

**THE IMPACT OF DIASPORA REMITTANCES ON TRADE BALANCE: EVIDENCE  
FROM KENYA**

**BY**

**KAGWIMA FRANKLIN GIKUNDA**

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REQUIREMENTS FOR THE AWARD OF THE DEGREE OF MASTER OF  
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**DECLARATION**

This research project is my original work and has not been presented for the award of a degree in any other university or institution of higher learning.

Kagwima Franklin Gikunda

Signature.....

Date.....

X51/6196/2017

**APPROVAL**

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

Dr. Peter Muriu

Signature.....

Date.....

## **DEDICATION**

This project is dedicated to my friends and relatives who have offered me support and advice during the study period at the University of Nairobi.

### **ACKNOWLEDGEMENT**

I wish to recognise the support by my supervisor, Dr.Muriu. His guidance has been very important in completing the project. I also appreciate the entire school of Economics University of Nairobi lecturers for preparing me enough to handle the project by equipping me with research skills that I needed. I appreciate the role of my classmates through discussions that enabled me enhance the research skills further.

## **ABSTRACT**

The study was motivated by the growing trade deficit due to overreliance on imports in Kenya, and the fact that there has been a growth in the Diaspora remittances as more people seek jobs abroad. This study sought to investigate how remittances affect the trade balance in the Kenyan economy. Annual time series data from the year 1980 to 2018 was used. The data was obtained from World Bank website. The estimation results revealed that diaspora remittances negatively affect trade balance. Therefore policies to tax the remittances should be embraced

## TABLE OF CONTENTS

|  |      |
|--|------|
| DECLARATION .....                                    | ii   |
| DEDICATION.....                                      | iii  |
| ACKNOWLEDGEMENT .....                                | iv   |
| ABSTRACT .....                                       | v    |
| List of Tables .....                                 | viii |
| List of Figures.....                                 | ix   |
| List of Acronyms and Abbreviations .....             | x    |
| CHAPTER ONE: INTRODUCTION.....                       | 1    |
| 1.1 Background of the study .....                    | 1    |
| 1.2 Diaspora remittances and Trade balance .....     | 4    |
| 1.3 Statement of the problem .....                   | 4    |
| 1.4 Objectives of the study.....                     | 6    |
| 1.5 Significance of the study.....                   | 7    |
| CHAPTER TWO: LITERATURE REVIEW.....                  | 8    |
| 2.1 Introduction .....                               | 8    |
| 2.2 Theoretical literature.....                      | 8    |
| 2.2.1 Classical theory .....                         | 8    |
| 2.2.2 Keynesian theory.....                          | 9    |
| 2.2.3 Monetarist theory .....                        | 10   |
| 2.3 Empirical Literature.....                        | 11   |
| 2.4 Overview of the literature .....                 | 13   |
| CHAPTER THREE: METHODOLOGY .....                     | 14   |
| 3.1 Introduction .....                               | 14   |
| 3.2 Theoretical framework.....                       | 14   |
| 3.3 Empirical model .....                            | 15   |
| 3.3 Definition and measurement of the variables..... | 16   |
| 3.4. Econometric approach .....                      | 17   |
| 3.4.1 Pre-estimation tests.....                      | 17   |
| 3.4.2 Post estimation tests .....                    | 18   |
| 3.5 Sources of data .....                            | 18   |
| CHAPTER FOUR: EMPIRICAL FINDINGS .....               | 19   |
| 4.1 Introduction .....                               | 19   |

|  |    |
|--|----|
| 4.2 Descriptive statistics .....                                 | 19 |
| 4.3 Correlation matrix (Pearsons correlation).....               | 21 |
| 4.4 Graphical analysis.....                                      | 22 |
| 4.5.1 Stationarity test .....                                    | 27 |
| 4.4 Co-integration test .....                                    | 28 |
| 4.5 Vector Error Correction Model .....                          | 30 |
| 4.5.1 Long-run Analysis.....                                     | 30 |
| 4.5.2 Short-run analysis.....                                    | 31 |
| 4.5 Post estimation tests.....                                   | 31 |
| 4.5.1 Breusch-Godfrey LM test for residual autocorrelation ..... | 32 |
| 4.5.2 Normality test.....  | 32 |
| CHAPTER FIVE: CONCLUSIONS .....                                  | 34 |
| 5.1 Introduction .....   | 34 |
| 5.2 Summary of the key findings .....                            | 34 |
| 5.3 Policy implications .....                                    | 34 |
| 5.4 Conclusion.....  | 35 |
| 5.5 Areas for further research.....                              | 35 |
| References .....   | 36 |

