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Do asymmetric J-curve phenomenon Evident for Ethiopia: An Application of Heterogeneous Panel ARDL model to its Major Trading partners

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Declaration of statement

I, the undersigned, confirm that this research study is my original work, that it has never been presented at this or any other university, and that all resources and materials utilized have been properly acknowledged.

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Abstract

Investigating the existence of the J-curve phenomenon of the trade balance in response to devaluation and examining its asymmetric relationships for panel data analysis of 28 major Ethiopia's trading partner were objective of this study. The data coverage is from 1992 to 2020 and is estimated using the Pooled Mean Group (PMG) approach which is determined by Hausman (1978) test, in both the linear and nonlinear ARDL frameworks. This study differs from prior studies by its model specification, including nonlinearities estimation technique, utilizing a modified version of the conventional trade balance model (standard bilateral trade plus gravity model approach), which is more suited for bilateral trade analysis. Under linear panel ARDL analysis seven bilateral trade connections have J-curve effects, based on the assumption of symmetric exchange rate effects. The J-curve effects are real in 20 situations when the estimate is performed assuming asymmetric effects. Long-run and short-run asymmetries are also verified, and it is demonstrated that simultaneous bilateral real exchange rate depreciation improves the long-run trade balance. Since the agricultural export compositions remained relatively constant, and total exports continued to worsen in 1984/85, declining by 55.95 percent in 1991/92 from prior decades. Following the overthrow of the military dictatorship and the EPRDF's takeover of the government and takes different policy measures (like currency devaluation) the quantities of oilseeds, pulses, meat products, fruits and vegetables, live animals, chat, and gold, on the other hand, have changed dramatically and indicate a substantial improvement, composed 11.39%, 5.27%, 1.55%, 1.44%, 2.15%, 9.49% and 9.01% respectively of overall export value during 1991/92-2019/20. Thus both the descriptive and empirical analysis of the study confirms existence of J curve phenomenon in the case of Ethiopia with major trading partners. Imply that a devaluation strategy can be utilized to improve Ethiopia's export competitiveness in the long run.

Key words: J-curve phenomenon, Bilateral trade Balances, Asymmetric effects, Exchange rate, Panel ARDL Model, Ethiopia.

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Acronyms and Abbreviations

AD: Aggregate Demand

AIC: Akaike Information Criteria

APSP: Average Petroleum Spot Price

AR: Autoregressive

ARDL: Autoregressive Distributed Lag

BIC: Bayesian Information Criteria

B-P LM: Bruesch-Pagan Lagrangian Multiplier

CGE: Computable General Equilibrium (CGE)

CIPS: Cross Sectionally Augmented Im, Pesaran and Shin (2003) test

CPI: Consumer Price Index

CSA: Central Statistical Agency

CSD (CD): Cross Sectional Dependence

CVAR: Conditional and structural Vector Autoregressive

DOLS: Dynamic Ordinary Least Square

ERPT: Exchange Rate Pass-Through

EUEPA: European Union's Economic Partnership Agreement

GDP: Gross Domestic Product

GMM: General Moment Method

HQ: Hannan –Quin information criteria

IMF: International Monetary Fund

LDC: Least Developed Countries

LSDV: Least Square Dummy Variable

MG: Mean Group

MWD: Import Weighted Distance

NARDL: Nonlinear Autoregressive Distributed Lag

NBE: National Bank of Ethiopia

NEER: Nominal Effective Exchange Rate

NER: Nominal Exchange Rate
OECD: organization for Economic Co-operation and Development
OLS: Ordinary Least Square
CADF: Cross Sectionally Augmented Dickey Fuller
PMG: Pool Mean Group
POLS: Pooled Ordinary least Square
PPI: Producer Price Index
PPP: Purchasing Power parity
RE: Random Effect
RER: Real Exchange Rate
SC: Schwarz Information Criteria
SD: Standard Deviation
SSA: Sub-Saharan Africa
SVAR: Structural Vector Autoregressive
UK: United Kingdom
USA (US): United State of America
USEBA: United States and All But Weapons
USD: United State Dollar
VAR: Vector Autoregressive
VEC: Vector Error Correction
VECM: Vector Error Correction Mechanism
VIF: Variance Inflation Factor
WDI: Work Bank Development Indicator Database
WITS: World Integrated Trade Solution

Dedication

For whom I sacrificed, during my master's program!

CHAPTER ONE

Background to the Study

1.1 Introduction

In the current digitalized and era of globalization, where economies are opening themselves to a wider range of international markets, a country's trading with the rest of the world plays an important role in its development. Classical trade theory sees little basis for trade between similar economies – it postulates that countries trade to take advantage of their differences. The basic idea, which dates back to Ricardo in 1817, is that each country has a comparative advantage in producing different goods - some goods can be produced more cheaply in different countries - and this gives rise to profitable opportunities for trade. According to the Ricardo theory, each country will specialize and export the goods in which it has a comparative advantage arising from differences in technologies. The theory does not explain why countries have access to different technologies; it is assumed that they do. In contrast, comparative advantage arises from different relative factor endowments in the Heckscher-Ohlin model. So capital abundant countries specialize in and export capital intensive goods and labor abundant countries specialize in and export labor intensive goods.

The interaction between the trade balance and the exchange rates its unknown if trade barriers and protectionism based on infant-industry arguments have resulted in the required changes in the trade balance. The J-Curve phenomena and the Marshall–Lerner (ML) criterion are central too much of the research. To transfer expenses from abroad to within the country, currency depreciation is used. As a result, the international trade balance is expected to improve. However, the short-run and also long-run responses of the foreign trade balance to devaluation cannot be similar. Currency depreciation is a policy tool used by many emerging economies (such as Ethiopia) to reduce inflation to strengthen the trade balance, there is usually a time lag until exhibiting signs of progress, if any. It is due to time lag structure, according to Junz and Rhomberg(1973), Magee(1973), and Meade(1988), Bahmani-Oskooee, and Ratha(2004). Devaluation initially worsens trade balance before improving it later.

This creates a J-shaped pattern in the trade balance. The J-curve phenomenon is referred to in the literature. The empirical literature on the J-curve phenomenon is extensive; however, the general assumption is that the reaction of the trade balance to currency devaluation or depreciation does not always follow a predictable pattern.

With respect to the elasticity method, Marshall (1923), the inventor of the elasticity approach, analyzed the relationship between the balance of trade and exchange rates. Lerner (1944) was the first to note this ailment. As a result, in the literature, this condition is referred to as the "Marshall-Lerner" condition. If the amount of absolute values of the price elasticity of import and export demand exceeds unity, the exchange rate elasticity (price elasticity) of export and import volumes (demand) is high enough; the foreign trade balance is expected to improve in the long run after a depreciation/devaluation. As the domestic currency depreciates, export prices fall in terms of foreign currency while import prices rise in terms of local currency. Then, as the volume of exports increases and the volume of imports decreases, the trade balance is expected to improve. Since the theoretical context of the J-curve is dependent on this condition, the Marshall-Lerner condition was used to determine the effectiveness of currency devaluation/depreciation on the balance of trade.

Emerging economies with underdeveloped capital markets, the fluctuations of foreign trade balance play a big role in current account balance as well as balance of payments. Countries may reduce their foreign trade deficit by implementing either expenditure-reducing policies, such as contractionary fiscal or monetary policy, or expenditure-switching policies, such as currency depreciation. The problem of exchange rates becomes increasingly important as goods and services cross national borders. The fluctuations of the foreign exchange balance play a large role in the current account balance as well as the balance of payments in developing countries with underdeveloped capital markets. Countries may reduce their foreign trade deficit by implementing either spending-cutting policies or tax-cutting policies.

World Bank, (2020) annual report Ethiopia is a small open economy and the most populous country on the UN's list of Least Developed Countries (LDC), and Africa's second most populous country, with an estimated population of over 112 million in 2019. It is strategically

located between Asia and Europe markets, with rich agro-ecological zones suitable for fresh and organic agricultural products. Furthermore, the country has been granted a number of special trade preferential agreements, including AGOA in the United States and All But Weapons (EBA), as well as the European Union's Economic Partnership Agreement (EPA). Despite these opportunities, the country's export output is unsatisfactory. Dealing with the external trade sector's underperformance and constraints, particularly in the export sector, is crucial if the country's trade potential is to be fully realized and the trophy of trade used to benefit the entire economy. As a result, subsistence and rain-fed agriculture are the economic foundation and source of income for the vast majority of these people. Ethiopia's agricultural contribution to GDP is higher than the average contribution of Sub-Saharan Africa. In Sub-Saharan Africa, the agricultural sector accounts for about 23% of GDP (Barrios). Ethiopia's agricultural sector, on the other hand, accounts for 35% of the country's GDP (CIA, 2020). While agriculture still employs more than 70% of Ethiopia's population, services have surpassed agriculture as the country's primary source of GDP.

1.2 Statement of Research Problem

For a long time, economic scientists have questioned the nature of the J-curve (devaluation). There are surprising findings on the effect of devaluation on trade balances, with some claiming that it improves trade balances, others arguing that it worsens trade balances, and still others reporting that there is no relationship between trade balance and exchange rate in an economy.

The critical issues on findings of currency devaluation are country-specific; they vary due to variations in the study timeframe and the methods used to look into the link between the exchange rate and the trade balance. It is worth noting that among several scholars Magee (1973), Himarios (1985), Bahmani-Oskooee and Miteza (2003), Arora et al. (2003), Bahmani-Oskooee and Hegerty (2011) and Bahmani-Oskooee et al. (2013) have documented several channels through which devaluation might have favorable impact on trade balance.

There are equally strong arguments against this view as there are for the theory discussed above. If a country has an initial trade deficit, Krugman and Taylor (1978) argue that devaluation would have a negative impact on aggregate demand through the import cost channel. They argue that after devaluation, imports become more costly in domestic currency, necessitating the use of

more domestic capital. Rose and Yellen (1989) were the first to test the theory using bilateral trade data. They tested the J-curve hypothesis for country pairs using cointegration techniques suggested by Engle and Granger (1987), but found no evidence for the existence of a J-curve. Moreover, a few other studies like Lal and Lowinger (2002), Bahmani-Oskooee and Kutan (2009), and Kalyoncu et al. (2009) found mixed results.

Many researchers have been dealing with the effects of currency devaluation on Ethiopia's trade balance, and the ambiguity for the currency devaluation is still present. Studies conducted by Kibre (1994), Asmamaw (2008), Hellen (2012), and more recently Fassil (2017) have shown that birr devaluation improved Ethiopia's trade balance. However, studies by Haile (1994), Alemu (2008), and Geda (2017) found that birr depreciation harmed the country's trade balance because the country's import rate is much higher than its export rate.

Whatever the case may be, the Ethiopian government continued to use devaluation of the currency as a macroeconomic policy to improve trade balance (especially, after 1992, when valued in US Dollars.) Even recent studies on trade balance dynamics have a flaw in that the methodology they use does not account for significant progress on asymmetric relationships between exchange rate and trade balance. As a result, this research will build on the Rose and Yellen model (1989). Following the econometric approach of Bahmani-Oskooee and Fariditavana (2016), Pesaran et al (2001) proposed an error-correction variant of an autoregressive distributed lag (ARDL) model, this study appears to be focused on examining asymmetric relationships using both linear and nonlinear models, which has been used in more recent studies to discover more evidence of the J-curve.

1.3 Objectives of the Study

The study has one broad objective:

- ✓ To investigate the existence of the J-curve phenomenon of the trade balance in response to devaluation and examining asymmetric relationships.

Specific objectives:

- ✓ To analyses the volume, Pace, Pattern and the commodity structure of bilateral trade flows between Ethiopia and major trading partners using annual datasets over the 1963/64–2019/20 periods.
- ✓ To analyzing the impact of exchange rate regimes in Ethiopia and assessing effect of exchange rate movements on the trade balance as symmetric.
- ✓ To look at the Patterns of parallel and official foreign exchange rate market in Ethiopia.

Finally, to draw policy implications for improving export performance of the country based on the findings of the study..

1.4 Research questions

- ✓ Is the asymmetric J-curve phenomenon real in the case of Ethiopia's bilateral trade balance in response to devaluation?
- ✓ What implies the Pattern and the commodity structure of bilateral trade flows between Ethiopia and major trading partners before and after devaluation in 1991/92?
- ✓ Does devaluation has impact on Ethiopia's bilateral Trade with major trading partners?

1.5 Significance of the Study

There is an increasing interest among economists regarding the effects changes in exchange rate on the foreign trade performance of a country. If depreciation of real exchange rate really increases the competitiveness of a country's exports, then it is possible to increase production and boost the export earnings. If such relationship does not exist, then depreciating the exchange rate may not be a reasonable way of improving the country's competitiveness. In this case, other forms of incentive schemes may be implemented. Hence, the study tries to examine whether foreign trade of Ethiopia during the recent years are influenced by the position of bilateral real exchange rate of the country against its trading partners. Therefore, the outcome of this study may enable policy makers to make adjustments in the formulation of policies/strategies aim at

improving the performance of the export sector. The study is also expected to contribute its own for further studies on the area.

1.6 Organization of the study

The remaining sections of the thesis are organized as follows: section two deals with classification of exchange rate regimes and reviews of theoretical and empirical studies, followed by third chapter, which focuses on the methodological approach. Chapter four provides a brief summary on Ethiopian economy, trade balance, exchange rate regimes nexus bilateral trade performance of Ethiopia. The data and estimation results are presented in Chapter five. The thesis is concluded in chapter six.

CHAPTER TWO

Literature Review

2.1 Introduction

It is now common practice to establish a direct link between the trade balance and the exchange rate when evaluating the effects of devaluation on the trade balance. Authors such as Miles (1979) and Himarios (1985, 1989) used bilateral exchange rates to investigate the response of less developed countries' trade balances to devaluation using a direct approach. Although most LDCs attach their currencies to a most important currency or a basket of major currencies, economists agree that as long as major currencies fluctuate against one another, they will experience fluctuations in their effective exchange rates. As a result, it is necessary to incorporate the effective exchange rate into analysis when assessing the effects of devaluation, as discussed in the first stages. Following the theoretical literature on devaluation, empirical literature is divided into four sections based on methodological advances in economics, and these studies look at the effects of devaluation on trade balance for countries other than Ethiopia and the studies which examine its validity for Ethiopian economy.

2.2 Classification of Exchange rate Regimes

Exchange rate as defined by Krugman (2008), the value of one country's currency (home) in terms of another country's currency. Around the world, different countries have different exchange rate policies. Although demand and supply determine exchange rates, governments can influence them in a variety of ways. Alternatives are defined by the extent and nature of government involvement in currency markets.

According to the study of FahrettinYagc (2001) Choice of Exchange Rate Regimes for Developing Countries the following classification system (ranked on the basis of the degree of flexibility of the arrangement) has been widely used in the literature: independent floating, managed floating, crawling bands, crawling pegs, pegged within bands, fixed peg arrangements, currency board arrangements, and exchange arrangements with no separate legal tender (Edwards and Savastano 1999, IMF 1999).To improve the layout of the topic and simplify the presentation, The ten regimes are classified into four parts: (a) Soft peg regimes (crawling narrow band, crawling peg, pegged inside bands, fixed peg); (b) Intermediate regimes (controlled

float, crawling wide band); (c) Floating regimes (independent floating, lightly managed float); and (d) Hard peg regimes (independent floating, lightly managed float). But Wolf (2002) states the selection of exchange rate regime depends on the economic situation, monetary history, trade openness, major trading allies and political situation.

2.2.1 The Fixed (pegged) Exchange rate Regime

Soft peg regimes (crawling narrow band, crawling peg, pegged between bands, set peg) keep the effective exchange rate competitive by maintaining it within a Band narrow band around a central rate that is updated regularly at a fixed preannounced rate. The exchange rate between two currencies is determined by government policy in a fixed exchange rate system. According to Johnston and Swinburne (1999), a country's currency is pegged to a major currency, such as the US dollar or the Euro. The management and announcement of exchange rate policy is the responsibility of the national or central bank. Following the announcement of the fixed exchange rate system by the monetary authority, dealing for an infinite sum at the fixed rate is permitted Obstfeld & Rogoff (1995). There are two types of crawling band systems: "crawling big band" and "crawling narrow band". In terms of merits and flaws, a wide band regime (say, +/- 15% around the central parity) has greater stability and is similar to a floating scheme. In the other hand, a narrow band scheme (the Bretton Woods system and the pre-1992 European Monetary System) can be combined with the other fixed exchange rate systems.

A fixed exchange rate system has a number of benefits. First, it maintains economic growth by avoiding inflationary consequences caused by exchange rate fluctuations. Ghosh et al (2002). Second, fixing at a low level would continue to mitigate domestic inflationary factors such as the government budget deficit and wage-and-price volatility. Obstfeld & Rogoff believe (1995) that this would give consumers and other business organizations trust in the "strength" of local currency. Third, a flexible exchange rate, which is important and beneficial for developed countries to carry out targeted development activities, would spur international trade and foreign direct investment (FDI) flows since a fixed exchange rate eliminates exchange rate risk for traders and investors. Appropriate for emerging countries with insufficient access to global capital markets, a less diversified supply and export system, shallow financial markets, and a lack of monetary discipline and legitimacy, as well as countries attempting to stabilize from extremely high inflation. If the peg is trustworthy, it can preserve equilibrium and competition by

lowering interest rates and providing a transparent and easily monitor able nominal anchor. This allows countries with high inflation to lower inflation by lowering inflationary expectations. However, if the country is exposed to international capital markets and allows external debt, the economy is vulnerable to currency crises. It is necessary to provide a large amount of foreign reserves. Shocks are mainly absorbed by improvements in the actual market, which has little shock absorption capability.

2.2.2 The Intermediate Exchange rate Regime

Intermediate regimes (managed float, crawling wide band) keep the effective exchange rate competitive by maintaining it within a broad band around a central rate that is set regularly at a fixed preannounced rate. The forward looking crawl is a standard change law (based on differentials between target inflation and expected inflation in major trading partners). Bubula & Robe, (2003) The degree of policy independence is a function of the band width, and it puts limits on monetary policy "Strictly Regulated Floating Exchange Rates" authorized body heavily control the movements of the exchange rate. Bubula & Ötger, (2002) described intermediate regimes as all regimes that fall between fixed and floating exchange rate regimes. The monetary authority intervenes aggressively in the foreign exchange market in a controlled floating exchange rate without defining or agreeing to a pre-announced exchange rate direction. Intervention may be active (sterilized and non-sterilized) or indirect (interest rate adjustments, for example). This regime was suitable for emerging market economies and certain other developed countries with a comparatively stronger banking system and a history of fiscal restraint. Reasonable flexibility allows for partial shock absorption. If the regime is credible, it would be able to sustain peace and competitiveness. The risk of a currency crisis is poor. If the band's edges are soft, it ensures a degree of exchange market freedom, because the regime encourages efficient capital distribution and the strengthening of the BOP account. Bofinger & Wollmershäuser, (2001) the main flaws are a lack of clarity, as the criteria for interference in managed float is not reported, and wide band regimes are not easily detectable. This may lead to a high level of confusion and loss of legitimacy. Economic growth is highest under intermediate exchange-rate systems, according to some scientific research, while the stable exchange rate is correlated with a lower growth rate.

Many countries have introduced this form of exchange rate policy, and the Ethiopian government has been adopting it since the 1990s. However, it leads to a challenge of currency overvaluation. The biggest difference between a "lightly managed float" versus a "managed float" is that in the latter, the government has an understanding of where the exchange rate can be in order to preserve competition and intervenes to hold it close to that level. In the former, demand and supply largely decide the rate in the market.

2.2.3 Floating Exchange rate Systems

Under floating (independent and gently managed) rate regime, the rate is decided by the demand and provide of exchange market. Financial authority doesn't intervene within the freelance exchange market. However below gently managed float occasional interventions (direct or indirect broad monetary sector, and robust prudent through financial policy) aim to moderate excessive fluctuations. Monetary policy is basically liberal to be wont to steer the domestic economy is completed. In flexible exchange rate regime, appreciation and depreciation of national currency bring the balance of payment to equilibrium.

The floating rate has both advantages as well as disadvantages. The drawbacks of the floating rate system include the foreign market impulses that cause inflation in the domestic market. As a result, domestic inflation and rate instability harm investment and homegrown enterprise in emerging countries. Furthermore, since the group action of export and import billed inside currencies that move against each other and the unforeseen ways, currency floating impacts export revenues and import pricing, resulting in a deficit. In addition simply deflect or absorb adverse shocks and not vulnerable to currency crisis it acceptable for medium and huge industrialized countries and a few rising market economies that area unit comparatively closed to international trade however absolutely integrated within the world capital market and have diversified production and trade, a deep and broad monetary sector, and powerful prudent standards. Per Huh et al. (1987) describes, several developing economies adopted the market-determined exchange rates. The adoption of flexible rate could also be because of pressure from IMF and World Bank.

2.2.4 Hard peg Regimes

Currency Board is a strict exchange rate mechanism backed by a monetary framework based on a statutory commitment to swap domestic currency for a given foreign currency at a predetermined rate. Domestic money is only distributed in exchange for foreign currency. Independent monetary policy has virtually no space to operate. Is reasonable for countries with an experience of monetary chaos, high inflation, and poor policymaker prestige that need a solid monetary anchor? Appropriate for countries with a history of monetary chaos, high inflation, and poor policymaker prestige that need a solid monetary stabilizer. Currency Union/Dollarization occurs when another nation's currency is used as the sole legal tender, or when a country joins a currency union of which all parties use the same legal tender. The monetary autonomy has been fully relinquished. Independent monetary policy is not possible. Appropriate for countries which have already established extensive economic and trade links (EMU). Small nations have now assimilated into their larger neighbors (Dollarized). Negative aspects, the position of the central bank as lender of last resort is lost. Shocks must be entirely absorbed by changes in economic activity, higher risk of liquidity crisis, low seigniorage under currency board or no seigniorage under currency board, and no shock absorptive capability. It's very difficult to get out of the dollarization trap.

It's worth noting that the regimes are ranked according to the degree of exchange rate stability. Free floating, on the other hand, is a regime that offers full stability by allowing the exchange rate to be calculated independently in the market by supply and demand. The other extreme is currency union/dollarization, in which the exchange rate does not exist when monetary sovereignty has been completely surrendered and a shared currency or some other country's currency is used as the sole legal tender.

2.3 Theoretical review

2.3.1 Standard Theory of International Trade

Mercantilism was the prevalent economic structure of most developed countries from the sixteenth to the eighteenth centuries. The Mercantilist view of foreign trade believed that a country's prosperity is based primarily on its right to own precious metals like gold and silver. Supporting exports and promoting metal finds in the Americas, on the one hand, and restricting

imports by enforcing unfair tariffs, Peukert was able to acquire certain metals (2012). For nearly three decades of economic failure and uncertainty, Mercantilism was roundly chastised by what became regarded as the Standard Theory of International Trade Wilson (1959). When tracing the emergence of the Standard Theory, one must go back to the years 1776 and 1817, when Adam Smith's work *Wealth of Nations* by Smith (1776) and David Ricardo's *on the Principles of Political Economy and Taxation* Ricardo (1817), respectively. Standard Trade Theory uses a common sense approach to connect merchandise to actual exchange rate changes. Although, all other factors remain constant, an adjustment in the exchange rate has an effect on the value and amount of trade. Households will get fewer imported commodities in return for a unit of domestic goods and services if the actual exchange rate in their home country raises, i.e. real depreciation. As a result, a unit of manufactured goods will yield a greater quantity of domestic goods. Zhang (2008) Domestic households eventually consume fewer imports, while foreign households consume more domestic products. Finally, the stronger home countries actual exchange rate, the greater the country's current account surplus.

