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# Determinant of Trade Balance in Ethiopia: Approaches from Autoregressive Distributive Lag (ARDL) Model

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**Abstract:** The overarching purpose of this study was to use approaches from the Autoregressive Distributive Lag (ARDL) Model to uncover the causes of Ethiopia's trade balance. Ethiopia's economy was primarily reliant on earnings from the sale of primary commodities, focused on a small number of export commodities and market outlays to finance the importation of desperately needed capital goods. As a result, the country's exports failed, resulting in a persistent trade imbalance in international trade. As a result, the study concentrated on the key determinants of Ethiopia's trade balance, including the structure, value, volume, and direction of Ethiopia's export and import. The bound testing approach of Johansson co-integration test and error correction model was developed within the autoregressive distributed lag (ARDL) model framework, and annual data for the period 1990 to 2020 was used to investigate whether a short run and long run relationship exists between trade balance and its determinants. The main purpose of this paper was to show that lnFEA might show long-run negative and short-run positive trade balance relationships. lag trade balance, on the other hand, has a short-term positive relationship with trade balance, but REER has a long-term and short-term negative relationship with trade balance.

**Keywords:** ARDL, Economic Growth, Export, Import, Trade Balance

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## 1. Introduction

### 1.1. Background of the Study

For thousands of years, people have traded internationally. Various scholars have written extensively on the causes of international commerce. The merchandise concept, for example, missed the point of what trade is all about and hence failed to grasp that its results were appreciated only in specific situations rather than in general, and much has been said on the subject [11].

Every person participates in the international trading system. An international trading transaction occurs when one country has something it wants to sell to another country. Nature has also bestowed various resources on various countries. The variations in natural resources among countries force countries to engage in international trade in goods and services.

Trade changes have been enacted as part of the structural adjustment program as the country moves toward a market-oriented economic system. Essentially, the policy regime

has transitioned from one of control to one of 'liberalization.' The country was adjusting its commerce to the rest of the world, which was rapidly globalizing, by modifying its trade and exchange rate regimes, and the International Monetary Fund encouraged and supported the structural Adjustment program [14].

Developing countries rely largely on imports of capital goods and intermediate goods from industrialized countries in order to achieve faster economic growth. They rely on their export profits to fund their imports. However, the export sector of emerging countries is characterized by volatility in both value and volume, and this unpredictability limits their economic progress. Furthermore, because commerce accounts for a significant amount of their GDP, developing countries are extremely sensitive to the outside world.

As previously mentioned, the price of developing countries' principal exports fluctuates. According to Salvatore (1998), the main reasons for this are inelastic demand and unreliable supply. Because developed-country consumers spend just a small part of their income on primary commodities, demand for developing-country primary

exports is price inelastic. On the supply side, due of internal rigidities and inflexibilities in the resources employed in most developing countries, the supply of developing countries' principal exports is price inelastic.

Developing countries, on the other hand, import commodities whose prices are rising with time. As a result, the foreign earnings from their decreasing exports will be insufficient to pay their imports. Furthermore, their import need is increasing with time, worsening the problem. As a result, the difficulty that developing countries face can be assessed based on their economic interactions with other countries, which are reflected in the country's trade balance. Given this, one could claim that the trade balance for many emerging countries has been unsatisfactory. Ethiopia is a country in the developing world. Despite the fact that Ethiopia has a favorable environment and abundant natural resources, the country's involvement in international trade is unavoidable and vital to its development; as a result, Ethiopia has been participating in the system [11].

The merchandise trade imbalance is the most significant component of Ethiopia's large current account deficit. Over the last two decades, stagnate exports and rising imports have resulted in a merchandise trade deficit. Despite these numerous policy efforts, growth in export earnings was not only unsteady, but also failed to keep pace with volume growth (Annual Report on the Ethiopian Economy, 1991/00). Furthermore, Ethiopia's core structure of export remains intact.

## **1.2. Statement of the Problem**

Aside from their low economic performance, Ethiopia's economy is frequently exposed to trade deficits (the value of goods and service they export is by far less than the value of good and service they import). For example, in many LDCs, the widespread balance of payment (Bops) crisis of the 1980s, which resulted in a significant debt problem, raised their demand for bigger export receipts [9].

Ethiopia's economic problems are similar to those of other LDCs. Ethiopia, aside from being the poorest country on the planet, has a persistent trade deficit. The main causes of the deficit are commodity concentration (excessively high reliance on agricultural exports, particularly coffee) and geographic market concentration (export and import concentration primarily in Europe, North America, and Japan) on the one hand, and import of basic goods on the other [3]. In general, the level of main commodity dependency has not decreased. In other words, there has been no move toward the export of semi-processed or manufactured commodities, implying that export earnings are low and insufficient to meet the country's import needs [3].

Since 1992, the country has enacted a number of foreign trade reforms aimed at boosting exports and liberalizing imports (Mulu and Tarekgn, 1999). As a result, earlier restrictive trade policies have been eased; various steps have been implemented since October 1992, following the initial devaluation of the national currency. Despite these facts, Ethiopia has never had a surplus trade balance in its history,

with the exception of the years 1972/73 and 1973/74. (NBE reports, various issues). More specifically, the country's trade imbalance as a proportion of GDP increased by 58 percent from an average of 8% during the pre-reform period to 13% during the post-reform period [15].

External pressures include international and national trade, as well as related policies. In the long run, international trade policies enacted by organizations such as the World Commerce Organization (WTO) may help to enhance international trade. In the short term, however, the degree to which globalization presses developing economies to open up without giving them the time to prepare for the challenges could have a significant impact on their export performance.

Thus, because of the above mentioned and other related problem, the Ethiopian Foreign trade sector is unable to play most of its major role in the development process of the country. It is this scenario that initiates me to do this research. So far, there are many researches done by this Topic. For instance By, Michael Negash (2003), Rose (1991) and so on. What makes this study was different from previous studies is that additional variables are included into the model. The other is the time period included in this study is long enough. In addition, the study was as a reference for those who are interested in making further investigation the same area of Research in the future [13].

