with the research hypothesis

and the theories revealing an increase in money supply over demand will create capital outflow effect leading to deteriorating trade balance. A 1% increase in the money supply will lead to 0.35% improvements in the trade balance. However, such an improvement might not be the direct effects of money supply where an increase in money supply might be attributed to the fact that it is as a result of improvements in income (GDP).

4.6. Short Run Model (ECM)

The results of short run effects of the variables are tabulated below:

Table 4.13

Co-integrating Form				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNREER)	0.134499	0.032730	4.109274	0.0005
D(LNMRX)	0.042669	0.180776	0.236033	0.8158
D(LNHHEGDP)	0.653114	0.243907	2.677712	0.0145
D(LNGEXGDP)	-0.330633	0.589446	-0.560921	0.5811
D(LNFLM)	-0.330633	0.213014	-1.552161	0.1363
D(LNOP)	-0.330633	0.056512	-5.850646	0.0000
D(LNMS)	-0.330633	0.188161	-1.757178	0.0942
CointEq(-1)	-1.858426	0.132576	-14.017810	0.0000

$$\text{Cointeq} = \text{LNTB} - (0.0724 * \text{LNREER} + 0.0230 * \text{LNM RX} + 0.3514 * \text{LNHHEGDP} - 0.3558 * \text{LNGEXGDP} - 0.1779 * \text{LNFLM} - 0.3558 * \text{LNOP} - 0.3558 * \text{LNMS} - 0.1779)$$

The coefficient of ECM is negative as expected, however the magnitude of the coefficient is -1.85. According to Narayan and Smyth (2006), such a coefficient greater than 1 implies that instead of monotonically converging to the equilibrium path directly, the error correction process fluctuates around the long-run value in a dampening manner. However, once this process is complete, convergence to the equilibrium path is rapid.

As indicated in table 5, LNREER has a better significant effect in the short run than the long run. Hence, the J curve effect does not hold in the Ethiopian context. 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 (current account 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. The short run impact

of HHE is significant indicating house hold consumption expenditure has a significant effect on the trade balance in the short run and will have less deteriorating impact in the long run. On the other hand, GEX has an insignificant impact on the trade balance in the short run revealing the fact that it takes time for government expenditure to affect the trade balance. The impacts of openness (LNOP) and Money supply (LNMS) are almost equivalent both in the short run and long run.

CHAPTER FIVE

5. CONCLUSION AND RECOMMENDATION

5.1. CONCLUSIONS

The study has been conducted on the determinants of trade balance in the Ethiopian context. It has covered the time period through 1984/85 to 2016/17 and the variables under consideration are: real effective exchange rate, household consumption expenditure, government expenditure, openness (liberalization), Foreign Direct Investment (FDI), money supply, and natural resource availability. As a method of econometric analysis the Auto Regressive Distributed Lag (ARDL) bound test approach has been employed using Eviews 10. The data being time series, tests such as the unit root has been employed and the results have indicated that the variables LNOP, LNMRX, and LNFLM are stationary at level $I(0)$, whereas LNTB, LNREER, LNMS LNGEXGDP, and LNHHEGDP are stationary at difference $I(1)$.

Furthermore, existence of long run relationship among the independent and dependent variables has been checked by the bound test and the result indicates that there is long run relationship. The bound test reveals that the calculated F -statistic (F -statistic = 4.17) which is higher than the upper bound critical value at 2.5% level of significance (3.84) on the eviews. Furthermore, the F value is higher than (3.586 & 4.15) both at 10% significance level using a restricted intercept and no trend as well as restricted intercept and trend as reported by Pesaran et al. (2001). This implies that the null hypothesis of no co-integration is rejected at 10%. Diagnostic tests have also been employed so as to check for existence of serial correlation, normality of the model, and hetroscedasticity. Existence of serial correlation has been checked by Breusch-Godfrey Serial Correlation LM Test confirming there is no serial correlation. The model also shows normal distribution of error terms by the normality test based on Jarque-Bera criteria. The model does not exhibit Hetroscedasticity problem checked based on the ARCH criteria.

