UNIVERSITY OF NAIROBI

SCHOOL OF ECONOMICS

EXCHANGE RATES AND THE VOLUME OF IMPORTS IN KENYA

BY

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DECLARATION

DECLARATION

The research effort is entirely my own work (original) and therefore it has not been submitted to another university or institution for review or a degree award.

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Supervisor

This project has been submitted for examination with my approval as the University Supervisor.

Signature: ..... Date: 09-12-2022

Dr. MARTINE OLECHE

DEDICATION

In honor for their perseverance, spiritual support, and prayers during my graduate studies, I dedicate this thesis to my family. I didn't squander the time I was away from you acquiring knowledge.

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I appreciate the following individuals whom combined efforts made it possible for this research to be completed: I want to initially and importantly share my sincere gratitude to God Almighty for giving me the blessings of good physical, mental, and financial health that allowed me to successfully complete my academic goals. Second, I'd want to thank my lecturers for helping me with my homework and, in particular, my supervisor, Dr. Martine Oleche, who helped me with the laborious effort of finishing my thesis. We greatly value their direction and advice. Last but not least, I would like to express my gratitude to my classmates and colleagues for their assistance and support during the study duration. I want to thank my hubby, for his steadfast support. To my daughters, father, mother and brothers thank you for your patience over the full study period. Godspeed, everyone.

ABSTRACT

Finding out how Kenya's trade level and system from the perspective interact was the study's main goal. The investigation particularly examined the connection test of exchange rate and import volume in Kenya so that to examine the effects of intervening variables including domestic income, terms of trade, and pricing, as well as to offer policy concerns for those variables. The secondary data collected for the study spans the years 1980 through 2020. The UN published directory, IFS, KNBS, global development indicators and the IMF which provided the data for the study. The study used time series analysis (KNBS). The investigation results demonstrated that the exchange rate affected Kenya's import volume. As the value of Kenyan shillings comparative to the US dollar rises, so does the volume of imports. The ability of local businesses to purchase items from other nations is implied by a growth in the value of the shilling. In contrast, a decline in the worth of the shilling results in a decrease in the volume of imports as local businesses lose their ability to finance the importation of goods into the nation. According to the study, terms of trade and GDP had an impact on the connection between Kenya's import volume and the exchange rate. When the terms of trade are advantageous, imports increase. Conversely, when the conditions of trade worsen, export quantities decline and the value of Kenyan Shillings falls. A rising GDP indicates a strong Kenyan shilling in relation to the US dollar, which causes imports to rise. As a result, while creating decisions and policies, it is important to take into account both the GDP and terms of trade give the link between the exchange rate and the volume of imports. Kenya was therefore recommended to decrease its imports while raising its exports by depreciating its currency. Due to the deflation of the domestic currency and the increasing competitiveness of Kenyan goods on international markets, the amount of imports would decline. Export growth will support the development of the nation's economy. Therefore, in order to raise inflation in the country, the rate of currency devaluation should be maintained. The research also recommended that Kenya's government bargain for improved terms of trade for our agricultural products with both present and potential new markets. The Kenyan government has to reopen markets for our items like khat and increase exports of goods with value addition. The increase in Kenya's exchange rate should be adopted as a instrument to improve trade agreements and, as a result, promote exports.

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LIST OF ABBREVIATIONS

ADF	Augmented Dickey Fuller
AIC	Akaike Information Criterion
ANOVA	Analysis Of Variance
ARDL	Autoregressive Distributed Lag
BOP	Balance of Payments
CIRP	Covered Interest Rate Parity
ER	Exchange Rate
FDI	Foreign Direct Investment
GARCH	Generalized Authoregressive Condition Heteroskedaticity
GDP	Gross Domestic Product
IFS	International Foundation For Science
IMF	International Monetary Fund
KNBS	Kenya National of Bureau of Statistics
KSH	Kenyan Shillings
LR	Likelihood Ratio
OLS	Ordinary Least Square
PPP	Purchasing Power Parity
QTM	Quantity Theory of Money
RER	Real Exchange Rate
RER	Real Exchange Rate
RESET	Regression Equation Specification Error Test
SDR	Special Drawing Rights
SIC	Schwarz information criterion
SMEs	Small and Medium Enterprises
SPSS	Statistical Package for Social Sciences
TOT	Terms Of Trade
UCIRP	Uncovered Interest Rate Parity
UN	United Nations
US	United States
USD	United States Dollar

CHAPTER ONE : INTRODUCTION

1.1 Research background

Kenya has been experiencing fluctuation on both exchange rate and inflation over decades; this has led to implementation of several regimes and policies to curb the fluctuations in the country's economy. Exchange rate in Kenya has had a deviation of 3% monthly between the major currencies in the world (Otiato, 2018), recording the highest level at 105KSH/USD in October 2015 while inflation rate in the country has never been stable due to the demand on the necessities, this is experience by the low record of 3.73% and a high end record of 18.31% during the period of under study. This beats the policy measures by Central Bank to control the inflation rate of 5% with a variation of 2.5% which aspires to makes the goods and services expensive and slow growth of the financial system.

Exchange rate play a very significant role globally. The disparities which exist in exchange rate frequently contain an impact in the global trade(Odera, 2015). Inflation and the exchange rate are usually correlated positively, hence decline in exchange rate that is devaluation of the home currency makes the prices to be high leading to imported inflation in the country (Ochieng, Mukras, & Momanyi, 2016). Exchange rate deviations usually dominate monthly thus the Kenyan government has been coming up with measures of containing the level of inflation. The fluctuations of the monetary elements and the worth of a certain currency impacts inflation. The global currency is basically traded in the majority parts of the world as the majority bank reserves are contained in USD thereby making the dollar international currency (Odera,2015). Thus, the strength of a nation's exchange rate is a determining factor of cost of imports and import duties on the major imported goods (Ceglowski, 2010). The Kenyan currency has declined against the US

dollar and also compared to its key trading countries. The currency decline has resulted to the increment of prices of importing most of processed agricultural goods alongside import duties.

In international economies, exchange rate and inflation have a relationship. An alteration in exchange rate will alter the prices of commodities, which will impact inflation. (Ochieng, Mukras, & Momanyi, 2016). Further when the shilling becomes stronger then the expectation is that the inflation rate will decline. The Kenya's government has been continuously putting policies on effect to suite the theory but this has not been the case, for example in January 2012 exchange rate was at 83Ksh/USD while the inflation rate was recorded at 13.31% as a consequence of increment in prices of the necessities including food and fuel. On the other hand, in September 2015, the shilling was exchanged at 105Ksh/Usd whereas inflation was recorded at 5.84% in the same month. This signify that exchange rate can affect inflation on indirect channel whereby the manufacturers will be required to adjust their prices due to the pressure which result from the imported products (Mussa,1979).

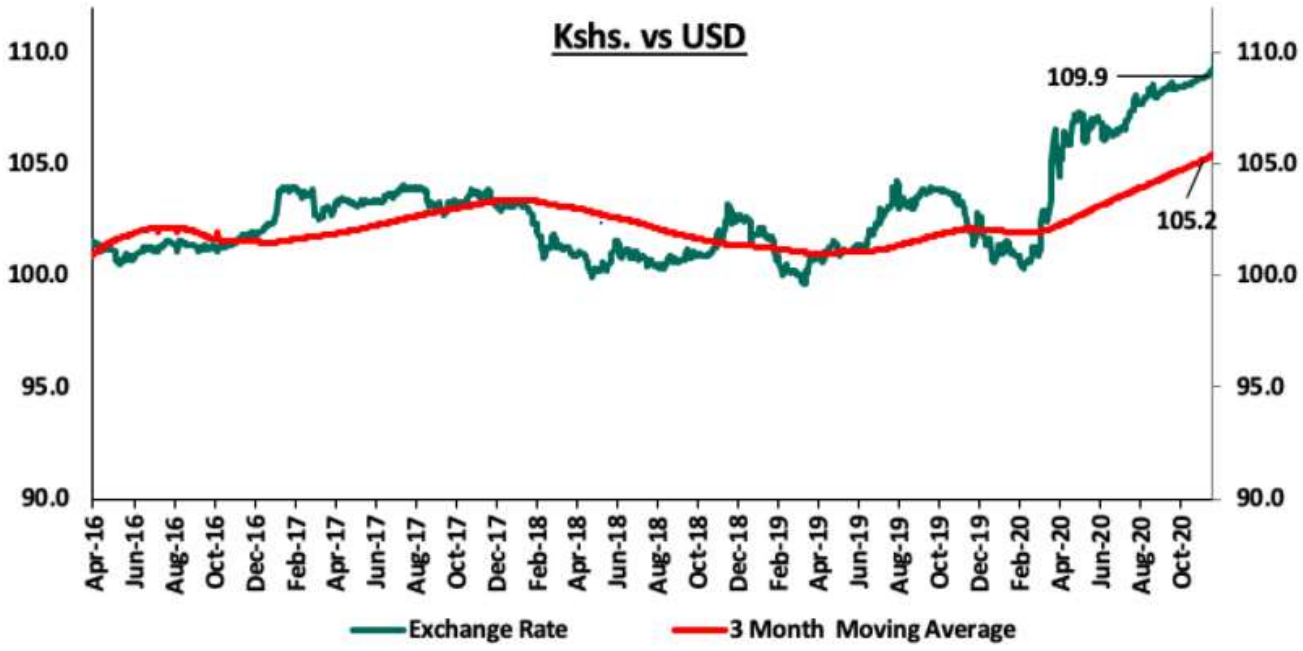
The volume of exports and imports, as well as the position of a nation's balance of payments, are all influenced by exchange rates. Currency exchange turbulence is another name for the term exchange rate when there is a long-term departure from equilibrium. In contrast to depreciation, which results in lower imports and higher export volumes, appreciation of exchange rates results in higher import volumes and lower export volumes. Exchange rates will likely decline as consumers switch from imported to domestically produced goods. Jarita's (2008) examined exchange rate shocks and export and volume connections in Malaysia and established that the exchange rate shocks influenced price fluctuations of imports.

Kenya has been undergoing different regimes with regard to exchange rates because of the various reasons, for example the balance of payments(BOP) crises. Exchange play a significant role in attaining economic goals for example trade balance and inflation (Odera, 2015). The level of the nation's exchange rate has been impacted by the intended policies and established goals. For instance, when effective BOP is achieved, the impact of imported goods is felt. The presence of imported inflation is caused by the variation in the currency rate, which raises transaction costs and reduces the advantages of global trade. Mwega (2012) claims that the use of exchange rates can be used to reduce inflation and increase the global competitiveness of local products. In the same vein, Muchiri (2017) noted that the exchange rate and inflation have a strong association to one another over the long term. However, because of the inconsistent fiscal and monetary policies in place in the country, this inquiry sought to examine on how exchange rate affected the volume of imports into Kenya.

1.1.1 General performance of exchange rate in Kenya

From Kenya's independence in the year 1963, there have been exchange rate modifications characterized by various economic events. From the year 1963 to the year of 1974, exchange rate was attached to the American dollar which later declined gradually after chains of depreciations, then it was completely liberalized in 1993. The present exchange rate regime is free-floating in nature and its affected by forces of demand and supply in the business market. Nonetheless, the Kenyan Central Bank regularly take part in foreign exchange market in times it require to curb volatility initiating from the external shocks, effect of government payments stocks of foreign reserves and control the liquidity in the business market.

The International Monetary Fund (IMF) suggested that Kenya's exchange rate was overvalued by 17.5% in a country review report published in 2018. This was partially attributed to the CBK's involvement in irregular foreign exchange operations, which mimicked the limited movement of Kenya's shillings in reference to the US dollar. The exchange rates in Kenya's shillings compared to American dollar was Kshs 101.4 at the start of the year 2020, however due to the overall effects of COVID-19 crisis affecting the economy globally, the Kenyan shilling has since fallen by a margin of 8.4% to settle at Kshs 109.9 on November 27, 2020 as illustrated in figure 1 below:



1.1.2 Importance of exchange rates to a country

Most of the world assets are owned and traded by non-residents. This is done through trade in the financial markets where the exchange rate plays a crucial role. Foreign exchange market forms an essential part of the financial system making it important for financial stability. Understanding

exchange rates requires an understanding of the different exchange rate systems. Kenya embrace a malleable exchange rate policy where the marketplace forces and economic basics contain critical roles to play in defining the movements of exchange rates where both sound monetary and fiscal policies are projected to back a steady exchange rate. In 1960s and 70s, Kenya operated within the regime of pegged currencies (Musyoki et al, 2012). This was of importance because it gave various businesses and government a definite sense of strength and stability lowering the uncertainty levels in matters of cost and budgeting of exports and imports. Over time such pegs were improved or currencies were permitted to head in the direction of a manageable float since the market forces were providing an altered value from the currency than the pegged rate.

The balance of payments theory states that market forces in foreign business market determine a country's exchange rate. Prices for foreign currencies will rise if there is less demand than there is supply. However, when the BOP is positive, the exchange rate will increase above the respective equilibrium rate, which will result in a decrease in exports. To support market-based, liberalized order, flexible exchange rate provides continuous advantage for continuous response in price adjustments. It also acts as an absorbing shock by using price changes to facilitate changes in the market. In achieving economic efficiency, monetary policy aimed at price stability should be pursued alongside exchange rate policy.

For example, David Dodge, Governor to Financial Market Association, 2001-2008, cited why Canada decided to break with the Bretton Woods system in 1950. He noted that in late 1940s, Canada experienced a large inflow of foreign capital and post-war investments. This was due to revaluation of its dollar which influenced heavy capital flows into the country amid speculation. This raised concern on inflation and worries on capital inflow which they believed might lead to

increased foreign debt. This meant a shift in policy to focus on exchange rate stability than stabilizing domestic prices (Bank of Canada Review, Winter 2005-2006).