As a result of the aforementioned and other related issues, Ethiopia's foreign trade industry is unable to play a significant part in the country's development. This scenario is what prompted me to conduct this investigation. This topic has been the subject of numerous studies thus far. To name a few, Michael Negash (2003) and Rose (1991) are two examples. This study differs from earlier studies in that it incorporates extra variables into the model. The third point is that the study's time frame is adequate. Furthermore, the study served as a guide for anyone interested in conducting further research in the same field in the future [13].

## **1.3. Objective of the Study**

### **1.3.1. General Objectives**

The general objective of the study is to examine on the identification of the determinant of trade balance in Ethiopia.

### **1.3.2. The Specific Objectives of the Study Are**

- 1) To analyze the structure, volume, value and direction of export and import of the Country.
- 2) To assess the short run and long run trends in Ethiopia trade balance.
- 3) To access on policies and measures taken by the government to deal with the problem in the export and import.

## **1.4. Significance of the Study**

Ethiopia's exports were dominated by a few agricultural primary items and were hampered by structural rigidities and a lack of demand. As a result, the analysis aids in the formulation of strategies to reduce the country's trade deficit by identifying the causes of the trade balance. The researcher

attempted to demonstrate the link between trade balance and the factors that influence trade balance in this study. By doing so, the study hopes to add to the current body of knowledge about the factors that influence Ethiopia's trade balance. Other researchers interested in this field will benefit from this study's knowledge and information.

## 2. Literature Review

### 2.1. Concepts of Trade Balance

The ARDL model and its theoretical implications will be used to investigate the relationship between exchange rate and trade balance. With the rise of Mercantilism in the 16th and 17th centuries, the concept gained traction. Mercantilist philosophers believed that a country's exports should exceed its imports (i.e., a favorable balance of trade) in order to bring money into the country, which they mistook for riches. The group advocated for legislation that limits the consumption of foreign goods, promotes exports, and prohibits the export of bullion. Until David Hume, Adam Smith, David Ricardo, and John Stuart Mill were concerned with theories on the adjustment of balance of trade, the value of a favorable balance of trade remained undisputed. According to the classic explanation of the mechanism, a country whose exports fall short of its imports must sell a portion of its gold stock, hurting its price structure and capacity to compete on the global market. The balance of trade is now only one of several components that makes up the nation's BOP; the US Department of Commerce publishes monthly updates on the current condition of the BOT in goods and services. Since 1980, the value of US imports has far outweighed exports, resulting in a huge trade deficit that has strained the US relationship with its trading partners, particularly Japan, China, and its partners in the North American Free Trade Agreement, Canada and Mexico [14].

Trade balances are defined by Douglas (1983) and Meade (1951) as the difference between the value of goods that a country exports and the value of goods that it imports. The trade balance, according to Douglas, differs from the BOP in that it excludes capital transactions, service payments, and goods shipment. To put it another way, the trade balance is merely a small part of the total BOP.

According to Mannur (1983), a trade balance is advantageous when goods exports exceed imports and unfavorable when goods imports exceed exports. However, according to Salvatore D. (1990), this is not always the case, and a positive trade balance might be deceiving. He cites the fact that a positive trade balance indicates that a country has less things to consume locally due to high domestic prices. In some cases, having a bigger credit balance than a debit amount is advantageous. When a country wishes to boost local investment and demand for contemporary technology, this is what they do [7].

International trade was seen as a growth engine by classical and neoclassical economists since it was so

important to a country's development. There are both direct and indirect advantages to trade. The advantages are direct. Because of international trade and labor division, when a country specializes in the manufacture of a few things, it may export those commodities at a lower cost in return for what others can produce at a lower cost. It benefits from trade and rising national income, which boosts output and the economy's growth rate. As a result, increased output through trade tends to break the poverty cycle and boost economic progress [15].

Export growth leads to increased national output. This is what Rostow refers to as a "leading sector." In a full employment economy, a positive shift in demand overseas or a cost-cutting innovation at home might boost exports and improve the trade balance, resulting in huge profits from trade. This will rise, resulting in even higher salaries due to increased savings; more commerce means more growth [5].

### 2.2. Theories Related to Some Factor Affecting Trade Balance

#### 2.2.1. Commodity Concentration

Underdevelopment manifests itself in two ways: a lack of diversity and an inability to adjust. Many impoverished countries lack the financial and technical resources to support a diverse range of sectors, especially secondary industries capable of exporting finished goods and services. As a result, many LDCs' cash economies have become nearly entirely reliant on the export of a few commodities in their raw and unprocessed forms (Khar Mohesions, 1974).

Africa, according to the World Bank discussion paper (2001), is more reliant on agricultural exports than any other emerging country. Furthermore, it is reliant on a limited number of agricultural export items. A variety of structural constraints, according to Fosu (2001), impede export diversification (which improves the trade balance) towards manufactured goods in the poorest countries, particularly in Sub-Saharan Africa. In general, the more a country's reliance on a single commodity or a limited range of items, the more likely it is that its total export profits and trade balance will fluctuate [1].

Another issue that affects emerging countries' trade balance is market concentration. According to Baban and Greene (1992), one of the reasons for developing countries' low export performance in general, and Sub-Saharan Africa in particular, is their failure to make significant inroads into new geographical markets for their product [2].

Because the market is concentrated in a few industrialized countries, developing countries (particularly African countries) rely heavily on the propensity and growth of industrialized countries to export. For example, if developed countries go through severe recessions, commodities markets in developing countries will suffer as well, resulting in lower export revenues and, as a result, a negative trade balances.

#### 2.2.2. Trade Policy in Developed Countries

Trade obstacles in the developed world impose a cost on

the developing world that significantly exceeds the overall flow of official development assistance (G. K Helleiner, 1994). According to the Common Wealth Secretariat, "protective measures (in industrial countries) discriminate against developing countries" (1982). "The majority of the new quantitative limits have been put on the products that these countries are most interested in, but emerging countries (especially the poorest ones) have been the hardest hit".