After all the above criteria have been met the short run and long run models has been estimated using eviews 10. According to the models a 1% appreciation in the real effective exchange rate has worsened the trade balance by 0.07% in the long run which is consistent with the research

hypothesis. However, increment/appreciation has a significant effect in the short run where a 1% increment in the REER has led the trade balance to deteriorate by 0.13%. This indicates the fact that the J curve effect and the Marshal-Lerner condition (because of the fact that trade balance does not significantly respond to real exchange rate appreciation) does not hold in the Ethiopian context and that devaluation will not improve the trade balance. Regarding house hold consumption expenditure (LNHHEGDP), a 1% increment in LNHHEGDP has led to 0.35% deterioration on the trade balance in the long run which is consistent with theories. However, the short run impact of HHE is significant indicating that house hold consumption expenditure has a significant effect on the trade balance in the short run. The negative impact of House hold consumption expenditure can be seen from the fact that it has shown an increasing trend outpacing the GDP growth, and the domestic production level is unable to meet the house hold's extra demand created by an increase in income (GDP). Furthermore, the nation has relatively liberalized its economy through time which has created greater opportunities for the supply of imported goods.

On the other hand, a 1% increase in LNGEXGDP leads to 0.36% improvement on the trade balance in the long run, which is inconsistent with the research hypothesis. However, in consistent with the finding of this study, empirical literatures such as Sulaiman (2010) and Waliullah (et al 2010) have concluded that GDP growth has positively affected the trade balance. The positive impact of GDP on the trade balance can be seen from the following perspective: increments in the government expenditure on various infrastructural development activities may have positive effects on export promotion and/or import substitution which will affect the trade balance positively. This can be seen from the fact that the country's GDP has shown increments in the study's time span, so does the export earnings. The short run model has also revealed that the impact of government expenditure is insignificant in the short run indicating that it takes time for government expenditure to affect the trade balance

The impact of openness (liberalization) is as expected and consistent with the research hypothesis, whereas it has almost an equivalent impact both in the short run and long run. In the long run, a 1% increment in LNOP has a 0.36% improvement effect on the trade balance. The

impact of money supply is positive and inconsistent with the research hypothesis and the theories revealing an increase in money supply over demand will create capital outflow effect leading to deteriorating trade balance. A 1% increase in the money supply has led to 0.35% improvements in the trade balance in the long run. However, such an effect might be attributed to the fact that an increase in the money supply is as a result of improvements in income (GDP).

5.2. RECOMMENDATIONS

Based on the findings of the study, the following recommendations have been forwarded:

- Policy measures such as devaluation may not work effectively in improving the trade balance. This is due to the fact that the J curve effect and the Marshal-Lerner condition do not hold in the Ethiopian context. The country is mainly dependent on exports of primary agricultural products having lower price and income elasticity of demand, whereas being an importer of goods such as capital goods, raw materials, semi-finished and finished goods, and petroleum products having higher price as well as income elasticity of demand. Hence, devaluation will have a deteriorating impact on the trade balance since the increased export earnings will not match the amount of imported commodities.
- It is recommended to increase local productivity levels so as to meet the extra demand by households that will emanate from increased income as a result of growth in GDP. Furthermore, the nation is expected to substitute imported goods by local productions through attracting more Foreign Direct Investments involved in the production of such commodities.
- The government is expected to increase expenditures on infrastructural development activities that will support export promotion. Investment on infrastructures such as road, electricity, water supply, and network has to be made so as to promote the existing export businesses as well as to attract new entrants in the export sector.
- Policy measures regarding liberalization have to incorporate the “inward looking import substitution approach” in addition to “the outward looking export promotion approach”. According to the finding of the study, the impact of openness on improving the trade balance is positive and statistically significant. However, openness/liberalization will not only promotes exports, but also will open the way for increased imported commodities.

Hence, it is recommended that the government has to strive in promoting the export sector, in the mean-time following the import substitution approach through encouraging local as well as foreign investments engaged in producing those imported goods.

- The central bank should effectively follow the patterns of money supply. The study's result has shown that money supply has a positive impact in improving the trade balance which is against the related theories. However, such an effect might be attributed to the fact that an increase in the money supply is as a result of improvements in income (GDP). Hence, it is recommended to keep the money supply in accordance with the demand for money, since amount of money in circulation may increase together with an increase in income (GDP) which may lead to increased demand for imported goods, deteriorating the trade balance henceforth.