In protecting domestic purchasing power of a nation's currency, managing inflation through monetary policy is used. This promotes strong and sustainable economic growth in the economy but a floating currency helps the economy deal with economic shocks. Over the years, many economists have raised concern over the profitability of devaluing exchange rates. During recession and periods when the economy is stuck and uncompetitive, a falling exchange rate is beneficial. Devaluation increases demand for exports which in turn creates employment. On the other hand it can lead to inflation and reduced standard of living as imports become expensive (Dornbusch, 1973). Appreciation of exchange rate becomes beneficial when the economy becomes more productive but if the appreciation is due to speculation, then it becomes harmful to exporters since exports will be un-competitive in the world market. Exports and imports are determined by exchange rate. Appreciation of domestic currency relatively makes imports cheaper in the domestic market and domestic enterprises find it difficult to compete with their counterparts. On the other hand a strong currency makes goods un attractive to foreign investors, thus loss of competitiveness.

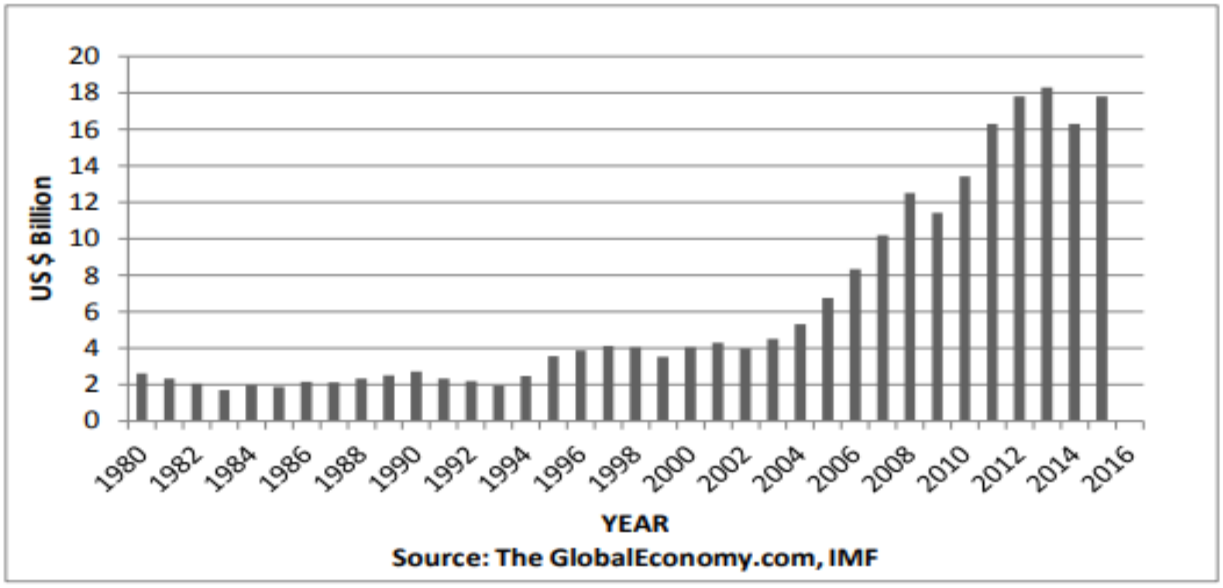
Maintaining fixed exchange rate conflicts with other macroeconomic objectives making the government to intervene particularly when the currency is falling below its band thus prompting the government to increase interest rates so as to increase the worth of the currency. An increase in interest rate increases hot money inflows and increases inflationary pressures. However, high interest rates may cause slower economic growth which might end up in recession and rising unemployment.

1.1.3 Import and export trends in Kenya

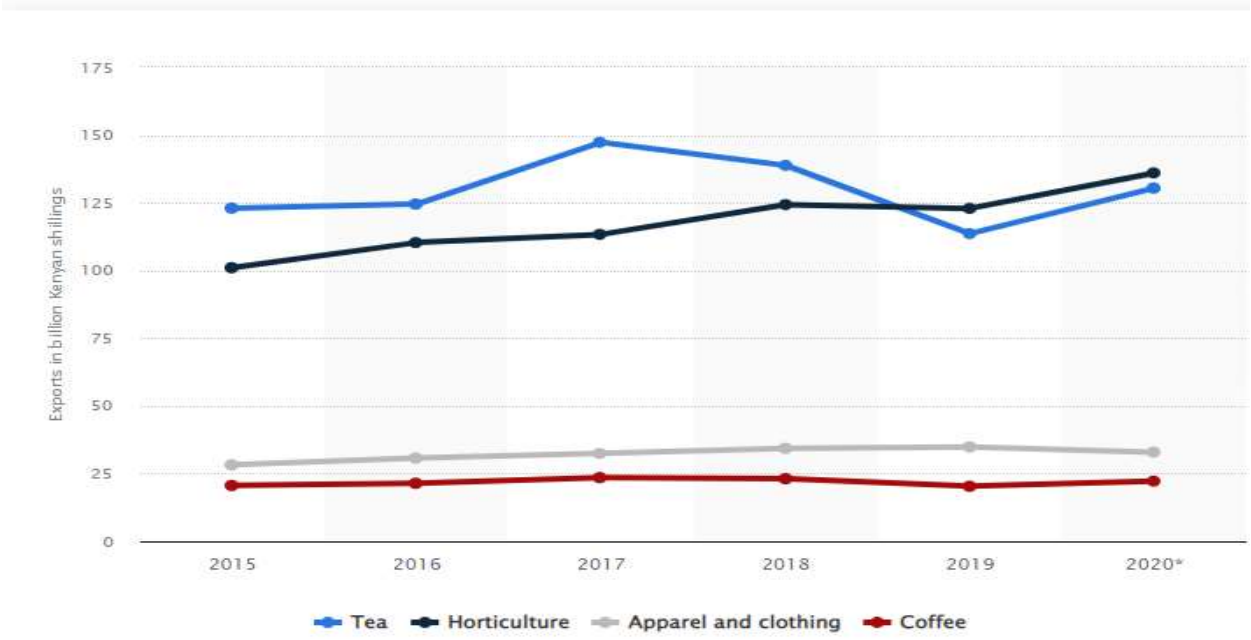
Imbalance in trade result to macroeconomic volatility in any country. Kenya has continuously documented negative balance of payment in the last 50 years except in year 1964 and 1977 when it documented a surplus of US$ 5.7m and US$ 18.1m respectively. In the year 1963, Kenya recorded a deficit in trade US$ 8.1m which increased to US$ 5649m, US$ 6303m, in 2008 and 2010 respectively reaching a peak of US$ 1019m in May of 2012. However in 2013 February, the country reported a deficit of US$ 808.5 m from US$ 682.9m documented the previous year, this was because imports rose faster than exports. However in 2015, the balance of trade improved from a deficit of US$ 1,081m recorded in 2014 to a deficit of US$ 997m. Total exports grew faster than total imports, as a result, increasing the total volume of trade marginally from US$ 2156m in 2014 to US$ 2158m in 2015 (Economic Survey, 2016).

Import value increased because of the increment in petroleum prices; oil lubricants, farm inputs, food prices, among others. The huge deficit resulted from the was faster growth on imports and low exports growth in the economy. Main exports are agricultural products which are constantly affected by volatility of international prices.

Figure 1.2 summarize Kenya's imports and exports trend over the study period.



Main exports from Kenya between 2015 and 2020*(in billion Kenyan shillings)*

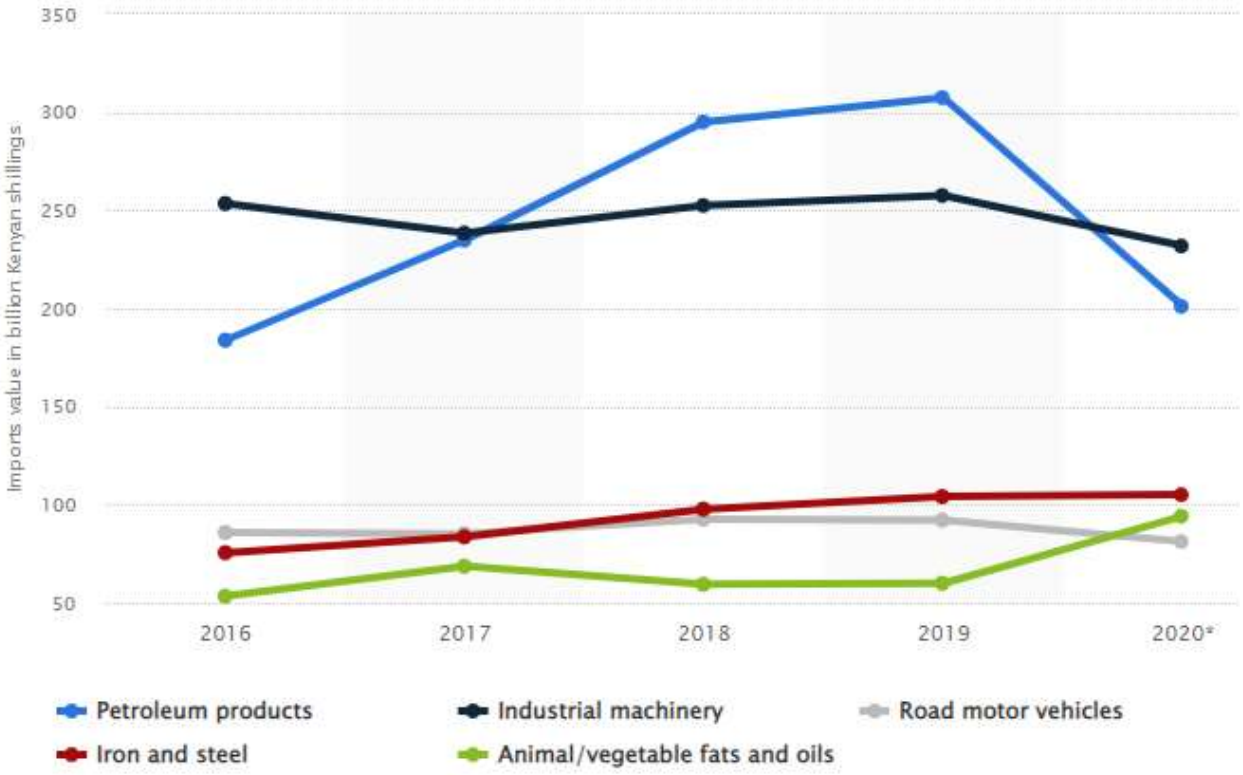


Statista 2022

In the year 2020, Kenya's exports of tea and horticulture products increased tremendously compared to the previous year. The major exported products from Kenya to other nations is for

example tea which contain of 130.4 billion Kenyan Shillings which is equal to USD1.18 billion and horticulture produces which generate about Kshs.136 billion which is estimated at USD 1.24 billion.

The Kenyan main imports from 2016 to 2020*(in billion Kenyan shillings)*



Petroleum products and industrial machinery contain the major imported goods into the country as indicated in the year 2020. Each totaling to about kshs. 231.9 billion which is estimated to be 2.1 billion U.S. dollars and kshs. 201.1 which is estimated to be USD 1.8 billion respectively. The charge of imports declined as compared to the preceding year.

1.2 Problem statement

A steady and viable macroeconomic environment generates confidence for the investors and inspire the investment in an financial system. Progressively with time, several nations globally have been trailing on policies that will permit them participate in the new age of globalization in order to attain the benefits connected with such advancements in the innovative world. Therefore, a decent exchange rate policy foster exports of a country and afford with an opportunity of import-competing and export-oriented businesses incentives (Kemal & Usman, 2005). The adoption of an equitable exchange rate in Kenya has been a topic of discussion to establish the impact of fluctuations of exchange rate on the amount of exported and imported goods. In the period of the fixed exchange rate systems that is 1966 to 1982, Kenya like other various developing countries globally devalued their currency progressively so that to curtail the adverse effects caused by real exchange rate (RER) posed in the economy (Musyoki et al. 2012). Between 1982 and 1993, the nation had a crawling peg regime. However, in the year of 1993, Kenya espoused the market determined exchange rate regime. Since then, volatilities of exchange rate have characterized the Kenyan financial market (Kiptoo, 2007).

The Kenya government, through the Economic Recovery Strategy and Wealth Creation, committed itself to improving economic performance, creating employment and fighting corruption so as to jumpstart the economy from stagnation. This played a great role in the stability and economic recovery during 2003-2007 and ushered in Kenya's new development agenda, Vision 2030. To realize economic growth and development, the Kenya Vision 2030 places high premium on steady macroeconomic environment for renewed growth. This is envisaged in a growth rate target of 10% per annum as reflected in the economic pillar of the vision. Achieving this growth rate requires implementation of prudent fiscal, monetary and exchange rate policies.

According to the Kenya Economic Report (2011), Kenya exchange rate remained steady compared to the US dollar for the greater part of 2003-2007 with some tendency to appreciate. In 2010, exchange rate averaged Ksh. 81.0 per US $ while in 2011 it depreciation against major currencies hitting a record low of Ksh. 107.0per US $ in October 2011. In 2013, the country recorded an annual average of Ksh 86.12 per US$ which continued to depreciate in 2014 and 2015 recording an annual average of Ksh 87.92 and Ksh 98.18 per US$ respectively. Danga (2016) claim that the Kenyan exchange rate has been unsteady with rising in trend which has brought pervasive effects on wages, employment opportunities, prices, production levels and interest rates. The degree in which the Kenyan shilling was devalued against the American dollar in 2015, peaking at 106.035 on September 7 the greatest rate Kenya has ever seen since the independence is what spurred this investigation. Kenya experienced an overshooting exchange rate in 2011 that went from kshs. 83 to kshs. 100 in a period of six months to over kshs. 106 in September 2015. Therefore, it was against this foundation that the inquiry examined how exchange rates affected the volume of imports in Kenya.