According to a World Bank research from 1994, import limitations in industrialized countries reduce the availability of a wide range of primary goods, with the exception of those that are by their very nature capable of being produced locally in these countries. Despite the fact that, the World Trade Organization has a large number of African members (WTO). Their negotiating power is minimal, and they have rarely collaborated to identify and safeguard their shared interests. Preferential access systems like the generalized system of preferences (GSP) and other related programs help to mitigate the negative effects of high tariffs to some extent. In theory, this should aid developing nation exports in overcoming high tariff barriers. Preferences are usually constrained in practice [17].

All of the following policy actions used by industrialized countries to restrict exports to developing countries result in a reduction in export expansion, resulting in a lack of export revenues and, as a result, a decrease in the trade balance.

### **2.2.3. Price and Income Elasticity for Exports**

Developing countries that rely significantly on earnings from the sale of basic products, focusing on a small number of communities and market outlays to finance much-needed capital goods imports, have expressed significant concern about the volatility of their export processes. This fear stems in large part from the fact that commodities prices and, as a result, foreign exchange profits have shown signs of secular volatility (International Economy, 1996).

Due to reduced income and price elasticity of demand for agricultural and primary products, as well as variable supply of these products due to factors such as weather, more specialization, and other causes, income can be highly volatile. The overall point is that developing-country exports, which are primarily primary, are sold in a few industrialized countries with little demand. According to Singer (1987), the expansion of synthetic items, which have supplanted natural products, has slowed relative demand growth for developing countries' export products. Other things being equal, this drop in demand growth has resulted in less upward pressure on basic product prices.

Furthermore, both developing and developed country labor markets have a substantial impact on the prices of developing country exports and imports (Salvatore D., 1990). Because labor in developed countries is relatively scarce and labor unions are strong, the majority of productivity gains in developed countries are extracted by labor in the form of higher salaries. This raises production expenses as well as the price of manufactured items. Surplus labor, high unemployment, and weak or non-existent labor unions in

most emerging countries, on the other hand, are reflected in lower production costs and lower agricultural export prices. As a result, the TOT of developing countries is rapidly decreasing.

In short, developing countries suffer greatly from foreign earning instability and trade balance deterioration since they export items with low price and income elasticity and import goods with high price and income elasticity.

### **2.2.4. Real Exchange Rate and Trade Balance**

The exchange rate is the cost of exchanging one national currency for another. From the perspective of the home country, an increase in the price of foreign exchange means a fall in the price of that country's currency in the rest of the world. Exchange rate changes as a result of market forces are referred to as overvaluation and depreciation (Chacholiade, 1981). When a currency is overvalued, it becomes more expensive in comparison to other currencies. Devaluation of a currency, on the other hand, indicates that the currency becomes less valuable in comparison to the currencies of other countries.

The impact of currency depreciation on the trade balance is significant, although it varies depending on the level of economic development. The Marshall-Lerner criterion states that real depreciation leads to a gain in the trade balance in the long term if the total of import and export demand elasticity is greater than one. Real depreciation helps to improve the trade balance in two ways. To begin, boost the volume of exports. As the currency depreciates, domestic goods become less expensive than foreign goods, making export more competitive. Second, as imports become more expensive, the amount of imports declines. Alternatively, the amount of export and import may not be responsive throughout the depreciation period. As a result, the trade balance may initially deteriorate due to a fall in the value of exports and an increase in the value of imports, but it recovers with time. This is referred to as a J-curve scenario (Fan and Shek, 2006).

### **2.2.5. GDP and Trade Balance**

The demand theory of money states that when people's income rises, their purchasing power rises, causing them to buy more local and foreign products and services. As a result, imports are also on the rise. The income elasticity of demand for imports is positive in some cases, but it can be negative in others if imports are lower in consumption. "If imports are the excess of domestic consumption over domestic supply, then income elasticity for import could be Negative if domestic supply is more income elastic than domestic consumption," says the author (E. Q. Walkahide, 1999: 13-14).

Other things being equal, the trade balance is a component of GDP; a surplus increases GDP while a deficit decreases it. If the influence is significant enough, the usual Keynesian multiplier effect occurs, with consumption going in the same direction. Long-term trade deficits, in particular, can result in foreign debt, on which the country must pay interest. If this debt is deemed uncontained by market agents, a current crisis may arise. Even before that,

this viewpoint took shape. It is possible to persuade the government to reduce GDP growth [10].

Perhaps today's emphasis on national income accounting is one of the main reasons why the naive form of Mercantilism clings to basic national income accounting. GDP is made up of consumption (c), investment (I), government spending (G), and exports (X) Minus are imported (M).

$$GDP = C+I + G+X-M \quad (1)$$

This gives the impression that exports raise GDP while imports lower it. This is incorrect because the definition of GDP is a tautology, and no causation conclusion can be drawn.

For instance, it is equally true that the volume of goods and service available to an economy (C+I+G) consists of domestic output (GDP) plus imports minus exports that is

$$C+I+G = GDP +M - X \quad (2)$$

When seen in this light, a trade fault looks to be beneficial because the researchers are primarily concerned with domestic spending.

### 2.3. Foreign Trade Policies in Ethiopia

#### *The post Reform Trade Policy*

Ethiopia has implemented a variety of initiatives and reforms in the aftermath of the Derge regime's demise in order to change the economy's structure and achieve quick economic growth and development.

As a result, in Ethiopia Trade liberalization is one of the comprehensive policy reforms undertaken by Ethiopia's transitional government (TGE) to address the country's foreign trade challenges, similar to other developing countries. In November 1991/92, the TGE introduced a new economic policy. The transition from a command to a market economy was the focus of the reform.

Price distortions were corrected, constraints on the private sector were lifted, markets for factors of production were established, macroeconomic imbalances were reduced, and trade liberalization was implemented (Ministry of Trade and Industry, 1994/45).