The ease with which a country can transfer its output capacity from non-tradable and strictly domestic goods to import substitutes and exports is measured by its demand and supply elasticity. It also demonstrates how inflationary the adjustment can be (Salvatore, 2004). Lerner (2008) went on to expand the traditional trade hypothesis by taking demand price elasticity of imports and exports into account as essential components in calculating the impact of actual exchange rate fluctuations on trade balance. As a result, an increase in exports and a decrease in imports as a result of depreciation in the real exchange rate do not always imply a decline in the balance of trade shortfall. The trade balance, according to Lerner, is concerned with the actual values of physical goods rather than their volume.

2.3.2 Elasticities Approach

The trade balance improvement path is viewed using the elasticities of demand for exports and imports in the elasticities approach. The method used to study the effects of the exchange rate on the on trade balance only considers responses to changing relative prices on the basis of substitution effects. According to this perspective, the price elasticity of demand is defined as the responsiveness of the quantity demanded of products or services to a shift in its price. This method assumes that wages and prices of domestic and foreign countries remain constant and

shifts in relative prices within countries come from fluctuations in the exchange rate only. Using the price elasticities of the import and export demand function, this attitude attempts to determine whether a local currency depreciation/devaluation will improve the foreign trade balance. It is widely assumed that if the addition of absolute values of the price elasticity of import and export demand exceeds one, the balance of foreign trade will recover following a depreciation/devaluation.

The Bickerdike-Robinson-Metzler Condition is a general name for the Elasticity Approach. Bickerdike (1920) was the one who first formulated and laid the basis of this approach by modelling nominal import and export rates as functions of foreign trade volumes. Later Robinson (1947) and Metzler (1945) contributed to the elasticities method by clarifying and detailing Bickerdike's novel theories. Bickerdike-Robinson-Metzler Condition means that the adjustment in the foreign exchange value of the trade balance depends upon the import and export supply and demand elasticities and the original amount of trade.

Lower domestic prices as a result of currency depreciation would usually boost international demand for domestic goods, but only if foreign demand is elastic. If, on the other hand, the elasticity of international demand for domestic products is small, the quantity of domestic goods would not increase to the point that it exceeds the fall in the volume of exports induced by lower prices Marshall and Groenewegen (1923). The case of domestic demand elasticity can be understood in the same way, using the same concepts. If domestic demand for foreign products is elastic, price changes in the domestic market would cause domestic consumers to change their behavior. Consumers can pay by purchasing domestic commodities rather than imported goods, lowering the prices of imports. In conclusion, the trade balance would increase if the reduction in the value of domestic imports is higher than the fall in the value of domestic exports. When a country's trade balance is in excess, policymakers use the Elasticity Approach. To determine how much devaluation would affect trade balance, they would have to weigh the response of imports and exports to a shift in exchange rate. If, on the other hand, international and domestic demand for imports and exports are both elastic, a slight adjustment in the spot exchange rate could have a big effect on the trade balance. Van-Hoose and Daniels (2005) as can be shown; the elasticities solution revolves entirely around the volume and value responses to changes in the actual exchange rate.

2.3.2.1 Marshall-Lerner Condition

The Marshall-Lerner Condition is a follow-up to the elasticities solution. The situation may be interpreted as a result of Bickerdike's work (1920). It was named after Alfred Marshall, who was born in 1842 and died in 1924, since he is regarded as the inventor of the principle of elasticity, and Lerner (1944) for his later exposition of it Brooks (1999). If monetary policy deteriorate the currency in order to improve the trade balance, demand for the country's exports and imports should be sufficiently elastic, according to this strategy. Assuming that all trade in commodities, investment revenue flows, and unilateral exports are zero, the sales account equals the current account. The Marshall-Lerner Condition notes that the number of demand elasticities for imports and exports must be greater than one in order for the foreign exchange rate supply and demand curves to be elastic enough and depreciation will then make it easier to fix a balance of payments shortfall. Conversely, if the number is less than one, trade deficit worsens as deflation takes place Lerner (1944). Salvatore, (2004) this is why calculating the real world value of the price elasticity for imports and exports is so critical.

Kemeç and Kösekah (2015) The Marshall- Lerner Condition, unlike Bickerdike's solution, is based primarily on two assumptions. One is that when exchange rates depreciated, trade was originally balanced, with the foreign currency value of exports equaling the foreign currency value of imports. Second, and most importantly, prices are fixed in the seller's currency, resulting in infinite supply elasticities. In other words, it is expected that the country's export-oriented manufacturing and import-oriented manufacturing will both increase in the required size and time.

2.3.2.2 J-Curve Theory

The Marshall-Lerner condition is assumed to hold in the long run. The J-Curve phenomenon is a reflection of how a devaluation of one's country's exchange rate affects its trade balance over time, as first illustrate by Magee (1973). Thus, it is known as a complex observation of Marshall-Lerner Condition Niehans, (1984) or, more broadly, the elasticity method. In the short-run, instantaneously after currency devaluation, domestic importers face inflated import rates as charged in domestic currency; hence, the net exports decline. On the other hand, the domestic exporters in the devaluating nation face lower export prices as the market for exports and imports

is to some extent inelastic in the short-run. The sluggishness in changing customer behavior, as well as the lag in renegotiating transactions, contributes to market inelasticity. In other words, because of the stickiness of markets and sluggishness to market adjustment, the balance of trade suffers in the short term when prices are comparatively stable. When commodities are still traded at their pre-devaluation rates, this is known as market stickiness. Because contracts made before the deflation force fixed rates and amounts, the trade balance deteriorated by the value of overall imports in foreign currency compounded by the extent of the increase in foreign currency price. The “exchange rate pass-through phase” is a term used to describe this short-run period.

As a result of the higher import rates, domestic demand shifts from international to domestic manufacturing of replacement products, resulting in a trade balance boost. Furthermore, because of the lower commodity rates, the markets in the home country see a rise in export volume. The “volume adjustment period” is what these two long-run variables are known for, and they have a positive effect on trade balance Gartner (1993). The J-Curve phenomenon, on the other hand, forecasts that the trade surplus will increase in the long run to a higher degree than before the depreciation. The complex reaction of trade balance as a short-run slump and long-run recovery takes the form of the flattened J letter, thus the J-Curve phenomenon.

The time path has a significant impact on trade flow reaction. The trade surplus deteriorates in the early stages of devaluation before improving over time. Carbaough (2006) explains it like this:

“...the J-curve effect, so called because the trade balance continues to get worse a while after depreciation (sliding down the hook of the J-curve) and then gets better (moving up the stem of the J-curve). This effect occurs because the initial effect of depreciation is an increase in import expenditures: The home-currency price of imports has risen, but the volume is unchanged owing to prior commitments. As time passes, the quantity adjustment effect becomes relevant: Imports volume is depressed, whereas exports become more attractive to foreign buyers.”

The J-Curve is seen in the diagram below.

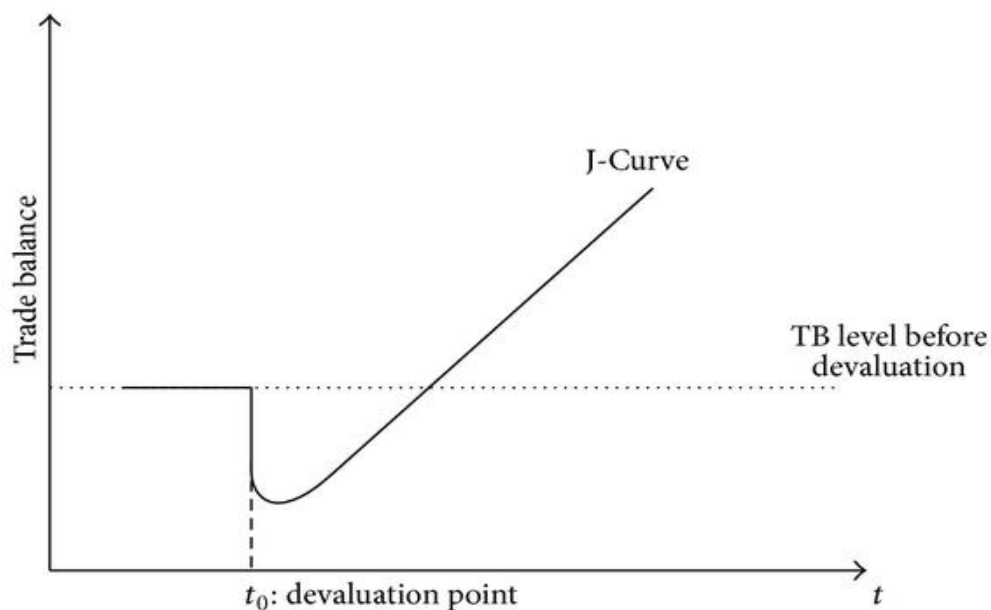


Figure 2.1 The J-Curve phenomenon.

In fact, after weighing all of the above hypotheses, it's clear that the J-Curve is the strongest of them all, for the reasons mentioned below: (i) By comparing the long- and short-run coefficients of the actual exchange rate in econometric analysis, analytical tests for the J-Curve will indirectly evaluate the approaches of elasticities and Marshall-Lerner Condition;(ii) Acquiring trade data for testing this concept is much easier than gathering data on volume and value of trade for analyzing Marshall-Lerner Condition; (iii) the J-Curve is the only approach that enables tracing the impact of real exchange rate depreciation on trade balance over time. The J-Curve approach is one of the most established and discussed hypotheses in the literature, according to Demirden and Pastine (1995). For monetary policymakers and economists, the J-Curve offers critical detail.

The exchange rate depreciation could be high enough to have a positive long-run effect on the trade balance, which has implications for monetary policy. In terms of the Marshall-Lerner Condition, we should consider the Marshall-Lerner Condition completely fulfilled if the trade balance changes in the long run as a result of currency devaluation to a degree higher than before devaluation Hacker and A. Hatemi, (2004) under the J-Curve assumptions. Mackintosh, Brown,

and Costello, (1996) Miles and Scott, (2005) If the Marshall-Lerner Condition is not met, the J Curve is predicted to flatten at a lower level than before the devaluation, according to Sodersten and Reed (1994). Before the Marshall-Lerner Condition kicks in and changes the trade balance, the J-Curve is said to take anything from a few months to two or three years.

2.3.3 Keynesian Absorption Approach

The elasticity approach is mostly criticized for being a partial equilibrium technique that ignores the macroeconomic consequences of market increases and demand variations in response to currency devaluation Kim (2009). In reality, it just takes into account the value and volume responses to changes in price. Depreciation, from the other hand, is linked to macroeconomic factors in the absorption and monetary approaches, which typically weaken the beneficial effect of exchange rate depreciation on a trade balance. The Absorption Approach combines the elasticities and Keynesian macroeconomics approaches. Meade (1951), Alexander (1952), and others formally designed it in the early 1950s. This theory states that a country's spending is divided into four categories: consumption (c), investment I government spending (g), and imports (m). Since prices are assumed to be stable in this method; all variables are measured in real terms. Domestic Absorption (a): This term refers to the number of all four groups.

$$a \equiv c + i + g + m \quad (1)$$

In contrast, a country's real income (y) equals its total production expenses, where x represents real exports; real income is represented as;

$$y \equiv c + i + g + x \quad (2)$$

The disparity between real income (y) and absorption (a) equals a country's current account balance, which can be written as;

$$y - a = (c + i + g + x) - (c + i + g + m) = x - m \quad (3)$$

As a result, the current account balance equals the adjustment in real income minus the amount of the remaining three factors, demand, investment, and government spending, as follows:

$$\Delta (x - m) = \Delta y - \Delta (c + i + g) \quad (4)$$

This means that the trade balance will change only if domestic production growth outpaces domestic absorption, according to Dunn (2000). If the replacement of domestic products in response to the relative price adjustment increases export rather than absorption, currency devaluation strengthens the trade balance. According to Edwards and Wilcox (2003), this is more likely to happen in an economy of surplus capacity, where the Keynesian multiplier effect is at

work. Production is unlikely to increase in a near-full-employment market or one with extreme supply bottlenecks, and the trade balance will only change as absorption collapses. According to Kim (2009), inflationary pressures often stifle relative price increases that lead to an increase in export demand and a decrease in capital goods use. In a nutshell, the Absorption Approach considers trade balance to be the product of actual income and absorption (domestic consumption) $TB = (Y, A)$. If there is a rise in output (Y) or a reduction in domestic demand (A), or both, the trade balance will change. Assume A is constant and the economy is not at maximum employment (as it is in most developed countries); when currency depreciation happens, the overall consequence is assumed to be a decrease in production, resulting in a change in the trade balance.

2.3.4 Monetary Approach

The Monetary Approach, popularized by Harry Johnson and Jacob Frenkel in the early 1970s, at the very same time as the J-Curve principle, argues that devaluation can be interpreted in a monetary sense. As a result, a balance of payments deficit is purely a monetary problem exacerbated primarily by an inadequate money supply Dunn and Mutti (2000). Only the influence of currency depreciation on the real money supply has a bearing on the balance of payments. As a result, depreciation improves by raising domestic rates and decreasing the real money supply will help to improve the balance of payments. The initial disequilibrium will be restored if devaluations are replaced by additional adjustments in the nominal money supply is restored.

The long-term influence on the trade balance, according to Edwards and Wilcox (2003), is thus unknown. When an authority devalues its currency, the money supply's monetary worth declines as the price of exchanged goods and services rises, as seen in domestic markets. The approach starts with the reasonable assumption that the exchange rate, as the relative price of domestic and international money, should be determined by the relative supply and demand for these currencies. Rosengren and Klein (1994). This essentially implies that if consumers want more money than the central bank can provide, the excess demand will be fulfilled by foreign currency inflows.

In the other hand, if the central bank provides more currency than is demanded, the surplus supply is eliminated by money outflow to other nations, worsening the trade balance. As a result,

any excess demand for goods, services, or investments that leads to a balance of payments deficit is a surplus supply or demand of the money stock. According to Marshall and Groenewegen (1923), the fundamental argument of the monetary solution to the balance of payments is that deficits or surpluses represent stock disequilibrium between demand and supply in the money market. As a result, by using a monetary strategy, it's important to stress the importance of money demand and supply in deciding exchange rates. As a result, the foreign exchange value, like any other item for sale, is subject to the rule of supply and demand Daniels and Van-Hoose (2005). This is why the exchange rate will be explained using the same geometric heuristics is used to describe market formation in general. As a consequence, the exchange rate between two currencies, as per this approach, is the ratio of their prices dictated by the two countries' money supply and money demand positions.

2.4 Empirical Review

2.4.1 The Evolution of Methodological Approaches

The link between trade balance and exchange rate is no exception. Methodological developments in economics often inspire scholars to rethink old ideas, and the link between the trade balance and the exchange rate is no exception. The exchange rate and its association with various macroeconomic variables in an economy are the subject of several studies in economics and foreign trade literature. In their attempt to compile the literature on the relationship between exchange rate and trade balance, Bahmani-Oskooee and Miteza (2003) divide studies into four groups. 'Before-and-after' approach, 'controls group' approach, 'macro-simulation' approach, and 'econometric' approach are the four classifications.

2.4.1.1 Before-After Approach

This analysis calculates a country's economic growth output before and after currency depreciation. Diaz-dissertation Alejandro's (1956) is one of the most influential studies in this area. He compares and contrasts the growth rates pre and post Argentina's 1959 devaluation between both the years 1955 and 1961. He discovers that the peso's depreciation has a contractionary impact on the economy's actual production. The negative effect on productivity, according to the author, is due to a change in income allocation from high-propensity consumers to high-propensity savers, which has resulted in lower national levels of consumption.

Cooper(1971), in another seminal report, uses the same methodology to examine the effects of currency devaluation in 19 developed countries from 1953 to 1966. Although devaluation strengthens a country's external status, it can also boost inflation and reduce economic activity, according to him. Despite the fact that research using the before-and-after model has some insights into devaluation and its effect on devaluing countries, Bahmani-Oskooee and Miteza (2003) point out that these studies have limitations. The main flaw in this strategy is that it does not specifically adhere to the *ceteris paribus* concept. As a consequence, since other macroeconomic factors interfere and adjust over time, the strategy struggles to determine the effect of currency depreciation on production independently. As a result, studies that use this method may not accurately represent the effect of currency depreciation on production.

2.4.1.2 Control group Approach

Studies that equate the production performance of a devaluing country to that of a non-devaluing country are classified as 'control group' studies (the control group). These studies assume that both countries are affected by the same collection of external conditions, and that the differences in exchange and output performance are solely due to devaluation consequences. Studies involving countries that devalued their currencies as part of IMF stabilization programs, especially in the 1970s and 1980s, are a big part of this strategy. 78 devaluations were carried out under IMF-supported programs between 1971 and 1980, according to Donovan (1982). The control group to reference community was selected from a pool of countries that are not oil-based economies that have not undergone an IMF stabilization policy. During the study time, the study finds that trade flows in the program countries improved slightly. In the short run, however, production efficiency in program countries is expected to deteriorate more than in the long run in comparison to the control group.

Kamin (1988) also uses the control group method to look at 107 devaluations from 1953 to 1983. The thesis examined at the output of a few macroeconomic variables by determining the statistical importance of the differences between the devaluing nation and the control group. According to the results, most devaluing countries increase their growth rates at least a year after the devaluation.

2.4.1.3 Macro-simulation Approach

Studies categorized as part of the macro-simulation method focus on economic model simulations to make claims about an economy's production efficiency after a simulated devaluation. In an open economy macroeconomic model, Gylfason and Schmid (1983) create a model that includes the cost of intermediate commodities. Currency depreciation increases production via the demand channel while reducing supply via the elevated costs of imported intermediate inputs, according to the model. They find support for expansionary effects of devaluation in eight out of ten countries as they test their model on a survey of several countries using the 'calibration' process and conclude that depreciation is more effective at promoting spending switching than at triggering demand contraction.

In a two-sector model for Kenya, Branson (1986) used a related approach to emphasis on imported intermediate products and wage indexation. According to the analysis, the majority of capital spending in developed countries is in the form of imported capital goods, which are subject to a higher price after devaluation. As a result of the increasing cost of imported capital goods, less new investments would be made, resulting in lower productivity. As a consequence, in the case of Kenya, Branson observes that devaluation raises prices, resulting in lower economic growth. In addition, Gylfason and Radetzki (1991) constructed a macro-simulation model to investigate the short and medium-term impact of devaluation on macroeconomic variables in 12 LDCs. The model captures the impact of devaluation on production by shifts in export and import prices, as well as the cost of imported inputs. They concluded that devaluation in most of these countries backed the contractionary hypothesis of devaluation due to increasing prices of imported inputs in output. Taye (1999) finds contractionary consequences of devaluation in Ethiopia using a related model.

2.4.1.4 Econometric Approach

According to Bahmani-Oskooee and Miteza (2003), the fourth and most common group of studies is those that use an econometric approach to create a link between devaluation, trade, and growth efficiency. With the application of modern and sophisticated econometrics methods over time, studies using this method have made a significant contribution to the literature.

Miles (1979) blames Cooper (1971), Connolly and Taylor (1972), Laffer (1976), and Salant (1976) research that aimed at the effects of depreciation on the flow of bilateral trade and the balance of payments, but none of them took into account factors other than the exchange rate that could affect those balances. a) These, analyses are unable to determine whether a trade deficit rebound is temporary or sustainable, b) do not assess the accounts' post-devaluation and pre-devaluation levels; c) Alternative factors, such as monetary or fiscal policy, are not taken into account in these reports.. To address these concerns, Miles compares the pre-devaluation activity of the accounts in the study of both the impacts and the long-run impacts of devaluation. Miles also uses exogenous factors such as government monetary and fiscal policy, as well as inflation rates, in addition to exchange rates. According to Miles, irrespective of the theoretical context is used, if devaluation results in a significant improvement in the balance of trade, this must be statistically evident. As a result, Miles uses multiple checks for annual statistics from 14 developed and emerging countries to see whether devaluation restores the trade surplus and/or balance of payments. According to Miles (1979), depreciation does not improve the international exchange surplus, but it does improve the balance of payments. This empirical research suggests that the capital account is responsible for the turnaround of the balance of payments.

In contrast to Miles (1979), Himarios (1985) uses similar methods to show that devaluations affect the projected course of the trade balance. In addition, Himarios (1985) criticizes Miles' findings, claiming that: a) the results are vulnerable to measuring units, and b) the results are inconsistent, b) domestic and international influences can have different consequences on the balance of trade, c) the actual exchange rate, not the nominal exchange rate, is the one that affects the balance of trade, d) exchange rate lags play a part, and e) evaluating the influences on the average balance of trade is not the same as analyzing the effects on the average balance of trade Bahmani-Oskooee and Ratha(2004). Himarios (1985) establishes a relationship between depreciation and trade balance using an absorption approach model for ten countries using the OLS technique of annual time series data for ten countries from 1956 to 1972. The study shows that actual devaluation boosts trade balance in nine out of ten countries in the long term. The study's main contribution is that it shows how domestic and international factors have varying effects on trade balance outcomes. It further emphasizes that the actual exchange rate, not the nominal exchange rate, influences an economy's trade balance.

Rose and Yellen (1989) use twenty-five years of US evidence to investigate the J-curve hypothesis. Using both US bilateral and aggregate trade statistics, the analysis found no evidence of a short-run worsening in the US merchandise trade balance in reaction to real exchange rate depreciations. The study attributed the discrepancy between their findings and traditional findings to two factors: the use of non-stationary time series data and the likely simultaneity of trade balances, exchange rates, and production. When these variables are taken into account in actual exchange rate and trade balance research, the analysts found no evidence of a J-curve. Bahmani-Oskooee and Brooks (1999) use a model similar to Rose and Yellen (1989)'s to investigate the validity of the J-curve hypothesis and the response of the balance of trade to a currency decline both in the short-run and long-run for the US bilateral trade with her six major trading partners using the ARDL method, but they critique the analysis; i) for their results being vulnerable to units of measurement, ii) for using a co-integration approach with a poor power unit root test, and iii) for not using an objective lag-length selection criterion. They do, however, use the balance of trade model to calculate the ratio of imports to exports; this norm is a unit less calculation that shows balance of trade in both actual and nominal terms.

Johansson's co-integration and error correction technique is used by Bahmani-Oskooee and Rhee (1997) to model quarterly time series data for Korea from 1971 to 1994. Variables like the actual effective exchange rate, terms of trade; government spending to GDP ratio, and money supply were used in their model. They confirm the reality of a long-run relationship between money supply, real exchange rate, and real demand in Korea, unlike Edwards (1986). According to the analysis, the main impact of devaluation on output was felt three lags after depreciation in the economy.

Gupta Kapoor and Ramakrishnan (1999), investigate the J-curve theory in Japan. They use quarterly data from 1975 to 1996 to apply the ECM and the impulse function analysis. They assume that the J-curve theorem holds for Japan as a consequence of the impulse response function. The majority of studies in the agricultural trade literature, on the other hand, have traditionally focused on the impact of shifts in the exchange rate on agricultural export volume and/or costs. The effect of exchange rate fluctuations on the agricultural trade balance has received only sporadic attention. Carter and Pick (1989) and Doroodian, Jung, and Boyd (1999) are the only two studies they know of that have tested the J-curve theory for the agricultural trade

balance in the United States. The polynomial distributed lag model is used by Carter and Pick (1989) to test the J-curve hypothesis for the US agricultural trade balance. They investigate empirical evidence for the first segment of the J-curve, namely that depreciation of the US dollar causes a worsening of the US agricultural trade balance. Using the Shiller lag model, Doroodian, Jung, and Boyd (1999) investigate the J-curve effect for agricultural and manufactured products in the United States. Their findings back up the J-curve effect for agricultural products but not for manufactured goods.