1.3 Objectives of the Research

This investigation's primary objective was to ascertain how exchange rates impacted Kenya's import volume.

1.3.1 Specific Objectives

i. To test granger causality between exchange rate and volume of imports in Kenya
ii. To examine the influence of intervening variables domestic income, terms of trade, price
iii. To recommend policy considerations in exchange rates and volume of imports in Kenya

1.4 Importance of the Research

The study's findings may be important to both current and future investors because they will give them knowledge to help them reduce the risks associated with fluctuations in exchange rates. Outcomes of this research are also very beneficial to the conditions creators and informers because they will help them develop important regulations that will serve as a guide for the Central Bank of Kenya in producing documents detailing changes in foreign exchange rates. Additionally, this investigation will help the relevant legislators pass laws and regulations that are appropriate for safeguarding the economy, particularly those businesses that import or export goods. The study's findings will, in the end, be very helpful to both present and future researchers who are interested in this topic and plan to conduct additional research. This will provide a basis for further research and analysis regarding the connection between the volume of imports and the exchange rate, as well as how these two variables relate to one another.

1.5 Study's Purpose and Restrictions

The investigation will use secondary sources of information which will cover a period of forty(40) years that is from 1980-2020 which will entail time series data. The sources of data will be obtained from UN published directory, IFS, KNBS, world developments indicators, and the IMF. The major drawbacks is in regard to the data on Kenya’s economy due to its inconsistency. Various sources of data provide various data for the same variable. For harmony purposes, the investigation will use the international sources of data.

CHAPTER TWO: LITERATURE REVIEW

There has been a growing concern on the role of macroeconomic policies, to provide incentives to firms engaged in international trade. Nations globally, irrespective of their progress they are now trailing on strategies and policies that will permit them to participate in the era of globalization and Kenya as a country is included. Trading among countries is encouraged as a necessary catalyst for promoting economic growth and over decades now the policy informers have embraced foreign trade and exchange rates policies to effect trade flows.

2.1 Theoretical Literature

This section will discuss theories which already exist and have been applied by Simba (2015) and Otuori (2013). The segment will avail their tenets, implications, their preconditions, merits and demerits attached to them. Theories of exchange rate to be used in this section can be categorized into three types to include general equilibrium models, partial balance models and imbalance or a hybrid simulation. The balance models include the virtual PPP and the absolute PPP, which each separately reflect the commercial market for producing goods which reflect investments in the commercial business market, and the exterior balance model, which requires that the rate of exchange to only depend on BOP (Kanamori & Zhao, 2006).

2.1.1 Purchasing Power Parity (PPP)

Another term of PPP is the inflation theory which originated in 16th century in the country of Spain and 17th century in England nonetheless Cassel (1918) who is an economist from Sweden pioneered the name PPP theory. He described that any discussion made outside this theory in regard to over-or- undervaluation of a currency is irrelevant. Hence, PPP has to be recognized and applied accordingly. The absolute PPP theory was adopted first to tackle on the connection of

commodities with the worth of diverse currencies whereby its applications entail robust preconditions. Normally, this theory grasp the integrated and competitive produce with the implied notion of neutral risk realm where imports or exports can be traded without restrictions like export quotas, transportation costs and trade tariffs so on and so forth.

Conversely, it is not realistic in the real society to make assumptions that there is no costs required when it comes to transportation of commodities from one nation to another. Globally, every individual economy generates and consume a variety of products indicated with different prices and costs from one nation to another due to costs associated to tariffs, transport and other constraints of trade (Kanamori & Zhao, 2006). The situation of the goods market balance is typically observed as total PPP. According to the absolute PPP theory, the domestic and international trading markets are combined into a single market. It is evident that this theory of partial balance is not the universal one since it does not transact with the money trading business market or the balance of global payments. Absolute PPP may not discuss the real phenomenon and big persistent variations from the Absolute PPP have been noted because it involves several impractical preconditions.

2.1.2 Interest Rate Parity

The tax policy intelligence agents demonstrated that during the period of the standard, adjustments in financial regulation had an effect on exchange rates. Regularly, local currency appreciation follows an increase in home country interest rates, and local currency depreciation follows a rise in home country interest rates. This indicates that exchange rate disparities are significantly influenced by the relative prices of the assets. Keynes (1923) established the interest rate equality state, or what is now known as interest rate parity, to connect the rate of exchange of imports, inflation rate, and interest rate, in that order. The CIRP and UCIRP are two formations that are

included in this idea. The CIRP defines the relationship between the exchange rates on the commercial and forward business markets and the interest rates on bonds issued by the two countries.

2.1.2.1 Covered Interest Rate Parity

According to the conventional CIRP version, the local interest rate must be greater compared to the international interest rates by the amount equated to forward premium of the domestic currency. Regarding to CIRP, the interest rates in both countries must be the same so that the Sh to USD rates of exchange to be secure. As a result, small countries with fixed exchange rates are unable to create their own monetary and fiscal policy.

2.1.2.2 Uncovered Interest Rate Parity

Conversely, various stakeholder's express indecision in the prospective activities. In the sensible anticipation framework, the advancing exchange rate can be affected intensely with the business market opportunities in the forthcoming exchange rate if the current information is considered. In the unstable business environment, un-hedged interest rate equality state might hold. Limited investigations back the UCIRP model, for instance is the Hansen and Hodrick (1980) who failed to adopt the hypothesis regarding to market efficiency of exchange rate. In this situation, the nominal interest rate is distributed by the amount of one and the projected rates of inflation, illustrating how the anticipated actual interest rates are equivalent in different countries around the world. The Fisher Open situation roughly illustrates how the difference in the NIR is equivalent to the difference in projected inflation rates between two countries. In limited empirical studies, Fisher Open postulations that Cumby and Obstfeld 1981, 1984 are true are supported. Therefore, the RIR parity cannot hold up when Fisher Open premise is refuted.

2.1.3 The Mundell-Fleming Model

This model was established by the extension lead of IS-LM model in cases of a free economy and therefore it afford to the understanding on the way exchange rate is conducted. This model emphasize of three market forces to include assets, goods and money and is majorly adopted to study the effect contained for both economic and financial policies in an economy. In the cases where goods in the business market are not in tandem with the full employment balance. It indicates on how to use both the monetary and fiscal policies to fix an economy as an effort of responding to a novel employment balance and stability. Because two out of the three business markets are autonomous, the ISLM model singly create a connection of products in business environment and money in the business market. In connection with this model, the stability of the global payments is undertaken as another balance state which is the addition to the market in place and the products in the market (Kanamori & Zhao, 2006). The trilemma stipulates that the monetary policy independence, impeccable capital agility, and a stable exchange rate system cannot be accomplished consecutively, is one of the crucial issues that this model illustrates. It specifically states that a nation cannot maintain an objective economic policy in a static rate environment with an impeccable capital agility.

2.1.4 The Balance of Payments (BOP) Approach Theory

The analysis of Simba(2015) examined on the impact of BOP to describe the components that determined goods demanded and supplied in a specific country currency. The BOP infer to a manner in which all the global monetary businesses of a particular nation are recorded over a a a specific time of the year. The respective transactions are categorized into three to include the central bank ones, the capital account and current account transactions. The above mentioned categories can either indicate a surplus or deficit, but hypothetically the general payments must be

at zero which in rare terms happens (Norman, 2003). As previously stipulated, the currency's price decline of increase, directly influence the volume of a nation's volume of imports and exports, subsequently, probable that the variations in exchange rates can enhance on the BOP inconsistencies.

For instance, a probable decline of currency will grow the worth of the exports in terms of local currency. Equally, the volume of imports will be costly and their worth will decrease in their local currency (the bigger is the importations' demanded the larger is the decline). Therefore, it is hypothesized that a decline will increase the local account except the price of exports in perspective increased is less than the worth of imports. More specifically, by taking into account how price-sensitive both exports and imports are, the effect of the domestic currency's decline on the modern account can be evaluated. The Lerner Condition states that a decline associated with exchange rate will increase the BOP's current account if the total of demand elasticities in price for exports and imports is greater than 1.

2.1.5 The Monetary Approach Theory

This strategy compares the capacity of individuals to contain these stocks to the trajectory of stock currencies. According to this idea, the exchange rate changes to ensure that the money to coin ratio matches the amount needed (Parkin & King,1992). The aforementioned assertions of this hypothesis have been supported by both QTM and PPP. According to the QTM, a clear correlation exist on the amount of money required and the extent of commodity sale prices. According to some viewpoints, a country's inflation rate will rise if there is an excess of money. The next equation has been created in the local framework.

$MV = PY$

M: denotes demand

V: Velocity of transmission

P: Average of price levels

Y: GDP

Due to inflation, which reduces the purchasing power of money, it is plausible to claim that expanding the money supply causes this. Because of this, it is evident that when well catered in the context of the global economy, the consequences will probably result in a substantial rise in the monetary base, inflation, and the influence of the PPP, both of which will diminish the rate of exchange being used as the currency rate. Since, there exist a converse connection between the amount of money in circulation and interest rates, the worth of the currency will likewise decline with an increase in interest rates.. Not to mention, if the GDP increases faster than the foreign GDP, there will be a greater need for money. Contrary to the PPP method, the exchange rate will fall if a specific amount of money is accessible (Harry, 1972). Last but not least, the demand for money will rise if the GDP develop quickely than the foreign GDP. The exchange rate will decline if a certain amount of money is available, which is in stark distinction to the PPP technique (Harry, 1972).

2.2 Evaluation of Research Literature

This section examines prior empirical studies conducted solely to ascertain how much exchange rates influence imports into Kenya. The studies conducted produced a range of results and findings, which are detailed below;

Exchange rates are essential for setting global price benchmarks against which other economies' prices can be contrasted. Two of the two thematic groupings of currency rates are the forward and spot exchange rates. The more accurate conclusions are the direct price, which will be in two days, and the appropriate exchange rate at that time. According to Flood and Gather (2000), the worldwide demand and supply brought about by commerce may be the driving force behind the evolution of the national adoption-based currency rate system. They alternatively characterized the shift in exchange rates as randomness or as an unobservable certainty. Additionally, Lindert and Pugel (1996) made the point that exchange rate instability might provide hazards to enterprises operating in foreign markets on both a positive and a negative scale. Bailey (2009) and Bhattarai (2011), among others, describe the independent changes in exchange rates that do not result from the formation of monetary and fiscal policy by the central bank. DE Paoli (2009) claims that there has been ongoing discussion regarding the range of the ideal exchange rate policy for many years. Alam and Ahmed (2012) used arguments of the same breadth to demonstrate that some academics are accountable for crimes related to the economic sphere, and even some scholars claim that currency values should to be freely assessed by the demand and supply mechanism. Hence, the respective should determine the optimum level of exchange rate.

Foreign investment, exchange rates of currencies and trade agreements were examined by Nicita (2013). By exploring the consequences of volatility on exchange rate and business misalignment, the study looked into the importance of exchange rates on the global trade. The investigation looked into whether or not the government's trade policy was affected by exchange rate misalignments. Large datasets from 100 different nations were used in the study, along with fixed effects models that ran for ten years (2000-2009). The majority of the analysis in this study was based on recent literature that emphasizes exchange rate misalignment strongly while ignoring

exchange rate volatility. Trade deviation measurements show that approximately 1% of global trade is out of synchronization. As per the scientific studies, terms of trade are thought to be used to mitigate some of the negative effects of overvalued currencies, particularly with relation to anti-dumping measures. One of the three main political ramifications of this research is that policy intelligence officers should focus on the exchange rates of their nations and those of other nations since there are significant currency persisted for decades in international trade. Second, a comparison of different currencies can only account for a small percentage of the global trade imbalances.

Kreinin (2007) assessed on changes of exchange rate and foreign trade volumes and prices. The research examined on exchange rate variations on prices of the traded products and trade flows of various Western European countries, Japan, United States, and Canada. In contrary, the econometrics examination in the same area, the investigation adopts the country control method to separate the effect of exchange rate changes from the effects of other components on prices and volume of goods traded. This method dictates use of percentage changes from the year 1970-1972 and from 1970-1973 in the consensual exchange rates and the bilateral trade inflows in the country under investigation and the major trading partners. The study's findings for the seven nations it covered included projected pass-through effects of exchange rates on imports and exports, estimated effects on volume of exports and imports, changes related to terms of trade, inferred elasticity of demand for imports and foreign demand for exports, and projected elasticity of substitution in the market among third-world country suppliers for the price changes between the years of 1970 and 1973. The study results adopted a well theoretical prospects where computations produced the estimates of the extent of trade overlap both for the importing and exporting nations. Although the trade overlap is not connected to the examined subjects in this study, the study results

might prove very important to other researchers and scholars for instance in the emerging economies or theory testing on the components of trade.

Dubravskaa M. and Siraa L. (2014) analyzed the components affecting the global trade in Slovak Republic. The investigation aimed to explore the selected elements regarding globalization procedures that have impacted on the global trade. The study adopted the scientific-cognitive procedures, for example the attained data synthesis, issue analysis and comparison and deduction of the selected elements impelling the global trade. The investigators examined on the past decade's time period after the entry of Slovak Republic in the European Union. According to the study findings, it was confirmed that there was an allowance of expansion and advancement in all the selected setting bearing in mind the strategic position of Slovak Republic in the epicenter of Europe.