Redressing the external sector imbalance and strengthening the country's foreign reserve position. Issuing a proclamation code that clarified foreign investors' rights to profits and dividends, as well as to pay corresponding fees, royalties, and other foreign exchange expenditures. Certain industries, such as finance, energy, and rail/air transportation, are excluded from the code.

## 3. Methodology

### 3.1. Description Area

Ethiopia is found in the African continent's north-eastern region, also known as the "Horn of Africa." Ethiopia is bordered on the west by Sudan, on the northeast by Eritrea and Djibouti, on the east and southeast by Somalia, and on

the south by Kenya. Ethiopia's economy is a mixed and transitional economy with a significant public sector.

### 3.2. Data Sources

The World Bank (WB), the World Development Index (WDI), the Federal Reserve Bank, EDRI, IFS, the National Bank of Ethiopia (NBE), the customs authority, and the Central Statistics Authority all provided secondary data (CSA) [11]. For general descriptive analysis, the study used processed data from international journals, magazines, periodicals, and many websites linked to the study and many publications [16].

### 3.3. Econometric Analysis

The estimate technique has three phases when using time series data: the first is the stationarity test, which is used to remove the risk of false regression findings; the second stage is the test for co-integration. The goal of co-integration is to determine whether or not the residual of a regression calculated with non-stationary variables is stationary. The short run models are calculated using the Error Correction Model in the final stage (ECM). The data on macroeconomic variables was analyzed by the researcher from 1990 to 2020.

#### a) The Unit Root test of stationary

The first stage in time series regression analysis is to ensure that each variable is stationary. The requirement to verify the variables for stationarity arose from the fact that estimating regression using non-stationary OLS leads to erroneous and inconsistent results (Gujarat, 1995). Furthermore, hypothesis testing is difficult when variables are non-stationary since the conventional assumption on the property of the error term, namely that it has zero mean, constant variance, and is non-auto correlated, is violated [12].

Most time series variables are known to be non-stationary at the level. The non-stationarity problem can be solved by separating the variables and running regression on them. However, this strategy has the drawback of losing information regarding the long-run relationship between the variables, because the first difference between these variables is zero in the long run [8].

#### b) Approach of Johansson co-integration test

The co-integration of two (or more) time series variables indicates that the variables had a long-run equilibrium connection. The Engle-Granger (1997) two-step process and the Johansen (1988) maximum likelihood approach are two extensively used approaches for testing Johansson co-integration. The Engle and Granger two-step residual based technique was applied in this study. The first stage in the Engle-Granger approach is to estimate co-integrating regressions, followed by a test to see if the residual generated from the co-integrating regression is stationary or not; if the residual is stationary, the independent and dependent variables have a long-run connection [4].

#### c) Error Correction Model (ECM)

The ECM depicts the OLS estimate findings' short-run dynamics and their adjustment to the long-run equilibrium.

Non-stationary series are removed from individual series using the Error Correction Model (ECM) in order to apply traditional regression techniques and rectify the disequilibrium error created in the short run (Gujarati, 1995). The short-run dynamics of the model can be seen by regressing the first difference of the dependent variables with the first difference of the independent variables(s) using OLS, but we can use the one period lagged error term to link the dependent variable's short-run behavior to its long-run value (Gujarat, 1995).

d) Diagnostic model

After estimating the long and short run coefficients, the next most critical step in any model is to run model diagnostic tests on the residual estimates of the ECM model. Diagnostic checks are critical in this research since a problem in the residuals from a model's estimation indicates that the model is inefficient, and parameter estimates from such a model may be biased.

e) Serial correlation test

The residuals associated with one observation are not connected with the residuals of any other observation when employing the OLS model. Durbin-Watson test (d-statistics) and Breusch-Godfrey Serial Correlation LM Test are used to conduct autocorrelation tests. The Breusch-Godfrey Serial Correlation LM Test is used in this investigation, and the results reveal that no serial correlation exists.

f) Normality test

The Jarque-Bera normality test was used to determine if the residuals were normally distributed. The histogram should be bell-shaped if the residuals are normally distributed, and the Bera-Jarque statistic should not be significant. To not reject the null hypothesis of malice at the 5% level, the p-value presented at the bottom of the normalcy test screen must be larger than 0.05.

g) Stability test

The CUSUM test, which is based on the cumulative sum of recursive residuals, and the CUSUMSQ test, which is based on the cumulative sum of squares of recursive residuals, was used to test the stability of long run estimates [11].

### 3.4. Model Specifications

In order to conduct this research, the ARDL model is used. The ARDL model was chosen because it provided for a sufficient number of lags to describe the data generation process. The ARDL method is used regardless of whether the underlying variables are I (0), I (1), or a combination of both, but not I. (2). This helps to avoid the pre-testing issues that come with traditional co-integration analysis, which requires the classification of variables into I (0) and I (1) categories (1). Endogeneity is less of an issue in the ARDL technique since it is free of residual correlation because each of the underlying variables stands as a single equation (i.e. all variables was assumed endogenous). The main advantage of this method was its ability to identify co-integrating vectors in situations when there were several co-integrating vectors.

In the econometric modeling of the level of trade balance, the aggregate trade balance was specified as a function of various significant factors. As a result, the model's primary goal is to determine the elasticity of Ethiopia's trade balance in relation to its main variables.

Trade balance is theorized to be dependent on lag trade balance (TBlag), real output (RGDP), real effective exchange rate (REER), foreign exchange availability (FEA), and trade liberalization when constructing trade balance models (LIB).

Therefore in this particular study the trade balance function will have the form:

$$TB = F(\ln TB_{t-1}, \ln RGDP, \ln REER, \ln FEA, LIB) \quad (3)$$

$$TB = \beta_0 + \beta_1 \ln TB_{t-1} + \beta_2 \ln RGDP + \beta_3 \ln REER + \beta_4 \ln FEA + \beta_5 LIB + e \quad (4)$$

Where TB= Trade balance defined as the ratio of export to import.