### **List of Tables**

|  |    |
|--|----|
| Table 1 Definition and measurement of variables .....                    | 16 |
| Table 2 Descriptive statistics .....                                     | 19 |
| Table 3 Unit root test.....  | 27 |
| Table 4 Differenced data .....   | 28 |
| Table 5: VAR Lag Length Selection.....                                   | 28 |
| Table 6 Co-integration test .....  | 29 |
| Table 7 Effects of Diaspora remittances on Trade deficit .....           | 30 |
| Table 8 Autocorrelation.....   | 32 |
| Table 9 Jarque-Bera test for Normality test .....                        | 32 |
| Table 10 Breusch-Pagan / Cook-Weisberg test for Heteroskedasticity ..... | 33 |



## List of Figures

|   |    |
|---|----|
| Figure 1 Trade deficit and Diaspora Remittances ..... | 2  |
| Figure 2 Foreign Direct investments.....              | 5  |
| Figure 3 Trade Deficit .....                          | 22 |
| Figure 4 Received Remittances .....                   | 23 |
| Figure 5 Exchange rate.....                           | 23 |
| Figure 6 GDP .....                                    | 24 |
| Figure 7 Broad money.....                             | 25 |
| Figure 8 Gross Fixed Capital Formation.....           | 25 |
| Figure 9 Domestic credit .....                        | 26 |
| Figure 10 Normality test.....                         | 33 |

## **List of Acronyms and Abbreviations**

GDP-Gross domestic product  
VECM-Vector Error correction model  
VAR-Vector autoregressive model  
CBK-Central Bank of Kenya

# CHAPTER ONE

## INTRODUCTION

### 1.1 Background of the study

With globalisation, many developing countries like Kenya have experienced a negative trade balance. Trade balance is a measure of the difference between exports and imports of goods in an economy (Mankiw, Kneebone, & McKenzie, 2011). Countries are concerned about their trade balance in that it determines the level of their GDP, hence the incomes and living standards of the people in the society. To be more specific, exports from a country are part of the GDP of the economy. With negative trade balance, it means that economic growth is dragging as there are many goods that are produced outside the country for consumption locally (Mankiw, Kneebone, & McKenzie, 2011). It leads to loss of income to the economy because people who would have been employed to produce such goods and services that have to be imported lose that opportunity.

Diaspora remittances are the money that is sent by citizens of a country living abroad to their relatives in their countries of origin. The Diaspora remittances have been very important in alleviating poverty in that they help individuals in the society get their basic needs. It can also provide savings and investment that further drive economic production. On the other hand, it can fuel consumption of imported goods. The remittances provide foreign reserves in an economy which is positive for the economy, but can also cause fluctuation in exchange rates that can cause uncertainties (Bakker, 2015).

From a theoretical point, remittances can boost aggregate demand in the economy, encourage local investment and lead to export of the excess goods. It can also be a source of savings and capital for investment that reduces imports hence improve trade balance. However, remittances can fuel demand for foreign goods and also makes the domestic currency to appreciate. In such a case, the trade balance would become worse (Mankiw, Kneebone, & McKenzie, 2011).