REFERENCES

- Abebe Belay Gebeyehu, (2014), *Trade Balance and Exchange Rate Evidence from Ethiopia*, Vol.6, ISSN 2422-846X, Journal of Poverty, Investment and Development, www.iiste.org
- Alan A. Rabin and Leland B. Yeager, (1982), *Monetary approaches to the balance of payment and exchange rates*, No 148, New Jersey, Princeton University.
- AlekawKebedeYeshineh, (2016), *Determinants and Potentials of Foreign Trade in Ethiopia: A Gravity Model Analysis*, MPRA Paper No. 74509, <https://mpra.ub.uni-muenchen.de/74509/>
- AlekawKebedeYeshineh, (2012), *Determinants of Trade Balance in Ethiopia: an ARDL Co-integration Analysis*, Addis Ababa, Ethiopian Development Research Institute (EDRI)
- Alexander Mihailov, (2005), *Macroeconomic Theories of Balance of Payments Adjustment: Flow Approaches*, EC933-G-AU – Lecture 2, University of Essex.
- Alison Butler, (1991), *Trade imbalances and economic theory: the case for a US-Japan trade deficit*, Federal Reserve Bank of st Louis
- AmitenduPalit, (2008), *India's Trade Deficit: Increasing Fast but Still Manageable*, no 72, Isas Brief, Website: www.isas.nus.edu.sg.
- BelaynehKassa, WondaferahuMullugeta, (2012), *Determinants of Export Performance In Ethiopia: VAR model analysis*, Vol 2, No. 5, ISSN 2277-1166, National Monthly Refereed Journal of Research in Commerce & Management, www.abhinavjournal.com
- Borena D. Lencho, (2013), *The effect of exchange rate movement on trade balance in Ethiopia*, the University of Tokyo.
- Cesar A. Calderon, Alberto Chong, Norman V. Loayza, (2002), *Determinants of Current Account Deficits in Developing Countries*, Volume 2, Issue 1, The Berkeley Electronic Press (bepress) Journals in Macroeconomics
- Dubai exports, (2016), *Ethiopia-Economic Overview and Trade Analysis*, EIP/MTR/005/03/2016, an agency of the department of Economic Development-government of Dubai, <http://www.sciencepublishinggroup.com/j/jwer>
- ECON 5450, (2013), *Notes on the Elasticities approach to BoP Adjustment*

Elias A. Ali, (2011), *The effect of depreciation of birr on major export products of Ethiopia: the case of hides and skins*, Addis Ababa University, Addis Ababa, Ethiopia

GebeYemataw, (2015), *Impact of Ethiopian Trade Balance: Bound Testing Approach to Co-integration*, Vol. 4, No. 4, *Journal of World Economic Research*,
<http://www.sciencepublishinggroup.com/j/jwer>.

EmekaNkoro, Aham Kelvin Uko, (2016), *Autoregressive Distributed Lag (ARDL)*, Vol 5, No. 4, *Journal of Statistical and Econometric Methods*, ISSN: 1792-6602 (print), 1792-6939 (online), Scienpress Ltd, 2016

Graham Bird, (1981), *Balance of payments stabilization policy in developing countries*, No. 5, London, ODI working paper

Giulio Fella, (2008), *The elasticity approach to the trade balance. Mundell-Fleming, Lecture 6*, A long run exchange rate model with demand effects

Gujarati. (2004). *Basic econometrics, fourth edition* (Fourth edition ed.). The McGraw-Hill Companies.

HailegiorgisBiramAllaro, (2012), *The Impact of Trade Liberalization on the Ethiopia's Trade Balance* 2(5) DOI: 10.5923/j.economics.20120205.02, *American Journal of Economics* 2012, <http://journal.sapub.org/economics>

Harry G. Johnson, (1977), *Money, Balance-of-Payment Theories, and the International Monetary Problem*, No. 124, Princeton-New Jersey, Princeton University

International Monetary Fund (IMF), (2015), *2015 Article IV Consultation—Press Release; Staff Report; and Statement by the Executive Director for the Federal Democratic Republic Of Ethiopia*, IMF Country Report No. 15/300, International Monetary Fund Publication Services, <http://www.imf.org>

J.M. Keynes, (1935), *The General Theory of Employment, Interest, and Money*, The University of Adelaide Library Electronic Texts Collection,
<http://etext.library.adelaide.edu.au/k/k44g/k44g.html>

JaritaDuasa, (2007), *Determinants of Malaysian trade balance: an ARDL bound testing approach*, 28,3 (2007), *The Lahore Journal of Economics*

Jere R. Behrman and James Hanson, (1979), *The Monetary Approach to the Balance of Payments with an Empirical Application to the Case of Panama*, Volume ISBN: 0-88410-489-3, NBER,
<http://www.nber.org/books/beh79-1>

Jean-François Arvis, Jean-François Marteau, and Gaël Raballand, (2010), *The Cost of Being Landlocked Logistics, Costs, and Supply Chain Reliability*, International Trade Department, the World Bank.