TB<sub>t-1</sub> = lagged trade balance

RGDP = Real output of the country

REER = Real Effective exchange rate

FEA = Foreign exchange availability

LIB = Trade Liberalization

e= Error term

### 3.5. Explanation of the Variables

#### 3.5.1. The Dependent Variable

##### Trade Balance

The net amount of goods imports and exports, excluding all money transfers, investments, and other financial components, is known as the trade balance. The value of a country's exports minus imports is its trade balance. The difference between the total export and import value is usually used to calculate the trade balance. The trade balance will be calculated as the ratio of export value (x) to import

value (y) in this study (M).

A trade surplus or positive trade balance exists when a country exports more than it imports, while a trade deficit or negative trade balance exists when a country imports more than it exports.

#### 3.5.2. The Explanatory Variables

- 1) Lag trade balance (TBlag): The addition of this variable is based on the notion that a prior year's deficit impacts the current trade balance since it is financed by subsequent years, causing trade balance equilibrium to be disrupted. When the previous year's trade balance deficit has a negative impact on the current year.
- 2) Real output (RGDP): The inclusion of actual output is based on the idea that an increase in a country's GDP leads to an increase in demand for manufactured items (which have high income elasticity of demand). Growth in real GDP has a favorable impact on Ethiopian imports, which has a negative impact on the country's trade balance [3].

- 3) Real effective exchange Rate (REER): The formulation of a trade balance model to manage the real effective exchange rate is based on the assumption that currency depreciation has significant economic consequences. The Marshall-Lerner condition, which states that real depreciation leads to an increase in the trade balance in the long run if the total of import and export demand elasticity exceeds one, is one of the most notable implications. For the Marshall- Lerner condition, Herman Rincon (1999) investigated the relationship between trade balance and exchange rate test. His empirical data showed that the marshal-Lerner condition was significant.
- 4) Foreign exchange availability (FEA): The addition of foreign exchange availability in this model is based on the notion that foreign exchange availability encourages imports, resulting in a worsening of the trade balance. Form exchange revenues and lag official reserves have a good and considerable impact on imports, according to Mamo Isayas Ambe (2019). As a result, the variable

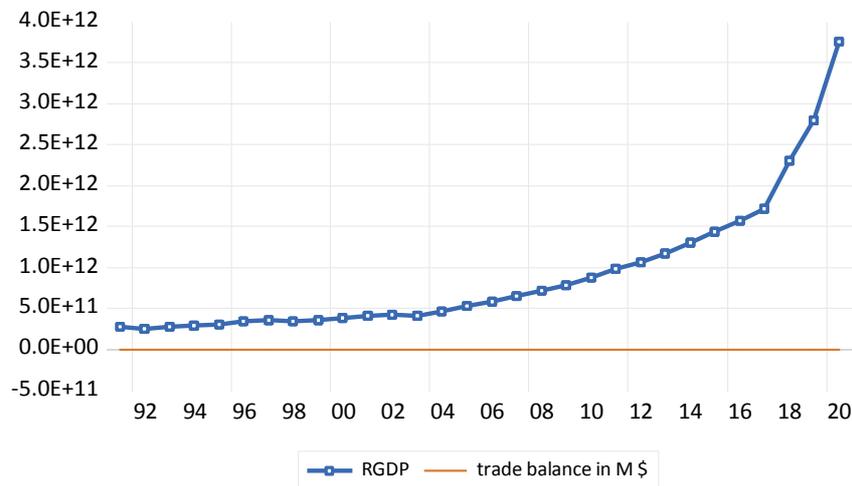
is projected to have a negative relationship with trade balance [6].

- 5) Trade Liberalization (TLIB): The inclusion of this variable in the model is based on the assumption that trade liberalization will improve the trade balance by lowering taxes and tariffs, as well as offering other subsidies. However, there is another hypothesis that trade liberalization has a negative impact on the trade balance.

## 4. Results and Discussions

### 4.1. Descriptive Analysis

The existing evidence indicates that the rate of trade balance and real gross domestic product has been increasing over the years 1990-2020. When; we see the relationship between trade balance and the inflows of real gross domestic product graphically with increase in trade balance; the rate of real gross domestic product continuously increase by high rate.



Source: Own computation based on National Bank of Ethiopia and World Bank data

Figure 1. Trends of trade balance and real gross domestic product.

### 4.2. Time Series and Econometric Model

#### 4.2.1. Empirical Results for Stationary Test

The stationarity test was one of the most crucial phases in adopting an ARDL model. This is a test that prevents the ARDL model application from crashing due to non-stationarity in the data. It allows you to determine the order of the variables'

integrated levels, ensuring that no misleading regression occurs. The results of the ADF and PP tests are mentioned further down. The null of non-stationarity or unit root has been rejected if the test statistic critical values are bigger than the ADF test statistic. We accept the null hypothesis of unit root or stationarity and decide to difference the data if the ADF test statistics is greater than the crucial threshold.

Table 1. ADF t-test for unit root.

| Variables | ADF t-statistics at level (0) |                     | ADF t-statistics t-first difference level (1) |                     | Order Integration |
|-----------|-------------------------------|---------------------|---|---------------------|-------------------|
|           | Intercept                     | Intercept and trend | Intercept                                     | Intercept and trend |                   |
| TB        | 0.367                         | 1.97                | 4.36  | 4.13                | I(1)              |
| lnRGDP    | 5.37                          | 1.4                 | 3.02  | 4.87                | I (1)             |
| TLIB      | 0.988                         | 0.35                | 3.37  | 3.79                | I (1)             |
| lnFEA     | 1.85                          | 4.53                | 3.5   | 3.59                | I (1)             |
| lnREER    | 2.15                          | 2.21                | 3.3   | 4.58                | I (1)             |
| Lag TBt-1 | 0.49                          | 1.79                | 4.19  | 4.02                | I (1)             |

Source: Authors Own computation.

As it was shown from the above table; all variables like TB, lnRGDP, LIB, lnFEA, lnREER, TBt-1 are non-stationary at level and become stationary after taking first difference. This implies that these series variables are integrated of order one, i.e. I(1),

Because the likelihood of all variables at ADF t-statistics at first difference level I(1) is less than 5%, and the intercept, intercept, and trend of ADF t-statistics first difference at level are more than critical value (5 percent). As a result, we reject the null hypothesis, which states that all variables are unit root tests, and accept the alternative hypothesis.