Oluyemi and Essi (2017) investigated Nigeria's currency, exports, and imports from 1996 to 2015. The analysis employed a three-variable vector auto regression (VAR) using the USD and Naira and was based on the monthly dataset. The stationary status of several variables was assessed adopting ADF test. When VAR lag order selection reveals that lag of order 2 is adequate for the associated model, the Schwarz information criteria was applied to regulate the two lag values for each variable (SIC). According to the VAR's findings, exchange rates have a minor but significant impact on outcomes at lag 1, a minor but negative impact on exports at lag 1, and a minor but considerable impact on import volume at lag 2. It was also found that import volume had a favorable effect on exchange rates whereas trade balance had a negative effect. The findings demonstrate that neither the volume of foreign trade nor the exchange rate have an impact on Nigerian exchange rates, which are only partially influenced by these activities. Imports into

Nigeria have indeed been rising over time regardless of currency rates, defying the economic principles that asserts exchange rate variations lead to a drop in imports. The impulse response function's findings showed that exchange rates reacted favorably to imports and negatively to exporters. Accordingly, the investigation makes the recommendation for policy implications that Nigerian export performance, specifically in non-oil industry, it should be fortified via economic empowerment; higher levels of goods imported into the country, — particularly consumer products, should be discouraged; instead, it is recommended that local production of goods be encouraged in order to create competition for the foreign products. Additionally, it was suggested that since raw material-related products are seen as requirements, they should be imported. the stabilization of currency rate policy measures in order to limit import levels and discourage exports. The ability of exports should be increased by the purchase of cutting-edge innovation and production tools, which will reduce the demand for goods imported into the nation.

Nyatwongi, (2015) did a study on factors affecting importing and exporting SME performance in Mombasa County, Kenya. The inquiry explored to pinpoint the components that affect SME exporting and importation performance, and a number of factors were found to be influential, including the regulatory and policy environment, technology, marketing data, finances, high tax rates, and management abilities. The investigation embraced a descriptive survey to gather the quantitative information using the primary sources where the questionnaire was generated. The inquiry targeted 50 SMEs where 64% was attained as the response rate. The SPSS software was adopted to analyse the collected information where frequency tables, graphs and charts were used to present data. The study results in regard to the aspects influencing SMEs performance were legal framework, market information, policies which contained as the critical elements affecting the SMEs' performance. Other elements which followed suit were for example management skills,

high tax costs, finances and technology which in the long run determined survival of the companies and the companies cannot function without them as they influence the exporting and importing of goods of the SMEs.

Mbithi (2009) examined the impact of foreign exchange rates on firm performance of the listed firms at NSE. The study covered a period of 2002 to 2012 of all the listed firms at NSE. The study used descriptive research design where qualitative, quantitative techniques were embraced. The inquiry used 46 companies as the sample size except for firms for financial and investments where 41 companies were examined. A survey tool was embraced for gathering primary sources of information from the top management in internal audit and finance departments respectively. The targeted information was from 2002-2012 and financial reports and publication were used to provide secondary information. The study adopted the multiple regressions where SPSS was embraced for analysis. The study results of the investigation indicated that the listed companies were influenced by foreign exchange rates changes. The use of owner‘s equity account and income statement were adopted to indicate the foreign exchange variations. Further, the investigation deduced that the unrealized foreign exchange profits or losses affected the net income of the listed firms.

The examination of Nteegah and Mansi (2017) established on the aspects affecting demand of goods in Nigeria from 1980-2014. The investigation embraced secondary sources of information to gather information with regard to the studied variables. The inquiry results indicated a negative and significant bearing on the total amount of goods imported into Nigeria from the exchange rate, real income level, and local price change. This showed that over time, the variables expressly slowed the total amount of commodities imported into Nigeria. The critical factors influencing

Nigeria's import demands of goods were also identified as the external debt stock, level of domestic investment, degree of openness, real income level, real exchange rate, and national price level. The study of the data revealed that the total amount of imported items was positively and significantly impacted by external debt, openness level, and gross capital formation. As a result, the inquiry concluded that the demand for imports had long-term, significant consequences on Nigeria's economy. The inquiry results propose that in order to help Nigeria's economy grow, real income per capita should be raised, foreign investment policies should be reviewed, and a favorable business environment should be created.

Nyambaringa (2017) conducted an inquiry with regard to exchange rate instability on imports and exports in Kenya. The aim of this investigation was to evaluate the effects of exchange rate instability on exports and imports between 1980 and 2015. The export and import functions for the economy whose specifications took a standard economic theory. The study's conclusions showed that real rates of voluntary contribution had a big impact on both goods exports and imports. The results also showed that the rise in exchange rate instability had an adverse long-term impact on the export function but not the import function. The study's findings showed that the long-run factor approximates models that follow the framework of economic theory. In a similar vein, Muhia (2019) looked at the impact of currency rate fluctuation on imports and exports. In order to investigate the effect, the investigation used data from 1980 to 2015 and a log-linear multiple regression model. From the study results, it was established that exchange rate volatility significantly affected exports and imports of goods. Further, the increment of the exchange rate instability contained long-term and adverse impact on the goods exported but not the goods imported.

The performance of exchange rate differ in accordance to the inquiry time volatility is regularly great in the short-term because of the activities such as expectations required for monetary policies, the forthcoming policies and political environment shifts. Krugman and Obstfeld (2003) in long-term volatility rely on the virtual prices of commodities of various economies. According to Samuelson and Nordhaus (2001) macroeconomic signals for instants the supplies and the demand of commodities investment and the economic growth of the various rates that influence volatility of exchange rate. Regardless the projections of PPP theory, adequate data exist indicating that the real exchange rates of various nations change over a period of time. The actual variation in connection with price of nations contain a number of effects on both the economic and trade inflow. The actual positive effect devaluation was detected at both sectoral and corporate points but in different nations the general extent of the effect was either negative or positive (Colacelli, 2008).

Kamal and Kadir (2005) examined the connection of real exchange rates of volume of exports and the imports in Pakistan using the monthly data of 1981-2003. From the study results, it emerged that a nation's trade can be influenced by the rate of exchange of a robust was connected to a nation. They deduced that exchange rate had a critical role in deciding the competitiveness of a nation's trade. The exchange rate overvaluation results the compensation of BOP to disfavor the balance of decline in the reserves. Thus, foreign exchange rate control and trade restrictions are employed to safeguard the economy of a country. Also, they established that volume of imports and exports were closely connected as the increase in export of goods without the surplus stocks need improved rate of production resulting to capital and supply increment. Nevertheless, the emerging economies of the world are grounded on the agriculture and contain adequate capital

inflows which denote that capital importation from a more advanced economy can stimulate their respective production.

Okoth (2013) examined effect of appreciation rates and the inflation rates on Kenya's exchange rate. ANOVA was used to evaluate the data, and the inquiry results indicated that although interest rates, inflation rates, and exchange rates were associated with one another, inflation had a negative relationship with each of them. Achieng (2015) studied the connection involving Kenya's inflationary pressures and monetary rating. The analysis used data from 1973 to 2014, and the factors examined were the GDP per person, foreign prices, inflation, interest rates, and exchange rate. To assess the data, multivariate vector auto regression was embraced. The short-term causal association between inflation and currency rate was found to exist. Muchiri (2017) investigated whether interest rates and inflation levels affected foreign exchange rates using data from 2007 to 2016. The money supply, consumer price index, and inflation all had a favorable effect on the exchange rate. Indirect relationships between foreign currency rate and FDI were also demonstrated by the study. An association between inflation and exchange rate is anticipated to exist. The relations either positive negative or even negligible. this evidence is enough from the past researches done. Besides the relationship between two variables, there also other factors such as economic growth, balance of payments, FDI, international debts and interest rates that have the effect positively or negatively. The results intend to facilitate the policy makers to know the efficient policy in helping curbing the high inflation and achieve both internal and external balance.

Godfrey and Cosmas (2014) explored the effect of currency rates on the volume of imports, exports, and the country's output in Tanzania. Time series simulation, variance decomposition, impulse response function, and VEC model were used during the evaluation, which encompassed

the years 1990 through 2011. The study found that the factors under investigation had a long-term link and converged at equilibrium over time, but that they had a less significant long-term impact on imports and exports. Muhammed (2014) investigated the connection of exchange rate instability and GDP per person, foreign exchange reserves, exports, and imports. The data used was from 1952-2010 where granger causality test, correlation removal method, multi-collinearity detection were adopted for the analysis. The findings of the inquiry confirmed a positive connection of devaluation of exchange rate and volume of exports. The research by Mahmood, Ehsanellah & Ahmed (2011) explored on whether exchange rate fluctuations influenced macro-economic components. The Generalized Autoregressive Condition Heteroscedasticity (GARCH) technique was used to examine data from 1975 to 2011. The study's findings showed that it had a good impact. Odili (2015) adopted data from 1971 to 2011 to assess how real exchange rate volatility affected the amount of imports into Nigeria. According to the study's conclusions, the rate of exchange only has a one-way connection with the imported goods as well as a long-term, positive connection of import volume and the exchange rate.

2.3 Brief Summary of the Literature

From the reviewed studies, it has been established that ambiguity exist in the sense that some investigations confirm an association of exchange rate and volume of imports while others not. Relying on the channels to which exchange rate is used, always a variation exist. There are no clear channels from the empirical studies that explain how exchange rates happen, as supplied by Campa and Goldberg (1999). Largest occurrence of this situation is the minimal information that can explain the information given. Second, a number of studies have exclusively relied on the variation in industry-level organization in terms of the exchange rate measure to assess the impact

on the volume of imports. Scholars like Alam and Ahmed (2012); Okoth (2013), and Muchiri (2017) are noteworthy examples.

CHAPTER THREE

RESEARCH METHOLOGY

3.0 Introduction

The methods and approaches adopted for this investigation were discussed in chapter. Basically, the description of time series features of data used was assessed, the empirical model was also used, data sources and how the study variables were assessed.

3.1 Econometric Methodology

Toda and Phillips (1993) gives the procedures used in testing causality. The first step followed is where all the variables investigated are subjected to unit root test. In the static variables, the stipulated model can be assessed in the various levels and test causality reactions using Granger method. In cases where we have non-stationary variables, 7(1), in various dimensions and static in the initial variances,1(0), then test of cointegration is conducted to establish whether a long-run association exist. One the cointegration is noticed, the causality tests have to be conducted by adopting the model of error correction. If the cointegration is unnoticeable, then the applied model takes an estimation in the initial changes and functional Granger causality.

3.2 Verification of unit foundations

The initial step involved is subjecting the studied components to the unit root assessments in order to form the order connected to integration. The ADF was used to assess the level of integration of the components under the study. The goal was to find out whether the studied variables trail on a non-stationary drift and are ranked in the order of 1 which is designated such as 7(1) or if the

stipulated series are in the static denoting order of 0 written by means of 7(0). The ADF examination is grounded on estimating the resultant regression expression:

$$\mathbf{\Delta x_t} = a + a_1 t + \beta X_{t-1} + \sum_{t-1}^{P} \delta_{\ 1}\, \mathbf{\Delta x_{t-1}} + \varepsilon_t$$

Where u_0 denote the drift term; *t* indicate the trend in time; and *p* is a big and adequate lag interval to confirm that ε_t is gray noise procedure. The formulated null proposition on the x variable that is nonstationary (*H*o: $\beta = 0$) is overruled if β is expressed as negative, once linked with the critical values of the ADF model (1979).

In cases where the time series are not stationary, the classical techniques usage for example the OLS could result into a spurious connection translating to a meaningless results. The suggestion contained in the tradition views to tackle with non-stationary series in their avenues was to provide the variation of the series. Nonetheless, first differentiating is not suitable resolution in the problem above and it contains a major drawback- it averts the detection of a long-run association that might exist in the collected information, that is the long-run information get lost (Emilio & Smith, 2001).

3.3 Cointegration and Error Correction Model

Majority of the economic components and variables are contained in a non-stationary state in the various levels involved(incorporated in the order of 1, *1*(1) but static, *1*(0), in the initial difference. If the studied components are *1*(1) in the subsequent phase is to assess for the cointegration. Engle and Granger (1987) established a model of cointegration where the economic components may result into a long-run balance that indicate a constant association.

Dual variables that is x and y are indicated to be cointegrated of the order 1 (*C1*(*I,1*) if both of the variables are incorporated of order 1 and there exist a linear blend of the dual components that is fixed, *1*(0). The linear blend is assumed by equation (2) or (3) as stipulated below:

$y_t=a_0+\beta_0 x_t+\mu_{0t}$…… (2)

$x_t=a_1+\beta_1 y_t+\mu_1 t$…… (3)

The investigation employed the two step method by Engle and Granger (1987) for testing cointegration. Several research findings on cointegration and the ECM have been established by Engle and Granger (1987). The two-step method as indicated by EG is simple as the first method runs OLS regression for each variable where the formulated null hypothesis is subjected to testing. If the formulated hypothesis is rejected, then the parameter approximate the studied variables to estimate the long-run association. The dynamic specification is considered in the second step where the lagged value residuals from the cointegrating regression appear amid the regressors.

Error-correction model usage give a supplementary channel where Granger sense connection can be examined. The typical Granger examination can afford void causal info as a result of omission of the error of correction terms in the test. In cases where error-correction is omitted from the causality examinations while the series are cointegrated, no causality can be noticed whether it exists, that is after the constant of the term error modification is statistically important. Once the cointegration is observed, it is requisite to trail that x variable result into y variable while y variable results into x or that there is a feedback among the variables examined (Granger, 1986; 1988).