In modern society, international trade has become an important activity, with globalisation being encouraged to achieve efficiency in the economies. Countries rely on their trade partners in the

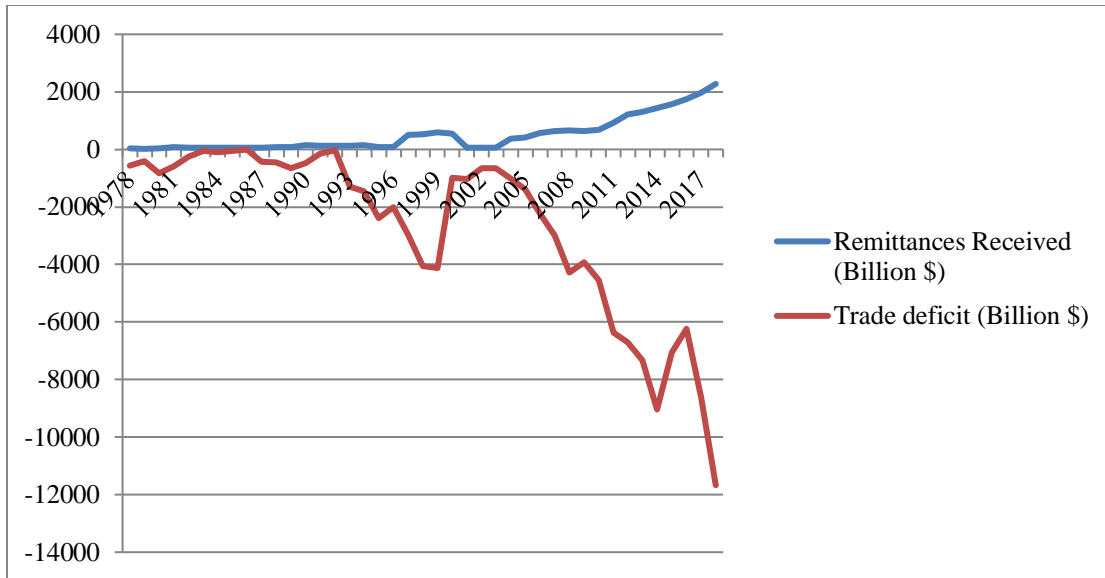
supply of important products, while the local economy benefits when it exports goods as it is a source of foreign income. While protectionist policies have reduced, countries tend to develop policies that ensure that they achieve a trade surplus (Masron, Abdullah, &Amran, 2012). The developing economies have not been able to achieve much of this, considering that most of them export raw materials and import finished products. This is why they have a trade deficit. To develop policies that can improve the trade balance, it is rational to evaluate factors influencing imports and exports, so that policies are designed to reduce imports and instead, increase exports (Masron, Abdullah, &Amran, 2012).

Trade balance measures the value of goods exported, less the value of imports. When a country's imports exceed exports, then there is a trade deficit, which is the case for developing countries such as Kenya. Countries seek to achieve a trade surplus, which is the case where the value of exports exceeds imports. When there is a trade surplus, a country gets the foreign currency that is needed to import equipment that helps improve investments. A trade surplus is regarded as a profit in the international trade between countries, and it assures that more locals are hired hence reducing unemployment (Mukit, Shafiullah, &Sajib, 2013). The local companies generate more profits, and this has the impact of increasing the wealth of a country and even facilitating growth in the GDP.

With the liberalization of economies and high unemployment rates in Kenya, many citizens have sought to work abroad, and send money back to their country to help their siblings and also as part of their investments back home. The central bank has recognized the diaspora remittances as important sources of economic development, considering that they form a significant proportion of the total GDP of the economy (2.3% of the total Kenyan GDP as per 2018 statistics) (Central bank of Kenya, n.d.). With so many people in the world living in foreign countries and sending money back home, there has been interest in understanding how such remittances impact on the economies

The following is the trade balance and Diaspora remittances over the years;

**Figure 1 Trade deficit and Diaspora Remittances**



Source: (World Bank)

From the chart, Kenya trade balance was positive in the years 1976 and 1977 but has been negative for the rest of the years. For the year 2000, the trade deficit has increased significantly, as the country has continued to open up its economy. There is a need to ensure that the trend is slowed down so that more jobs can be created locally. It is noted that fluctuating trade balance influences exchange rates, which then can influence the standards of living in the economy.

The chart also shows that there was a sharp increase in the diaspora remittances to Kenya from the year 2010. This is a reason why the Central bank of Kenya introduced regulations through the Kenyan parliament to regulate and monitor remittances (Central bank of Kenya, 2013). There are many channels used to remit money to Kenya, and some of them are not well monitored, meaning that the remittances may be underreported. It shows that this source of foreign currency significantly impact the overall economy.