#### 4.2.2. Lag Selection Criteria

The model with the shortest AIC, SC, and HQ estimations or modest standard errors and high R<sup>2</sup> performs substantially better, as was known from the theory. In our situation, the AIC is used to determine the number of delays that the model should have. According to the ARDL model's lag selection criteria, the maximum latency for our ARDL model should be lag 4. This is due to the fact that the AIC value at lag 4 is 2.227182, which is less than the AIC values at lag 0, lag 1 lag 2, and lag 3, which are 12.38930, 12.41380, and 10.83521, respectively.

Table 2. The Results of Lag selection criteria.

| No. of lags | logL value | LR value | FPE value | AIC value | SC value  | HQ value  |
|-------------|------------|----------|-----------|-----------|-----------|-----------|
| 0           | -282.4460  | NA       | 275.373   | 22.11123  | 22.3537   | 22.18090  |
| 1           | -131.0609  | 232.9001 | 0.172431  | 12.38930  | 13.84095  | 12.80732  |
| 2           | -106.3794  | 28.47873 | 0.224918  | 12.41380  | 15.07515  | 13.18017  |
| 3           | -60.85768  | 35.01668 | 0.097043  | 10.83521  | 14.70627  | 11.94993  |
| 4           | -76.04664  | 52.65551 | 0.0001145 | 2.227182* | 7.307956* | 3.690261* |

Source: Authors Own computation

\*Indicates lag order selected by the criterion

LR: sequential error

FPE: final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

Source: Authors Own computation.

#### 4.2.3. Results of Bound Test and Long Run Estimation

The first step in the ARDL approach to co-integration is to look for co-integration or a long-term link between the variables. The ARDL Bounds test F-statistic was used to assess the long-run association, and the Akaike Information Criterion (AIC) approach was used to determine the ideal lag. The derived F statistics is 6.79; which are in between the Pesaran's lower and upper critical values bound in all (1

percent, 2.5 percent, 5 percent, and 10percent) significance levels, as can be seen in the co-integration test of ARDL bounds test table below, indicating that the test is inconclusive.

##### (i). Bound Test

From the result of the bound test, since the F-Statistic values are 6.79; which were higher than the lower values and the upper values at 5 percent.

Table 3. The Results for Long run Estimation and Bound Test.

| F-Bounds Test Null Hypothesis is: No levels relationship |          |          |      |      |
|--|----------|----------|------|------|
| Test t-statistic   | Value    | Sign if. | I(0) | I(1) |
| Asymptotic: n=1000                                       |          |          |      |      |
| F-statistic  | 6.792019 | 10%      | 2.2  | 3.09 |
| K  | 4        | 5%       | 2.56 | 3.49 |
|  |          | 2.5%     | 2.88 | 3.87 |
|  |          | 1%       | 3.29 | 4.37 |

Source: Authors Own computation.

The model was estimated by ARDL and the optimal lag was selected by Akaike Information criterion (AIC) method. In this study automatic selection (using the Akaike Information Criterion) was used with a maximum of 4 lags for both the dependent variable and the regressors.

##### (ii). Estimation Results of the Long Run ARDL Model

Once the existence of the long run relationship between

the variables is identified the next step in ARDL model is to estimate the long run coefficients. In regression analysis, we predict the values of the unknown dependent variables based on the known values of the independent variables.

The long run ARDL model equation can be written as follows:

$$\text{Trade balance} = \text{lagTB} - (-291.7306 * \text{LIB} + 5546.58 * \text{LN RGDP} - 28602.05 * \text{LN REER} - 10384.14 * \text{LN FEA} + 13026.41)$$

Table 4. The Result for Long Run Coefficient.

| Levels Equation  |             |            |             |        |
|--|-------------|------------|-------------|--------|
| Case 2: Restricted Constant and No Trend   |             |            |             |        |
| Variable   | Coefficient | Std. Error | t-Statistic | Prob.  |
| TRADE LIBERALIZATION   | -291.7306   | 63.944     | -4.562245   | 0.0002 |
| LNRGDP   | 5546.58     | 2486.13    | 2.231007    | 0.0386 |
| LNREER   | -28602.05   | 4866.41    | -5.877438   | 0.0000 |
| LNFEA  | -10384.14   | 2600.386   | -3.993306   | 0.0009 |
| C  | 13026.41    | 46287.16   | 0.281426    | 0.7816 |
| EC = TRADE BALANCE IN M \$ - (-291.7306*TRADE LIBERALIZATION + 5546.58*LNRGDP - 28602.05*LNREER - 10384.14*LNFEA + 13026.41) |             |            |             |        |

Source: Authors Own computation.

In this study as it was expected and as theoretically stated by many scholars trade liberalization measured found to have negative and statistically significant impact on trade balance of our country measured as determinant of trade balance. Other things remaining constant a one percent increase in trade liberalization will result decrease in trade balance by 291.7306 percent.

The impact of real GDP on Trade Balance is positive in the long-run, However, in the short run the effect of real GDP on trade balance is positive relationship and significant.

In the long run, the level of real gross domestic product, which is the study's major variable, is found to have a positive and statistically significant impact on trade balance. When the RGDP as a percentage of trade balance improves by 1%, the trade balance increases by 5546.581 in the long run, assuming all other factors remain constant. Another finding is that REER has a negative impact on trade balance, which is statistically significant. In the long run, increasing REER by 1% lowers the country's trade balance by 28602.05 percent. The effect of foreign currency availability on trade balance is negative and statistically significant in the long term, according to the estimation results, and our country's trade balance is reduced by 10384.14 percent when FEA is increased by 1%.