3.4 Testing for Granger Causality (GC)

This inquiry tested the Granger causality of the ER and volume of imports. The Granger causality encompass a numerical tests which observes on whether the time series project another time series (Granger, 1969). These tests use prior values to forecast future events in a different time series. The premise of Granger causality is that the cause occurs before the effect and that the cause has unique information related to potential values for the effect. A series of F-tests and t-tests on the lagged values of the independent variables are used to analyze Granger causality.

According to this approach, the y variable (volume of imports) is produced by the x, in this case the exports conducted, if y can be projected better from previous values used of the y and x than from the previous values of y variable alone. With due consideration to the simple bivariate model, x can be tested to see whether Granger-causing y by assessing equation (4) and then assessing the formulated hypothesis in (5) by embracing the standard F test.

$y_t = \mu_1 + \sum_{j-1}^{P} Y_{1tj} \boldsymbol{\Upsilon}_{t-j} + \sum_{j-1}^{P} Y_{12j} X_{t-1} + \mu_1 t$……(4)

H_0: $Y_{12j}=0$ for j=*1*,…..,*p*

H_1: $Y_{12j \neq 0}$ for atleast one j…….(5)

Where $\mu_1 t$ denotes a white noise procedure. Variable x is indicated to Granger-cause to y variable if the formulated null hypothesis(5) is rejected where γ_{12} encompass the vector of coefficients of the trailed values of the x variable. Likewise, y causes x can be tested by assessing equation (6) and testing the formulated null hypothesis (7) by using an F test.

$x_t = \mu_2 + \sum_{j-1}^{P} Y_{21j} \boldsymbol{\Upsilon}_{t-j} + \sum_{j-1}^{P} Y_{22j} y_{t-1} + \mu_2 t$……(6)

H_0: $\gamma_{22}=0$ for j=*1*,…..,*p*

H_0: $\gamma_{22j \neq 0}$ for atleast one j…….(7)

Rejecting the formulated null hypothesis (5) but not (7) provide with an indication that affirm the ELG hypothesis. Nonetheless, this inquiry embrace a wider description of ELG, where the ELG is affirmed if the generated hypothesis (5) but not (7) is overruled or if both formulated hypotheses are nullified. On the other hand, if the formulated hypothesis (7) but not (5) is overruled, we deduce that the is consecutively from the exchange rate to the growth of imports therefore justifying the evidence of validating the GEE hypothesis. In cases where neither the formulated hypothesis is rejected, the volume of imports and the output are indicated to be causally autonomous and must be generated by set of variables added in the model. Preceding to the examination for the causal association between time series, it is ensured that the set of variables embraced as the regressors neither individually non-stationary nor stationary individually. The main goal is to validate if the stated series contain stationary trend and whether the nonstationary establish the order of integration. The growth of import-output causal linkage denote a long-term behavioral association whose examination need the estimation methods suitable for the long-term equilibria. Consequently, the set variables in the system should be verified for cointegration preceding to the examining for Granger causality (Awokuse, 2003).

3.5 The study's findings

This inquiry tested the following formulated hypotheses; that there exist a bidirectional connection between exchange rates and volume of imports. (ii) imports, exports and terms of trade are not significant factors in describing the variations in the GDP per capita.

3.6 Empirical Model Specification

The empirical model was equated as follows:

$$LN\Delta GDP_1=\beta_0+\beta_1 LNRER_t+ \beta_2 LNM_t+ \beta_3 LNF_t+ \beta_4 LNTOT_t+ \varepsilon_{1t} \quad (8)$$

$$LN\Delta RER_1=a_0+a_1 LNGDP_t+ a_2 LNM_t+ a_3 LNF_t+ a_4 LNTOT_t+ \varepsilon_{1t} \quad (9)$$

Where β_0 and a_0 = constant

B_i and a_i where i=1,2,3,4 are the projected coefficients

$\square_{1t}$= random variable

t= time period

3.7 Parameter definitions and anticipated indications

Table 1: Parameter definitions and anticipated indications

Variable Name	Data Description	Measurements	Expected Signs
LNΔGDP	Natural log of Δ in GDP	Δ in the value of GDP as a % of GDP of preceding year	Positive(+)
LNMNF	Natural log of manufactured volume of exports	Worth of manufactured goods exported	Positive(+)
LNM	Natural log of volume of imports	Worth of the goods imported	-
LNTOT	Natural log of terms of trade	Unit price of the exports indicated as the % of unit price of the products imported $TOT=\frac{Px}{Pm}$	Positive(+)
LNΔRER	Comprise the price of the local currency against terms of foreign currency	This will be assessed in terms of KSH against the USD	Positive(+)

3.8 Data Types and Sources

This investigation was solely rely on the secondary sources of information where data period was from 1980-2020 and was time series in nature. The sources of data was obtained from UN

published directory, IFS, KNBS, world developments indicators, and the IMF. The investigation comprehensively covered to go beyond traditional bivariate method by incorporating exports as an added variable. Investigations conducted for example that one Riezman et al (1996) proposed that volume of imports might back to the formation of cointegration hence have to be catered for when examining for the longterm balance between goods exported and the economic growth of a country.

3.9 Estimation Method

Time series modeling was employed to model the volume of imports and the ER in the present study. Time series modeling entail a number of processes to be conducted so that to investigate the regression model to be assessed. The investigation conducted a number of analytical examinations before analyzing the stated model. This safeguarded that time series expectations are not desecrated. They entail both the pre and post estimation examinations which was analyzed. The pre-estimation examination included:

3.9.1 Lag Length Determinations

The investigation adopted the likelihood ratio (LR) examination to test the lag interval to be embraced in the ARDL, VAR or the VECM. Because significant autocorrelation leads to incorrect least square estimations, choosing an appropriate lag time ensures that the available residuals are free of it (Enders, 1995). With the exception of trailing too much degree of freedom, the least lag can be selected using the same criteria.

3.9.2 Test for Stationarity

The term stationary series refers to a kind of series that includes both the mean and the constants of variation over a certain time interval (Gujarati, 2008). Estimating the OLS model using non-

stationary series would produce false results (Gujarati, 2008). The Phillips-Peron and ADF methods are typically used to test the unit root. The unit root, or the series that is integrated of order one, is a null proposition under the ADF test. Despite the Phillips-Peron having a different description from the ADF test, this investigation will use the ADF test to check for availability of unit foundation.

3.9.3 Test for Serial correlation

The sequence must be included for order one to create the links between the research hypotheses. As provided that the set variables are incorporated for order one, it is probable to examine the times of the long-term balance linkages in the investigated variable (Johansen, 1991). The eigen values are used for this case where the formulated null hypothesis of the suggestion propose r cointegrating relations compared with the alternate which stipulate connection exist of k cointegrating relations. The formulated null hypothesis for the optimum eigen values cointegrating relations exist as compared with the alternate proposition of r+1cointegrating relations. Nonetheless, if the respective series are incorporated of the order one and zero respectively then the ARDL method was adopted used to evaluate both terms (short and long) associations.

3.9.4 Autocorrelation Test

This investigation tested for serial autocorrelation as an effort of ensuring that all the estimated values are proficient. Various techniques and approaches are used which include Breusch- Godfrey test, Runs test and Durbin-Watson tests. For the purpose of this investigation Breusch- Godfrey test was conducted since it is beyond the limitations of other tests for example Durbin-Watson test (Gujarati 2008).

3.9.5 Normality Test

Analyzing models which contain residuals which are distributed abnormally led to void implications of both F and t statistics. Therefore, the investigation adopted the Jarque-Bera test to look at the normalcy of the corresponding residuals in order to make sure that the stated residuals are not unusually spread. Jarque-proposed Bera's null hypothesis states that the analyzed series has no skewness and that the kurtosis is mesokurtic. The normally dispersed residuals, according to the Jarque-Bera statistic, are therefore equal to zero (Gujarati 2008). The Ramsey RESET, ARCH effects, and stability tests of various parameters were among the other tests that were to be carried out.

CHAPTER FOUR

RESEARCH RESULTS

4.1 Introduction

This chapter shows the analysis of the findings which used data for the years 1980 to 2021 on global demand, real exchange, domestic product output, and trade conditions. (See appendix II.) The ARDL model, Augmented Dickey Fuller (ADF), and stationary data from the Johansen Connection and communication test were used to analyze the data's stationarity.

4.1 Augmented Dickey Fuller (ADF) Test for Stationarity of the Data

The Augmented Dickey Fuller (ADF) test was used to determine the stationarity of sequential time data by factoring in the volume of imports, exchange rate, net domestic product, and terms of trade. The below ADF equation with an intercept term and a time trend was used to assess the data's serial correlation.

$$Y_t = \alpha_0 + \theta Y_{t-1} + \gamma_t + \alpha_1 \delta Y_{t-1} + \alpha_2 \delta Y_{t-2} + ... + \alpha p \delta Y_{p-2} + \varepsilon_t$$

Where Y represent a variable

α_0 represent an intercept

γ_t represent time trend

α_0, $\alpha_1 \ldots \alpha p$ are coefficients

P stands for augmenting lags

. ε_t is the standard error

The ADF equation test the following hypotheses

H0: The parameter is not static or contains a unit root

H1: The parameter is stagnant and lacks a unit root

The following tables present the study findings on ADF values at level and at the first difference.

Table 4.2: Dickey-Fuller test for inflation

Level						
Volume of import (IM)	Intercept only		Linear Trend and Intercept		No trend and No intercept	
	t-Statistic	Prob.*	t-Statistic	Prob.*	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-3.7303	0.0064	-3.6581	0.0348	-0.91145	0.3165
5% level	-2.92118		-3.50237		-1.94782	
Augmented Dickey-Fuller Test Equation	Variable		Coefficient	Std. Error	t-Statistic	Prob.
Intercept only	IM(-1)		-0.4402	0.118007	-3.7303	0.0005
Linear Trend and Intercept	IM(-1)		-0.43892	0.119985	-3.6581	0.0006
No trend and No intercept	IM(-1)		-0.07016	0.076978	-0.91145	0.3669
First Difference						
Volume of import(IM)	Intercept only		Linear Trend and Intercept		No trend and No intercept	
	t-Statistic	Prob.*	t-Statistic	Prob.*	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-8.71013	0.0000	-8.78277	0.0000	-8.79891	0.0000
5% level	-2.92378		-3.50637		-1.94782	
Augmented Dickey-Fuller Test Equation	Variable		Coefficient	Std. Error	t-Statistic	Prob.
Intercept only	D(IM(-1))		-1.82527	0.209558	-8.71013	0.0000
Linear Trend and Intercept	D(IM(-1))		-1.85015	0.210656	-8.78277	0.0000
No trend and No intercept	D(IM(-1))		-1.82418	0.207319	-8.79891	0.0000

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

Lag Length: 0 (Automatic - based on SIC, maxlag=10)

Null Hypothesis: IM has a unit root

Sample (adjusted): 1980 2021 (level), 1982 2021 (first difference)

Included observations after adjustments: 42(level), 40 (first difference)

The ADF results in Table 4.1show that the rate of volume of import at level was stationary (had no unit root) in ADF test equation with intercept only (t-statistic=3.7303>2.92118 and p=0.0064< 0.05at 5% critical Value) and in ADF test equations with trend and intercept (t-statistic=3.6581>3.50237, p=0.0348< 0.05). However, the study findings showed that volume of import had unit root (was not stationary) when the test equation had neither time trend nor intercept

(t-statistic=0.91145<1.94782, p=0.3165> 0.05). Therefore, the study concludes that the rate of Volume of import at level was not stationary.

The study findings showed that the rate of volume of import became stationary on first differentiation (had no unit roots) as indicated by all the test equations, that is, equation with intercept only (t-statistic=8.71013>2.92378, p=0.0000), time trend and intercept (t-statistic=8.78277>3.50637, p=0.0000) and without time trend and intercept (t-statistic=8.79891 > 1.94782, p=0.0000).

Table 4.3: Dickey-Fuller test for Exchange Rate

Level						
Exchange Rate (ER)	Intercept only		Linear Trend and Intercept		No trend and No intercept	
	t-Statistic	Prob.*	t-Statistic	Prob.*	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-3.160900	0.0284	-3.210668	0.0940	-0.449013	0.5152
5% level	-2.921175		-3.502373		-1.947665	
Augmented Dickey-Fuller Test Equation		Variable	Coefficient	Std. Error	t-Statistic	Prob.
Intercept only		ER(-1)	-0.321074	0.101577	-3.160900	0.0027
Linear Trend and Intercept		ER(-1)	-0.341610	0.106399	-3.210668	0.0024
No trend and No intercept		ER(-1)	-0.025677	0.057186	-0.449013	0.6555
First Difference						
Exchange Rate (ER)	Intercept only		Linear Trend and Intercept		No trend and No intercept	
	t-Statistic	Prob.*	t-Statistic	Prob.*	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-9.621785	0.0000	-9.512972	0.0000	-9.655932	0.0000
5% level	-2.922449		-3.504330		-1.947665	
Augmented Dickey-Fuller Test Equation		Variable	Coefficient	Std. Error	t-Statistic	Prob.
Intercept only		D(ER(-1))	-1.315759	0.136748	-9.621785	0.0000
Linear Trend and Intercept		D(ER(-1))	-1.315936	0.138331	-9.512972	0.0000
No trend and No intercept		D(ER(-1))	-1.308381	0.135500	-9.655932	0.0000

The research results in Table 4.2 displays the exchange rate at level was stationary (had no unit root) for ADF equation with intercept only (p=0.0284< 0.05). However, exchange rate at level was not stationary (had a unit root) for ADF equation with trend and intercept (p=0.0940> 0.05) and test equation without time trend and intercept (p= 0.5152> 0.05). Therefore, study concludes that

ER was not stationary at level. The study established that ER became stationary on first differentiation (had no unit roots) as indicated by p= 0.0000< 0.05 for all the test equations with intercept only, time trend and intercept and without time trend and intercept. The variable coefficients were negative hence the equations were fit for analysis.