In past studies, various factors have been identified as determinants of the trade balance. This includes the money supply in the economy, the level of incomes, and exchange rates. However, there have been no attempts to evaluate how Diaspora remittances affect trade balance in Kenya. There is a reason to evaluate whether diaspora remittances influence trade balance in the Kenyan economy.

With increasing diaspora remittances in various economies, the interest has been to have policies that achieve sustainable development of the economies. The diaspora remittances are known to solve social, economic problems such as low education levels and alleviation of poverty in some families (Peprah, KwesiOfori, & Asomani, 2018). Sustainability means that the short term impacts of diaspora remittances should not be prioritized over the long-run effects. The study evaluates the long-run effects of remittances in Kenyan economy by evaluating how it impacts the trade balance.

## **1.2 Diaspora remittances and Trade balance**

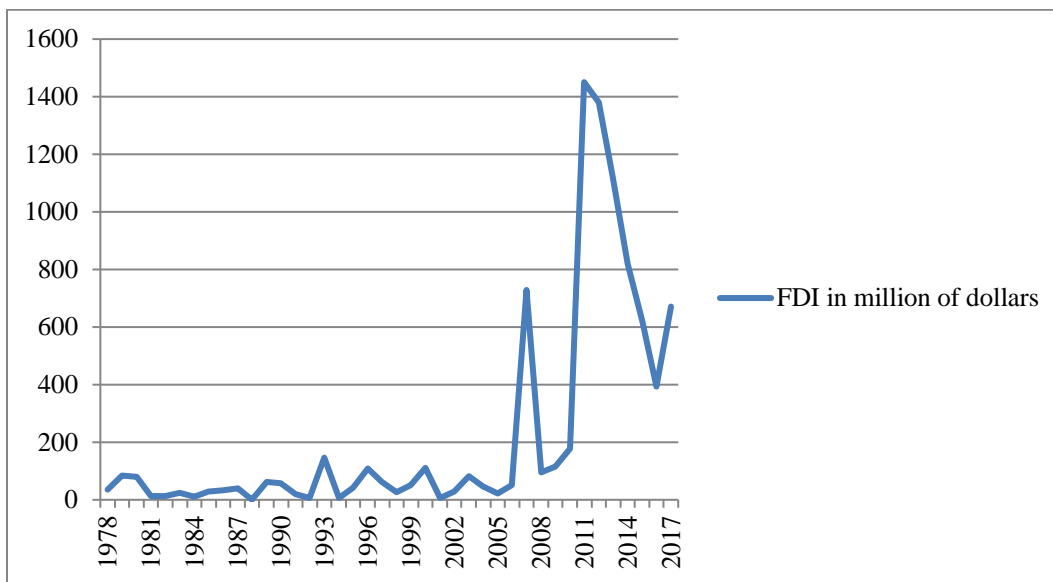
Diaspora remittances can affect trade balance in various ways. First, the remitted income can be consumed locally, saved, or invested. After investments, the goods produced locally can be used as substitutes for imports, and the rest can be exported. In such a case, the remittances could have helped reduce the trade deficits, and also create jobs locally (Hien, 2017). On the other hand, the Diaspora remittances can make the local currency to appreciate, hence reduce the exports as the local products become expensive. This is why Diaspora remittances have been said to cause a Dutch disease, as it affects the other sectors of the economy (export sector) in a negative way (Gutema, 2018). Also, diaspora remittances can increase the consumption of imported goods, and this can also adversely affect the trade balance. In sub-Saharan Africa, the Diaspora remittances have been associated with the Dutch disease, but have helped boost trade balance in the case for Malaysia. There was a need to study the case for Kenya to have a clear understanding of how remittances affect the economy.