Over the period 1971-1994, Bahmani-Oskooee (2001) investigates the relationship between nominal and actual effective exchange rates and the trade output of seven Middle Eastern countries. The research uses the reduced version of the trade balance model for Turkey, Bahrain, Jordan, Syria, Egypt, Tunisia, and Morocco using Johansen and Juselius's co-integration methodology. The reduced form of the trade balance establishes a connection between a country's trade balance and variables such as domestic revenue, international income, and the actual effective exchange rate. In the long term, real depreciation in most non-oil exporting Middle Eastern countries has a positive impact on the trade balance, according to the report. Bahmani-Oskooee (2001) makes a significant contribution by arguing that actual effective exchange rates, rather than nominal effective exchange rates, should be used to analyze the effects of devaluation or depreciation in the region. He claims that nominal devaluation's inflationary effects will negate its beneficial effects on a country's trade balance. As a result, when evaluating an economy's foreign competitiveness, the analysis highly recommends using the actual effective exchange rate to account for inflationary consequences of devaluation.

Kalyoncu et al. (2008) use the error correction model to conduct a similar study for 23 OECD countries from 1980Q1 to 2005Q4. This analysis, like those before it, yields mixed findings. It shows that in 9 of the 23 countries studied, there is a long-run relationship between real exchange rate and production. However, only three of these nine countries' export production was expected to increase as a result of currency devaluation. Similarly, Galebotswe and Andrias (2011) examine the impact of currency depreciation on Botswana's export production from 1993Q1 to 2010Q4. The analysis models real GDP as a function of real exchange rate, domestic interest rate, international interest rate, government expenditure and foreign income., and other variables using VECM., As a result, the analysis discovers that, while currency depreciation has

expansionary consequences in the short term, it frequently has a negative influence on production in the long run. In the long term, Ayen (2014) finds similar contractionary consequences of devaluation in the case of Ethiopia.

Using the bounds test approach to co-integration and error-correction modeling introduced by Pesaran et al., Bahmani-Oskooee and Gelan (2012) investigate the post-devaluation action of the trade balance for a community of nine African countries (Burundi, Egypt, Kenya, Mauritius, Morocco, Nigeria, Sierra Leone, South Africa, and Tanzania) (2001). Although the findings do not confirm the presence of a short-run J-curve effect, they do find that in the case of Africa's largest economies – Nigeria, South Africa, and Egypt – a real depreciation in the exchange rate has positive long-run consequences. They conclude that real depreciation can foster a positive trade balance in Africa's major economies based on this result. Using data from 13 African countries, Mohsen Bahmani-Oskooee (2020) examines the asymmetric impact of exchange rate fluctuations on the trade balance using nonlinear ARDL method with data from each of Africa's 13 nations. The approach is based on recent advances in asymmetry co-integration and error-correction simulation. Conclusions although the authors find short-run asymmetric effects in many of the countries in their study, asymmetry co-integration in Algeria, Cameroon, Ethiopia, Morocco, Tanzania, and Zambia supports the new concept of the J-curve.

Wilson (2001) investigates the relationship between the actual trade balance and the real exchange rate, as well as the presence of the J-curve hypothesis in bilateral trade between Singapore, the United States, Japan, Korea, and Malaysia. The United States and Japan, on the other hand, are selected as each country's trade partners. By extension, this situation is considered to be a rather narrow work Bahmani-Oskooee and Ratha, (2004). The ARDL method is used to analyze data from 1970 to 1996, using quarterly data. Except for Korea, the actual exchange rate has no major impact on the real trade balance, according to the findings. Furthermore, there is no evidence that the J-curve is true in Singapore or Malaysia. However, there are several J-curve effects for Korea in relation to both Japan and the United States.

Edwards (1986) uses pooled data from 12 developed countries to approximate a fixed effects model of actual production for the period 1965-1980. To capture the short- and long-run impact on real growth, his econometric model combines variables such as government spending, monetary surprise variable, terms of trade, and real exchange rate with lagged values. According

to the findings, the monetary surprise concept and government spending have a positive effect on production. Currency devaluation, on the other hand, decreases productivity in the first year but has a positive effect the next year, according to the report. In the long run, due to the various lagged effects of devaluation in the first and second years, there was no impact on actual productivity.

More recent studies by Bahmani-Oskooee and Fariditavana (2016) investigated the possibility that the relationship is non-linear and used the non-linear ARDL method to analyze the asymmetric effect of exchange rate fluctuations on the trade balance. Used evidence from the United States and its six most important trade partners the analysis shows that incorporating a non-linear ARDL method led them to uncover further proof of the J-curve theory, which provide evidence of a nonlinear influence of real exchange rate on the trade balance, using data for the United States and its six largest trading partners. By evaluating the existence of the J-curve phenomenon between South Korea and its neighbors', Bahmani-Oskooee and Baek (2019) affirm this. Bahmani-Oskooee and Baek (2019) support this by examining the nature of the J-curve phenomenon between South Korea and its 14 trading partners. The investigators discovered that the former supports the J-curve effect in seven nations, while the latter finds no proof of the J-curve effect in ten. Asymmetric effects were also more evident in South Korea's trade with Asian countries, implying that asymmetric effects could be trade partner specific.

2.4.2 Study from Ethiopia

Devaluation of currency has an ambiguous effect on economic growth of Ethiopia study by Tirsit (2011) focus on Currency Devaluation and Economic Growth. By analyzing the effects of devaluation on GDP per capita growth in Ethiopia using time series data from 1980 to 2010. Currency depreciation has a negative effect on GDP per capita in the same year, while the coefficient for the one-year delayed exchange rate is considerably positive, indicating that devaluation has a time changing effect.

A Conditional and structural Vector Autoregressive (CVAR) and SVAR models analysis of Hellen (2012) to look at the rate of exchange pass-through within the case of Ethiopia, found that ERPT in Ethiopia during the study period has been significant and moderate, and protracted within the case important prices. However, the ERPT was low and short lived within the case of

consumer prices. More specifically, she found that the elasticity important prices to the change in rate of exchange was about 0.29 and showed that the degree of rate of exchange pass-through to import prices within the end of the day was incomplete. However, the degree of rate of exchange pass-through to consumer prices was found to be insignificant within the end of the day which indicated an absence of rate of exchange undergo to consumer prices. Thus, on the idea of the co-integration analysis, the study concluded that there was incomplete ERPT to import prices and absence of pass-through to consumer prices within the long-standing time.

Study by Gudina et al (2018) examines the effect of devaluation on domestic price alongside the effect of changes in monetary resource (MS), World Commodity price level (WCPI) and therefore the Output gap on the buyer price level (CPI) in Ethiopia for the amount 1995 to 2017 on the idea of secondary data using bound testing (ARDL) approach of co-integration. Implies within the short run ARDL shows that devaluation of the nominal effective rate of exchange (NEER) has no significant effect on CPI although funds and WCPI have a positive and significant effect. The speed of adjustment from previous quarter's disequilibrium in CPI to current quarter's equilibrium is fast in each period. Within the end of the day, the NEER, MS and WCPI have positive and significant effect on the CPI. The results of Granger causality test shows that there's a unidirectional causality from nominal effective rate of exchange and funds to the CPI although there's bidirectional causality between CPI and WCPI. The results of impulse response function, shows that devaluation increases CPI in each period and therefore the study suggests avoiding continuous and high devaluation of the Birr to the extent possible to avoid the evil consequences of devaluation on the quality of living of the people.

Asmamaw (2008) utilize the OLS, Instrumental variable and Error correction model to explore the impact of devaluation on the balance of trade. He completed that Ethiopian exports have increased following the devaluation of the Birr during the amount under study thanks the following subsequent reasons; initially, the amount of money received by the country from a given amount of exports has grown in terms of the native currency. Second, the increase in the price of main exports may have reduced domestic consumption of exportable items. On the other hand, He stated that the country's imports did not exhibit a downward trend after the currency depreciation. This might be due to the fact that the overwhelming majority of imports are strategic items with low price elasticities. He primarily found that the country's trade balance has

not improved as exports and imports have risen, and that an increase in production was insufficient to offset an increase in importation.

What effect do currency rates have on Ethiopian exports? Using the ARDL panel technique, Samuel (2019) evaluated the long- and short-run effects of the real rate of exchange on Ethiopian export profits. The research used balanced yearly panel data from 1997 to 2016. The study's findings revealed that the key rate of exchange has a considerable impact on export revenues over time, but has little effect in the short run. This implies that a depreciation of the key rate of currency boosts the country's export revenues. Empirical studies have also shown a big positive impact of devaluation on real output growth (see as an example International Bank for Reconstruction and Development Group, 2014) Due to a chronic lack of foreign money, a sluggish economic process, and pressure from the IMF and the International Bank for Reconstruction and Development, the ETB has been devalued several times (Taye, 1999). The most important devaluation happened in 1992 when the worth of the ETB devalued by 141.50%, and therefore the rate of exchange devalued from 2.10 to 5birr per USD. Afterwards, the ETB was devalued in 2009 by 23.70% and therefore the recent in 2018 by 15%, and International fund (IMF) has warmly welcomed the recent devaluations. When, one USD is pegged at ETB 27 with minor fractional up and downs. There's a robust objection of other studies concluded as devaluation results in inflationary and high external debt servicing situation.

In terms of export and rate of exchange polices in developing countries, previous empirical studies have also indicated a robust relationship between rate of exchange policy changes and export performance. Wondimu and Potts (2016), in their study on impact of rate of exchange changes on export performance in Ethiopia and Tanzania, showed that the difference in real rate of exchange policies is that the key factor that explains why Ethiopia and Tanzania have different export performances. The authors argued that Tanzania has maintained an undervalued real rate of exchange for an extended period and, as a result, performs better in terms of export supply and diversification compared to Ethiopia. A study by the planet Bank also indicated that a tenth decrease in real rate of exchange could end in a rise in export growth by quite 5 percentage points per annum , which translates into 2-percentage point increase in economic process in Ethiopia (World Bank Group, 2014). The World Bank, however, suggested that any changes within the rate of exchange might get to be amid additional macroeconomic policy changes to

attenuate its pressure on inflation, which again signals why Ethiopia's financial institution raised the saving rate of interest in conjunction with the devaluation.

Theoretically, devaluation is predicted to deal with the matter of external deficits because it raises the worth of tradable goods (exports, imports, and shut substitutes), thereby encouraging production of those goods, while reducing the demand for them Minot, (1998). Contrary to those there are studies that Ethiopia's balance of trade doesn't improved following the devaluation? While export earnings increase, import prices also increase. This suggests that thanks to the high dependence on imports, the rise in export earnings won't offset the reduction within the demand for imports resulting from the import price increases. internet impact would likely rest on the famous Marshal-Lerner condition, which stipulates that impact of rate of exchange devaluation depends on export and import elasticities of demand. In an import dependent developing country like Ethiopia, which has no ability for a domestic substitute to several goods and whose exports are mainly non-processed primary agricultural goods, the Marshal-Lerner condition might not hold true a minimum of within the short run. Empirical evidence supports this assertion. As an example, Mengistu and Jin-Sang (2014) in their study in Asia found no strong evidence on positive impact of devaluation on balance of trade especially for those small countries with very strong demand for imported necessities and inelastic foreign demand for many of their exports. They concluded that with relatively inelastic demand for exports and imports, currency devaluation has little or no impact in improving balance of trade. Similarly, Geda (2017) argues that about 70% of Ethiopia's imports are capital, intermediate goods and petroleum products, which need to be imported no matter their price. This might explain why devaluation doesn't improve balance of trade but rather results in inflation.

Haile (1994) has attempted to estimate the effect of devaluation on the balance of trade using the elasticity approach. consistent with him, the sum of elasticities of export and import is bigger than one and since the Ethiopian balance of trade was initially in deficit, the Marshal-Lerner condition isn't satisfied and isn't enough and he concluded that within the Ethiopian case, devaluation isn't strong enough to satisfy what the country is in need. The argument is that devaluation isn't likely to scale back Ethiopia's external deficit, rather results in economic contraction and inflation.

Arndt and Dorrance (1987) use a saying to define J-curve phenomenon. This motto relates thereto “things may worsen before they recover.” They also examine J-curve phenomenon in terms of small and enormous country case separately. In small country, traders are price taker in international trade and zip can impact the foreign currency prices of imports and exports. When domestic currency devalues, it doesn't affect terms of trade. Hence, J-curve effects don't emerge within the small country. They attribute that J-curve phenomenon relates to large country case. Befikadu and Kibre (1995) elucidate that, Devaluation is of course inflationary. The effect is passed on domestic prices both explicitly via the upper prices of imports (consumer goods, fuel, raw materials, and spare parts) also as implicitly via the upper demand appearing from income side of the tradable sector. The pass-through would be higher the lower the elasticity of demand for imports and import- substituting goods.

Abule and Abdi (2012) evaluated the effect of rate of exchange variability on the export of oilseed production in Ethiopia. They used the Auto-Regressive Distributive Lag (ARDL) model covering period 1992-2010. Their finding shows that the continual devaluation of Ethiopian currency adversely affected the export of oilseed. They also argued that the export of oilseed is positively associated with terms of trade. In similar manner Haile (2008) investigate the impact of devaluation on balance of trade of Ethiopia. The demand for export and import function of the country from the amount 1980 to 2003 is estimated using the standard least square (OLS) model and instrumental variable estimation model. Co-integration approach and error correction model is employed within the paper to unravel the spurious regression problem; the findings of the study show that Ethiopian balance of trade deficit worse after devaluation. However the Ethiopian exports have shown an increasing trend following the devaluation of the Birr exports don't sufficient to outway the increased imports. This might have something to try to with long gestation of the Ethiopian agricultural exports and therefore the inelasticity of demand for exports. This might even be because Ethiopian imports are strategic goods which are critical for growth, and therefore the strong preference domestic consumers have for foreign goods than domestically produced goods.

Jiffara (2019) check out the theoretical and empirical relationship between Ethiopian currency devaluation, balance of trade, Inflation, External debt servicing, and economic process. The study employed analysis alongside Econometric analysis like Johnson co-integration, Vector

Error correction model (VECM), Granger causality tests, impulse response function, and forecast error variance decomposition to analysis end of the day and short-run relationship between variables using quarterly data for the amount starting from 1992Q2 to 2017Q4. Counting on analysis and therefore the results from econometric tools, the thesis confirmed the hypothesis that currency devaluation will cause inflationary and high external debt servicing. However, it rejected the hypothesis that currency devaluation will boost economic performance and permit a stable balance of trade. It's crystal clear that massive inflation and large external debt servicing are the burdens for the Economy. Similarly, low economic performance and unstable balance of trade are bad news too.

Fassil (2019) elucidate that the effect of Birr devaluation on balance of trade of Ethiopia for the amount 1970-2014 using the Vector Error Correction Model. Results of this study revealed that Birr devaluation deteriorates the balance of trade of Ethiopia within the short run and improves it within the end of the day. Moreover, the result from the long and short run models showed that real effective rate of exchange, funds, domestic real income and term of trade are the main determinants of the balance of trade of Ethiopia both within the short and end of the day. Besides the short and therefore the end of the day model, the impulse response function and therefore the descriptive analysis revealed that a J-curve phenomenon exists for the balance of trade of Ethiopia. Meaning, the finding of this study showed that the Marshall-Lerner Condition holds only within the end of the day. So, this study revealed that the elasticity, monetary and absorption theories are significant in explaining the balance of trade of Ethiopia.

Getachew et.al (2019) seek to contribute to the present debate around currency devaluation in Ethiopia by employing a recursive dynamic Computable General Equilibrium (CGE) model and simulating the impacts of rate of exchange devaluation and a rise in key rate of interest find that although devaluation helps exports to be more competitive within the short term, thereby increasing export earnings, over the future the policy is found to possess a contractionary and inflationary impact during a developing country like Ethiopia. It also comes at the value of a discount in household welfare and investment. In terms of distributional impact, the policy simulation result suggests that devaluation disproportionately affects urban households than rural households in Ethiopia given the character of their consumption basket. Policy simulation result

suggests that devaluation disproportionately affects urban households than rural households in Ethiopia given the character of their consumption basket.

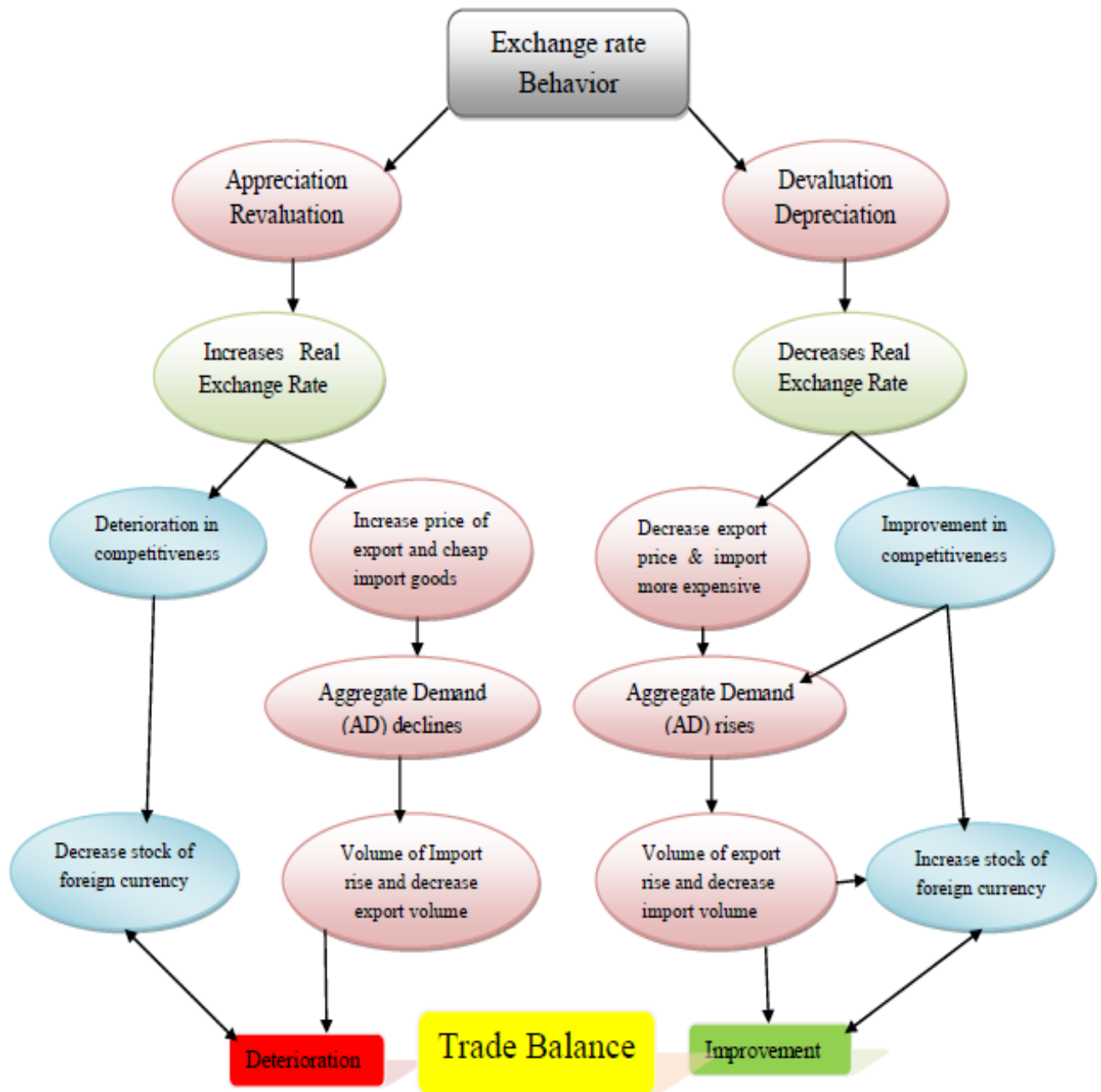
2.4.3. Summary and evaluation of the literatures

On aggregate, these literatures provide interesting but inconclusive insights between rate of exchange and devaluation or J-curve. Primarily asymmetries matter and therefore the use of non-linear models seem to supply more support to the existence of a J-curve phenomenon relative to the linear models. This case results in ambiguity for the currency devaluation policy measurement. Ethiopia may be a small open economy, it faces perfectly elastic world demand curves for its exports at fixed world prices and an infinitely elastic world supply at fixed world prices for its imports. Imported goods are considered imperfect substitutes to domestically produced goods in both final and intermediate demand.

Regardless of the case is, Ethiopian government still used currency devaluation approach from among the absorption and monetary approaches as macroeconomic policy to enhance balance of trade and lots of researchers were dealt about it and therefore the ambiguity for the currency devaluation is sustained. Another important observation is that the short-run response of the balance of trade to currency depreciation doesn't follow any specific pattern because the results are context-specific. Therefore, this study will repose on model of Rose and Yellen (1989). Moreover, examining asymmetric relationships using both linear and nonlinear models seem to be the main target for this study following econometric approach of Bahmani-Oskooee and Fariditavana (2016) and Pesaran et al. (2001) introducing a non-linear ARDL approach led them to get more evidence of the J-curve phenomenon.

Other things remains constant, the behavior of exchange rate, has implication on the behavior of trade balance. A decrease in exchange rate (negative change) which is (devaluation/depreciation) of local currency could make import expensive which directly increase price but export cheaper. When import expensive and export become cheap, the volume of import decline while the volume of export rises. An increase in export would then improve current account. On the other hand an increase in exchange rate (positive change) which is (appreciation/revaluation) of local currency is expected to make import cheaper and export expensive resulting in lower competitiveness in international market. This also leads to lower price directly. The decline in the volume of export finally results worsen in current account.

Figure 2.2: Conceptual Framework: Effects of exchange rate change on bilateral trade balance.



Source: authors design Based on literatures reviewed.

CHAPTER THREE

Methodology

3.1 Introduction

The purpose of this study is to analyze the impact of the asymmetric change in exchange rate on the bilateral trade gap and to validate the phenomenon of J-curve. There are three approaches to elucidate the factors determining the balance of trade, the elasticity approach, absorption approach and monetary approach. a single base-line model of balance of trade springs now that captures the consequences of all the factors followed by these three approaches, as employed by Krugman and Baldwin (1987), Rose and Yellen (1989), Rose (1991). The appliance of appropriate method to statistic data is most crucial a part of the statistical analysis as wrong specification of the model or using wrong method will provides biased and unreliable estimates. Methodological framework for statistical data analysis, a chronological balance of trade model specification is completed which originated from the open economy standard aggregate demand model and discussed the econometric methodology of ARDL model.