Krugman Obstfeld Melitz, (2012). *International Economics Theory & Policy*, ninth edition, Boston, Pearson Education Inc

M. Hashem Pesaran, (1995, 1997), *An Autoregressive Distributed Lag Modelling Approach to Co-integration Analysis*, The Norwegian Academy of Science and Letters, Oslo

Mankiw, (2001), *Economics*, fifth edition. TSI Graphics.

Michael P. Todaro, Stephen C. Smith, (2012), *Economic Development, Eleventh Edition*, Boston, Pearson Education Inc

Mohammad A. Ashraf, Hasanur R. Joarder, (2009), *Factors affecting Volatility of Bangladesh Trade Deficit: An Econometric Analysis*, Vol 29, No. 2, Research Gate, <https://www.researchgate.net/publication/304172936>

Moses Joseph Shawa, Yao Shen, (2013), *Analysis of the determinants of trade balance: Case study of Tanzania*, Vol. 2, No. 6, 2013, pp. 134-141., International Journal of Business and Economics Research, (<http://www.sciencepublishinggroup.com/j/ijber>)

Mohsen Bahmani-Oskooee and Artatrana Ratha, (2007), *The Bilateral J-Curve: Sweden versus her 17 Major Trading Partners*, 4(1), International Journal of Applied Economics,

Mehmet E. Yaya and Xiaoxia Lu, (2012), *The Short-Run Relationship between Real Effective Exchange Rate and Balance of Trade in China*, 9(1), International Journal of Applied Economics,

Muhammad Zakaria, (2014), *Effects of trade liberalization on exports, imports and trade balance in Pakistan: a time series analysis*, PRAGUE ECONOMIC PAPERS, 1

Nega Muhabaw Kassie, (2015), *Assessment on Real Effective Exchange Rate and External Sector Development of Ethiopia*, Vol. 4, No. 4, Science publishing group, <http://www.sciencepublishinggroup.com/j/eco>

Nega Muhabaw, (2013), *what determines the export performance of Ethiopia: a time series analysis*, Addis Ababa University, Addis Ababa.

Oleksandra Betliy, (2002), *Measurement of the real effective exchange rate and the observed jcurve: case of Ukraine*, The National University of "Kyiv-Mohyla Academy"

Osoro Kennedy, (2013), *Kenya's foreign trade balance: an empirical investigation*, vol.9 no. 19, European Scientific Journal

Pedro M. G. Martins, (2009), *Do Capital Inflows Hinder Competitiveness? The Real Exchange Rate in Ethiopia*, No. 10/07, CREDIT Research Paper, Centre for Research in Economic Development and International Trade, University of Nottingham, www.nottingham.ac.uk/economics/credit/

Perman, Ma, McGilvray, Common, (2003), *Natural Resource & Environmental Economics*, third edition, London, Pearson Education Ltd

Pierre-Richard Agénor and Peter J. Montiel, (2008), *Development Macro Economics*, third edition, New Jersey, Princeton University Press

RajanSilwal,(2008), *the Causes of Trade Deficit of Nepal*, The Hague, Netherlands, Institute of Social Studies.

Samuel Feyisa&TarekegnGeromsa, (2011), narrowing trade deficit through increased import substitution, Addis Ababa, Private Sector Development Hub/ the Addis Ababa Chamber of Commerce and Sectoral Associations

Sarbapriya Ray, (2012), *An Analysis of Determinants of Balance of Trade in India*, Vol 3, No 1, Research Journal of Finance and Accounting, www.iiste.org

Sulaiman D Mohammad, (2010), *Determinant of Balance of Trade: Case Study of Pakistan*, ISSN 1450-216X Vol.41 No.1, European Journal of Scientific Research, <http://www.eurojournals.com/ejsr.htm>

SunandaSen, (2010),*International Trade Theory and Policy*, No. 635, New York, The Levy Economics Institute Working Paper Collection, <http://www.levyinstitute.org>

TamrayehuGosaye (2015), *Effectiveness of devaluation in achieving internal and external balance: the case of Ethiopia*, Addis Ababa, Addis Ababa University.