#### 4.2.4. Estimation Results of the short run ARDL Model and Error Correction Model

##### Short run ARDL model

Having already obtained the long run model and estimated the coefficient, the next step will be estimating the coefficient of the short run dynamics that have important policy implication. The results reveals that all the explanatory variables included in the dynamic short run model has relationship with dependent variables. The effect of Lag trade balance with trade balance was positive and statistically significant. In the short run real GDP is found to have a positive and statistically significant impact on trade balance and when lnRGDP increased by 1%, then trade balance increased by 0.399261. And also trade liberalization is negative impact on the trade balance and statistically significant in the short run. The result of REER is negative impact and statistically significant. When the real effect exchange rate increased by 1% then, trade balance is decreased by 12240.72. The last one is the effect of foreign exchange available statistically insignificant in the short run.

The short run ARDL model equation can be written as follows

$$\text{Trade balance} = 0.399261(\text{lagTB}) - 175.2540(\text{LIB}) + 332.049(\text{lnRGDP}) - 12240.72(\text{lnREER}) + 1888.815(\text{lnFEA})$$

Table 5. The result for the Estimation of the short run ARDL model.

| Variable          | Coefficient | Stand. Error                      | T-statistics | Prob.* |
|-------------------|-------------|-----------------------------------|--------------|--------|
| Lag TB            | 0.399261    | 0.178419                          | 2.23771      | 0.0381 |
| LIB               | -175.2540   | 33.23690                          | -5.272874    | 0.0001 |
| LNRGDP            | 3332.049    | 1117.552                          | 2.981560     | 0.0080 |
| LNREER            | -12240.72   | 2148.113                          | -5.698360    | 0.0000 |
| LNREER(-1)        | 2350.474    | 3093.464                          | 0.759820     | 0.4572 |
| LNREER(-2)        | -7292.123   | 2289.214                          | 3.185427     | 0.0051 |
| LNFEA             | 1888.815    | 2290.175                          | 0.824747     | 0.4203 |
| LNFEA(-1)         | -1686.643   | 2375.229                          | -0.710097    | 0.4867 |
| LNFEA(-2)         | -6440.329   | 2094.797                          | -3.07440     | 0.0065 |
| C                 | 7825.473    | 29061.09                          | 0.269277     | 0.7908 |
| R-squared         | 0.9988744   | Mean dependent var. -5593.368     |              |        |
| Adjusted R-square | 0.983117    | S.D dependent var. 4865.977       |              |        |
| S.E of regression | 632.2673    | Akaike info criteria 16.00895     |              |        |
| SUM squared resid | 7195715     | Schwarz criteria 16.48474         |              |        |
| Log likelihood    | -214.1254   | Hannan-Quiz criteria 16.15441     |              |        |
| F-statistics      | 175.6888    | Durbin-watson statistics 2.527383 |              |        |
| Prob.             | 0.00000     |                                   |              |        |

Note: p-value and subsequent test do not account for model.

*Error Correction Model (ECM)*

Hence an error correction model (ECM) was estimated that incorporate the short term interactions and the speed of

adjustment towards long run equilibrium. Since all variables in the model are now I (1), statistical inference using standard T and F tests are valid.

*Table 6. The result of error correlation.*

| Dependent Variables: D(Trade Balance in M \$) |             |            |             |        | Remarks |
|---|-------------|------------|-------------|--------|---------|
| Variables                                     | Coefficient | Std. Error | t-Statistic | Prob.  |         |
| C   | -2.11E-13   | 2.13E-13   | -0.913279   | 0.3710 |         |
| D(LNRGDP(-1))                                 | -2.81E-12   | 1.97E-12   | -1.423805   | 0.1685 |         |
| D(LNREER(-1))                                 | -1.17E-12   | 1.87E-12   | -0.623188   | 0.5396 |         |
| D(LNFEA(-1))                                  | 1.29E-12    | 1.41E-12   | 0.91371     | 0.3708 |         |
| D(LAG_TRADE(-1))                              | 1.00        | 2.24E-16   | 4.47E+15    | 0.0000 |         |
| D(TLIB(-1))                                   | -4.33E-14   | 4.63E-14   | -0.9342     | 0.3603 |         |
| ECM   | 1.25E-15    | 2.92E-16   | 4.2957      | 0.0003 |         |

**4.2.5. Diagnostic Model**

Once the long run and the short run coefficients are estimated the next most important step in any model is to undertake the model diagnostic tests on the estimates of the residual of the ECM model. Diagnostic checks are crucial in this analysis, because if there is a problem in the residuals from the estimation of a model, it is an indication that the model is not efficient, such that parameter estimates from such model may be biased.

**4.2.6. Serial Correlation Test**

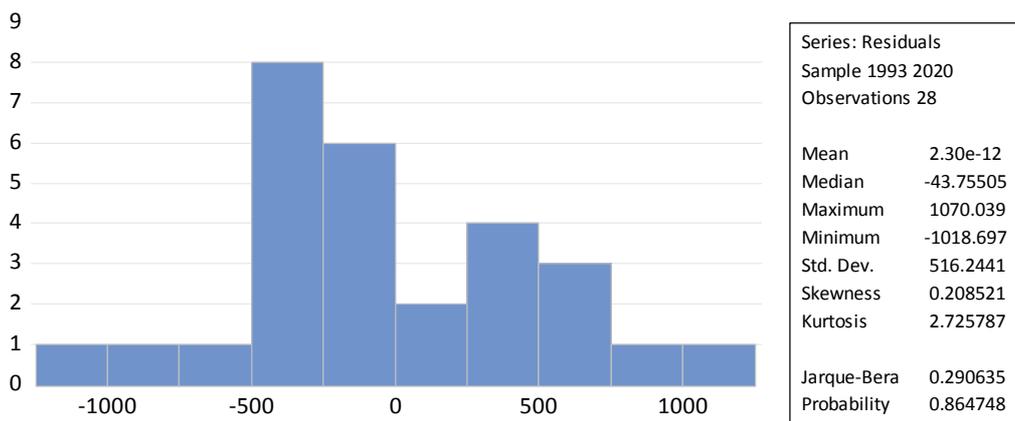
In using the OLS model, the residuals associated with one observation is not correlated with the residuals of any others observation. Autocorrelation test is conducted by applying Durbin-Watson test (d-statistics) and Breusch-Godfrey Serial Correlation LM Test. In this study the Breusch-Godfrey Serial Correlation LM Test is applied and the result shows that there is no serial correlation i.e. we do not reject the null hypothesis of residuals are not serially correlated since the P-values of F-statistic and Obs\*R-squared exceeds the 5% critical value as indicated in table below.