3.2 Bilateral trade, Exchange Rates, and the J-Curve

The standard aggregate demand model of small open economy is made up of total private demand for goods and services, total public demand for goods and services and the net exports, this model closely as employed by a two-country model of Rose and Yellen (1989), Krugman and Baldwin (1987) which defined as: there are three approaches to explain the factors determining the trade balance – the elasticity approach, absorption approach and monetary approach. These approaches are base-line model of bilateral trade balance and here derived now as to capture the effects of all the factors followed by these three approaches,

$$Y = D + G + TB \qquad 3.1$$

Where Y is the real/actual GDP, and all demand components, including the trade balance, are quantified in units of domestic goods on the right-hand side of equation (3.1). This goes on to state that the expensive good is made up of household goods. G, denotes public demand for

goods and services, while D expresses total private demand for goods and services, and the trade balance (TB), often known as net exports, is measured as exports minus imports. As a result, it is assumed that nation i 's demand for imported products is determined by the actual price of imports and local real income.

$$M_{ij} = M_{ij}(RP_{mi}, Y_i) \quad 3.2$$

Where, M_{ij} is for the domestic demand imports by country i , RP_{mi} is the comparative price of imported goods to domestically produced goods, and Y_i is the home country's real income. The emphasis of this study is bilateral trade balance and its relationship with the exchange rate. If the amount of imported foreign goods is M_{ij} , the nominal cost of imports measured in units of national currency will be $RP_{ij}M_{ij}$. Nominal exchange rate (ER_{ij}), is well-defined as the price of one unit of domestic currency in terms of foreign (partners) currency; that is, the quantity of units of foreign currency per unit of domestic currency. There for absolute price of imported goods can be expressed as.

$$RP_{mi} = \frac{P_{xi}}{ER_{ij}P_j} = \left\{ \frac{P_i}{ER_{ij}P_j} \right\} \left\{ \frac{P_{xi}}{P_i} \right\} = RER_{ij}(ER_{ij}) \quad 3.3$$

Where RER_{ji} is real exchange rate P_{xj} is the foreign currency price of foreign exports, P_i and P_j are the domestic (country i) price indices and foreign (country- j) price indices of all goods respectively and RP_{xj} is the relative price of foreign (j) exports of foreign produced goods. Real (actual) exchange rate is one of the key determinants of net exports as defined below:

$$RER_{ij} = ER_{ij} \left(\frac{P_i}{P_j} \right) \quad \text{or} \quad RER_{ji} = \frac{1}{ER_{ji}} \left(\frac{P_j}{P_i} \right) \quad 3.4$$

The actual exchange rate is just the relative price of foreign products, and it reflects how many units of domestic commodities must be sacrificed in order to get one unit of foreign goods. This is also an indicator of local manufacturers' international competitiveness, since the higher the real exchange rate, the cheaper domestic goods are in comparison to those produced elsewhere. Substituting RP_{mi} Equation (3.4) into Equation (3.2) gives the following equation.

$$M_{ij} = M_{ij}(RER_{ji} * RP_{xj}, Y_i) \quad 3.5$$

Likewise, the foreign country's demand for imports be determined by foreign real income (Y_j) and domestic relative export prices. When solving this problem, it can be reasonably assumed that the export volume X_{ij} precisely depends on the international competitiveness of domestic

producers as measured by the real exchange rate RER_{ij} . In theory, exports are dynamically dependent on the total production (Y_j) of the rest of the world. Some believe that the higher economic activity in trading partner economies make available a broader export market for domestic producers. Hence, the derived equation is expressed as:

$$M_{ji} = M_{ji}(RP_{xi}/RER_{ji}, Y_j) \quad 3.6$$

Given these export and import model specifications on equilibrium domestic exports equal foreign imports and vice versa, that is, domestic (i) countries supply of exports to foreign (j) country (X_{ij}) equals demand for imports by foreign (j) country from home(i) country M_{ji} and vice versa.

$$X_{ij} = M_{ji} \text{ and } X_{ji} = M_{ij} \quad 3.7$$

The (TB_{ij}) is internal trade balance of country (i) with country (j), according to various research results like Haynes and Stone (1982), Bahmani-Oskooee(1991), Brada, Kutan and Zhou (1997), and Shirvani and Wilbratte (1997), (TB_{ij}) can be expressed as the ratio of exports over imports ($\frac{X_i}{M_j}$). Since the ratio is not sensitive to the unit of measurement and can be interpreted as nominal or real trade balance, it has been used in many empirical studies on the trade balance-exchange rate relationship the ratio is referred to as the actual trade balance in this study. The use of the exports – imports ratio allows us to concentrate on what percentage of imports is financed by exports, which aids in identifying the reasons for one country falling behind another. When solving the first problem, it can be reasonably assumed that the export volume, X exactly be determined by the international competitiveness of domestic suppliers as measured by the real exchange rate RER_{ji} . In theoretically, exports are actively influenced by the rest of the world's total production Y_j . Some argue that increased economic activity in trade partner nations provides local producers with a larger export market. Equations (3.1) – (3.4) are structural equations that may be solved using equations (3.5) and (3.6) and then replaced into equations (3.7), a consequence, the TB_{ij} equation (3.8) is derived as follows:

$$TB_{ij} = \frac{X_{ij}}{M_{ij}} = \frac{M_{ji}}{M_{ij}} = \frac{M_{ji} \left(\frac{RP_{xi}}{RER_{ji}}, Y_j \right)}{M_{ij} (RER_{ji} * RP_{xj}, Y_i)} \quad 3.8$$

Assuming constant or stationary values of RP_{xi} and RP_{xj} , when deriving the first problem, it is reasonable to assume that the export volume, X , is proportional to the international competitiveness of domestic manufacturers as assessed by the real exchange rate RER_{ji} . As I discussed earlier exports are actively dependent on the total output Y_j of the rest of the world and others also believe the higher economic activity in trading partner economies provides a broader export market for domestic producers. Hence, the derived equation is expressed as:

$$X_{ij} = X_{ij}(RER_{ji}, Y_j) \quad 3.9$$

National (domestic) output and imports meet the economy's entire demand. The domestic income level, Y , influences this in an economy. Furthermore, the volume of foreign products imported is inversely linked with the actual exchange rate. Consumer demand for foreign goods is reduced by the higher relative price of foreign goods, partially due to the income and substitution impact. Increases in the price of imported products diminish the buying power of domestic nominal earnings (known as the income impact), encouraging consumers to substitute locally produced items (called the substitution effect). As a result, the import equation is as follows:

$$M_{ij} = M_{ij}(RER_{ji}, Y_i) \quad 3.10$$

The trade balance equation as the dependent variable in the empirical work now expressed as

$$TB_{ij} = TB_{ij}(RER_{ji}, Y_i, Y_j) \quad 3.11$$

In general the standard model of bilateral trade balance which consists of three explanatory variables, real exchange rate (RER_{ji}), real domestic income (Y_i), and real foreign income (Y_j). The vectors of these three explanatory variables are thought to capture the effects on trade balance in a model that sets together (nets) as the elasticity, absorption and monetary approaches.

- ❖ Devaluation, according to the elasticity method, improves the trade balance by altering the relative pricing of locally and internationally supplied products (expressed in the RER).
- ❖ An exchange rate change can only influence the trade balance if it causes a rise in revenue that is higher than the increase in total domestic spending, according to the absorption technique (absorption).
- ❖ The monetary approach claims that changes in exchange rates have only a short-term impact. As a result, no long-run equilibrium link between trade balance and currency rates should exist. In terms of the income variable, the monetary method posits that a rise

in income improves the trade balance in the short run, provided that the Keynesian premise ($0 < MPC < 1$) is correct.

3.3 The Gravity Model of International Trade

Tinbergen (1962), Pöyhönen (1963), and Linneman (1964) pioneered the gravity model (ii), which is a bilateral trade model (1966). Bergstrand showed its empirical robustness (1985, 1989). The name "gravity" comes from the fact that the nonlinear form of equation 3.11 resembles Newton's law of gravity: exports are directly proportional to the economic "mass" (GDP) of the exporting and importing countries, and inversely proportional to the distance between them (rather than the square of the distance between them, as in physics(i)).

Newton's Law of Universal Gravitation.

$$(i) F_{ij} = \frac{GM_i M_j}{D_{ij}^2}$$

Gravity Model specification similar to Newton

$$(ii) X_{ij} = \frac{KY_{ij} y_{ij}}{D_{ij}} \quad 3.12$$

According to the generalized gravity model of commerce, the volume of trade (exports + imports) between pairs of nations T_{ij} is a function of their economic size (GNPs or GDPs), per capita income, and distance from each other (proxy for transportation costs). The gravity model (Kalbasi 2001, Kristjánssdóttir 2005) was written in multiplicative form.

$$T_{ij} = \alpha Y_i Y_j y_i y_j D_{ij} U_{ij} \quad 3.13$$

Where Y_i and Y_j show the GDP or GNP of countries i and j ; y_i and y_j represent the corresponding per capita incomes; D_{ij} denotes the distance between the two countries capital cities (or economic center's); U_{ij} is the error term. The gravity model also embodies both export X_{ij} and import M_{ij} as functions of incomes Y_i and Y_j ; per capita incomes y_i and y_j and distance D_{ij} . In addition, exchange rate ER_{ji} and prices (P_i, P_j) in both countries (i and j) are also taken as exogenous variables in some studies (*i.e.*, Rahman, 2006). Therefore, the trade balance can be expressed as

$$TB_{ij} = \frac{X_{ij}}{M_{ij}} = \frac{X_{ij}(Y_i Y_j y_i y_j D_{ij} ER_{ji} P_i P_j)}{M_{ij}((Y_i Y_j y_i y_j D_{ij} ER_{ji} P_i P_j))} \quad 3.14$$

Thus based on the gravity model and assuming fixed relative prices, the bilateral trade balance function can be derived as

$$TB_{ij} = \frac{X_{ij}}{M_{ij}} = TB_{ij}(Y_i Y_j y_i y_j D_{ij} ER_{ji} P_i P_j) \quad 3.15$$

The real exchange rate (RER_{ji}) of equation (3.8) captures the influence of both exchange rate (ER_{ji}) and price level arrangements (P_i, P_j) in paired countries. RER_{ji} denotes the relative prices, the price of one country's exports relative to foreign prices of related goods expressed in a common currency. The general inflation or rise in the price level raises the real exchange rate and so affects the trade balance. Therefore the three variables ER_{ji}, P_i, P_j of equation (3.15) can be replaced by a single variable RER_{ji} of equation (3.4) and therefore, the augmented bilateral trade balance model stands as.

$$TB_{ij} = TB_{ij}(Y_i Y_j y_i y_j RER_{ji} D_{ij}) \quad 3.16$$

This is the study's benchmark model, which incorporates the key components of popular theories in influencing a country's trade balance. Based on the conventional model, an alternative trade balance model has been created.

3.4 Extension on Standard Trade Model

The extended model's main premise is that in bilateral trade, a country's absolute size (in terms of wealth and population) is less relevant than its relative size (in terms of trading partners), which influences export supply and import demand. GDP reflects a country's production and absorbing capability in the conventional trade balance model. In the expanded model, the exporting country's GDP reflects production capacity, but the importing country's per capita GNP better indicates absorption capacity. The ratio of per capita income (y_j/y_i) is now a key determinant of import demand since it signifies the relative absorption capacity of trading country pairs. Therefore, in the protracted model of bilateral trade balance, relative $GDP \left\{ \frac{GDP_j}{GDP_i} = \frac{Y_j}{Y_i} \right\}$ and relative per capita income $\left(\frac{y_j}{y_i} \right)$ are considered in the first four variables of the model (3.16). These novel variables capture the relative size of the country in terms of income, population and per capita income differences since the ratio $\left(\frac{y_j}{y_i} \right)$ is a unit free representation of the per capita

income variance. The RER_{ij} in the standard model embodied the relative price level of two trading partners and their bilateral nominal exchange rate and is an important determinant of trade balance.

The Gravity model introduces distance as a proxy for transportation cost which is an important determinant of trading decision. A suitably weighted distance measure can also capture the impact of adjacency of a country to its trading partner(s) or the common border between them. These are considered as separate variables in models of trade between two countries by some researchers using ‘gravity’ factors Adam and Cobham (2007), Dear-dorff (1997, Faruquee (2004). As a proxy for transportation cost, the absolute ‘distance’ of domestic country i from its trading partners (D_{ij}) does not have sufficient explanatory power, since a nation does not trade equally with all partners.

The cost of transportation is determined not only by the distance traveled, but also by the volume (weight) of the traded commodity. The use of the absolute distance as a proxy for transportation cost is inappropriate; instead, the trade-weighted distance serves as a proxy for transportation cost. Exports are generally f.o.b. (free on board) while imports are usually c.i.f. (cost-in-flight) (cost, insurance and freight). That is, the majority of international transportation costs are related to imports. Imports are the proper delegate when it comes to weighing the distance in terms of commerce. As a result, the expanded model uses bilateral import-weighted distance to calculate distance. Consequently, the extended model take bilateral import-weighted distance (MWD_{ij}) as a proxy for transportation cost. Therefore, the trade balance model of equation (3.16) demonstrated as:

$$\begin{aligned}
 BTB_{ij} &= BTB_{ij} \left(\frac{Y_j}{Y_i}, \frac{y_j}{y_i}, BRER_{ij}, MWD_{ij} \right) \\
 &= BTB_{ij}(RGDP_{ji}, RPGNI_{ji}, BRER_{ij}, MWD_{ij})
 \end{aligned}
 \tag{3.17}$$

3.5 Empirical Method for Estimation

In the spirit of Bahmani-Oskooee and Fariditavana (2016) econometric data analysis, equation (3.17) trade balance model estimated in this study. However, my model deviates from its original specification (which follows the model of Rose and Yellen (1989), the trade balance as a function of the real exchange rate, domestic income, and foreign income) because it considered the extended bilateral trade model takes bilateral import-weighted distance (MWD_{ij}) as a proxy for transportation cost and the asymmetric effect of exchange rate movement, based on this ground I adopt the following logarithmic form of bilateral trade balance model:

$$\ln(BTB_{ij})_t = \beta_0 + \beta_1 \ln(BRER_{ij})_t + \beta_2 \ln(RGDP_{ji})_t + \beta_3 \ln(RPGNI_{ji})_t + \beta_4 \ln(MWD_{ij})_t + \varepsilon_t \quad 3.18$$

The logarithmic form of the equation assumes that vector of trade balance $\ln(BTB_{ij})$ of Ethiopia is a function of the incomes of the Ethiopia and the Ethiopia's trading partner country i and the real exchange rate between birr and the trading partner country's currency. A constant β_0 and $\beta_1 - \beta_3$ are parameters of the model, and ε_t is the random error term.

The J-curve hypothesis holds that an increase in the bilateral real exchange rate ($BRER_{ij}$) will cause countries trade balance to deteriorate initially, but when the adjustment price of imports and exports change since declining $BRER_{ij}$ imply real depreciation while a rise in BTB_{ij} improves with increasing export competitiveness (elasticity approach) depicts increase in exports and/or decline in imports. Therefore, according to the standard aggregate demand model of an open economy discussed above β_1 expect to be negative ($\beta_1 < 0$) in the long run in order to satisfy the Marshall – Lerner condition, the trade balance deteriorate in the short run resulting from real depreciation in line with the J-curve hypothesis β_1 is expected to be positive ($\beta_1 > 0$) in the short run.

On coefficients of relative GDP, increase in the ratio of GDP ($RGDP_{ji}$) expected to have a positive impact on the amount of goods and services that the foreign economy imports from other parts of the world, thus promoting the exports of its trading partners. I expect β_2 to be positive ($\beta_2 > 0$) since increase in the demand for Ethiopia's exports particularly agriculture would swell the country's exports, thereby improving Ethiopia's trade balance. But there is a strong disagreement which implies that higher relative GDP ($RGDP_{ji}$) country j (partner country)

produces more goods compared with country i (home country i.e. Ethiopia) and partner country comparatively has more capacity to meet her domestic demand as well as has more exporting capacity. In view of this, Bigger countries have more diversified production and tend to be more self-sufficient Kalbasi, (2001) and therefore, will have negative impact on the bilateral trade balance of small home country i and arise in Ethiopia's domestic income (real GDP growth) may increase the country's propensity to import goods and services from the rest of the world, leading to expect to deteriorate the Ethiopia's bilateral trade balance. Thus, β_2 will be negative ($\beta_2 < 0$).

The rise in relative per capita GNI ($RPGNI_{ji}$), might be attributed to increased production of replacements for Ethiopia's exports, resulting in a reduction in the number of products bought by foreigners from Ethiopia as Ethiopia's national income rises, resulting in a negative β_3 . Similarly, a rise in home production of local goods in response to domestic demand for import-substitute items might impact national revenue. This would result in a decrease in imports from other nations, resulting in a positive β_3 implication. Based on this reality β_2 and β_3 could be positive or negative so my hypothesis sign and direction of these exogenous variables are inconclusive.

The signs for the coefficient associated with import-weighted distance (MWD_{ij}) on trade balance has been negative, import-weighted distance, being proxy for transportation cost, has negative impact on the trade balance.

3.6 Data Source

The study utilizes significantly large annual time series data for descriptive analysis of 57 year trade data including volume of merchandize exports and imports for Ethiopia's as well as annual and quarterly official and parallel exchange rate data from the National Bank of Ethiopia. For the extended model of the trade balance developed as Equation (3.17 or 3.18) has been examined empirically for the case of Ethiopia using data on bilateral trade between Ethiopia and her major trading partners during the 1992-2020 periods. Bilateral panel data of total 28 major trading partners of Ethiopia (blend of industrialized and developing partner countries) covers above 85% of Ethiopia's export and above 80% of Ethiopia's import trade in both directions and these countries were chosen based on their share to Ethiopia's external trading and the availability of needed data which I listed them on appendix 1A.

Export and import statistics over the sample period have been collected from data from the World Integrated Trade Solution (WITS) database on the IMF website. The World Bank's, World Development Indicator (WDI) database provided the GDP and per-capita GNI statistics, while the IMF's International (IFS) database provided the nominal exchange rate and consumer price indices used to compute RERs. The geographical distance between Addis Ababa (the capital Ethiopia) and the capital cities of respective partner countries is obtained from website (www.) and has been weighted by the ratio of bilateral import volume from respective partners to total import volume of Ethiopia (W_{ij}) in respective years in order to calculate import-weighted distance (MWD_{ij}) All observations were made on a yearly basis and were processed according to procedure.

3.7 Estimation Technique

Applying appropriate methods on time series data is most critical part of the time series analysis, because incorrect model specification or using wrong methods will provide biased and unreliable estimates. Having the equation 3.11 a long-run model and coefficient estimates only reflecting long-run effects of the explanatory variables, I converted the Rose and Yellen (1989) model to the Panel Autoregressive Distributed Lag (ARDL) as conducted on equation (3.18) of Pesaran *et al.* (2001) which considers both the short-run and long-run effects of the variables on a dependent variable.

3.7.1 Dynamic Heterogeneous Panel ARDL Method

The above empirical model can be transformed in to the following panel ARDL ($p, q_1, q_2, q_3, q_4, q_5$) model where, p is the lag order of the indigenous variable BTB_{ij} and q are the lag orders of the control variables. The main model of panel ARDL approach is to obtain the relationship between bilateral trade and real exchange rate presented as follows;

$$\ln(BTB_{ij})_t = \beta_0 + \sum_{i=1}^p \beta_{1i} \ln(BTB_{ij})_{t-i} + \sum_{i=0}^q \beta_{2i} \ln(BRER_{ij})_{t-i} + \sum_{i=0}^q \beta_{3i} \ln(RPGNI_{ji})_{t-i} + \sum_{i=0}^q \beta_{4i} \ln(RGDP_{ji})_{t-i} + \sum_{i=0}^q \beta_{5i} \ln(MWD_{ij})_{t-i} + \varepsilon_t \quad 3.19$$

By re-parametrizing eq. 3.19

$$\begin{aligned}
\Delta \ln(BTB_{ij})_t &= \beta_0 \\
&+ \varphi_i \left\{ \theta_1 \ln(BTB_{ij})_{t-1} - \theta_2 \ln(BRER_{ij})_{t-1} - \theta_3 \ln(RPGNI_{ji})_{t-1} - \theta_4 \ln(RGDP_{ji})_{t-1} \right. \\
&- \left. \theta_5 \ln(MWD_{ij})_{t-1} \right\} + \sum_{i=1}^{p-1} \beta_{1i} \Delta \ln(BTB_{ij})_{t-i} + \sum_{i=0}^{q-1} \beta_{2i} \Delta \ln(BRER_{ij})_{t-i} \\
&+ \sum_{i=0}^{q-1} \beta_{3i} \Delta \ln(RPGNI_{ji})_{t-i} + \sum_{i=0}^{q-1} \beta_{4i} \Delta \ln(RGDP_{ji})_{t-i} + \sum_{i=0}^{q-1} \beta_{5i} \ln(MWD_{ij})_{t-i} + \varepsilon_t \quad 3.20
\end{aligned}$$

Where Δ is a first difference operator, t is time, β_0 is an intercept term, β_1 to β_5 signify short run coefficients, θ_1 to θ_5 shows the long run parameters of the model and p and $q - 1$ are the optimal lag lengths lastly, φ_i shows the speed of adjustment. In this linear ARDL model if short-run deterioration combines with long-run improvement on the trade balance (as the estimates of are negative or insignificant in the short-run and the estimate of normalized θ_2 (β_{2i}) is positive and significant in the long-run) this will signify evidence of a J-curve.

After confirming and estimating the long-run relationship, the next step is estimating the error correction model (ECM) to determine the speed of adjustment back to long-run equilibrium after a short-run disturbance. Thus, the associated error correction version of the ARDL model is specified in the following manner;

$$\begin{aligned}
\Delta \ln(BTB_{ij})_t &= \beta_0 + \sum_{i=1}^{p-1} \beta_{1i} \Delta \ln(BTB_{ij})_{t-i} + \sum_{i=1}^{q-1} \beta_{2i} \Delta \ln(BRER_{ij})_{t-i} + \sum_{i=1}^{q-1} \beta_{3i} \Delta \ln(RPGNI_{ji})_{t-i} \\
&+ \sum_{i=1}^{q-1} \beta_{4i} \Delta \ln(RGDP_{ji})_{t-i} + \sum_{i=1}^{q-1} \beta_{5i} \ln(MWD_{ij})_{t-i} + \varphi(ECM)_{t-i} + \varepsilon_t \quad 3.21
\end{aligned}$$

Where φ is the residual error correcting variable from the long run equation, and is the speed of adjustment parameter, which quantifies the speed at which equilibrium is restored following disequilibrium errors caused by shocks.

The Linear panel ARDL model states that the link between the real exchange rate and the trade balance is normal; nevertheless, the relationship might be non-linear, causing the trade balance to react differently to real appreciations and devaluations. But studies Bahmani-Oskooee & Fariditavana (2016)) tells the impact of changes in currency values on the trade balance might be asymmetric, according to A partial sum decomposition (the exogenous variable) technique is

used to model the asymmetric influence of exchange rates on trade and evaluate whether opposite-sign exchange rate fluctuations affect trade values and/or quantities differentially.