Table 4.4: Dickey-Fuller test for Gross Domestic Product (GDP)

Level						
Gross Domestic Product (GDP)	Intercept only		Linear Trend and Intercept		No trend and No intercept	
	t-Statistic	Prob.*	t-Statistic	Prob.*	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	2.129990	0.9999	-1.879327	0.6486	2.550967	0.9968
5% level	-2.931404		-3.513075		-1.948686	
Augmented Dickey-Fuller Test Equation		Variable	Coefficient	Std. Error	t-Statistic	Prob.
Intercept only		D(GDP(-7))	-1.122042	0.367693	-3.051571	0.0044
Linear Trend and Intercept		GDP(-1)	-0.961017	0.511362	-1.879327	0.0681
No trend and No intercept		GDP(-1)	1.017541	0.398884	2.550967	0.0153
First Difference						
Gross Domestic Product (GDP)	Intercept only		Linear Trend and Intercept		No trend and No intercept	
	t-Statistic	Prob.*	t-Statistic	Prob.*	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-2.943722	0.0486	-3.518962	0.0499	-2.706525	0.0080
5% level	-2.931404		-3.518090		-1.948686	
Augmented Dickey-Fuller Test Equation		Variable	Coefficient	Std. Error	t-Statistic	Prob.
Intercept only		D(GDP(-1))	-2.443464	0.830059	-2.943722	0.0057
Linear Trend and Intercept		D(GDP(-1))	-2.956895	0.840275	-3.518962	0.0013
No trend and No intercept		D(GDP(-1))	-2.210236	0.816633	-2.706525	0.0103

The inquiry findings are indicated in Table 4.3, which shows that the level of the overall GDP was not stationary in both the ADF test equation with intercept only (p=0.9999 0.05) and equation with trend and intercept (p=0.6486 0.05). (Had a unit root). Due to their negative coefficients, both equations—those with an intercept alone and those with a trend and intercept—fit the criteria for the stationary test. However, because the test equation lacked a temporal trend and an intercept

and had a positive coefficient, it was unsuitable for the test of stationary (1.017541). The investigation comes to the conclusion that the GDP was not level or steady.

The study established that Gross Domestic Product became stationary on first differentiation (had no unit roots) as indicated by all the test equations, that is, equation with intercept only (p=0.0486), time trend and intercept (t-statistic=0.0499) and without time trend and intercept (p=0.0080). The variable coefficients were negative hence the equations were fit for analysis.

Table 4.5: Dickey-Fuller test for Terms of Trade

Level						
Terms of Trade (TOT)	Intercept only		Linear Trend and Intercept		No trend and No intercept	
	t-Statistic	Prob.*	t-Statistic	Prob.*	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-0.179365	0.9341	0.403467	0.9987	0.119808	0.7160
5% level	-2.921175		-3.504330		-1.949319	
Augmented Dickey-Fuller Test Equation		Variable	Coefficient	Std. Error	t-Statistic	Prob.
Intercept only		TOT(-1)	-0.018001	0.100358	-0.179365	0.8584
Linear Trend and Intercept		TOT(-1)	0.051300	0.127149	0.403467	0.6885
No trend and No intercept		TOT(-1)	0.011523	0.096176	0.119808	0.9051
First Difference						
Terms of Trade (EB)	Intercept only		Linear Trend and Intercept		No trend and No intercept	
	t-Statistic	Prob.*	t-Statistic	Prob.*	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	5.845713	1.0000	5.215314	1.0000	6.118645	1.0000
5% level	-2.938987		-3.529758		-1.949609	
Augmented Dickey-Fuller Test Equation		Variable	Coefficient	Std. Error	t-Statistic	Prob.
Intercept only		D(TOT(-1))	20.70009	3.541072	5.845713	0.0000
Linear Trend and Intercept		D(TOT(-1))	21.84112	4.187883	5.215314	0.0000
No trend and No intercept		D(TOT(-1))	20.29325	3.316624	6.118645	0.0000

All ADF equations both at the absolute value of test statistics (9.973) are less than the absolute 5% critical value (3.5), according to the study findings in table 4.4. Because of this, Terms of Trade has no unit root and is stationary.

All the models have shown that the variables had no unit root and the schedule data used in the study was stationary. The study findings in tables show that the Augmented Dickey Fuller model was valid because all L1 values were negative {L1 (inflation) =-1.45423, L1 (budget deficit) =-1.31887, L1 (domestic borrowing) =-1.08426 and L1 (Terms of Trade) =-1.36682}

4.2 Lag Selection

The study ran VAR diagnostic statistics to examine criteria for lag order selection. Lag order selection statistics (pre-estimation) enabled the study to select the number of lags to use when analysing VAR model and Johansen Test for Cointegration. Table 4.5 shows lag order selection statistics.

Table 4.6: Lag order selection statistics

lag	LL	LR	df	P	FPE	AIC	HQIC	SBIC
0					-1362.56	6.30E+19	56.94	56.9989
1	-1327.92	69.273	16	0.000	2.90E+19	56.1634	56.4581	56.9431*
2	-1298.6	58.648	16	0.000	1.70E+19	55.6083	56.1386	57.0117
3	-1271.19	54.823*	16	0.000	1.1e+19*	55.1328*	55.8988*	57.1599

The lag order selection statistics (pre-estimation) show that the study should select lag 3 to run VAR model, Johansen Cointegration Test or, VECM or ARDL model (LR=54.823*, FPE=1.1e+19*, AIC =55.1328*, and HQIC=55.8988*).

4.3 Johansen Cointegration Test model

Johansen Cointegration Test examines whether the variables relate. The variables relate when integrated together.

Table 4.7: Johansen Cointegration Test Results

Included observations: 40 after adjustments
Trend assumption: Linear deterministic trend
Series: IM ER GDP TOT
Lags interval (in first differences): 1 to 1
Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.619822	81.42682	47.85613	0.0000
At most 1 *	0.300571	34.03821	29.79707	0.0153
At most 2 *	0.204010	16.52115	15.49471	0.0349
At most 3 *	0.103268	5.340900	3.841466	0.0208

Trace test indicates 4 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.619822	47.38861	27.58434	0.0000
At most 1	0.300571	17.51706	21.13162	0.1490
At most 2	0.204010	11.18025	14.26460	0.1454
At most 3 *	0.103268	5.340900	3.841466	0.0208

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Johansen Cointegration tests the following null hypotheses

H0: The original study parameters do not cointegrate.

H1: The original study parameters are cointegrated.

The study findings (table) demonstrate that a trace parameter of 81.42682, a 5% critical value of 47.85613, and a p value of 0.000 all support the null hypothesis—that there are no co-integrations. The null hypothesis (H0), which argues co-integration does not exist among the research parameters, is rejected because the trace statistic is over 5% critical value (81.42682 47.85613). The Johansen Co-integration Test results, however, indicate that there are just three co-integrated equations linking the variables under investigation. As a result, the analysis demonstrates that the pertinent variables exhibit co-integration (volume of import, ER, Gross Domestic Product and Terms of Trade).

The alternative proposition that there isn't any co-integration among the research variables is rejected since the Max-Eigen statistics (51.5087) are more than the 5% critical threshold (27.58434). The normality of the time series data utilized in the study is ensured by the stringent restriction of the Eigenvalue values by 1, or I 1. (all the Eigenvalues are smaller than 1). According to the study's findings, currency rate, import volume, terms of trade, and gross domestic product are co-integrated and therefore have a short- or long-term connection. Therefore, the investigation can use the VECM or ARDL models.

4.4 Autoregressive Distributed Lag (ARDL)

A Johansen Co-integration tests in section 4.3 showed that the research variables were correlated. The variables display dependence on their lags since they are auto-correlated. The variables have the same order of integration, and Autoregressive Distributed Lag (ARDL) was used to determine the variables' short- and long-term causal relationships.

The study adopted the following long run ARDL equation.

$$IM=a_0+a_1ER_t+ a_2GDP_t+ a_3TOT_t+e$$

Where: IM= Volume of import
ER= refers to the Exchange rate
GDP= Gross Domestic Product
TOT= Terms of Trade
a_0 = Constant Term
a_1 - a_3 = Beta coefficients
e = error term

4.4.1 Lag Selection

The inquiry generated the following Standard ARDL model having 4 independent variables and 6 lags to examine suitability of 6 lags with focus on AIC and SIC criterion.

D(IM) C D(IM(-1)) D(IM(-2)) D(IM(-3)) D(IM(-4)) D(IM(-5)) D(IM(-6)) D(ER(-1)) D(ER(-2)) D(ER(-3)) D(ER(-4)) D(ER(-5)) D(ER(-6)) D(GDP(-1)) D(GDP(-2)) D(GDP(-3)) D(GDP(-4)) D(GDP(-5)) D(GDP(-6)) D(TOT(-1)) D(TOT(-2)) D(TOT(-3)) D(TOT(-4)) D(TOT(-5)) D(TOT(-6)) IM(-1) ER(-1) GDP(-1) TOT(-1)

The Standard ARDL model having 4 independent variables and 6 lags generated the following results.

Table 4.8: Standard ARDL model results: 4 independent variables and 6 lags

Dependent Variable: D(IM)
Method: Least Squares
Sample (adjusted): 1986 2021
Included observations: 36 after adjustments

R-squared	0.871459	Mean dependent var	-0.171413
Adjusted R-squared	0.614378	S.D. dependent var	15.64775
S.E. of regression	9.717016	Akaike info criterion	7.612329
Sum squared resid	1321.886	Schwarz criterion	8.800115
Log likelihood	-134.6651	Hannan-Quinn criter.	8.050348
F-statistic	3.389817	Durbin-Watson stat	1.985903
Prob(F-statistic)	0.009736		

The study also developed the following Standard ARDL model having 4 independent variables and 4 lags:

D(IM) C D(IM(-1)) D(IM(-2)) D(IM(-3)) D(IM(-4)) D(ER(-1)) D(ER(-2)) D(ER(-3)) D(ER(-4)) D(GDP(-1)) D(GDP(-2)) D(GDP(-3)) D(GDP(-4)) D(TOT(-1)) D(TOT(-2)) D(TOT(-3)) D(TOT(-4)) IM(-1) ER(-1) GDP(-1) TOT(-1)

Table 4.9: Standard ARDL model results: 4 independent variables and 4 lags

Dependent Variable: D(IM)
Method: Least Squares
Sample (adjusted): 1986 2021
Included observations: 36 after adjustments

R-squared	0.871459	Mean dependent var	-0.171413
Adjusted R-squared	0.614378	S.D. dependent var	15.64775
S.E. of regression	9.717016	Akaike info criterion	7.612329
Sum squared resid	1321.886	Schwarz criterion	8.800115
Log likelihood	-134.6651	Hannan-Quinn criter.	8.050348
F-statistic	3.389817	Durbin-Watson stat	1.985903
Prob(F-statistic)	0.009736		

The study further developed the following Standard ARDL model having 4 independent variables and 2 lags:

D(IM) C D(IM(-1)) D(IM(-2)) D(ER(-1)) D(ER(-2)) D(GDP(-1)) D(GDP(-2)) D(TOT(-1)) D(TOT(-2)) IM(-1) ER(-1) GDP(-1) TOT(-1)

Table 4.10: Standard ARDL model results: 4 independent variables and 2 lags

Dependent Variable: D(IM)
Method: Least Squares
Sample (adjusted): 1982 2021
Included observations: 40 after adjustments

R-squared	0.737012	Mean dependent var	-0.025549
Adjusted R-squared	0.644193	S.D. dependent var	14.97359
S.E. of regression	8.931687	Akaike info criterion	7.446492
Sum squared resid	2712.351	Schwarz criterion	7.958235
Log likelihood	-161.9926	Hannan-Quinn criter.	7.639064
F-statistic	7.940288	Durbin-Watson stat	1.987366
Prob(F-statistic)	0.000001		

The lower the value of Akaike info criterion and Schwarz info criterion the better the model. The study chooses the standard ARDL model having lag 2 with the lowest value of Akaike Info Criterion (7.446492) and Schwarz Info Criterion (7.958235).

D(IM) C D(IM(-1)) D(IM(-2)) D(ER(-1)) D(ER(-2)) D(GDP(-1)) D(GDP(-2)) D(TOT(-1)) D(TOT(-2)) IM(-1) ER(-1) GDP(-1) TOT(-1)

Table 4.11: Standard 2 lags ARDL model for the Study

Dependent Variable: D(IM)
Method: Least Squares
Sample (adjusted): 1982 2021
Included observations: 40 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.592682	1.389794	0.426453	0.6725
D(IM(-1))	0.247982	0.320070	0.774775	0.4438
D(IM(-2))	-0.086555	0.193426	-0.447482	0.6574
D(ER(-1))	-0.373526	1.607764	-0.232326	0.8177
D(ER(-2))	0.159889	0.912702	0.175182	0.8620
D(GDP(-1))	-7.83E-05	0.000244	-0.321414	0.7499
D(GDP(-2))	-9.13E-05	0.000152	-0.599086	0.5531
D(TOT(-1))	0.000107	0.000405	0.263763	0.7936
D(TOT(-2))	0.000246	0.000402	0.611231	0.5451
IM(-1)	-1.627535	0.435180	-3.739913	0.0007
ER(-1)	-0.446482	2.089820	-0.213646	0.8321
GDP(-1)	-5.58E-05	0.000270	-0.206979	0.8373
TOT(-1)	-0.000285	0.000525	-0.542136	0.5913

R-squared	0.737012	Mean dependent var	-0.025549
Adjusted R-squared	0.644193	S.D. dependent var	14.97359
S.E. of regression	8.931687	Akaike info criterion	7.446492
Sum squared resid	2712.351	Schwarz criterion	7.958235
Log likelihood	-161.9926	Hannan-Quinn criter.	7.639064
F-statistic	7.940288	Durbin-Watson stat	1.987366
Prob(F-statistic)	0.000001		

4.4.2 Impacted the overall ARDL model Breusch-Godfrey Statistical Test Elimination Method

To determine whether the conventional ARDL model: The Breusch-Godfrey Serial Correlation LM Test was appropriate.