*Table 7. The result for Serial Correlation LM Test.*

| Breusch-Godfrey Serial Correlation LM Test:            |          |                      |        |
|--|----------|----------------------|--------|
| Null Hypothesis: No Serial Correlation at up to 2 lags |          |                      |        |
| F – Statistic  | 1.602495 | Prob. F (2,16)       | 0.2321 |
| Obs*R-Squared  | 4.672730 | Prob. Chi-square (2) | 0.0967 |

**4.2.7. Normality Test**

By using the Jarque-Bera normality test, the study checked whether the residuals are normally distributed or not. If the residuals are normally distributed, the histogram should be bell-shaped and the Bera-Jarque statistic would not be significant. This means that the p-value given at the bottom of the normality test screen should be greater than 0.05 to not reject the null hypothesis of normality at the 5% level. As shown in figure below since, the histogram is bell-shaped and the Bera-Jarque statistic is not significant, this means the p-value (0.864748) given in the histogram figure of the normality has greater than 0.05, the researcher do not reject the null hypothesis of normality at the 5% level. As a result, we conclude that the error terms of the specified model in this study is found to be normally distributed.



*Figure 2. The result of normality test.*

**4.2.8. Test of Model Stability**

The stability of long run estimates has been tested by applying the CUSUM test based on the cumulative sum of the recursive residuals and CUSUMSQ test, the cumulative

sum of squares of recursive residuals test. Such tests are recommended by Pesaran et al (2001). The CUSUM test finds parameter instability if the cumulative sum goes outside the area between the two critical lines within the 5% significance lines.

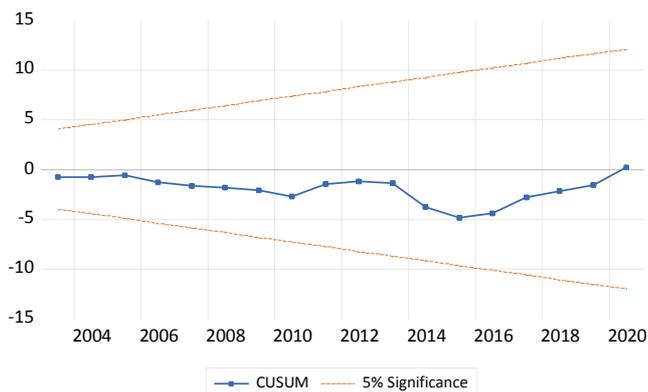


Figure 3. The result of stability test.

As shown in figure above, the line is well within the confidence bands and the conclusion would be the null hypothesis of stability is not rejected. Therefore, the test clearly indicates stability in the equation during the sample period. In addition to the diagnostic tests, in order to guarantee the goodness of the model; we used cumulative sum (CUSUM) and CUSUM of squares tests of structural break for the long run relationship equation and we found that there were no structural breaks as it was seen in the model.

## 5. Conclusion and Policy Recommendation

### 5.1. Conclusions

In this study the empirical relationship between trade balance and that's determinant is investigated by including some of the explanatory variables like real gross domestic product, the effect of real effective exchange rate, foreign exchange available, lag trade balance and trade liberalization.

As stated in the introductory part the main question this paper tries to answer is to clarify whether there exist a positive or negative relationship between trade balance and level of some explanatory variable by using the ARDL approach. We have analyzed the determinant of trade balance in Ethiopia for the period 1990-2020.

We begin discussing the condition variables; lnRGDP positive effect and statistically significant in both long run and in the short run. Lag Trade balance is positive relationship and statistically significant in the short run. The natural logarithm of real effective exchange rate and trade liberalization are negative impact on the trade balance and statistically significant in both long run and in the short run. lnFEA negative relationship and insignificant in long run, and also positive relationship and statistically insignificant in the short run.

### 5.2. Recommendations

Based on the finding of the paper the following policy recommendations are presented as follows.

- 1) Export diversification towards high potential areas since Ethiopia has various advantages for the development of its export sector. These include the abundant and

capable labor Force; low wage level; a wide range of weather and soil conditions; preferential access to European market and proximity to the Middle East markets. Moreover the preferential access to the common market for eastern and southern African states (COMESA) with a total population of more than 260 million also offers substantial market opportunities for several export items for the country.

- 2) Policies that enhance the diversification and facilitate the shift towards the export of semi processed and manufactured goods are essential. One obvious option in this case is to make huge investment in the export sector through a coordinated effort between the private sector and the government. Moreover, policies that diversity the destination of export to new inroads, in addition to the already existing is also essential.
- 3) As implication, in order to achieve the desired effects on trade balance, Ethiopia should depend on policy that focusing on the variable of real exchange rate, which is the nominal exchange rate to aggregate price level. At the same time, the devaluation-based policies (affected through changes in nominal exchange rate) must cooperate with stabilization policies (to ensure domestic price level stability) to achieve the desired level of trade balance.
- 4) Create awareness among the people to change their attitude towards domestic products which is highly in favor of foreign product goods.
- 5) Rationing the available foreign exchange that is allowing foreign exchange only for necessary products.

### 5.3. Suggestions for Further Research

There are various aspects that can determine Ethiopia's trade balance, according to established ideas based on literature review. Depending on the availability of data for Ethiopia during the time period under consideration, this study attempted to capture some of the characteristics. However, due to the difficulty in obtaining data, some variables such as trade and related policies in developing countries, price and income elasticity for export, trade policies in developed countries, and commodity concentration, which all have a significant impact on explaining the determinant of trade balance in Ethiopia, are not included in the model. As a result, researchers who are interested in conducting a study in the area might incorporate these factors in their analytic model.

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