3.7.2 Asymmetric Panel ARDL Model

For three reasons, the nonlinear autoregressive distributed lag (NARDL) technique is chosen. For instance, it produces more reliable findings that are sensitive to the small sample size characteristic, allowing it to reject a false null hypothesis. Second, it works regardless of the order in which the variables are integrated; and third, it concurrently provides short- and long-run coefficients as well as covariance matrices, allowing inferences about long-run estimates, which isn't always the case with other co-integration tests Arize et al., (2017). In an asymmetric long-run equation, the decomposition of partial sums of negative (Birr devaluation) and a positive (Birr appreciation) shocks to the real exchange rate is as follows:

$$\begin{aligned} \ln(BTB_{ij})_t = & \beta_0 + \sum_{i=1}^p \beta_{1i} \ln(BTB_{ij})_{t-i} + \sum_{i=0}^q (\beta_{2i} \ln(BRER_{ij})_{t-i}^- + \beta_{3i} \ln(BRER_{ij})_{t-i}^+) \\ & + \sum_{i=0}^q \beta_{4i} \ln(RPGNI_{ji})_{t-i} + \sum_{i=0}^q \beta_{4i} \ln(RGDP_{ji})_{t-i} + \sum_{i=0}^q \beta_{5i} \ln(MWD_{ij})_{t-i} \\ & + \varepsilon_t \end{aligned} \quad 3.22$$

$$(BRER_{ij})_t = (BRER_{ij})_0 + (BRER_{ij})_t^- + (BRER_{ij})_t^+$$

Where $\ln(BRER_{ij})_t$ is logarithm of bilateral real exchange rate at time t and, $(BRER_{ij})_0$ is the value of the first observation at time t_0 , and $(BRER_{ij})_t^-$ and $(BRER_{ij})_t^+$ are partial sum processes of depreciations and appreciations of the exchange rate, respectively:

$$(BRER_{ij})_t^- = \sum_{j=1}^t \Delta(BRER_{ij})_t^- = \sum_{j=1}^t \Delta(BRER_{ij})_t I\{\Delta(BRER_{ij})_t < 0\} = \sum_{j=1}^t \min(\Delta(BRER_{ij}), 0)$$

$$(BRER_{ij})_t^+ = \sum_{j=1}^t \Delta(BRER_{ij})_t^+ = \sum_{j=1}^t \Delta(BRER_{ij})_t I\{\Delta(BRER_{ij})_t > 0\} = \sum_{j=1}^t \max(\Delta(BRER_{ij}), 0)$$

$I\{\Delta(BRER_{ij}) < 0\}$ and $I\{\Delta(BRER_{ij}) > 0\}$ Denote the indicator functions, which take the value of 1 if the condition is satisfied and 0 otherwise. To analyze the separate effects of depreciations and appreciations of Birr on the trade balances of the Ethiopia, I apply this changes in exchange

rate($BRER_{ij}$) $_t$ on linear ARDL model and arrive at non-linear ARDL approach which introduced by Shin *et al* (2014), as stated below: By re-parametrizing eq. (3.22) we obtain:

$$\begin{aligned}
\Delta \ln(BTB_{ij})_t = & \beta_0 \\
& + \varphi_i \left\{ \theta_1 \ln(BTB_{ij})_{t-1} - \theta_2 (\beta_{2i} \ln(BRER_{ij})_{t-i}^- - \theta_{3i} \ln(BRER_{ij})_{t-i}^+ - \theta_4 \ln(RPGNI_{ji})_{t-1} \right. \\
& \left. - \theta_5 \ln(RGDP_{ji})_{t-1} - \theta_6 \ln(MWD_{ij})_{t-1} \right\} + \sum_{i=1}^{p-1} \lambda_{1i} \Delta \ln(BTB_{ij})_{t-i} + \sum_{t=1}^{q-1} \lambda_{2i}^- \Delta (BRER_{ij})_{t-i}^- \\
& + \sum_{t=1}^{q-1} \lambda_{3i}^+ \Delta (BRER_{ij})_{t-i}^+ + \sum_{i=0}^{q-1} \lambda_{4i} \Delta \ln(RPGNI_{ji})_{t-i} + \sum_{i=0}^{q-1} \lambda_{5i} \Delta \ln(RGDP_{ji})_{t-i} \\
& + \sum_{i=0}^{q-1} \lambda_{6i} \ln(MWD_{ij})_{t-i} + \varepsilon_t \tag{3.12}
\end{aligned}$$

Where, λ_{1i} to λ_{6i} be the short run coefficients and θ_1 to θ_6 be long run coefficients of the model and ε_t is the disturbance term. The long-run coefficients of real exchange rate are $\frac{\theta_3^-}{\theta_2}$ and $\frac{\theta_3^+}{\theta_2}$ equation (3.14) now becomes the non-linear ARDL model and nonlinearity is introduced through the partial sum variables of $(BRER_{ij})_t$. Changes in the real exchange rates would have linear effects on the trade balance if the coefficient λ_{3i}^+ and λ_{2i}^- have the same size, sign and are significant at the 5 percent level. Otherwise the effects are non-linear. Shin *et al* (2014) justify applying Pesaran *et al* (2001) bounds testing approach to equation (3.14).

A dynamic error correction model (ECM) can be derived from ARDL through a simple linear transformation. Similarly, the ECM combines short-run dynamics with the long-run equilibrium without losing long-run information and avoids problems such as spurious relationship resulting from non-stationary time series data. To illustrate the non-linear ARDL modeling approach, consider the following simple model:

$$\begin{aligned}
\Delta \ln(BTB_{ij})_t = & \beta_0 + \sum_{i=1}^p \lambda_{1i} \Delta \ln(BTB_{ij})_{t-i} + \sum_{t=1}^q \lambda_{2i}^- \Delta (BRER_{ij})_{t-i}^- + \sum_{t=1}^q \lambda_{2i}^+ \Delta (BRER_{ij})_{t-i}^+ + \sum_{i=1}^q \lambda_{3i} \Delta \ln(RPGNI_{ji})_{t-i} \\
& + \sum_{i=1}^q \lambda_{4i} \Delta \ln(RGDP_{ji})_{t-i} + \sum_{i=1}^q \lambda_{5i} \ln(MWD_{ij})_{t-i} + \gamma ECM_{t-1} + \mu_t \tag{3.23}
\end{aligned}$$

3.8 Pre-estimation Tests

3.8.1 Stationarity and Unit Roots

The problem of stationarity is one of the most important assumptions in time series data analysis. “Time series data is considered stationary if its mean and variance are constant across time, and the value of the covariance between two time periods varies solely on the distance or gap or lag between the two time periods Gujarati, (2004, p. 797)” The first step is to look for the series' unit roots, which may be done using a variety of methods outlined in the literature. For this reason primarily the study performed major pre-estimations of this paper and run panel unit root tests to ensure that the variables are non-stationary. Im et al. (2003) test (IPS), Levin et al. (2002) test (LLC), and second generation of IPS test (CIPS) of Pesaran (2007) will be tested. The LL test assumes non-heterogeneity of the autoregressive parameter, but the IPS test permits heterogeneity, and the CIPS unit root test relaxes the requirement of contemporaneous correlation cross-sectional independence. In addition to Granger and Newbold, (1974) advice if the time series are non-stationary, the unit root problem arises and the use of non-stationary time series may reveal a “spurious regression problem”, this test is conducted to rule out the possibility of second differenced $I(2)$ variables so null hypothesis of non-stationarity is used in all of these tests.

3.8.2 Panel Co-integration Tests

Co-integration detection is a vital step in determining if a model experimentally displays meaningful long-run relationships. If the co-integration of the underlying variables cannot be established, it is necessary to deal with variables in differences instead. Long-term data, on the other hand, will be lacking. There are numerous co-integration tests; three panel co-integration tests, Pedroni (1996), kao, and Westerlund co-integration tests are based on the findings of early non-stationarity testing (2007). These co-integration tests are expected to reveal the existence or otherwise of a long-run relationship. The limit testing method of co-integration offers certain benefits over other methods. For example, it eliminates endogeneity bias and allows for simultaneous estimation of the model's long- and short-run parameters, and the approach is effective regardless of the order in which the variables are integrated. The basic concept of the panel ARDL method is to find the following link between bilateral trade and real exchange rate:

The Pesaran et al. (2001) test offers two critical values, one with lower constraints assuming all variables are I(0) and the other with higher bounds assuming all variables are I. (1). To test for the presence of a long-run connection, using F- and t-statistics under the null hypothesis of no co-integration among the model's variables, as well as the joint significance of the coefficients of the lagged level variables, as follows:

$$H_0: \theta_1 = \theta_2 = \theta_3 = \theta_4 = \theta_5 = 0$$

$$H_1: \theta_1 \neq \theta_2 \neq \theta_3 \neq \theta_4 \neq \theta_5 \neq 0$$

3.8.3 Poolability and Optimal Lag Length Selection Criteria

In order to test serial correlation in time series data, you must know the number of terms back down the autoregressive process (AR), also known as the lag length. In order to determine the maximum lag duration in time series data, the number of parameters that minimize information criteria must be chosen. The Akaike Information Criteria (AIC), Schwarz Information Criteria (SC)/ Bayesian Information Criteria (BIC), and Hannan-Quin Information Criteria (HQ) are the most well-known information criteria (IC). The model with the least AIC or BIC value is usually chosen, however when the number of independent variables is excessively high, the BIC may be suitable and offer a basic model that is neither too huge nor too little (Acquah, 2010). As a result, the BIC was employed in this study to assess the model's suitable lag period. Finally I conducted poolability test on constant coefficients (pooled regression) models, fixed effects models, and random effects models which is the primary types of panel data analytic models I looked at.

CHAPTER FOUR

Descriptive Analysis

4.1 Introduction

Macroeconomic policies in emerging nations, such as Ethiopia, have distorted the economy in all sectors. The only option to correct these imbalances is to implement comprehensive economic reforms with the goal of restoring internal and external balances and encouraging long-term growth and development in all sectors. In this part, write down what you wish to alter. Then, in the box below, click the paraphrase button. Ethiopia faced serious economic problems from the mid-1970s to the entire decade of the 1980s; this crippling economic crisis manifested itself in a variety of ways, including low GDP growth, negative per capita income growth, increasing balance of payment deficits, and massive debt servicing followed by arrears accumulation.

The International Monetary Fund (IMF) and the World Bank (WB) advised developing countries to weaken their currencies in order to assist local businesses thrive throughout the structural adjustment program. Furthermore, Ethiopia's national currency, the birr, was devalued by 142 percent from its fixed rate of 2.07 per US dollar to 5 per US dollar in October 1992, marking the first significant shift in the value of the birr. As a result, this research is prompted by the recent IMF and World Bank-initiated proposal to devalue the Ethiopian Birr, as well as the attention it sparked in certain contentious blogs. The researcher covers Ethiopia's trade patterns, exchange rate policies, developments, trade policies, and trade performance in this part.

4.2 Overview of Ethiopia's Economy

Ethiopia's development has been accelerating steadily since 2004. Figure 1 depicts a graph of yearly real GDP growth rates from 1982 through 2020. Annual GDP growth averaged 3% between 1980 and 2003. The growth trajectory before to 2004 was very erratic, with the highest levels of growth occurring during favorable weather conditions and the lowest occurring during dry (or stormy) years. Unlike its inconsistent development before to 2004, the economy grew at a record-high rate of 10.7% per year from 2004 to 2017, which is noteworthy when compared to the SSA regional average of 4.6 percent during the same time. However, the economy increased by 6.1 percent in fiscal year 2020, down from 8.4 percent in fiscal year 2019 which is largely

because Political disruption associated with social unrest, the worst locust invasion and the COVID-19 pandemic.

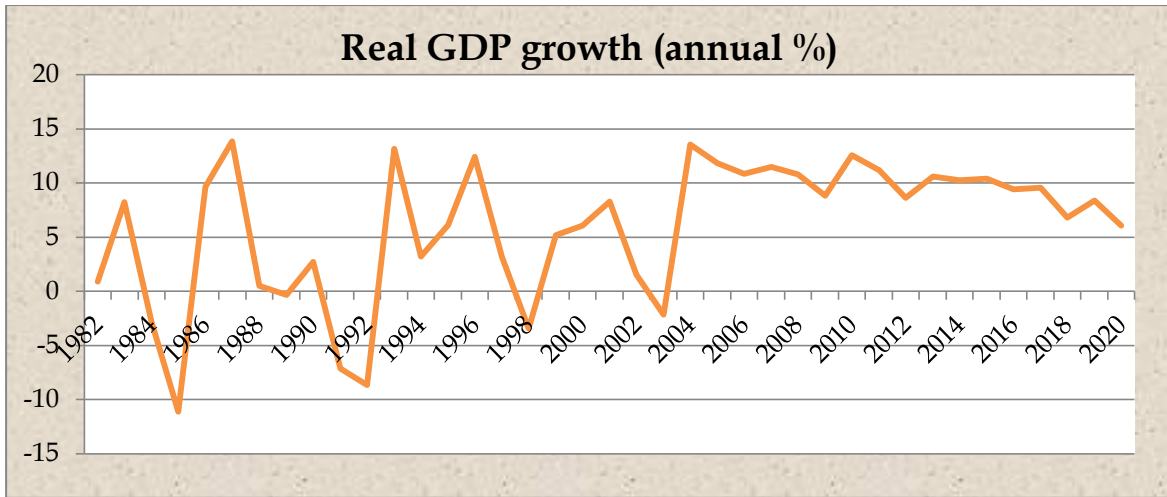


Figure 4.1 Real GDP growth rate. World Bank data

From 1981 to 2020, the share of value added economic sectors in the gross domestic product (GDP) reveals that while Ethiopia's economy had robust, broad-based development averaging 10.7% per year from 2004 to 2017, Ethiopia's real GDP growth slowed to 6% in 2020 owing to COVID-19 (coronavirus pandemic). Industry, particularly construction, and services have accounted for the majority of growth during the previous decade.

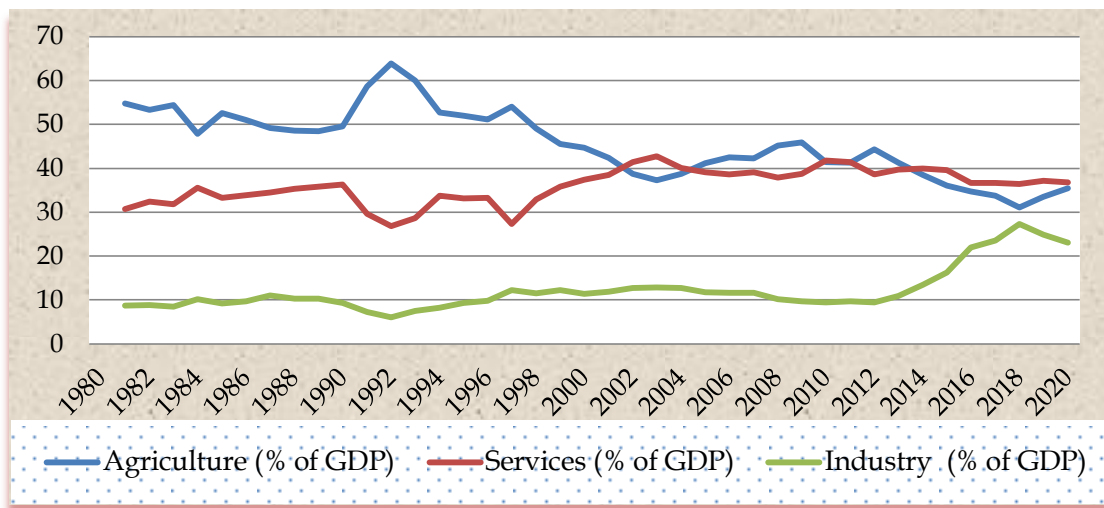


Figure 4.2 share of value by economic sector

Different subsectors were affected to varied degrees by the shutdown. The service sector's GDP shrank by 21.9 percent, owing to significant losses in the hotel and trade sectors. The industrial

sector's GDP decreased by roughly 9% in 2019 and 15% in 2020, owing largely to manufacturing and significant reductions in mining (16.2 percent). Agriculture only declined by 4.7 percent due to the lack of direct limitations on the sector; this may be explained by the worst locust invasion and the sector's interconnection with the rest of the economy, as well as the relatively direct effect of the COVID-19 caused low export performance. The COVID-19 had no significant impact on agriculture, contribution to growth slightly improved in 2019/20 compared to the previous year 31% in 2018 than 35% in 2020.

4.3 Monetary and Exchange Rate Developments in Ethiopia

A thorough examination of Ethiopian currency would bring one back to the ancient Axsumite Kingdom, when gold and copper coins featuring pictures of rulers and Greek inscriptions circulated across the Ethiopian highlands and down the Red Sea coast. However, new kingdoms have emerged and perished throughout the course of the last two thousand years. As a result, silver has supplanted gold as the primary money, and now paper has supplanted silver. Because appropriate data for the period previous to 1931 is unavailable, this research will focus on the modern money supply—that is, the money supply after the initial issuance of paper currency and provide an overview of significant monetary events in Ethiopia since 1931. The Maria Theresa thaler was issued in 1931. It was the main form of money in Ethiopia, containing 83.33 percent silver and weighing about an ounce. Despite the fact that the thaler was not produced in Ethiopia, it was believed that between sixty and seventy million silver thalers were in circulation in the 1930s.

The Bank of Ethiopia, formed in 1931 to replace the British-built Bank of Abyssinia, was owned and controlled entirely by Ethiopians. The Imperial government held 60% of the bank's shares, and the bank's policies were subject to Ministry of Finance scrutiny. The Emperor appointed the whole Board of Directors. In 1932, the bank had just 39 workers and seven branch offices in Ethiopia.) A half-hearted attempt was made to introduce bank notes in values of \$5, \$10, \$50, \$100, and \$500. The fact that these bank notes could be readily changed into gold or silver thalers was their strength at any branch office of the bank.

The Ethiopian dollar, issued by the State Bank, became the basic financial unit there under 1945 Proclamation. On July 23, 1945, the Ethiopia dollar (E\$) was introduced as the country's official

currency, with a value of 5.52 grains (equal to 0.355745 grams) of pure gold. As a result of the 1944 Bretton Woods Agreement, a monetary system was established that had a link to fine gold. The gold content was largely constant until the Bretton Woods system collapsed and the US dollar depreciated. The gold content was decreased to 0.355468 grams in 1964 in order to lower the exchange rate to a more manageable US\$ 0.40 or 2.50 birr/USD official rate. The relationship to fine gold followed the 1944 Bretton Woods Agreement, which established a monetary system (i.e. the gold standard). Currency structure during 1968 to 1973, President Richard Nixon of the United States proclaimed the "temporary" suspension of the dollar's gold convertibility in August 1971, via Proclamation 1945. In March 1973, after a fruitless attempt to reestablish fixed exchange rates, the major currencies began to float against each other. The Ethiopian dollar after 1976, the Ethiopian dollar was renamed Ethiopian birr.

4.3.1 Ethiopia's Trading Policy and Exchange rate Regimes

Ethiopia's trade approach, which has become increasingly incompatible with certain of the country's macroeconomic objectives, is a case in point. Ethiopia has always been a low-inflation country in Sub-Saharan Africa. Strong currency, prudent monetary and fiscal policies (1960s-1973), general price control (1974-1992), and economic reform and stabilization initiatives were all factors (1992-2004). The fiscal deficit averaged about 5% of GDP per year from 1965 to 1973, compared to 14.14 percent and 8.64 percent per year from 1974 to 1990 and 1991 to 1996, respectively. As Naude and Abu, (1994) described the Derge regime, in particular, has long been characterized by controlled foreign exchange allocation, import quotas, high tariffs, state-owned marketing exports, export prohibitions, export subsidies and other measures of export taxes.

Except for a few necessary consumption products, imports were not subject to licensing or other quantitative limitations throughout the Imperial period, and exporters were forced to return their foreign currency to commercial banks at the official exchange rate. Tameru, (1994) discussed in this regime, the presence of macroeconomic stability and a reasonably open trade regime most likely decreased misalignment of the actual exchange rate from its equilibrium. The Derge regime, on the other hand, was marked by a steady decline in the real official exchange rate and a steady rise in the real parallel exchange rate, indicating the currency's overvaluation. Since 1975/76, exports have remained stagnant while imports have risen due to an overvalued exchange rate. The Derge regime tightened its control regime in response to the declining

competitiveness of legal exports and smuggling by imposing stricter foreign exchange rationing, prohibiting the domestic trade of many exportables (notably coffee), and providing export subsidies to loss-making state-owned exporters. During 1977, the exchange and commerce system saw substantial modifications in the Derge regime's history.

The exchange rate of Ethiopian currency versus its reference or reserve currency, the US dollar, was fixed by government edict for nearly half a century, until October 1992. Prior to the merger of the official and auction exchange rates in July 1995, there were four major currency rates in use in Ethiopia: the official rate, the parallel rate, the auction marginal rate, and the weighted average rate. Ethiopia has adopted the two major exchange rate regimes as part of its exchange rate management strategy in order to ensure an efficient mechanism for determining the exchange rate and improve the allocative efficiency of foreign exchange resources, with the overall goal of achieving internal and external balance. Administrative means established the official and weighted average rates, whereas market and quasi-market systems decided the parallel and auction exchange rates, respectively.

4.3.1.1 Fixed Exchange Rate Regime

Since the 1940s, the Ethiopian Birr has been tied to the US dollar. Between 1934 and 1974, when the Imperial regime was in power, and 1974 to 1991, when the Derg regime was in power, both political regimes adopted the same type of exchange rate regime: a fixed exchange rate framework with relatively severe limitations on system-related operations. Exchange rates were effectively locked to gold parities under the Bretton Woods exchange rate regime, with very minor fluctuations permitted. The industrial world switched to a flexible exchange rate system when this arrangement collapsed in 1971. The country has had a passive exchange rate strategy since then, allowing the Birr to decline and rise in tandem with the dollar. The Birr has only appreciated against the dollar on two occasions. As can be seen from the graph below, the currency rate was fixed at Birr 2.30 = US\$ 1 in 1971 and Birr 2.07 = US\$ 1 since February 1973. However, there are some indicators that the Birr has been overvalued.

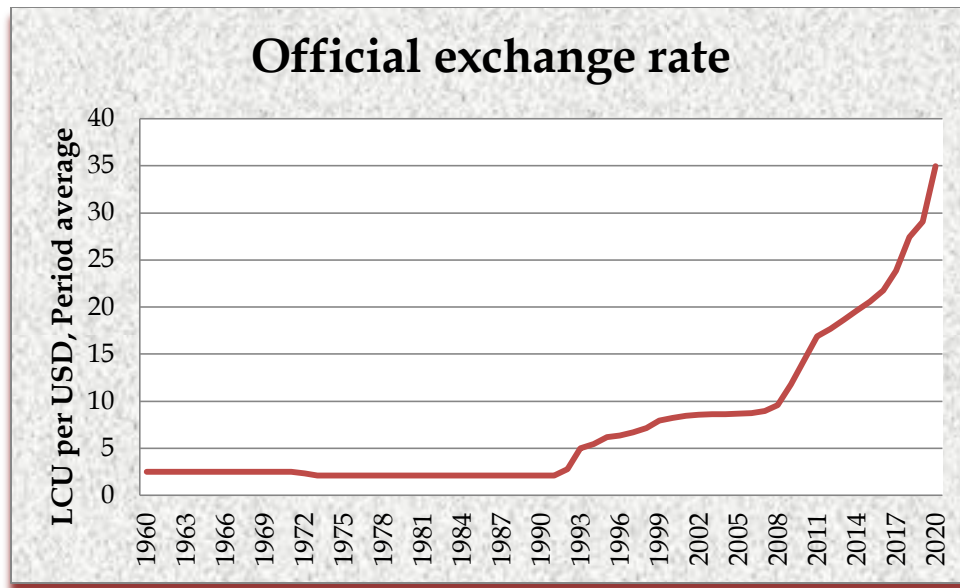


Figure 4.3 Official exchange rate. Source; World Bank data base.

An overvalued birr indicates that there is a surplus of foreign currency (in this example, the dollar) demand that cannot be met at the official exchange rate. This overpriced currency will result in ongoing balance of payment deficits. This is because an overstated exchange rate makes export production unprofitable (decreases export competitiveness), while imports become less expensive. Due to the scarcity of hard money, only a few individuals or organizations will be able to reap the benefits of the artificially low exchange rate. Because imported products are priced at market rates, privileged imports can make large profits. The high dollar equivalent price of non-tradeable output, on the other hand, boosts the production of local manufacturers, making them uncompetitive and preventing their export. By categorizing the production of tradeable and non-tradeable products, one may have a better understanding of the impacts of overpriced currencies. Domestic demand for tradeable goods is high due to low relative prices; however, non-tradeable goods production will be discouraged due to low pricing and lack of competitiveness.

Because demand exceeds supply, governments turn to currency control as export profits decline and foreign exchange becomes scarce. Controls breed corruption, and the official system and parallel market thrive at a growing premium, when remittances from overseas fail to flow via the banking system, both exporters and tourists turn to the parallel market.