D(IM) C D (IM (-1)), D (IM (-2)), D(ER(-1)), D(ER(-2)), D(GDP(-1)), D(GDP(-2)), D(TOT(-1)), D(TOT(-2), D(TOT(-2))

The study's findings are shown in Table 4.11.

Table 4.12: Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.157513	Prob. F(2,32)	0.8549
Obs*R-squared	0.458185	Prob. Chi-Square(2)	0.7953

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 10/29/22 Time: 09:44
Sample: 1982 2021
Included observations: 40
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.153320	2.523236	0.457080	0.6507
D(IM(-1))	1.573812	2.833680	0.555395	0.5825
D(IM(-2))	0.643838	1.175550	0.547691	0.5877
D(ER(-1))	0.568732	1.935590	0.293829	0.7708
D(ER(-2))	-0.461664	1.295957	-0.356234	0.7240
D(GDP(-1))	0.000377	0.000728	0.518164	0.6079
D(GDP(-2))	0.000178	0.000355	0.500831	0.6199
D(TOT(-1))	-0.000105	0.000473	-0.221053	0.8265
D(TOT(-2))	-0.000260	0.000649	-0.401062	0.6910
IM(-1)	-2.923394	5.289823	-0.552645	0.5843
ER(-1)	-0.536569	2.347231	-0.228596	0.8206
GDP(-1)	-0.000384	0.000749	-0.513094	0.6114
TOT(-1)	0.000147	0.000614	0.239708	0.8121
RESID(-1)	1.343157	2.463105	0.545310	0.5893
RESID(-2)	0.410304	0.762514	0.538094	0.5942

R-squared	0.009749	Mean dependent var	2.65E-16
Adjusted R-squared	-0.423486	S.D. dependent var	7.678812
S.E. of regression	9.161587	Akaike info criterion	7.521802
Sum squared resid	2685.909	Schwarz criterion	8.112275
Log likelihood	-161.7623	Hannan-Quinn criter.	7.744001
F-statistic	0.022502	Durbin-Watson stat	2.002434
Prob(F-statistic)	1.000000		

Table 4.11 contains the study's findings, and the probability values for the F-statistic are Prob. F(2,32)=0.8549 and Prob. Chi-Square(2)=0.7953, both of which are more than 0.05. The long term ARDL model exhibits no serial correlation, hence the study accepts the null hypothesis that it is desirable.

4.4.3 CUSUM Test for Stability of the long run ARDL Model

The study's CUSUM Test was used to determine whether the common ARDL model:

D(IM) C D(IM(-1) D(IM(-2) D(ER(-1) D(ER(-2) D(GDP(-1) D(GDP(-2) the stability of D(TOT(-1)) D(TOT(-2)) IM(-1) ER(-1) GDP(-1) TOT(-1)

The study's results are displayed in Figure 4.1.

Figure 4.1: CUSUM Test for Stability of the long run ARDL Model

In the CUSUM test shown in Figure 4.5, the line graph is situated between the two red lines. The Ardl approach is hence stable throughout time. The findings of the study demonstrate the stability, lack of serial correlation, and suitability of the long run ARDL tool for studying long-term

causality. The study used a bound test to check whether a long-term connection between none dependent dimensions exists (import quantity, exchange rate, gdp, and terms of trade).

4.4.4 Bound Testing for Long Run Causality

The study employed bound testing to assess the existence or absence of long-term connections in the following standard ARDL model, which contained the four variables volume of imports, exchange rate, gross domestic product, and terms of trade (Table 4.12):

D(IM) C D(IM(-1)) D(IM(-2)) D(ER(-1)) D(ER(-2)) D(GDP(-1)) D(GDP(-2)) D(TOT(-1)) D(TOT(-2)))) IM(-1) ER(-1) GDP(-1) TOT(-1)

Table 4.13: Table 4.10: Standard 2 lags ARDL model for Bound Testing

Dependent Variable: D(IM)
Method: Least Squares
Sample (adjusted): 1982 2021
Included observations: 40 after adjustments

Variable		Coefficient	Std. Error	t-Statistic	Prob.
C1	C	0.592682	1.389794	0.426453	0.6725
C2	D(IM(-1))	0.247982	0.320070	0.774775	0.4438
C3	D(IM(-2))	-0.086555	0.193426	-0.447482	0.6574
C4	D(ER(-1))	-0.373526	1.607764	-0.232326	0.8177
C5	D(ER(-2))	0.159889	0.912702	0.175182	0.8620
C6	D(GDP(-1))	-7.83E-05	0.000244	-0.321414	0.7499
C7	D(GDP(-2))	-9.13E-05	0.000152	-0.599086	0.5531
C8	D(TOT(-1))	0.000107	0.000405	0.263763	0.7936
C9	D(TOT(-2))	0.000246	0.000402	0.611231	0.5451
C10	IM(-1)	-1.627535	0.435180	-3.739913	0.0007
C11	ER(-1)	-0.446482	2.089820	-0.213646	0.8321
C12	GDP(-1)	-5.58E-05	0.000270	-0.206979	0.8373
C13	TOT(-1)	-0.000285	0.000525	-0.542136	0.5913

R-squared	0.737012	Mean dependent var	-0.025549
Adjusted R-squared	0.644193	S.D. dependent var	14.97359
S.E. of regression	8.931687	Akaike info criterion	7.446492
Sum squared resid	2712.351	Schwarz criterion	7.958235
Log likelihood	-161.9926	Hannan-Quinn criter.	7.639064
F-statistic	7.940288	Durbin-Watson stat	1.987366
Prob(F-statistic)	0.000001		

The study applied Wald Statistics examine the following null hypothesis (H_0)

H_0: C(10)= C(11)+ C(12) + C(13)=

Table 4.14: Wald Test

Test Statistic	Value	df	Probability
F-statistic	7.976982	(2, 34)	0.0014
Chi-square	15.95396	2	0.0003

Null Hypothesis: C(10)=C(11)+C(12)+C(13)=0
Null Hypothesis Summary:

Normalized Restriction (= 0)	Value	Std. Err.
C(10)	-1.627535	0.435180
C(11) + C(12) + C(13)	-0.446823	2.089914

Restrictions are linear in coefficients.

The Wald test's F statistic value was 7.976982, and it was compared to the Pesaran Critical value at the 5% level. The unrestricted intercept, trendless ARDL model utilized in the study. The lower and upper bounds are 3.79 and 4.85, respectively, according to the Pesaran table. We can rule out the null hypothesis H0: C(10)= C(11)+ C(12)+ C(13)=0 when the upper bound statistic is bigger than the F statistics.

In this study F statistics 7.976982 > upper bound value: 4.85. The study therefore rejects the *H0: C(10)= C(11)+ C(12) + C(13)=0* and conclude that the four variables (volume of imports, exchange rate, gross domestic income and terms of trade) have long run association.

4.4.5 Short run Causality

The variables in the long ARDL model $IN = \beta_0 + \beta_1 BD + \beta_2 DB + \beta_3 EB + \ell$ have long run association. By calculating the residuals of the long run models, the study improved upon them. Coefficients for the Short Run ARDL model are shown in Table 4.15.

Table 4.15: Coefficients of the Short Run ARDL model

Dependent Variable: IM
Method: Least Squares
Sample: 1980 2021
Included observations: 42

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.555849	1.291728	0.430315	0.6690
ER	-1.445981	0.758123	-1.907317	0.0627
GDP	-0.000105	5.85E-05	-1.787657	0.0804
TOT	-0.000113	8.82E-05	-1.280277	0.2069

R-squared	0.136429	Mean dependent var	0.102350
Adjusted R-squared	0.080109	S.D. dependent var	9.179183
S.E. of regression	8.803840	Akaike info criterion	7.264872
Sum squared resid	3565.350	Schwarz criterion	7.417833
Log likelihood	-177.6218	Hannan-Quinn criter.	7.323120
F-statistic	2.422396	Durbin-Watson stat	2.597226
Prob(F-statistic)	0.077895		

The following short run standard ADR model with 2 lags was further developed to include Error Correction Term (ECT):

D(IM) C D (IM (-1)) D(IM(-2)) D(ER(-1)) D(ER(-2)) D(GDP(-1)) D(GDP(-2)) D(TOT(-1)) D(TOT(-2)) ECT(-1)

The result of the short run coefficients and ECT are shown in table below

Table 16: Short run 2 lag standard ADR model with Error Correction Term

Dependent Variable: D(IM)
Method: Least Squares
Sample (adjusted): 1982 2021
Included observations: 40 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.366720	1.284230	-0.285557	0.7768
D(IM(-1))	0.287607	0.306526	0.938280	0.3542
D(IM(-2))	-0.091479	0.184742	-0.495172	0.6234
D(ER(-1))	1.018937	0.809846	1.258186	0.2162
D(ER(-2))	0.738947	0.663226	1.114171	0.2724
D(GDP(-1))	1.15E-05	0.000103	0.112040	0.9114
D(GDP(-2))	-5.50E-05	9.36E-05	-0.587164	0.5607
D(TOT(-1))	2.64E-05	0.000104	0.253626	0.8012
D(TOT(-2))	0.000174	0.000155	1.120881	0.2696
ECT(-1)	-1.678757	0.417935	-4.016794	0.0003

R-squared	0.727343	Mean dependent var	-0.025549
Adjusted R-squared	0.661021	S.D. dependent var	14.97359
S.E. of regression	8.717908	Akaike info criterion	7.354938
Sum squared resid	2812.071	Schwarz criterion	7.748586
Log likelihood	-162.8410	Hannan-Quinn criter.	7.503070
F-statistic	10.96686	Durbin-Watson stat	2.019064
Prob(F-statistic)	0.000000		

The Error Correction Term (ECT=-1.678757) gauges how quickly a system is adjusting to long-run equilibrium. The ECT is negative (-1.678757) and significant (p=0.0003), indicating that the entire system (ARDL model) adapts towards long-term equilibrium at a rate of 167.87%.

4.4.6 Short run Regression analysis Breusch-Godfrey Statistical Test LM Testing

The statistical method and sustainability of the shorter term ARDL model were investigated. Table 4.7 displays the short-term ARDL model's stability under the CUSUM test.

Table 4.17: Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.259327	Prob. F(2,35)	0.7730
Obs*R-squared	0.686309	Prob. Chi-Square(2)	0.7095

Dependent Variable: RESID
Method: Least Squares
Sample: 1982 2021
Included observations: 40
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.205185	1.343612	0.152711	0.8795
D(IM(-1))	-0.673175	1.013603	-0.664141	0.5110
D(IM(-2))	-0.256228	0.430992	-0.594507	0.5560
D(ER(-1))	-1.360688	2.230959	-0.609911	0.5459
D(ER(-2))	-0.496983	0.973456	-0.510535	0.6129
D(GDP(-1))	-0.000123	0.000214	-0.572448	0.5707
D(GDP(-2))	-6.36E-05	0.000130	-0.488096	0.6285
D(TOT(-1))	-0.000109	0.000188	-0.577804	0.5671
D(TOT(-2))	-2.76E-05	0.000165	-0.166718	0.8686
ECT(-1)	1.090377	1.714679	0.635907	0.5290

R-squared	0.014602	Mean dependent var	2.08E-16
Adjusted R-squared	-0.295094	S.D. dependent var	7.818694
S.E. of regression	8.897846	Akaike info criterion	7.425334
Sum squared resid	2771.008	Schwarz criterion	7.897712
Log likelihood	-162.4954	Hannan-Quinn criter.	7.603093
F-statistic	0.047150	Durbin-Watson stat	2.054954
Prob(F-statistic)	0.999997		

The Breusch-Godfrey Serial Regression was used. The LM Test reveals that the short run ARDL model has no serial correlation, supporting the invalid theory that the structure is favorable.