## **1.3 Statement of the problem**

Kenya needs to increase exports so that jobs are created in the local market, and the standards of living of the people will improve. It is clear that increasing exports can provide a foreign exchange that is needed to purchase investment goods locally. There is thus a need for policies that can ensure that the trade balance is improved (Farzanegan, & Hassan, 2015). In the past, foreign aid and foreign direct investments helped improve investments that would reduce the need to import various goods. It has also been critical in boosting investments, creation of jobs, generation of incomes and overall economic growth. However, foreign aid has been reducing, and the foreign direct investment has also been declining over the years, considering that some companies find it cheaper to enter new markets such as Africa through the export of finished

goods (Buzdugan, & Tüselmann, 2018). There has also been an emphasis on creating jobs in the home countries, and this means that multinationals do not necessarily need to start new branches in international markets such as Kenya. The following chart summarise the declining foreign direct investments:

**Figure 2 Foreign Direct investments**



Source: World Bank

Trade balance also tells the extent to which an economy is improving its GDP. Countries such as China have achieved a sustained GDP growth through maintaining a trade surplus, meaning that they produce enough for the locals and export the excess. African countries such as Kenya can boost their economies if they focus in import substitution industries and also increase export of the surplus goods as China has done.

For the case of Kenya, negative trade balance indicates that there are potential jobs lost considering that some of the goods consumed locally are made in other foreign countries (Buzdugan, & Tüselmann, 2018). Diaspora remittances provide an opportunity to increase savings and investments hence create jobs locally. If Diaspora remittances facilitate the negative trade balance, then there would be a need for policies to ensure that this negative impact is controlled.

Kurshid et al. (2018) study concluded that the diaspora remittances cause a Dutch disease in most developing countries by causing a trade deficit. However, this is not the case for all countries and there would be a need to study each individual country. The study by Hien (2017)

revealed that Diaspora remittances did not cause Dutch disease in Malaysia. However, Maduka, Madichie, &Ekesiobi (2019) indicated that in Nigeria, diaspora remittances negatively affect Nigerian trade balance. While there are studies and theories explaining trade balance, there is no empirical study in Kenya to show how the remittances affect trade balance. There has been no study in Kenya relating to Diaspora remittances and trade balance, and this study closes this gap. It will thus help suggest policies directed to Diaspora remittances that are necessary to deal with the problem of negative trade balance.

With the freedom of movement and the shortage of labour in the developed countries, Kenyans will continue to seek jobs abroad, and will thus continue to remit incomes to their home countries. As the inflow of foreign currencies increases, there is a need to ensure that the country channels such incomes to investments that can substitute imports and also generate exports hence improve the trade balance (Gutema, 2018). Coming up with policies to achieve these goals is possible if there is a clear understanding of whether the inflow of remittances influences the trade balance positively or negatively. In past studies in different parts of the world, remittances can positively or negatively affect the trade balance of a country, hence there was a need to focus on the case for Kenya to understand the relationship and make policies that are good for the economy. In summary, the study needs to find out whether Diaspora remittances economic growth and create jobs locally, or harm economic growth of the economy by increasing imports and discouraging exports from the economy.

#### **1.4 Objectives of the study**

The main objective is to investigate the influence of Diaspora remittances on trade balance. Specifically, the study seeks to;

- i) To find out how foreign remittances affect the trade balance in Kenya
- ii) Establish how Exchange rates affect trade balance in Kenya
- iii) Find out how domestic income (GDP) affect trade balance in Kenya
- iv) To find out how money supply affects trade balance in Kenya
- v) To establish whether a long-run equilibrium relationship exists



### **1.5 Significance of the study**

The study is valuable to various groups in society. First, it will inform the financial sector of the growing volume of diaspora remittances, so that efficiency in the delivery of services and also offering financial advice to those receiving huge remittances can be offered. The financial sector, such as banks can come up with incentives to encourage savings as well as encourage people to remit more money to the economy (Hien, 2017). Such a move can boost banking activities because savings in banks can be loaned to investors hence boost the economy.

The study will also benefit the policy makers in various government agencies. Based on the results, the study can be used to introduce taxes to generate government revenue, if the remittances are considered to have an overall negative impact on the economy. Regulations can also be enhanced to encourage remittances if the impact is improvement in the trade balance.