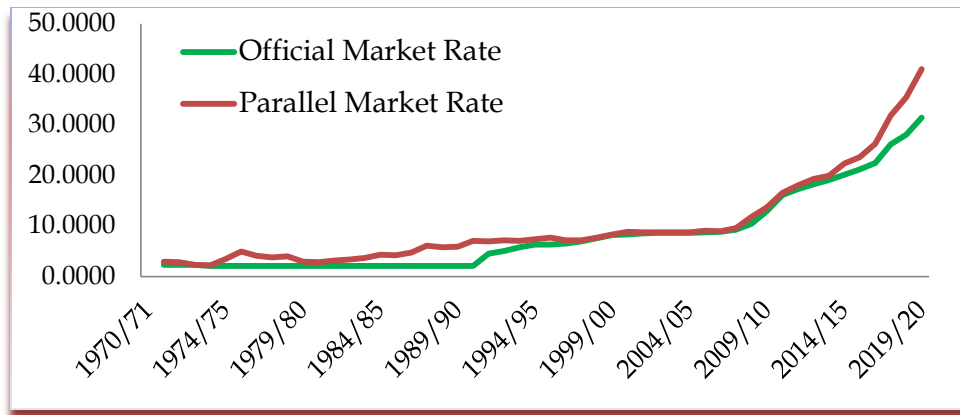


Figure 4.4 the parallel and official exchange rate market. Source NBE.

The parallel premium grew significantly throughout the period 1971–1991, growing geographically from 0.69 percent in 1972/73 to 238 percent in 1991, then abruptly falling to 54 percent in 1992 due to the maximum depreciation in that year, according to statistics from the Ethiopian National Bank (1970/71-2019/20). In 1995, the premium dropped even lower, to around 16.72 percent, owing to the auction system's performance. The fast growth of the foreign exchange parallel market, especially after 1973 and before 1992, may be linked primarily to the severe economic crisis that resulted in part from harsh foreign exchange limitations during the Dergeregime. During the military government, official earnings from major exports were practically static, owing to an internal production problem and an overvaluation of the official currency rate. The parallel premium is the percentage difference between the parallel and official currency rates.

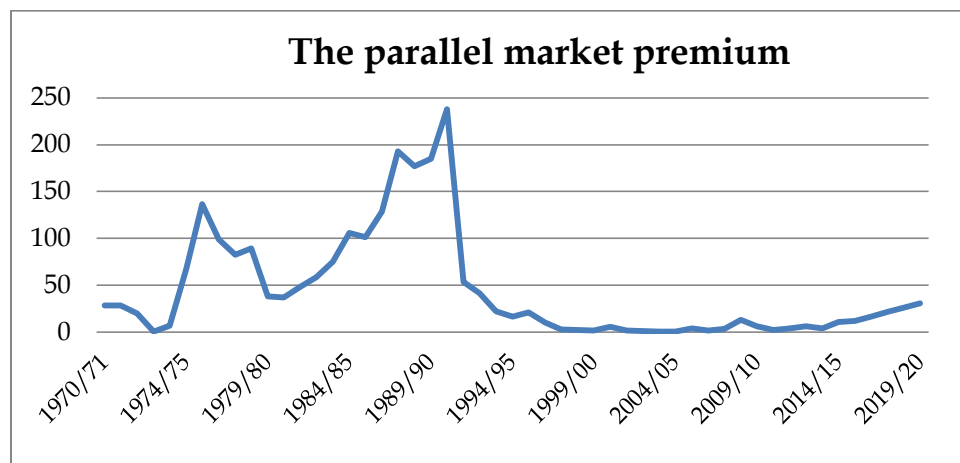


Figure 4.5 parallel premium. Source NBE

It is also claimed that Ethiopia's alternative foreign exchange market operations have played a role in luring merchants, dealers, and others who desire to export cash in excess of allowed limits

at various periods. Parallel market operations grew frantic after the Ethiopian dollar was replaced by the Ethiopian birr in September 1976, according to World Currency Yearbook (1989). The growing political instability forced money out of the nation, according to World Currency Yearbook (1989).

4.3.1.2 The Managed Floating Exchange Rate Regime

Recognizing the negative effects of an overvaluation of the birr on the country's trade balance and, as a result, on the country's balance of payments, the Transitional Government of Ethiopia (TGE) depreciated the birr seven times before unification in late 1995, with an official exchange rate gradually reaching 6.25 birr per US dollar, as shown in Figure 3. Following the 1992 devaluation, the exchange rate was adjusted from fixed to managed floating in order to prevent overvaluation by gradually depreciating the local currency each year. The TGE held a foreign exchange auction in May 1993 in an attempt to liberalize the foreign exchange market and achieve a market-determined exchange rate. The primary objective behind successive devaluations of official currency rates and the establishment of the auction system is to bolster the official reserve by drawing foreign exchange from the parallel market back to the official line.

The Ethiopian National Bank (central bank) has maintained a managed floating exchange rate regime in which the local currency, the Birr, is pegged to the US Dollar for over three decades. Due to the currency rate's stability and the NBE's intervention policy, the authorities define Ethiopia's de facto exchange rate regime as controlled float, but the IMF considers it as crawl-like. According to the NBE, the exchange rate has no predetermined pattern and is consequently allowed to fluctuate from day to day, with the government occasionally buying and selling currencies in the currency market. The nominal exchange rate is determined by the interbank foreign exchange market. As a result, external shocks and changes in macroeconomic fundamentals have had little influence on the nominal exchange rate. The birr is carefully controlled against the dollar, which serves as the notional anchor for Ethiopia's exchange rate policy.

With the significant depreciation of the birr by roughly 142 percent in October 1992, a new exchange rate regime was established, and the foreign exchange auction system (which was

mostly supported by grant and loan inflows) was adopted in May 1993. As a result, until 1996, the parallel exchange rate varied between 7.75 and 6.80 birr per US dollar, with the yearly parallel premium fluctuating between 45 and 15.59 percent. The difference also narrowed compared to the time when the exchange rate was set. The Ethiopian Birr was devalued by 23.7 percent and 16.5 percent against the US dollar in 2009/10 and September 2010/2011, respectively. The goal of this massive devaluation was to "reduce overvaluation and enhance competitiveness" (IMF, 2010; MOFED, 2009). As foreign exchange demands increased, the National Bank of Ethiopia (NBE) depreciated the Birr by 15% on October 10, 2017. The devaluation was implemented, according to the government, to boost exports and alleviate a foreign exchange shortfall. ETB17 was worth one dollar a decade ago. The value of the Birr has been lowered by as much as 130 percent throughout the years, after successive devaluations of the currency in attempt to enhance the import-dependent country's international competitiveness. Nonetheless, from the late Meles Zenawi's government through Abiy Ahmed's (PhD) administration, the belief that "devaluation is a cornerstone to raising international competitiveness" has been the way to go.

In general, Ethiopia's actual exchange rate has risen rapidly over the last year, with the birr's overvaluation now standing at 31.73 percent. Current account deficits grow as a result of overvaluation and subsequent exchange control. However, depreciation of an overvalued currency is intended to reduce the current account deficit by improving the profitability and competitiveness of exports. At the same time, the cost of imports in local currency is projected to rise. In the parallel market, the birr buys less dollars, thus the effective price of the birr is the parallel market rate, implying that the birr has devalued faster if more market-based movement of exchange rate were allowed. Figure 9 indicates that the parallel market premium has been steadily rising in recent years, despite the fact that it hinders productivity and growth. To limit inflation, the birr must be devalued even further and followed by a tightening of monetary policy.

4.4 Trends of Bilateral Trade Performance of Ethiopia

Landlocked location geography increases trade costs and lowers international competitiveness of Ethiopia. The level of economic development, resource endowments, policies, and development strategies pursued are all determining factors in a country's export structure. Agriculture was Ethiopia's primary contribution to growth at the start of the country's development; a substantial percentage of the country's total exports consist age-old traditional agricultural exports, which account for more than 95 percent of total foreign exchange earnings. Coffee accounted for 58 percent of total export profits in 1966, and this proportion has steadily increased over time, reaching more over 65 percent in 1997. This shows that the country's reliance on a single product for foreign exchange revenues has grown, making it considerably more vulnerable to the impacts of a monoculture export profile. Despite attempts at the end of the Derge government to diversify the export mix, no new major export product has been established since 1991. In the economy, there is also less inter-sectoral dependency. Agriculture employs a higher share of the active work population, and the export sector's performance has been disappointing.

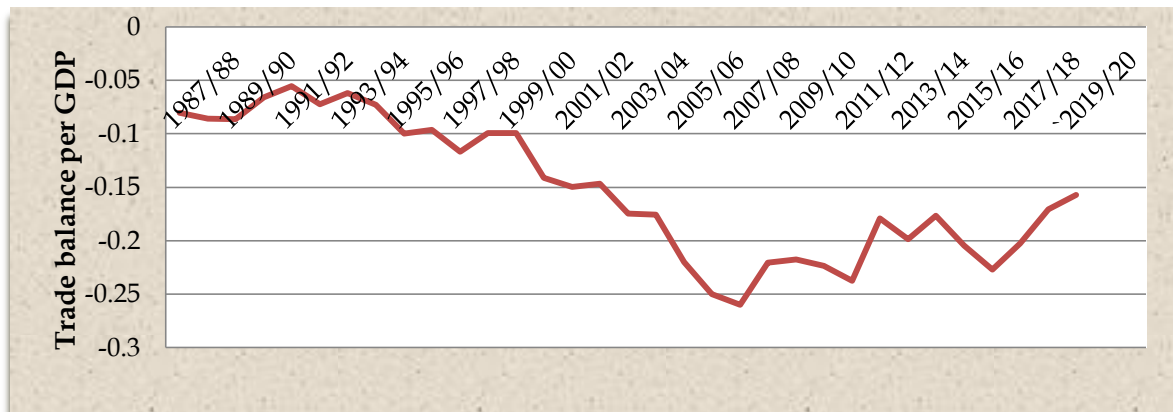


Figure 4.6. Aggregate Trade Balance to GDP ratio for Ethiopia (1986 - 2019)

Source: Own computation data from the NBE

Throughout the Imperial period, imports were not subject to licensing or other quota restrictions, save for a few essential consumer goods, and exporters were forced to repatriate their foreign money to commercial banks at the official exchange rate. The prevalence of macroeconomic stability and a relatively open trading environment in this era most likely reduced real exchange rate misalignment from its equilibrium.

4.4.1 Commodity Structure of Ethiopia's Export

Ethiopia has become one of Africa's fastest-growing economies. Agricultural goods account for the majority of Ethiopian exports, since the country is largely dependent on agriculture. Primary agricultural goods accounted for more than 80% of Ethiopia's merchandise export profits during the past 57 years, except for the previous decade, according to data and proof. Non-agricultural exports are therefore minor in comparison to overall exports. Coffee, oilseeds, leather products, pulses, meat products, fruit and vegetables, live animals, chat, gold, and flower contributed for 49.55, 8.65, 9.83, 5.55, 1.3, 1.27, 1.79, 5.64, 4.83 and 1.99 percent of the total export proceeds, respectively between 1963/64 and 2019/20.

Average share of major exports of Ethiopia				
Commodity group	Period (during the three successive Regimes)			Overall share
	1963/64-1973/74	1974/75-1990/91	1991/92-2019/20	
Coffee	52.82	62.28	40.84	49.55
Oilseeds	10.13	3.02	11.39	8.65
Leather prdts	10.09	12.54	8.13	9.83
Pulses	8.78	3.94	5.27	5.55
Meat Prdts	2.64	0.63	1.55	1.3
Fruits & Vegetables	2.01	0.98	1.44	1.27
Live Animals	0.95	1.94	2.15	1.79
Chat	1.02	2.31	9.49	5.64
Gold	-	0.81	9.01	4.83
Flower	-	-	3.91	1.99

Table 4.1 Merchandize export Source: Own computation data from NBE 2020.

During Both imperial and socialist governments sought to improve Ethiopia's trade balance, with the former encouraging exports (the First Five-Year Development Plan began in 1956/57) and the latter limiting imports. During the Imperial, Derge, and current governments, coffee accounted for 52.82, 62.28, and 40.84 percent of total goods exports, respectively. During the imperial period, revenue from coffee exports has been declining since 1965, with its proportion of total exports falling from 65 percent in 1964/65 to 27.3 percent in 1973/74, owing to low international market prices and a change difficulty. The smallest proportion was 30.67 percent in 1974/75 owing to political instability, while

the greatest share was 75.37 percent in 1976/77 due to the government's development campaign efforts. The income share of agricultural exports in general and coffee has decreased from 71.89 percent in 1997/98 to 22.02 percent in 2013/14 and 28.70 percent in 2019/20, as shown in the table. All of these data show that Ethiopia's goods export sub-sector is heavily reliant on a single export commodity (coffee) for much-needed foreign exchange revenues. We may deduce from this that coffee continues to control the size of Ethiopia's export economy.

Since 1953, Ethiopia's international trade balance has been negative. International trade has grown at a higher rate than the national economy in general, particularly since the early 1970s, although it remains a small part of the overall economy. In 1980/81, exports and imports each contributed 3% and 2% of GDP, respectively. In the EFY 1988/89, exports had dropped to 8% of GDP, while imports had increased to 2%. The amount of exports increased during the 1970s, and by EFY 1988/89, exports had nearly doubled the value of 1973. However, despite changes in the relative proportion of various agricultural exports, the export composition remained relatively constant, and total exports continued to worsen beginning in 1984/85, declining by 55.95 percent in 1991/92 from prior decades. Following the overthrow of the military dictatorship and the EPRDF's takeover of the government, the average proportion of coffee and leather products fell from 52.82 percent, 10.13 percent (imperial) and 62.28 percent, 3.03 percent (durge) to 40.84 percent and 8.13 percent, respectively. The quantities of oilseeds, pulses, meat products, fruits and vegetables, live animals, chat, and gold, on the other hand, have changed dramatically and indicate a substantial improvement, composed 11.39%, 5.27%, 1.55%, 1.44%, 2.15%, 9.49% and 9.01% respectively of overall export value during 1991/92-2019/20.

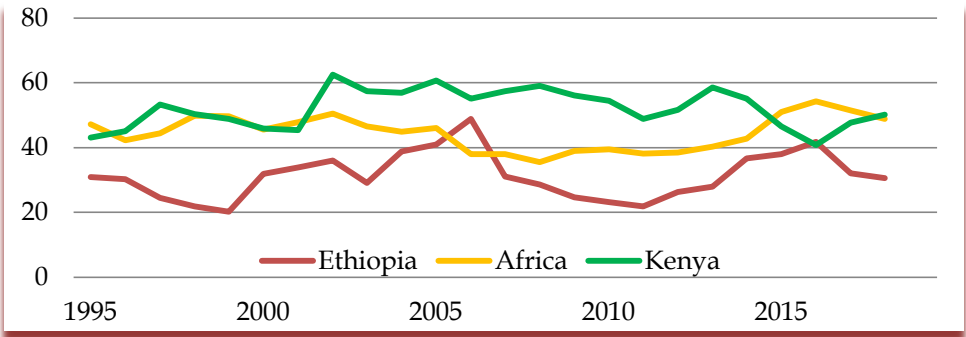


Figure 4.7 share of industry sector to total export

Ethiopia's industrial sector is still a long way from being a driver of structural transformation and prosperity. Between 2000/01 and 2017/18, the share of manufactured exports to total exports stayed below 13%, while overall exports fell from 12.7 to 7.9% of GDP.

As can be seen in the graph above, the industrial manufactured products sector's share of total merchandise export earnings (percentage) was one of the list, even among emerging African nations (i.e. Kenya), at 30.9 percent in 1994/95 and 30.6 percent in 2017/18. Low-value products produced in the leather and leather goods, textiles and clothing, and meat sectors dominated manufactured exports, which primarily went to other low/middle-income countries. When compared to traditional coffee and new cut-flower exports, which accounted for 28.7% and 14.1% of total goods exports in 2019/20, respectively, and a higher percentage of these, exports, was destined for higher income markets

4.4.2 Imports of Ethiopia

Agriculture, natural resources, and manufacturing resources are all examples of broad categories in which import products may be found. These imported commodities from the worldwide market can be classified according to their processing stage and intended end use throughout the manufacturing chain. As a result, goods are classified as Semi-finished Goods (Chemicals, Fertilizers, Textile Materials, and Others), Fuel (crude petroleum, Petroleum Products, Others), Capital Goods (Durables and Non-durables).

Capital goods contribute for the largest percentage of imports among the major import products, as indicated in Table 1.1 below. Capital goods, consumer products, fuel, and semi-finished goods accounted for 45.03, 15.57, 14.45, and 9.73 percent of total import profits, respectively, from 1963/64 to 2011/12. When comparing other imports during the three consecutive Regimes 49.98 percent (imperial), 44.41 percent (socialist), and 43.51 percent (communist), capital goods were one of the most dominating (EPRDF Regime and onwards).

Except for food and fuel supplies, there was a general ban on imports during the imperial period. Better harvests in 1967 and 1968 were the major reason for lower imports of consumer goods and food items in general, as well as lower imports of gasoline and associated products due to local processing of petroleum products. Periods of increased capital imports coincided with extremely high loan disbursements by the government and autonomous institutions such as Ethiopian electric light and power authority, Ethiopian airlines (imported two commercial planes), shipping lines, imperial board of telecommunication, and so on. However, due to a supply shortfall, an unusually large increase in consumer goods imports occurred in 1970, mostly

due to an increase in food imports. Consumer products were Ethiopia's most important import sector during the military rule, accounting for about one-third of overall import volume in 1984/85-1985/86. Petroleum Products and capital goods, mostly machinery and transportation equipment, accounted for another 18% and 39% of the total volume of imports, respectively. Semi-finished commodities accounted for the remaining third of the total value of imports.

Period	Consumer Goods	Capital Goods	Fuel	Semi-finished Goods	Others
1963/64-1973/74	15.75	49.98	10.20	13.03	11.05
1974/75-1990/91	17.85	44.41	15.66	12.76	9.32
1991/92-2019/20	14.17	43.51	15.36	6.71	20.25
Overall share					
1963/64-2019/20	15.57	45.03	14.45	9.73	15.22

Table 4.2 Import structure of Ethiopia Source: Own computation data from NBE 2020.

With the exception of a few years, Ethiopia has had persistent balance of payments problems since 1993. The trade imbalance that existed during the imperial years continued to expand following the revolution and the EPRDF Regime. The export sector's overall performance was poor from 1963/64 to 2019/20, as indicated by a decreasing export/GDP ratio and a diminishing proportion of exports in import finance. The findings of the trend analysis also reveal that Ethiopia's export growth rates have been extremely erratic. The worsening status of merchandise trade was a key element in the deteriorating balance of payments among other determinants the exchange rate policy both the imperial and socialist period adopted the same type of exchange rate regime: a fixed exchange. This overvaluation of domestic currency influenced its own impact on foreign trade relation and Marshal-Lerner criterion may not hold true in the near run in an import-dependent emerging nation like Ethiopia, which lacks the ability to produce local substitutes for numerous products and exports mostly non-processed primary agricultural exports this type of currency procedure worsens balance of payment in general and trade balance in particular manner.

After the great devaluation in 1992 the trade imbalance continues due to large import volumes and a nearly constant level of export throughout time. The value of exports has been dropping since 1998, and from 1999 to 2002, the value of exports has been decreasing, whilst the value of imports has been increasing at a decreasing pace. Export values have fluctuated or gone up and

down since 2003, and will continue to do so until 2020. The years 1992 and 1993 central bank (NBE) was devalued by around 142 percent for the first time. The Ethiopian currency was devalued by around 413 percent in 2002, compared to 1992, after ten years. In 2011, the local currency ETB was devalued by roughly 25% in comparison to the previous year.

4.4.3 Bilateral Trade Partners of Ethiopia

Our exports are sold all over the world, with the most out of them going to Asia, Europe, America, and Africa. Other regions account for a relatively tiny fraction of our total exports during the imperial rule, with the United States taking the lead (49.3 percent in 1964, 54.6 percent in 1965, 44 percent in 1966, 43.1 percent in 1967). However, since 2008/09, China has risen to the top of all geographical import and export relations. For example, during the 2005/06 fiscal year, China was Ethiopia's most important export destination, followed by Germany and Japan. Following Germany, Italy and Saudi Arabia were Ethiopia's second and third largest export markets in 2006/07. Saudi Arabia came in second the following year, followed by the United States of America. Finally, China and Germany were the leading and second most important sources of revenue for Ethiopian exports in the last two years of the period under review. For the fiscal years 2008/09 and 2009/10, the Netherlands and Somalia were the third and fourth most important export destinations, respectively. On the other side, the above table indicates that African nations like Sudan, Djibouti, Somalia, and Egypt are becoming major export markets for Ethiopian goods. This might indicate a positive attitude toward taking advantage of local and regional possibilities

CHAPTER FIVE

Empirical Result and Discussions

5.1 Descriptive Statistics

The augmented model of bilateral trade model, Equation, was designed with the goal of retesting the J-curve hypothesis (3.18). Data on bilateral trade between Ethiopia and her key trading partners was analyzed empirically for the instance of Ethiopia from 1992 to 2020. With 812 observations, bilateral panel data of Ethiopia's 28 largest trading partners (16 industrialized and 12 developing) covers 78 percent to 85 percent of Ethiopia's international trade in both directions (import and export partners Share (%)). The sample period's data statistics are chosen based on Ethiopia's prominence as a trading partner and the availability of needed data. The standard deviation, which is a summary estimate of each observation's average distance from the mean, reveals that the variation between the regressors, notably the dependent variable (2.596949), is quite relevant.

Table 5.1 descriptive statistics

Variables	Obs.	Mean	Std. Dev.	Min	Max
log_RBTB	812	-1.109945	2.596949	-11.1765	21.4025
log_BRER	812	-0.450464	3.62684	-29.3904	8.4677
log_RGDP	812	2.7146	2.191402	-3.46561	7.40964
log_PGNI	812	2.292366	2.349989	-4.08511	8.97175
log_MWD	812	-3.182048	2.400131	-17.7788	1.3766

Author's computation based on dataset.

Given that the mean values obtained are all in the middle of the maximum and lowest values, they are good measurements of central tendency. RBTB has an annual growth rate of about US\$ -1.1099, with the greatest and lowest numbers being US\$ -11.1765 and US\$ 21.40, respectively. Because the trend of bilateral trade for Ethiopia has been in deficit over the period under study, this validates the fact that on average, the trend of bilateral trade for Ethiopia has been in deficit. The average value obtained for the data set is -0.450464, with the maximum and minimum values being -29.3904 and 8.4677, respectively. Continuous exchange rate devaluation seen to have a negative value, log BRER, the average value obtained for the data set is -0.450464, with the maximum and minimum values being -29.3904 and 8.4677, respectively. RGDP and PGNI

averaged about 2.7146 per year (-3.46561 and 7.40964) and 2.292366 per year (-4.08511 and 8.97175), respectively, throughout the study period. Import weighted distance has average maximum and minimal values of -3.182048 and -17.7788, respectively.

5.2 Correlation Analysis

Correlation analysis can assist to prevent multicollinearity since there is no precise or linear connection among regressors. It is evidence of a linear link between the variables if the correlation values between the explanatory variables are 0.80 or higher. When this happens, I don't use both regressors in the same model. We can see from table (5.2) that none of the regressors are linearly dependent or represented by another regressor. Variance inflation factors (VIF) are used to corroborate this, as this appears to be the standard method for detecting multicollinearity. Because none of the variables are larger than 5 and/or 10, the VIF result also indicates that multicollinearity is not present in the model. As a result, we can confidently state that our model passes the multicollinearity test.

Table 5.2 Pair-wise Correlation (r)Multicollinearity test

Variable	logRBT	logBRER	LogRGDP	logPGNI	logMWD	Variable	VIF	1/VIF
logRBTB	1.0000					log_RGDP	2.34	0.42679
logBRER	-0.0272	1.0000				log_MED	2.20	0.45356
logRGDP	-0.3571	0.2605	1.0000			log_PGNI	1.10	0.91064
logPGNI	0.0220	0.0977	0.2612	1.0000		log_BRER	1.08	0.92172
logMWD	-0.4727	0.2529	0.7295	0.0957	1.0000	Mean VIF	1.68	

5.3 Unit Root and Cross-sectional Dependence in Panels

The panel unit root validation for Ethiopian bilateral trade from 1992 to 2020 is discussed in this section. It provides information on each variable's degree of integration. Each variable must be I(0) or I(1), or a mix of I(0) and I(1), to fulfill the limits test assumption of the ARDL models (1). Under no circumstances should it be I(2). The empirical findings provided in this section are starts with conducting a variety of panel unit tests to ensure that variables were steady. The panel unit root results of the Im-Pesaran-Shin unit-root test (IPS), Fisher-type unit-root test based on augmented Dickey-Fuller test (FADF), and second generation unit root tests of Pesaran Panel

Unit Root Test with cross-sectional and first difference mean (CIPS) and Cross-sectional average in first period extracted and extreme t-values are included in Table 5.3.