4.4.7 CUSUM Test for Stability of the long run ARDL Model

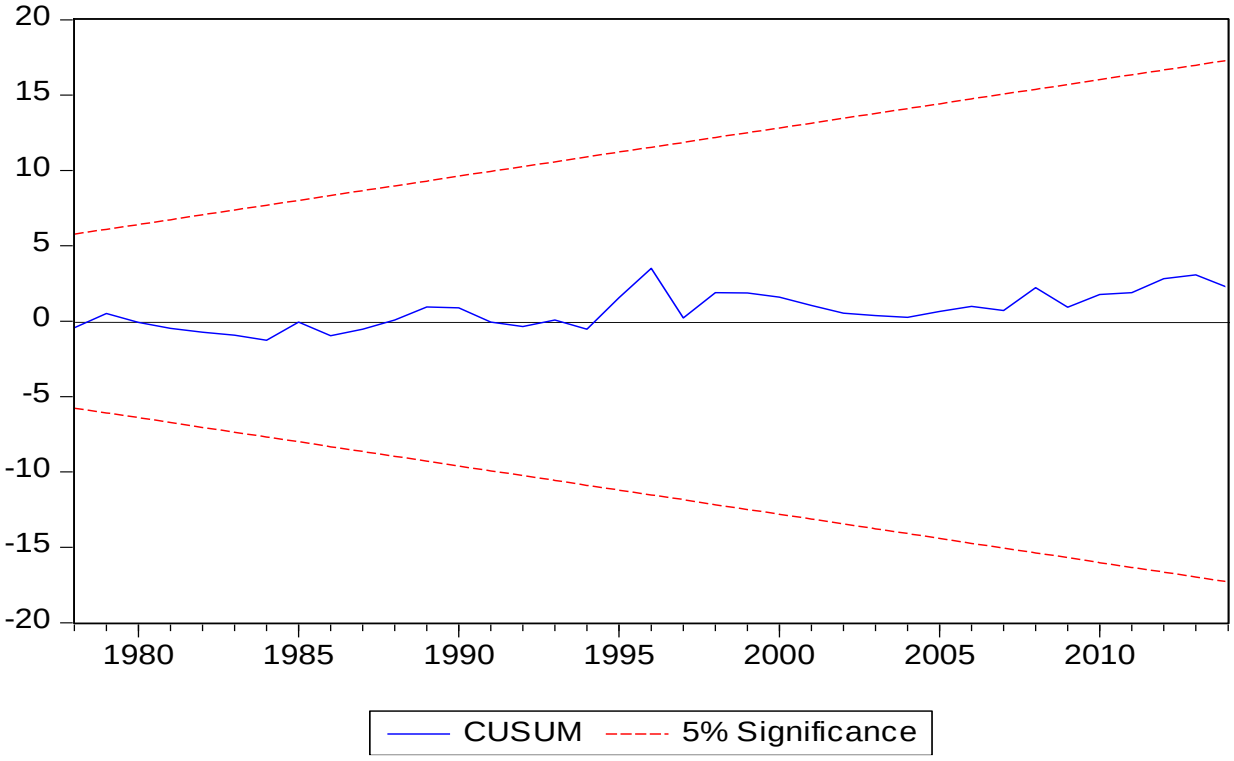


Figure 4.2: CUSUM Test for Stability of the long run ARDL Model

The CUSUM test indicates that the line graph lies between the two red lines. As a result, the ARDL is stable in the short term. The short run ARDL model is suitable for the analysis of short-term causality because it is stable, lacks serial correlation, and is stable. The study then used bound testing to determine whether or not there was a short-term association between the four variables (volume of imports, exchange rate, gross domestic product, and terms of trade).

4.4.8 Bound Testing for Short Run Causality

Table 4.18: Short run ADRL for Bound Testing for Short Run Causality

Dependent Variable: D(IM)
Method: Least Squares
Sample (adjusted): 1968 2014
Included observations: 47 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C1 C	-0.366720	1.284230	-0.285557	0.7768
C2 D(IM(-1))	0.287607	0.306526	0.938280	0.3542
C3 D(IM(-2))	-0.091479	0.184742	-0.495172	0.6234
C4 D(ER(-1))	1.018937	0.809846	1.258186	0.2162
C5 D(ER(-2))	0.738947	0.663226	1.114171	0.2724
C6 D(GDP(-1))	1.15E-05	0.000103	0.112040	0.9114
C7 D(GDP(-2))	-5.50E-05	9.36E-05	-0.587164	0.5607
C8 D(TOT(-1))	2.64E-05	0.000104	0.253626	0.8012
C9 D(TOT(-2))	0.000174	0.000155	1.120881	0.2696
C10 ECT(-1)	-1.678757	0.417935	-4.016794	0.0003

R-squared	0.727343	Mean dependent var	-0.025549
Adjusted R-squared	0.661021	S.D. dependent var	14.97359
S.E. of regression	8.717908	Akaike info criterion	7.354938
Sum squared resid	2812.071	Schwarz criterion	7.748586
Log likelihood	-162.8410	Hannan-Quinn criter.	7.503070
F-statistic	10.96686	Durbin-Watson stat	2.019064
Prob(F-statistic)	0.000000		

Table 4.18 outcomes of the Wald Test for the relationship between inflation and exchange rate over the short term.

Table 4.19: Wald Test results for short run causality running from exchange rate to the volume of imports.

Test Statistic	Value	df	Probability
F-statistic	0.868210	(2, 37)	0.4281
Chi-square	1.736419	2	0.4197
Null Hypothesis: C(4)=C(5)=0			
Null Hypothesis Summary:			
Normalized Restriction (= 0)		Value	Std. Err.
C(4)		1.018937	0.809846
C(5)		0.738947	0.663226
Restrictions are linear in coefficients.			

The probability Chi-square (2) = 0.4197 is greater than 0.05. The study accepts the null hypothesis: C(4)=C(5)=0 meaning that there is no short run causality running from exchange rate to the volume of imports.

Table 4.19 shows Wald Test results for short run causality running from Gross Domestic Product to the volume of imports.

Table 4.20: Wald Test results for short run causality running from Gross Domestic Product to volume of imports.

Test Statistic	Value	df	Probability
F-statistic	0.408166	(2, 37)	0.6678
Chi-square	0.816332	2	0.6649

Null Hypothesis: C(6)=C(7)=0
Null Hypothesis Summary:

Normalized Restriction (= 0)	Value	Std. Err.
C(6)	1.15E-05	0.000103
C(7)	-5.50E-05	9.36E-05

Restrictions are linear in coefficients.

The probability Chi-square (2) = 0.6649 is greater than 0.05. The study accepts the null hypothesis: C(6)=C(7)=0 meaning that there is no short run causality running from Gross Domestic Product to the volume of imports.

Table 4.20 shows Wald Test results for short run causality running from Terms of Trade to the volume of imports.

Table 4.21: Findings of the Wald test for the short-term causation connecting the volume of imports to the Trade relations.

Test Statistic	Value	df	Probability
F-statistic	0.634428	(2, 37)	0.5359
Chi-square	1.268855	2	0.5302
Null Hypothesis: C(8)=C(9)=0			
Null Hypothesis Summary:			
Normalized Restriction (= 0)		Value	Std. Err.
C(8)		2.64E-05	0.000104
C(9)		0.000174	0.000155
Restrictions are linear in coefficients.			

Chi-square (2) = 0.5302 has a greater than 0.05 probability. The research supports the null hypothesis. C(8)=C(9)=0 implying that there is no immediate link between the terms of commerce and the amount of exports.

According to the research, the optimal model to analyze both long- and short-term causality between the variables is an ARDL model with two lags (volume of imports, exchange rate, gross domestic income and terms of trade). Serial correlation was absent, and the model was stable. The study found a long-term relationship between the variables. On the other hand, there was no immediate causality between the factors.

CHAPTER FIVE: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

The study's goal was to determine how currency exchange rates impacted Kenya's import volume. Evaluate the relationship between the exchange rate and Kenya's import volume, as well as the effects of domestic income, trade conditions, and pricing, were the study's main goals. Additionally, it sought to offer policy suggestions in light of its findings.

5.2 Summary

The amount of imports, the exchange rate, and the other four variables show a long-term association, according to the study's findings (F-statistic = 7.976982, p=0.0014). However, there was no immediate cause and effect between the variables (F-statistic=0.259327, p=0.7730). The study thus shows that over time, changes in the exchange rate have had an effect on the volume of imports into the country. The amount of imports rises as a result of cheaper international imports brought about by the strengthening of the Kenyan shilling against the US dollar. On the other hand, as the shillings depreciate against the United States dollar, there are fewer imports into the nation.

The short-term lack of causation between the variables can be attributed to exporters' use of local currency pricing. Exporters are free to draft their invoices in their own currency, another country's currency, a third party's currency, or the currency of Kenya or another country that is importing the goods. Even when the exchange rate varies, import prices remain stable when merchants invoice their products in the local currency. However, businesses who produce and export items to Kenya avoid long-term increases in the value of those commodities in local currency in order to maintain their competitive advantage in international markets.

The study discovered a long-term link between GDP, terms of trade, export volume, and exchange rate. The trading environment has grown, which can be a sign of rising international demand for Kenyan products and higher export earnings. Kenya exports more, hence the shilling's value relative to the US dollar rises. However, export volumes decrease and the value of shillings relative to the US dollar decreases when trade circumstances deteriorate. An increase in the exchange rate improves the conditions of trade as export prices rise and import prices decline.

The GDP measure of domestic income has an impact on the exchange rate. When GDP decreases, currency dealers undervalue the country's currency relative to other currencies. An increase in interest rates, a fall in GDP, and a consequent decline in the value of the shilling all reflect poor economic performance in Kenya. The value of the Kenyan shilling varies, which has an impact on imports and exports both domestically and internationally.

5.3 Conclusion

The analysis comes to the conclusion that Kenya's import volume is influenced by the exchange rate. As the value of the Kenyan shillings rises versus the US dollar, import volume rises. A rise in the value of the shilling suggests that local businesses are able to buy products from other nations. On the other side, a decline in the value of the shilling results in a decrease in the level of imports as local businesses lose the ability to finance the importation of commodities into the nation.

The study's conclusions indicate that Kenya's exchange rate and import volume are influenced by trade conditions and gross domestic product. Import volume increases as trade terms worsen. In contrast, when trade circumstances deteriorate, export quantities decline and the value of Kenyan Shillings declines. An increase in GDP signals a strong Kenyan shilling relative to the US dollar,

which results in an increase in the amount of imports. Therefore, in relation to the relationship between the exchange rate and the number of imports, gross domestic product and trade relations are significant factors in decision-making and policy formation.

5.4 Policy Recommendations

According to the paper, Kenya should devalue its currency to reduce imports while increasing exports. Due to the local currency's depreciation and the enhanced competitiveness of Kenyan goods on international markets, the number of imports will decline. Export growth will support the development of the country's economy. Devaluations of currencies should nonetheless continue at rates that drive up inflation in the country.

The paper recommends that Kenya's government improve trade conditions by having thoughtful conversations with both current and potential new markets for our agricultural products. The Kenyan government needs to reopen markets for our agricultural products and increase exports of items with value added. The increase in Kenya's exchange rate should be utilized to enhance commercial conditions and subsequently promote exports.

5.5 Limitations of the study

The study was inconclusive because it ignored some of the factors that affect the exchange rate and instead concentrated only on the factors that are known to be the primary determinants influencing the volume of imports: the volume of imports, the exchange rate, the gross domestic product, and also the trade conditions. Additional shortcomings of the study included time constraints and the requirement for secondary data. This was because the information required consulting with the appropriate authority to acquire authorization to access it because it was not readily available to the general public. The researcher had difficulty developing the statistical

presentation because of his or her limited familiarity with the Stata tool. This need some additional software training to enable correct utilization of the tool to obtain the required statistical presentations for the data.

5.6 Suggestions for further studies

In terms of the parameters impacting exchange rates on the number of imports and how those components interacted, the study, as said, was not exhaustive. Therefore, it is expected that future academics and researchers would thoroughly examine the impact of the other factors that were not taken into account in this study.

The paper suggests more research to advance our understanding of the relationships among import volume, exchange rate, gross domestic product, and terms of trade. This is because there is a shortage of studies that show the relationship between the four variables, which is why this research was required.

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APPENDICES

Appendix I: Research Data

Year	GDP Per Capital (%)	Volume of export (Billion USD)	Volume of Imports (Billion USD)	Terms of trade	Price of the local currency against terms of foreign currency (KSH against the USD)
1980	5.6	2.1	2.61	80.46	7.42
1981	3.8	2.09	2.32	90.09	9.05
1982	1.5	1.71	2.03	84.24	10.92
1983	1.3	1.55	1.69	91.72	13.31
1984	1.8	1.66	1.98	83.84	14.41
1985	4.3	1.55	1.85	83.78	16.43
1986	7.2	1.87	2.16	86.57	16.23
1987	5.9	1.7	2.1	80.95	16.45
1988	6.2	1.87	2.31	80.95	17.75
1989	4.7	1.91	2.5	76.40	20.57
1990	4.2	2.2	2.69	81.78	22.91
1991	1.4	2.2	2.33	94.42	27.51
1992	-0.8	2.16	2.19	98.63	32.22
1993	0.4	2.24	1.95	114.87	58
1994	2.6	2.65	2.45	108.16	56.05
1995	4.4	2.95	3.54	83.33	51.43
1996	4.1	3.04	3.87	78.55	57.11
1997	0.5	2.98	4.11	72.51	58.73
1998	3.3	2.84	4.05	70.12	60.37
1999	2.3	2.69	3.53	76.20	70.33
2000	0.6	2.74	4.03	67.99	76.18
2001	3.8	2.98	4.29	69.46	78.56
2002	0.5	3.27	3.98	82.16	78.75
2003	2.9	3.59	4.48	80.13	75.94
2004	5.1	4.28	5.29	80.91	79.17
2005	5.9	5.34	6.74	79.23	75.55
2006	6.5	5.94	8.33	71.31	72.1
2007	6.9	7	10.22	68.49	67.32
2008	0.2	8.14	12.53	64.96	69.18
2009	3.3	7.95	11.51	69.07	77.35
2010	8.1	9.14	13.74	66.52	79.23

2011	5.1	10.1	17.27	58.48	88.81
2012	4.6	11.2	17.91	62.53	84.53
2013	3.8	10.97	18.3	59.95	86.12
2014	5	11.25	20.28	55.47	87.92
2015	5	10.61	17.67	60.05	98.18
2016	4.2	9.91	16.17	61.29	101.5
2017	3.8	10.45	19.08	54.77	103.41
2018	5.6	11.56	20.17	57.31	101.3
2019	5.1	11.47	20.41	56.20	101.99
2020	-0.3	9.7	17.71	54.77	106.45
2021	7.5	11.66	22.18	52.57	109.64