UNDP, (2012), *Trade policy studies on implications of Ethiopia's integration into regional and global trading systems*, No 2/2012, Poverty Reduction and Economic Growth Unit, UNDP Ethiopia, www.et.undp.org

U.S. International Trade Commission, (1997), *The Dynamic Effects of Trade Liberalization: An Empirical Analysis* Publication no. 3069, Washington DC 20436, U.S. International Trade Commission

U.S. INTERNATIONAL TRADE COMMISSION, (2009), *Land Transport for Exports: The Effects of Cost, Time, and Uncertainty in Sub-Saharan Africa*, No. 2009-10-A, Washington, Office of Economics Working Paper

United Nations Conference on Trade and Development (UNCTAD), (2005), *Trade liberalization and economic reform in developing countries: structural change or de-industrialization? No.179*, UNCTAD,<http://www.unctad.org>

Waliullah, Mehmood Khan Kakar, RehmatullahKakar and Wakeel Khan, (2010), *The Determinants of Pakistan's Trade Balance: An ARDL Co-integration Approach*, 15: 1 (Summer 2010): pp. 1-26, The Lahore Journal of Economics
World Trade Organization (WTO), (2012), the WTO and trade economics: Theory and Policy, WTO E-learning.

ZenegawAbiyHailu, (2010), *Impact of Foreign Direct Investment on Trade of African Countries*, Vol 2, No. 3, International Journal of Economics and Finance, www.ccsenet.org/ijef

APPENDIX 1

Raw data of the variables employed in the model from 1984/85 to 2016/17

Year	TB in mln (USD)	REER	HHCE in mln ETB	GEX in mln ETB	MS	MRX/X	FLM/M	X+M mln ETB
1984/85	495.585	239.3431	80573.17	13194.48	3383.7	0.0886	0.1796	2,515.01
1985/86	617.125	246.6057	81782.25	14932.78	3383.7	0.0479	0.0996	3,125.08
1986/87	696.455	204.9398	94621.64	16953.9	3383.7	0.0362	0.1010	3,032.23
1987/88	725.125	186.8013	85638.51	19494.45	3383.7	0.0492	0.0951	3,048.29
1989/90	583.382	188.0597	88674.97	21037.09	3383.7	0.0221	0.1009	3,013.11
1991/92	525.272	201.1383	93816.61	21626.83	3383.7	0.0383	0.1234	2,560.93
1993/94	767.063	231.3438	99368.53	17894.02	3383.7	0.1882	0.0988	2,672.79
1995/96	740.034	284.7589	103815.7	10593.16	3383.7	0.1937	0.1067	2,089.92
1997/98	1004.68	170.6053	112222.9	12368.87	3383.7	0.1914	0.2269	4,419.53
1999/00	606.338	124.3902	114127.3	13256.39	3383.7	0.1803	0.1556	5,978.70
2001/02	610.228	112.3984	115782	14883.97	3383.7	0.0724	0.1518	9,278.32
2003/03	818.195	105.3759	129867.4	15504.8	3383.7	0.0521	0.1209	10,247.30
2004/05	772.159	102.7037	135176.5	15851.99	3383.7	0.1373	0.1768	11,990.83
2006/07	755.038	119.118	128234.4	19953.63	3383.7	0.0025	0.2426	13,480.97
2008/09	1073.71	112.2502	137361.6	28371.2	3383.7	0.0507	0.1119	15,339.26
2010/11	918.731	99.33445	137622	38064.93	3383.7	0.0693	0.1759	15,396.46
2011/12	1014.34	100	153614.8	33755.91	3383.7	0.0695	0.1747	16,180.56
2012/13	1243.31	93.57807	163831.3	34706.15	3383.7	0.0891	0.1521	18,349.61
2013/14	1389.71	98.991	167218.3	30702.56	3383.7	0.0956	0.1533	20,209.70
2014/15	1986.04	98.47258	172547.7	33943.39	3383.7	0.0877	0.1170	27,472.33
2015/16	2785.88	94.04825	210136.3	36046.68	3383.7	0.0759	0.1825	38,765.43
2016/17	3592.64	102.8823	237159.1	39355.01	3383.7	0.0691	0.1862	48,558.45