The IPS test is asymptotic, while the Fisher test is exact. While the IPS test allows for heterogeneity, the second-generation CIPS unit root test relaxes the assumption of contemporaneous correlation cross-sectional independence. Both tests use the null hypothesis of non-stationarity. As a result, we use the CIPS and CADF tests to examine the residual characteristics and see if there is any cross-sectional dependency. The table above shows the study's variables, with the top row displaying distinct panel root tests. The test results are presented at both the level and the first difference for each variable. Overall, the findings imply that all variables are stationary at the 1% level of significance, although some variables are stationary at the first difference, i.e. I(1), while others are stationary at level I(0).

Table 5.3 unit root test and test for cross-sectional dependency

Variable	IPS		FADF		CIPS		CADF	
	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
log_RBTB	-3.72* (0.005)	....	119.67* (0.00)	....	-2.65* (0.00)	....	-2.61* (0.00)	....
log_BRER	-4.01* (0.00)	....	154.00* (0.00)	....	-3.01* (0.00)	....	-2.48* (0.00)	....
log_RGDP	-1.40 (0.08)	-11.81* (0.00)	73.88 (0.06)	295.60* (0.00)	-1.78 (0.061)	-4.60* (0.00)	-2.04 (0.06)	-3.41* (0.00)
log_PGNI	4.45 (1.00)	-5.02* (0.00)	18.34 (1.00)	130.75* (0.00)	-4.44* (0.00)	....	-3.06* (0.00)	....
log_MED	-4.23* (0.00)	....	123.82* (0.00)	....	-3.10* (0.00)	....	-2.58* (0.00)	....

*Note: - * and ** represents a 1% and 10% level of significance respectively. The values in parenthesis are the corresponding p-values.*

Table 5.3 shows that Log RGDP and log PGNI are variables that are stationary at first difference I(1), but log RBTB, log BRER, and log MWD are variables that are stable at level (integrated at level, I(0)), implying that the panel is stationary both at I(0) and I(1). Due to numerous benefits over alternative co-integration techniques, Pesaran, Shin, and Smith (2001) and Pesaran and Shin (1999) recommend using the ARDL or bound testing model for establishing a long-run connection, co-integration, among the variables.

This result is derived from the majority of panel unit root testing; therefore performing a model of panel ARDL estimation approach is recommended.

5.4 Panel Co-Integration Tests

Panel cointegration tests are used in this case, although they are optional based on the findings of preliminary non-stationarity testing. Pedroni (1999, 2004) proposed seven distinct panel cointegration tests to determine whether or not there is cointegration. There are two categories for the seven test statistics: i) between-dimension techniques that average the results of individual country test data (individual AR coefficient) and ii) within-dimension approaches that pool the statistics along the within-dimension (common AR coefficient). Both groups use nonparametric (rho and PP) and parametric (augmented Dickey–Fuller [ADF] and v) test statistics.

Table 5.4 Test for co-integration

	Test	Statistic	Prob.		Statistic	Prob.
	Panel v-Statistic	-2.0496**	0.0202			
	Panel rho-Statistic	-0.4033	0.3434	Group rho-Statistic	1.5029*	0.0664
Pedroni	Panel PP-Statistic	-6.1910***	0.0000	Group PP-Statistic	5.5053***	0.0000
	Panel ADF-Statistic	-6.0069***	0.0000	Group ADF-Statistic	5.5979***	0.0000
Kao	ADF-Statistic	-2.9657***	0.0015			

Note: -Test results generated from Stata 16. (***), (**) and * represents a 1%, 5% and 10% level of significance respectively.

Overall, the table shows that all tests (Pedroni and Kao) reject the null hypothesis of ‘no co-integration’ among the variables, implying that the log of real bilateral trade balance, bilateral real exchange rate, real GDP, per capita GNI, and import weighted distance have a long run association ship. Because all of the test statistics are distributed $N(0,1)$, statistical inference is simple. Except for the panel rho statistics, all of the tests are significant at the 10% level.

5.5 Optimal lag Selection

The Schwarz Bayesian Information Criterion is used to determine the lag lengths in the variables (SIC). The optimal lag was chosen for the model with the least BIC, according to the Schwarz Criterion the degree of fit (quantified in terms of the log-likelihood (BIC)). This statistic was

applied to the ARDL panel's unconstrained models. The ARDL technique calculates the best lag length for each variable by estimating $(p + 1)k$ regressions, where p is the maximum number of lags and k is the number of variables in the necessary equation. Using an information criteria and an unconstrained model, the decision on optimum lags for each partner nation per variable is made by selecting the most frequent lag for each variable across 28 countries to represent the lag for the model. The greatest number of lags for the dependent variable (log RBT) is one and the most common lags for independent variables is zero, as shown in the table (5.5), and we may describe the result as ARDL (1,0,0,0,0).

Table 5.5 Selection criteria for optimal (common) lag length

Country	BIC	lag(variables)	country	BIC	lag(variables)
Australia	-12.899098	ARDL(1,0,0,0,1)	Malaysia	-19.217924	ARDL(2,0,2,0,2)
Belgium	-13.548574	ARDL(1,0,0,0,1)	Netherlands	-21.598958	ARDL(1,2,1,0,0)
China	-29.515118	ARDL(1,0,0,1,0)	Pakistan	-17.504294	ARDL(1,2,2,0,2)
Djibouti	-28.539182	ARDL(1,0,1,1,2)	Russian Fed.	-17.680876	ARDL(1,1,0,1,1)
Egypt,	-26.551836	ARDL(1,0,0,0,0)	Rwanda	-36.602272	ARDL(1,0,1,1,0)
France	-1.887898	ARDL(1,1,0,0,1)	Saudi Arabia	-1.558650	ARDL(1,0,0,0,1)
Germany	-3.659140	ARDL(2,1,0,0,0)	South Africa	-13.291542	ARDL(1,2,1,1,0)
India	-10.488707	ARDL(2,0,2,0,1)	Sudan	-23.640273	ARDL(2,1,1,0,1)
Israel	-15.798955	ARDL(1,0,0,0,2)	Switzerland	-8.155815	ARDL(1,0,2,1,2)
Italy	5.590242	ARDL(1,0,0,0,1)	Turkey	-13.111564	ARDL(2,1,0,1,0)
Japan	-8.209296	ARDL(1,1,0,2,0)	UAE	-15.792939	ARDL(2,0,0,0,0)
Jordan	-19.892294	ARDL(1,0,1,0,1)	UK	8.958904	ARDL(1,1,0,0,0)
Kenya	-39.327286	ARDL(1,2,1,0,2)	USA	-2.837613	ARDL(1,0,0,1,2)
Korea, Rep.	-13.142906	ARDL(1,1,0,0,0)	Vietnam	-22.443160	ARDL(1,0,0,1,0)
Decision					ARDL(1,0,0,0,0)

5.6 Poolability of Panel Analytic Models

Constant coefficients (pooled regression) models, fixed effects models, and random effects models were the primary types of panel data analytic models I looked at. We could pool all of the data and run an ordinary least squares (OLS) regression model with an intercept and slope coefficients that are constant across firms and time if there is no significant cross sectional and temporal impact. However, if there is a substantial cross-sectional or temporal effect, we cannot assume a constant intercept across all partner nations and years; instead, one-way or two-way error component models must be considered, we have a fixed effects model if the mistakes are believed to be fixed. This model may be broken down into two primary assumptions and six sub-

assumptions: I heterogeneous intercept with a homogeneous slope; (ii) heterogeneous intercepts with a heterogeneous slope. 1) Slope coefficients are constant but intercept varies across companies (LSDV1), 2) Slope coefficients are constant but intercept varies over time (LSDV2), 3) Slope coefficients are constant but intercept varies across companies and time (LSDV3), 4) All coefficients (intercept and slope) vary across companies (LSDV4), 5) All coefficients (intercept and slope) vary over time (LSDV5), and 6) All coefficients (intercept and slope) vary over time (LSDV6).

Table 5.6 Poolability taste

Types of Panel Analytic Models			
The Constant Coefficients and Least Squares Dummy Variable(LSDV) models			
Pooled Regression Model(POLS)		LSDV1*	
$F(3, 808) = 82.01$	$Prob> F = 0.0000$	$F(31, 780) = 21.91$	$Prob> F = 0.0000$
$R\text{-squared} = 0.2334$	$t\text{-val} = 3.19^{***}$	$R\text{-squared} = 0.4665$	$t\text{-val} = 2.68^{***}$
Poolability(LSDV1 vs POLS)	$Wald\ chi2(4) = 45.65$	$compare\ r2$	
	$Prob> chi2 = 0.0000$	$R_p^2 < R_f^2$	
LSDV3*		LSDV2*	
$F(59, 752) = 13.31$	$Prob> F = 0.0000$	$F(32, 779) = 21.91$	$Prob> F = 0.0000$
$R\text{-squared} = 0.5109$		$R\text{-squared} = 0.2672$	$t\text{-val} = 2.68^{***}$
Poolability (LSDV3 vs POLS)		Poolability (LSDV2 vs POLS)	
$R_p^2 < R_f^2$		$R_p^2 < R_f^2$	$F(28, 779) = 1.09$
$F(55, 752) = 7.61$	$Prob> F = 0.0000$		$Prob> F = 0.0904$
$F(28, 752) = 2.49$	$Prob> F = 0.0000$		
$F(27, 752) = 13.87$	$Prob> F = 0.0000$		
LSDV4*		LSDV5*	
$F(166, 645) = 2771.55$	$Prob> F = 0.0000$	$F(172, 639) = 36.55$	$Prob> F = 0.0000$
$R\text{-squared} = 0.9986$		$R\text{-squared} = 0.9077$	

Note; (***), (**) and * represents a 1%, 5% and 10% level of significance respectively.

Table 5.6 discusses with least squares dummy variable (LSDV) regression, there was no difference in intercept and slopes when comparing the pooled OLS points. The F-test compares a fixed effect model to OLS (pooled), whereas the LM test compares a random effect model to OLS. Fixed and random effect models are compared using the Hausman specification test. These tests, on the other hand, do not give meaningful interpretations of fixed and random effects. The joint assumptions of the whole fixed effect model were rejected at least at a 10% significance level using the F-test, Wald chi2(4), and R-squared. By applying Breusch-Pagan and F-test on the pooled OLS data set and producing dummies (country and time).

Table 5.7 summarizes the results of the fixed effects (within-groups regression) and random effects model tests, revealing that the unreported marginal effect and random effects intercept are less than those of the fixed effect-within model; these intercept are statistically significant. Also, notice how low the R-squared is in comparison to the fixed effect-within model. The F statistic for overall model significance is not provided here since the random effect estimator has only asymptotic features; instead, we have the results of a Wald chi-square test that suggests that the model as a whole is (all the coefficients considered together are) significant. Based on fixed effects (Within-groups) result (*F test, u i=0: F(27, 781) = 12.11 and Prob> F = 0.0000*, Stata provides a poolability test at the bottom of the results. I can now proceed to my panel data analysis using the hausman test to choose the best estimate.

Table 5.7 poolability POLS, FE and RE Model

The Fixed Effects (Within-groups) Model	Random Effects
<i>F test that all u_i=0: F(27, 781) = 12.11</i>	<i>Wald chi2(4) = 175.07</i>
<i>Prob> F = 0.0000</i>	<i>Prob> chi2 = 0.0000</i>
<i>R-squared = 0.1755</i>	<i>R-squared = 0.1727</i>

5.7 Determination of the Best Estimator

There are numerous panel data methods that may be utilized in my setting, but I need to use one that can handle non-stationary heterogeneous dynamic panels because my data collection comprises lengthy time series observations ($T > 25$) and big cross-sectional units ($N > 25$). The panel ARDL technique may be used to account for long-run and short-run connections, as previously mentioned. This section covers three methods: PMG, MG, and DFE. The estimation results of these approaches are shown in Table 5.8.

Only MG finds in the short run that bilateral real depreciation of the exchange rate has a negative impact on trade balance in the model. The impact of relative GDP on the bilateral trade balance is statistically insignificant. However, although having a negative sign as predicted, relative per capita GNI and import weighted distance are mostly significant in DFE and PMG, with the exception of the import weighted distance proxy variable in the MG estimator. Only the PMG approach finds a substantial and positive long-run association of bilateral real depreciation of the exchange rate in the estimation. The other two estimators also indicate a small but substantial

positive indication. In the long term, relative GDP, real per capita GNI, and import weighted distance are all positive and very significant, but relative GDP is positive and strongly significant on DFE and PMG, while real per capita GNI is significant but negative on MG and PMG. The three estimators reveal a highly substantial negative impact of import weighted distance on bilateral trade balance in the long term.

The error correction term in the ECM has a large negative sign, implying that this model converges to a long-run relationship. Among all of the error correction findings, MG from the short-run model has the greatest speed of adjustment of 67 percent (0.670), suggesting a correction of 67 percent for the estimation mismatch. As a result, Pesaran et al. (1999) use and recommend a Hausman (1978) type analysis to see if the difference between the aggregate MG, PMG, and DFE estimations is statistically significant. I anticipate the PMG estimator to be the optimal technique, and the Hausman(1978) test to be conducted here, based on the discussion in table 5.8 and general theory

Table 5.8 Panel ARDL Estimation Results

Variable (in log)		MG (A)	MG (B)	DFE (A)	DFE (B)	PMG (A)	PMG (B)
Short-run ECT			-0.670*** (0.0553)		-0.246*** (0.0175)		-0.401*** (0.0453)
	BRER		-0.109*** (0.0333)		-0.00599 (0.0225)		-0.0488* (0.0265)
	RGDP		0.118 (0.488)		0.450* (0.239)		0.172 (0.297)
	PGNI		-0.235 (0.510)		-1.044*** (0.234)		-1.061*** (0.391)
	MWD		-0.189* (0.110)		-0.562*** (0.0387)		-0.448*** (0.0652)
Long-run	BRER	0.163* (0.0884)		0.0652 (0.0641)		0.0480** (0.0208)	
	RGDP	0.769 (0.554)		1.330*** (0.458)		1.763*** (0.259)	
	PGNI	-0.724** (0.283)		-0.397 (0.242)		-0.731*** (0.175)	
	MWD	-0.884*** (0.150)		-0.815*** (0.119)		-0.871*** (0.0525)	
Constant			-3.313*** (1.152)		-1.648*** (0.264)		-2.660*** (0.417)
Observations		784	784	.	.	784	784

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Test the null hypothesis of homogeneity through a hausman-type test, based on the comparison between mean group (MG) and the pooled mean group (PMG) estimators. Study estimates the

model using MG followed by PMG – in this case the null hypothesis of Hausman test states that MG and PMG estimates are not significantly different. PMG is the best estimator. The decision criterion is reject the null hypothesis if probability value is less than 5% (prob-value<0.05). The test cannot reject the null hypothesis of slope homogeneity (prob-value>0.05 = 0.5128). Thus the model supports PMG estimate as most efficient (look table 5.09)

Table 5.9 Hausman test over MG and PMG

Variable	---- Coefficients ----		(b-B)	sqrt(diag(V _b -V _B))
	MG(b)	PMG(B)	Difference	S.E.
<i>log_BRER</i>	0.1625329	0.0480342	0.1144986	0.1349853
<i>log_RGDP</i>	0.7686565	1.762613	-0.9939567	0.8152221
<i>log_PGNI</i>	-0.7239656	-0.7312444	0.0072787	0.40009
<i>log_MWD</i>	-0.8844313	-0.8709771	-0.0134541	0.2249985

Test: Ho: difference in coefficients not systematic
 $\chi^2(4) = (b-B)'[(V_b-V_B)^{-1}](b-B)$
 $= 3.28$
 Prob> $\chi^2 = 0.5128$

Once the most efficient estimator from MG and PMG was decided, it is necessary to further investigate the best estimator from MG and DFE. This process takes the MG regression estimates first and DFE second with null hypothesis of DFE is more efficient. The decision criterion is reject the null hypothesis if probability value is less than 5% (prob-value<0.05). Based on the Hausman test, the null hypothesis cannot be rejected (prob-value>0.05 = 0.9561) hence DFE is the most efficient estimator (look Table 5.10).

Table 5.10 Hausman test over MG and DFE

Variable	---- Coefficients ----		(b-B)	sqrt(diag(V _b -V _B))
	MG(b)	DFE(B)	Difference	S.E.
<i>log_BRER</i>	0.1625329	0.0651758	0.0973571	0.2650286
<i>log_RGDP</i>	0.7686565	1.330079	-0.5614226	1.645198
<i>log_PGNI</i>	-0.7239656	-0.39653	-0.3274357	0.8375451
<i>log_MWD</i>	-0.8844313	-0.8152224	-0.0692088	0.445681

Test: Ho: difference in coeff. not systematic
 $\chi^2(4) = (b-B)'[(V_b-V_B)^{-1}](b-B)$
 $= 0.66$
 Prob> $\chi^2 = 0.9561$

Because the findings of the study were mixed, the next step is to compare the PMG and DFE estimators. PMG is the best estimator in this case, according to the null hypothesis. As a result, when the prob. Value (x^2) is larger than 0.05, the decision criteria is to accept the null hypothesis. I cannot reject the null hypothesis of PMG slope homogeneity, which is the best estimator, because the P-value is 0.9742. (Look table 5.11). The use of the Hausman test to

compare the estimates of MG, PMG, and DFE demonstrates that PMG is the most efficient estimator of my panel ARDL model.

Table 5.11 Hausmantest over DFE and PMG

Variable	---- Coefficients ----		(b-B)	sqrt(diag(V_b-V_B))
	DFE(b)	PMG(B)	Difference	S.E.
<i>log_BRER</i>	0.0651758	0.0480342	0.0171415	0.0244305
<i>log_RGDP</i>	1.330079	1.762613	-0.4325342	-
<i>log_PGNI</i>	-0.39653	-0.7312444	0.3347144	-
<i>log_MWD</i>	-0.8152224	-0.8709771	0.0557547	0.0280188

Test: Ho: difference in coeff. not systematic

$$\chi^2(4) = (b-B)'[(V_b-V_B)^{-1}](b-B)$$

$$= 0.49$$

$$\text{Prob}>\chi^2 = 0.9742$$

5.8 Dynamic Heterogeneous Panel ARDL Analysis

This study asserted the applicability of panel ARDL, as demonstrated by the panel unit root test and panel co-integration test. A panel ARDL-SBIC(1,0,0,0,0) model is created by selecting the lag-length that happens most frequently for each variable among bilateral trading pairings. As previously indicated, I believe the PMG estimator to be the most effective method. PMG allows for different reactions across nations in the short run while restricting non-heterogeneity in the long run. The PMG has the benefit of being less sensitive to the presence of outliers (Pesaran et al. 1999). Furthermore, the problem of serial autocorrelation may be addressed at the same time. The advantage of employing panel ARDL with suitable delays is that endogeneity (Pesaran and Smith, 1999) is reduced, which has been a concern in recent bilateral real exchange rate studies.

5.8.1 The long-run Symmetric Panel ARDL Model Estimates

Panel A's long-run PMG estimates (see table 5.12) show that the BRER's long-run coefficient is positive and statistically significant at the 5% level of significance ($P = 0.021$), implying that if the birr depreciates by 1% in real terms against the currencies of the 28 trading partners, the trade balance improves by 0.048 percent. As a result of the symmetry, a 1% increase in the value of the dollar improves the trade balance by 0.048 percent. This demonstrates that the Marshall-Lerner criterion has been met. These conclusions are likewise consistent with economic theory, and they accord with Asmamaw (2008) and, more recently, Fassil (2017), who both investigate

the Marshall-Lerner condition in the Ethiopian situation. My findings concur with those of Mohsen Bahmani-Oskooee (2020), who claims that depreciations have a beneficial influence on trade balances in several SSA nations. These findings, however, challenge those of Haile (1994) and Geda (2017), who claim that depreciations will worsen Ethiopia's trade balance in the long term.

The long-term trade balance of Ethiopia is considerably improved by the rise in the real GDPs of trading partners (RGDP). This conclusion, which differs from expectations, is positively signed on linear PMG calculations, suggesting that a 1% increase in trading partners' productive capabilities compared to Ethiopia improves the trade balance by 1.763 percent (at 1 percent significance level). That may be because of trade partners that acquire more advanced manufacturing skills, which may enable them to become self-sufficient, boost their need for primary products from emerging countries. It implies that when partners' production and exporting ability grows, so do Ethiopia's exports. This generally leads to higher imports from Ethiopia, and therefore a demand for Ethiopia's major unprocessed exports, notably agriculture acting as input for partners, swelling the country's exports or favorably altering Ethiopia's trade balance, which might be the source of this discovery.

The coefficients of the variable relative per capita GNI (RPGNI) are likewise highly significant ($P = 0.000$ at the 1% significance level) and negatively signed which is contrary to hypothesized sign. This finding implies that when a foreign economy (partner country) demands more of Ethiopia's domestic goods due to a higher relative per capita GNI, or in other words, when Ethiopia's exports structure has a high concentration of primary products with low income elasticities due to low value-addition, the coefficients of RPGNI will be negative. As a result, a 1% gain in per capita income among trading partners relative to Ethiopia improves the buying power of families, which reduces demand for Ethiopia's exports by 0.731 percent, resulting in a deterioration of the trade balance. In the case of Ethiopia, which dominated, finding of my study justifies the Linder hypothesis (which suggests that the demand structure in two countries will be similar due to similar per capita income) of Heckscher-Ohlin effect (suggests that trade patterns are a supply-side phenomenon and therefore, trading partners who have larger differences in relative factors of production will trade more).

The basic gravity model of import-weighted distance MWD as a proxy for transportation cost constitutes an impediment ('resistance') to trade, implying a substantial (at 1%, $P = 0.000$) negative value coefficient (-0.871). A 1% increase in transportation costs reduces Ethiopia's bilateral trade balance, represented as a ratio of export to import, by 0.84 percent, indicating that Ethiopia imports more from surrounding nations than it exports, resulting in a negative trade balance.

Table 5.12 Overall PMG estimation result

Panel ARDL-SBIC(1,0,0,0)			
Panel A. Long-Run Estimates		Panel B. Short-Run Estimates	
<i>logBRER</i>	0.0480**(0.0208)	<i>ECT_{t-1}</i>	-0.697*** (0.0692)
<i>logRGDP</i>	1.763*** (0.2591)	<i>ΔlogRBTB_{t-1}</i>	-0.401*** (0.0453)
<i>logRPGNI</i>	-0.731*** (0.1749)	<i>ΔlogBRER</i>	-0.0488* (0.0265)
<i>logMWD</i>	-0.871*** (0.0525)	<i>ΔlogRGDP</i>	0.172 (0.2974)
		<i>ΔlogRPGNI</i>	-1.061*** (0.3908)
		<i>ΔlogMWD</i>	-0.448*** (0.0652)
		<i>Constant</i>	-2.660*** (0.4165)

Standard errors in parentheses

**** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

5.8.2 Short run Panel linear-ARDL Model Estimates

As previously stated, the PMG estimator is the ideal method since it limits non-heterogeneity in the long run while allowing for different responses in the short run across nations. The existence of co-integration among the variables is reinforced by the substantial and negative coefficient of the Error Correction Term (ECT), which means that the pace of adjustment to shocks is fairly quick. In other words, the ECM reveals that the model converges to a long-run relationship. The coefficient is negatively signed (-0.697) and is between -1 and 0, indicating that about 0.697 percent of long-run equilibrium variations are adjusted during the fiscal year (annually).

The ARDL model's total short-run estimations are shown in panel B of Table 5.12. The BRER coefficient is negative (-0.0488) and statistically significant (significant at 10%, $P = 0.066$), implying that a real devaluation deteriorates the trade balance in the short-run. This finding indicates that in the long-run and short-run, the linear panel ARDL models suggest a general existence of the J-curve phenomenon after a simultaneous depreciation of Ethiopia's BRER with the 28 trading partners. The short-run panel ARDL results for each bilateral trading relationship

criterion should be satisfied by this long-run improvement; we establish that J-curve effects occur in seven bilateral trading partnerships. The short-run findings also show statistically insignificant but negatively-signed coefficients for bilateral trade with the 13 countries, while a paradoxical significant but positively-signed coefficient for bilateral trades with Djibouti, Switzerland, and Pakistan is seen in Panel A. of Table 5.13.

5.9 Asymmetric Panel ARDL Analysis

Despite the benefits of the ARDL method discussed above, it has significant flaws. It begins with the assumption of linearity and symmetrical correction. Linearity denotes proportional change, i.e., a 1% change in the endogenous variable will always result in an X% change in the exogenous variable. Meanwhile, symmetrical refers to a variable that increases and decreases at the same rate before and after reaching equilibrium. These two assumptions are very limiting and impractical, particularly for economic variables that have become increasingly unpredictable as a result of modern globalization, in which economies are increasingly intertwined. As a result, this work will loosen these two ARDL assumptions by using non-linear ARDL (NARDL), a more sophisticated approach developed by Shin et al (2014).

5.9.1 Test for Correlation and Multicollinierity

We can see from table 5.14as none of the regressors are linearly dependent or represented by another regressor. Variance inflation factors (VIF) are used to corroborate this, as this appears to be the standard method for detecting multicollinearity. Because none of the variables are larger than 5 and/or 10, the VIF result also indicates that multicollinearity is not present in the model. As a result, we can confidently state that our model passes the multicollinearity test.

Table 5.14 Test for correlation and multicollinierity

variable	logRTB	logRGDP	logPGNI	log_MWD	POS	NEG	variable	VIF	1/VIF
<i>log_RTB</i>	1.0000						<i>log_RGDP</i>	2.35	0.42479
<i>log_RGDP</i>	-0.3571	1.0000					<i>log_PGNI</i>	1.15	0.45625
<i>log_PGNI</i>	0.02200	0.26120	1.0000				<i>log_MWD</i>	2.19	0.81426
<i>log_MWD</i>	-0.47270	0.7295	0.0957	1.0000			<i>POS</i>	1.23	0.83584
<i>POS</i>	-0.0148	-0.0682	0.1325	-0.0252	1.0000		<i>NEG</i>	1.20	0.87212
<i>NEG</i>	0.0186	-0.0544	-0.0734	-0.0341	0.3845	1.0000	Mean VIF	1.62	

Note: -Test results generated from Stata 16.

5.9.2 Panel Co-integration Test

Table 5.16 shows that all tests (Pedroni and Kao) reject the null hypothesis of ‘no co-integration’ among the variables, implying that the log of real bilateral trade balance, asymmetric bilateral real exchange rate (*POS* and *NEG*), real GDP, per capita GNI, and import weighted distance (MWD) have a long run association ship.

Table 5.15 Pedroni and Kao test for panel data cointegration

Test		Statistic	Prob.	Statistic		Prob.
Pedroni	Panel v-Statistic	-4.7935***	0.0000			
	Panel rho-Statistic	1.63050	0.0515	Group rho-Statistic	3.5937***	0.0002
	Panel PP-Statistic	-4.2526***	0.0000	Group PP-Statistic	-3.883***	0.0010
	Panel ADF-Statistic	-4.263***	0.0000	Group ADF-Statistic	-3.2835***	0.0005
Kao	ADF-Statistic	-3.5539***	0.0002			
<i>Note: -Test results generated from Stata 16. (***), (**) and * represents a 1%, 5% and 10% level of significance respectively.</i>						

5.9.3 Test for Unit Root and Cross- Sectional Dependency

Each variable must be $I(0)$ or $I(1)$, or a mix of $I(0)$ and $I(1)$, to fulfill the limits test assumption of the ARDL models (3.23). Under no circumstances should it be $I(2)$. The empirical findings provided in this section are starts with conducting a variety of panel unit tests to ensure that variables were steady. The panel unit root results of the Im-Pesaran-Shin unit-root test (IPS), LLC tests. Fisher-type unit-root test based on augmented Dickey-Fuller test (FADF), and second generation unit root tests of Pesaran Panel Unit Root Test with cross-sectional and first difference mean (CIPS) and Cross-sectional average in first period extracted and extreme t-values are included in table 5.17.

Table 5.16 unit root test cross sections dependency

Variable	Unit root test			Cross- sectional dependency	
	IPS	FADF	LLC	CIPS	CADF
	I(0)	I(0)	I(0)	I(0)	I(0)
	Time trend not included			Cross- sectional dependence	
POS	-6.454 ***	1026.1***	-5.501***	-5.24***	-4.227***
NEG	-6.2473***	980.09***	-8.521***	-5.24***	-3.637***
	Time trend included			Critical value	
POS	-6.7739***	1010.4***	-7.502***	(-2.07*, -2.3***)	(-2.07*, -2.3***)
NEG	-6.5396***	978.9***	-8.327***	(-2.07*, -2.3***)	(-2.07*, -2.3**)

*Note: -Test results generated from Stata 16. (***) , (**) and * represents a 1%, 5% and 10% level of significance respectively.*

The null hypothesis in the unit root test described above is that all panels have a unit root. We reject this hypothesis based on the data of table 5.15. When I look at the p-values for the IPS, CADF, and LLC tests, I see that they are all significant. Because the p-value is less than 1%, at a 1% level of statistical significance, I may reject the null hypothesis. This indicates that under the test conditions, my panels have no unit roots.

5.9.1 Long run Non-linear Panel ARDL Model Estimates

The results of the nonlinear model's estimations of the positive and negative exchange rate decomposition are significant. Table 5.11 shows that a 1% depreciation of the BRER versus all 28 trading partners increases the trade balance by 0.0504 percent. In contrast, a 1% BRER appreciation does not affect the trade balance by the same extent as depreciation (-0.982 percent). This indicates that there are inequalities in the long-run consequences of exchange rate changes. The positive POS coefficient indicates the presence of a long-run J-curve effect over the research period.

Changes in Ethiopia's trading partners' relative GDP (RGDP) have a major impact on the trade balance, worsening it in the long run. The nonlinear PMG estimates reveal that a 1% increase in trading partners' productive capabilities relative to Ethiopia's deteriorates the trade balance negatively (-0.886 percent). This means that Ethiopia's trade balance deteriorates when the GDP of partner nations rises faster than Ethiopia's. It indicates that partners' production and exporting capability grows faster than Ethiopia's. This generally leads in greater export to Ethiopia or less

import from Ethiopia in bilateral trade, which has a negative impact on balance of trade of Ethiopia.

Table 5.17 Overall NARDL, PMG estimation rest

<i>Asymmetric Panel ARDL-SBIC(1,0,0,0,0)</i>			
<i>Long-Run Estimates</i>		<i>Short-Run Estimates</i>	
<i>POS</i>	0.0504(0.0208)	<i>ECT_{t-1}</i>	-0.661***(0.0693)
<i>NEG</i>	-0.982**(0.0455)	<i>ΔlogRBTB_{t-1}</i>	-0.382***(0.0491)
<i>logRGDP</i>	-0.886(0.153)	<i>ΔPOS</i>	-0.0825*(0.0496)
<i>logRPGNI</i>	0.408***(0.111)	<i>ΔNEG</i>	0.0428(0.0492)
<i>logMWD</i>	-1.010***(0.0471)	<i>ΔlogRGDP</i>	0.173(0.314)
		<i>ΔlogRPGNI</i>	-0.896** (0.3908)
		<i>ΔlogMWD</i>	-0.378***0.0997)
		<i>Constant</i>	-1.984***(0.308)

Standard errors in parentheses

**** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

The forecasted long-run coefficients of relative per capita GNI are positive (0.408) and very significant, as expected. Because per capita GNI is a factor of a country's absorption capacity, a greater relative per capita GNI (RPGNI) indicates a better absorption capacity. It is expected that the country would import more due to increased absorption capacity. Ethiopia's trading partners with greater RPGNI import more from Ethiopia. As a result, a 1% gain in per capita income among trading partners relative to Ethiopia improves the buying power of families, which increases demand for Ethiopia's exports by 0.0408 percent, resulting in an improvement of the trade balance.

A negative sign of the coefficients of import-weighted distance (MWD) were found as expected, just as it was in the linear ARDL analysis portion. The coefficient of MWD has a very significant negative value (-1.010), indicating that Ethiopia imports more from surrounding countries than it exports, resulting in a negative trade balance. This high elasticity of transport cost (-1.010) implies that Ethiopia's trade balance is very sensitive to transportation costs, as reflected by land-lockedness.

5.9.2 Short run Non-linear Panel ARDL Model Estimates

The findings in panel B of Table 5.18 show statistically significant negative coefficients(-0.0825) for the ΔPOS variable in Ethiopia's bilateral trade with Belgium, China, Djibouti, Egypt, France, Germany, Israel, Italy, Japan, Malaysia, Russian Federation, Rwanda, Saudi Arabia, south Africa

Sudan, Turkey, United Arab Emirates, United Kingdom, and the United States in the nonlinear model. For bilateral trade balances with the China, India, Turkey and South Africa, the magnitude of the coefficients is notably significant. This might be because these economies are the primary export destinations for Ethiopia's manufactured goods, and therefore a depreciation of the currency rate would lower export profits in the short term.

This finding, especially combined with the general positive coefficient of POS in Panel B of Table 3, reveals 20 bilateral J-curves. As a result, the nonlinear model clearly gives greater evidence of bilateral J-curve effects, which is consistent with Bahmani-Oskooee and Fariditavana's findings (2016). However, paradoxical signals emerge for bilateral trade with, the Kenya, Australia, Pakistan and Switzerland where the ΔPOS coefficient positively and considerably increases bilateral trade balances. This means that BRER depreciations benefit Ethiopia's ex-ports while discouraging imports in the short term. The causes for this result are outside the scope of this investigation. In the short term, BRER appreciations are shown to have a favorable effect on bilateral trade balances in China, India, Turkey and United States of America.

5.10 Post Estimation Specification Tests

To ensure the validity of our findings, we ran the analysis once, this time omitting the seven bilateral partnerships with the lowest bilateral trade shares. Rwanda, Australia, South Africa, Russian federations, Vietnam, Kenya, Korea republic were among the nations involved. In the appendices section table 5A shows that the results obtained using the nonlinear ARDL template have similar signs and significance to those obtained using table 5.11. However, the magnitudes are slightly different. As a result, regardless of the number of observations, our findings are consistent. I also choose a different lag-length, as Goswami and Junayed (2006) suggest. We estimate a nonlinear ARDL-AIC (1,1,1,0,0,0) using the Akaike Information Criteria (AIC) in this situation and find that the findings are still robust. The NEG and MWD variables are now statistically insignificant, which is the only variation from the results in Table 5.18.

CHAPTER SIX

Conclusion and Policy Implications

6.1 Concluding Remark

The main objective of this study is to look at the existence of J-Curve between Ethiopia and her major trading partners. By any standard, the empirical literature on J-Curve is extensive and only a small percentage has been examined, with the ones that offer new information to the ongoing inquiry getting the most attention. Exchange rates (the price of one currency in terms of another) play a crucial part in international financial stability in the modern period, as international finance is becoming more important in the global economy. Bilateral trade balances have sparked political (if not economic) interest in a number of nations across the world, with authorities viewing bilateral trade deficits as indication of unfair trading practices by their counterparts. As a result, this article investigated whether the J-curve implications of the exchange rate can be seen in Ethiopia's bilateral trade with 28 trading partners, as well as if asymmetric effects occur.

Based on methodological developments the literature part is divided into four parts: 'Before-and-after' approach, 'controls group' approach, 'macro-simulation' approach, and 'econometric' approach are the classifications. Apart from disclosing bilateral-specific heterogeneity in how trade balances with different trade partners respond to exchange rate changes, PMG estimation results using a linear ARDL structure reported evidence of the J-curve effect in seven bilateral trade relations, whereas the same estimation using a nonlinear ARDL framework acknowledged 20 cases. In the long run, there was asymmetry in the adjustment of trade balances to exchange rate changes, but it was only noticeable in 20 cases in the short run. Different signs and magnitudes of the depreciation and appreciation variables in the nonlinear ARDL framework demonstrated this imbalance. In both estimation techniques the J-curve effect is found in Belgium, France, Germany, Saudi Arabia, South Africa and Sudan.

Under the descriptive foreign trade analysis of this study from 1963/64- 2019/20 with the exception of a few years, Ethiopia has had persistent balance of payments problems. The trade imbalance that existed during the imperial years continued to expand following the revolution and the EPRDF Regime. The export sector's overall performance was poor from 1963/64 to

2019/20, as indicated by a decreasing export/GDP ratio and a diminishing proportion of exports in import finance. The findings of the trend analysis also reveal that Ethiopia's export growth rates have been extremely erratic. This overvaluation of domestic currency during imperial and socialist regime influenced its own impact on foreign trade relation and Marshall-Lerner criterion may not hold true in the short run for an import-dependent emerging nation like Ethiopia, which lacks the ability to produce local substitutes for numerous products and exports mostly non-processed primary agricultural exports this type of currency procedure worsens balance of payment in general and trade balance in particular manner. After the great devaluation in 1992 the trade imbalance continues due to large import volumes and a nearly constant level of export throughout time. The value of exports has been dropping since 1998, and from 1999 to 2002, the value of exports has been decreasing, whilst the value of imports has been increasing at a decreasing pace however after unstable ups and down between 2005/06 and 2015/16, substantial improvement in trade balance is found after 2015/16. Thus both the descriptive and empirical analysis of the study confirms as there a J curve phenomenon in the case of Ethiopia with major trading partners.

The long-run result from both linear and nonlinear heterogeneous panel ARDL of real GDP (RGDP) and relative per capita GNI (RPGNI) variables have ambiguous in signs. This is may be results from greater relative GDP (RGDP) indicates that country-*j* (partner country) produces more products than country-*i* (home country), and that country-*j* (partner country) has more ability to fulfill local demand as well as to export. This means that partner nation *j* will export more to country *i* and import less from it. On the other hand trading partners that acquire more advanced manufacturing skills, which may enable them to become self-sufficient, boost their need for primary products from emerging countries (like Ethiopia).It implies that when partners' production and exporting ability grows, so do Ethiopia's exports. This generally leads in higher imports from Ethiopia, and therefore a demand for Ethiopia's major unprocessed exports, notably agriculture acting as input for partners, swelling the country's exports or favorably altering Ethiopia's trade balance, which might be the source of this discovery. Relative per capita GNI findings of my study justifies the Linder hypothesis. In general, the descriptive analysis shows that, the Marshall-Lerner Condition holds only in the long term, according to the findings the elasticity, monetary, and absorption theories are likely to affect Ethiopia's trade balance.

A negative impact of import-weighted distance (MWD_{ij}) were found in both linear and non linear panel ARDL analysis as expected, the coefficient of MWD has a strongly significant and negative both in the short run and long-run findings, indicating that Ethiopia tends to imports more from surrounding countries than it exports, resulting in a negative trade balance. This high elasticity of transport cost (-1.010) implies that Ethiopia's trade balance is very sensitive to transportation costs, as an implication for geographical land-lockedness.

6.2 Policy Implications

Although there is evidence of a stable linkage, these findings suggest that exchange rate interventions can be used to target Ethiopia's trade balance in the long run. However, this must be done on a bilateral basis. The data also show that a devaluation strategy does not work right once, and that bilateral trade balances deteriorate at first before recovering after some time. The policy recommendation is that measures that foster productivity increases, export sector diversification, and the growth of import computing businesses are alternates to devaluation in the meantime. Furthermore, the government may need to be cautious about adopting devaluation (exchange rate policy) to improve the trade balance because it might exacerbate the problem in the short term.

Import dependent and primary agricultural export should have been substituted by process of industrialization and encourage import computing manufacturers, and later, after production is established, devaluation will be obvious. Finally, while attempts to stabilize the exchange rate are essential, maintaining a highly overvalued currency relative the currencies of trading partners inhibits exports, stimulates imports, and worsens the trade deficit. the parallel market, where birr buys less dollars, thus the effective price of birr is the parallel market rate, seeming that birr is till overvalued at official market. Findings highlight the significance of strong macroeconomic policies in Ethiopia in order to avoid currency misalignments that might lead to major currency crises. The necessity of adopting a more flexible approach to currency rate management, as well as more liberal and open policies regarding trade and financial flows, A shift to a more flexible exchange rate regime (from a fixed rate regime) may amplify the J-curve effect because domestic prices adapt more quickly to exchange rate fluctuations under a flexible exchange rate regime than in a fixed rate regime. If real variables react rapidly to price fluctuations, a policy move to a

freer exchange rate system, along with liberalization of the trade sector in particular and the economy in general, may reduce the J-curve phenomenon.

However, I should point out that my findings still have some aggregation bias, and that they may be enhanced by using commodity- or industry-level data, which this study was unable to obtain. Regardless of whether models based on aggregate data or models based on bilateral data are used, none of them can explain a country's exchange rate sensitivity of comparative advantage goods until dis-aggregated data at the commodity level is included. The results of such a study would be more detailed, and they would aid in identifying which industries would gain most from exchange rate depreciation or devaluation.

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Appendix

Table A1: Ethiopia's bilateral trade performance between (1991/92-2019/20)

Country	Export Partner Share (%)	Import Partner Share (%)
Australia	0.54	0.22
Belgium	2.10	1.11
China	8.23	17.77
Djibouti	6.28	0.49
Egypt, Arab Rep.	0.88	1.11
France	2.18	2.02
Germany	10.76	3.79
India	1.86	6.77
Israel	3.27	0.39
Italy	5.69	6.45
Japan	6.12	6.21
Jordan	0.90	0.58
Kenya	0.75	0.77
Korea, Rep.	0.75	2.00
Malaysia	0.33	1.41
Netherlands	1.48	1.58
Pakistan	1.22	0.54
Russian Federation	0.27	0.71
Rwanda	0.05	0.00
Saudi Arabia	7.90	9.53
South Africa	0.61	0.84
Sudan	2.45	0.81
Switzerland	5.39	0.64
Turkey	1.73	2.67
United Arab Emirates	3.31	3.08
United Kingdom	2.74	2.68
United States	6.60	7.26
Vietnam	0.66	0.18

Source: World Integrated Trade Solution (WITS) database, National Bank of Ethiopia.

Table A2: NARDL (PMG) results for the short-run.

Trading Partners	<i>POS</i>	<i>NEG</i>
Australia	0.382***(0.139)	-0.131(0.857)
Belgium	-0.0141*(.118)	-0.0961(0.0681)
China	-0.697**(0.28)	0.526**(0.237)
Djibouti	-0.288(0.192)	0.223(0.229)
Egypt, Arab Rep.	-0.115(0.161)	0.136(0.176)
France	-0.0992(.0654)	0.0135(0.0561)
Germany	-0.106(0.101)	-0.0523(0.0868)
India	-0.174*(0.101)	0.224**(0.113)
Israel	-0.0241(0.111)	0.0516(0.167)
Italy	-0.0657(0.0556)	0.0468(0.0485)
Japan	-0.0261(0.0704)	-0.0091(0.0593)
Jordan	0.0612(0.175)	-0.113(0.154)
Kenya	0.721(0.502)	-0.863*(0.519)
Korea, Rep.	0.0865(0.104)	-0.113(0.117)
Malaysia	-0.336(0.246)	0.0863(0.288)
Netherlands	0.021(0.246)	-0.0984(0.2)
Pakistan	0.0141(0.153)	0.295**(0.142)
Russian Federation	-0.0341(0.161)	0.101(0.219)
Rwanda	-0.116(0.254)	0.0332(0.191)
Saudi Arabia	-0.0535(0.0669)	-0.00776(0.053)
South Africa	-0.291*(0.149)	0.229(0.176)
Sudan	-0.191(0.296)	-0.267(0.0453)
Switzerland	0.000427(0.0938)	0.164*(0.0977)
Turkey	-0.331*** (0.117)	0.614*** (0.235)
United Arab Emirates	-0.611(0.587)	-0.0923(0.302)
United Kingdom	-0.0156(0.0325)	0.0525(0.042)
United States	-0.00959(0.076)	0.130**(0.0637)
Vietnam	0.00197(0.166)	0.115(0.153)

Table A3: Hausman test results

. hausman mg pmg, sigmamore

	Coefficients		(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
	(b) mg	(B) pmg		
log_brer	.1625329	.0480342	.1144986	.1349853
log_rgdg	.7686565	1.762613	-.9939567	.8152221
log_pgng	-.7239656	-.7312444	.0072787	.40009
log_mwd	-.8844313	-.8709771	-.0134541	.2249985

b = consistent under Ho and Ha; obtained from xtpmg
 B = inconsistent under Ha, efficient under Ho; obtained from xtpmg

Test: Ho: difference in coefficients not systematic

chi2(4) = (b-B)'[(V_b-V_B)^(-1)](b-B)
 = 3.28
 Prob>chi2 = 0.5128

. hausman DFE pmg, sigmamore

	Coefficients		(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
	(b) DFE	(B) pmg		
log_brer	.0651758	.0480342	.0171415	.0244305
log_rgdg	1.330079	1.762613	-.4325342	.
log_pgng	-.39653	-.7312444	.3347144	.
log_mwd	-.8152224	-.8709771	.0557547	.0280188

b = consistent under Ho and Ha; obtained from xtpmg
 B = inconsistent under Ha, efficient under Ho; obtained from xtpmg

Test: Ho: difference in coefficients not systematic

chi2(4) = (b-B)'[(V_b-V_B)^(-1)](b-B)
 = 0.49
 Prob>chi2 = 0.9742
 (V_b-V_B is not positive definite)

Table A5: Nonlinear Panel ARDL Analysis

Pooled Mean Group Regression
(Estimate results saved as pmg)

Panel Variable (i): country1
Time Variable (t): year

Number of obs = 567
Number of groups = 21
Obs per group: min = 27
 avg = 27.0
 max = 27

Log Likelihood = -507.4182

D2.log_rtb	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
ECT						
dlog_brer_pos D1.	.0085442	.0360986	0.24	0.813	-.0622078	.0792962
dlog_brer_neg D1.	-.0175363	.0262693	-0.67	0.504	-.0690232	.0339505
log_rgdg	-.1610227	.104455	-1.54	0.123	-.3657507	.0437054
log_pgni	.1642596	.0699412	2.35	0.019	.0271774	.3013418
log_mwd	-.020819	.0406551	-0.51	0.609	-.1005015	.0588636
SR						
ECT	-1.046031	.0481536	-21.72	0.000	-1.14041	-.9516513
dlog_brer_pos D2.	-.076334	.035757	-2.13	0.033	-.1464165	-.0062516
dlog_brer_neg D2.	.0454788	.0326379	1.39	0.163	-.0184903	.109448
log_rgdg D1.	.6143884	.2900455	2.12	0.034	.0459098	1.182867
log_pgni D1.	-.150876	.297164	-0.51	0.612	-.7333067	.4315546
log_mwd D1.	-.9365696	.0941778	-9.94	0.000	-1.121155	-.7519845
_cons	.1118746	.0937475	1.19	0.233	-.0718671	.2956162