APPENDIX 2

BOUND TEST RESULT

ARDL Bounds Test

Date: 12/29/18 Time: 12:46

Sample: 2 33

Included observations: 32

Null Hypothesis: No long-run relationships exist

Test Statistic	Value	k
F-statistic	4.169374	7

Critical Value Bounds

Significance	I0 Bound	I1 Bound
10%	2.03	3.13
5%	2.32	3.5
2.5%	2.6	3.84
1%	2.96	4.26

Test Equation:

Dependent Variable: D(LNTB)

Method: Least Squares

Date: 12/29/18 Time: 12:46

Sample: 2 33

Included observations: 32

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNGEXGDP)	1.192411	0.537882	2.216864	0.0384
D(LNOP)	0.048431	0.062265	0.777824	0.4458
D(LNMS)	0.365338	0.218813	1.669640	0.1106
C	2.559276	0.757678	3.377789	0.0030
LNREER(-1)	-0.090254	0.036846	-2.449513	0.0236
LNMRX(-1)	0.381424	0.232711	1.639047	0.1168
LNHHEGDP(-1)	-0.313760	0.343559	-0.913263	0.3720
LNGEXGDP(-1)	-0.621520	0.519601	-1.196149	0.2456
LNFLM(-1)	-0.441715	0.262113	-1.685212	0.1075
LNOP(-1)	0.102990	0.045229	2.277094	0.0339
LNMS(-1)	-0.171379	0.056719	-3.021562	0.0067
LNTB(-1)	-0.581740	0.181930	-3.197601	0.0045
R-squared	0.720757	Mean dependent var		-0.007496
Adjusted R-squared	0.567173	S.D. dependent var		0.066664
S.E. of regression	0.043858	Akaike info criterion		-3.135730
Sum squared resid	0.038470	Schwarz criterion		-2.586079
Log likelihood	62.17167	Hannan-Quinn criter.		-2.953536
F-statistic	4.692929	Durbin-Watson stat		2.110159
Prob(F-statistic)	0.001371			

APPENDIX 3

RESULTS OF SHORT RUN AND LONG RUN MODELS

SHORT RUN MODEL

Cointegrating Form				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNREER)	0.134499	0.032730	4.109274	0.0005
D(LNMRX)	0.042669	0.180776	0.236033	0.8158
D(LNHHEGDP)	0.653114	0.243907	2.677712	0.0145
D(LNGEXGDP)	-0.330633	0.589446	-0.560921	0.5811
D(LNFLM)	-0.330633	0.213014	-1.552161	0.1363
D(LNOP)	-0.330633	0.056512	-5.850646	0.0000
D(LNMS)	-0.330633	0.188161	-1.757178	0.0942
CointEq(-1)	-1.858426	0.132576	-14.017810	0.0000

Cointeq = LNTB - (0.0724*LNREER + 0.0230*LNMRX + 0.3514
 *LNHHEGDP -0.3558*LNGEXGDP -0.1779*LNFLM -0.3558*LNOP
 -0.3558*LNMS -0.1779)

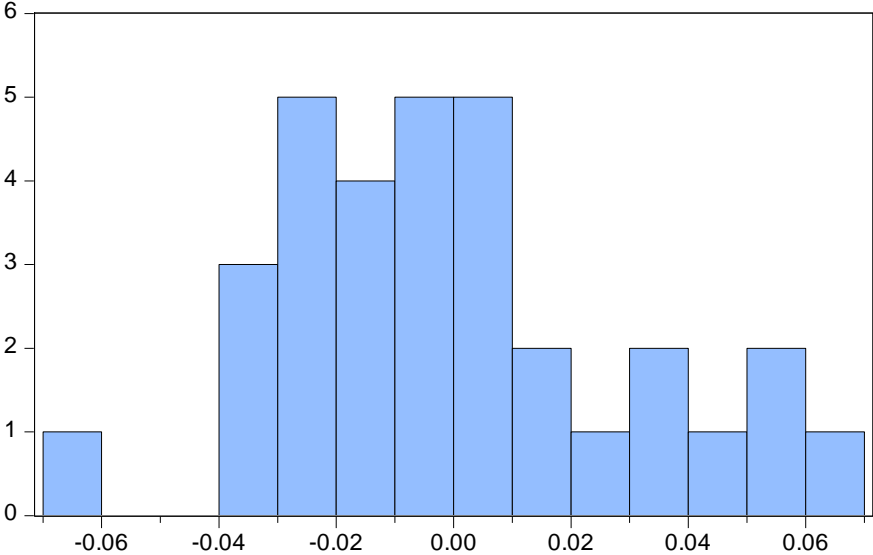
LONG RUN MODEL

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNREER	0.072372	0.018701	3.870018	0.0010
LNMRX	0.022960	0.097128	0.236386	0.8155
LNHHEGDP	0.351434	0.143510	2.448843	0.0237
LNGEXGDP	-0.355820	0.197729	-1.799532	0.0870
LNFLM	-0.177910	0.117226	-1.517668	0.1447
LNOP	-0.355820	0.038503	-9.241434	0.0000
LNMS	-0.355820	0.024924	-14.276004	0.0000
C	-0.177910	0.292667	-0.607893	0.5501

APPENDIX 4

DIAGNOSTIC TESTS

NORMALITY TEST



Series: Residuals	
Sample 2 33	
Observations 32	
Mean	8.88e-16
Median	-0.003576
Maximum	0.067041
Minimum	-0.067154
Std. Dev.	0.030655
Skewness	0.363294
Kurtosis	2.832697
Jarque-Bera	0.741227
Probability	0.690311

APPENDIX 5

SERIAL CORRELARION- LM TEST

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.658867	Prob. F(1,19)	0.2132
Obs*R-squared	2.569537	Prob. Chi-Square(1)	0.1089

Test Equation:

Dependent Variable: RESID

Method: ARDL

Date: 12/29/18 Time: 11:30

Sample: 2 33

Included observations: 32

Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNTB(-1)	0.099651	0.151664	0.657051	0.5190
LNREER	-0.011351	0.033389	-0.339977	0.7376
LNMRX	-0.034440	0.179868	-0.191471	0.8502
LNHHEGDP	0.041924	0.242184	0.173107	0.8644
LNGEXGDP	0.032257	0.580510	0.055567	0.9563
LNGEXGDP(-1)	-0.083026	0.493638	-0.168192	0.8682
LNFLM	0.002865	0.209602	0.013671	0.9892
LNOP	-0.016376	0.057039	-0.287099	0.7771
LNOP(-1)	-0.002680	0.059906	-0.044733	0.9648
LNMS	0.109288	0.203655	0.536634	0.5977
LNMS(-1)	-0.086570	0.187328	-0.462132	0.6492
C	-0.103495	0.526949	-0.196403	0.8464
RESID(-1)	-0.360186	0.279654	-1.287970	0.2132

R-squared	0.080298	Mean dependent var	8.88E-16
Adjusted R-squared	-0.500566	S.D. dependent var	0.030655
S.E. of regression	0.037552	Akaike info criterion	-3.434991
Sum squared resid	0.026793	Schwarz criterion	-2.839536
Log likelihood	67.95985	Hannan-Quinn criter.	-3.237614
F-statistic	0.138239	Durbin-Watson stat	2.039918
Prob(F-statistic)	0.999428		

APPENDIX 6

HETROSCEDASTICITY TEST

Heteroskedasticity Test: ARCH

F-statistic	1.426903	Prob. F(1,29)	0.2419
Obs*R-squared	1.453779	Prob. Chi-Square(1)	0.2279

Test Equation:

Dependent Variable: RESID^2

Method: Least Squares

Date: 12/30/18 Time: 15:02

Sample (adjusted): 3 33

Included observations: 31 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.000699	0.000284	2.458209	0.0202
RESID^2(-1)	0.218050	0.182540	1.194530	0.2419
R-squared	0.046896	Mean dependent var		0.000903
Adjusted R-squared	0.014030	S.D. dependent var		0.001272
S.E. of regression	0.001263	Akaike info criterion		-10.44805
Sum squared resid	4.63E-05	Schwarz criterion		-10.35554
Log likelihood	163.9448	Hannan-Quinn criter.		-10.41789
F-statistic	1.426903	Durbin-Watson stat		1.946877
Prob(F-statistic)	0.241949			