This study generates interest in the study of diaspora remittances and various impacts it may be having to the economy. Scholars could be interested in finding out the major sources of foreign remittances and the major reason why individuals choose to remit money and to who in the economy. One could also be interested in understanding whether there are methods of remittances that are not accounted for and if some remittances are from money laundering activities or online consultancy and sales from foreign individuals colluding with the locals.

Most important, the study will close the existing literature gap on how growing Diaspora remittances are affecting trade balance. There has been no study to find out how the two variables are related and this study will contribute to the existing literature by explaining how the remittances affect trade balance.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

This section evaluates theories related to the selected topic, before evaluating the past empirical studies. At the end, overview of literature is presented and the gaps in the past studies identified.

#### **2.2 Theoretical literature**

##### **2.2.1 Classical theory**

According to Mercantilism, a good citizen has to generate more wealth for their country by exporting more than they import. Through exports, countries were able to get silver and gold from other countries. These were precious metals that would be important when evaluating the wealth for a nation. If a country is exporting less than it imports, then it would be draining its wealth. The mercantilists thus suggested that there should be policies that regulate international trade so as to ensure a favourable balance of trade (Kumar, 2008). The theory was criticized by Adam Smith who emphasized on free trade. The argument by Smith is that seeking to export more than a country import would give the other country undue advantage. This is considering that the price for the precious metals would increase in a great way that countries would have to export huge amounts of goods to get small amounts of silver and gold as expected by the Mercantilists.

According to Adam Smith, countries can trade in goods that they have absolute advantage. He considered labour as the only factor of production; hence productivity was the major factor that would lead to trade imbalance. His proposal was that there needs to be subsidies and other policies to encourage exports, and also policies that can discourage imports. Adam Smith encouraged specialization in production of goods that a country has absolute advantage over and trade would be beneficial for both countries engaging in trade. Unlike Mercantilists, Adam Smith argued that the wealth of nations can be measured by the goods and services that are available for consumption by a country (Seyoum, 2009). The theory of Absolute advantage was criticized by David Ricardo who explained that countries could still trade even if one country has absolute

advantage in trading of two goods. This is possible if the disadvantaged country specialized in producing and exporting goods that it has more comparative advantage as compared to the other country.

As per the Mercantilist theory, individuals must export so that they have the currency (gold and silver) to pay for their imports. If there are remittances, then it means that the countries receiving remittances get the currency to import goods and services (Kumar, 2008). Even without having to export, such a country can be motivated to import since they have the foreign reserves that are needed for importing goods and services. The theory by Adam Smith and David Ricardo explains that trade balance is influenced by productivity of labour. Adam Smith and David Ricardo theories assume that there is no movement of labour across the border. This means that they do not explain how remittances affect trade balance.

Remittances have been crucial in educating relatives in the countries where they are sent. When such people are educated, it means that their productivity increase and this is a source of trade advantage in that it improves productivity that can help export goods abroad hence accumulate more wealth. Remittances are thus important in enhancing the exports and reducing imports, hence help achieve a more favourable trade balance.

### **2.2.2 Keynesian theory**

According to Keynes, trade imbalances are problems caused by free trade between countries. The country with trade surplus causes a negative externality in that it reduces the global aggregate demand. Keynes proposed an international bank that would have a global currency (The bancor) that would be used to clear trade balances (Deardorff, 2014). The theory explains that the international currency would be used to measure trade imbalances and borrowing of the currency to clear the imbalances would be important in ensuring stability in international trade. Keynes predicted chaos if there is no trade balance, considering that if the countries with trade deficit failed to pay loans they borrowed, then the countries with the trade surplus would be losing (Seyoum, 2009). This is considering that as countries borrow abroad, they invest so as to minimize the need to import. The problem is that some countries would make investments that do not generate returns, and would thus not be able to meet their obligations.

The theory suggests that international borrowing to invest in productive projects can be important in reducing trade deficits. Based on this, the theory supposes that remittances that are sent from foreign countries can be used for investments that would then help reduce imports and instead create exports hence reduce the trade deficit.

### **2.2.3 Monetarist theory**

The monetarists argue that trade deficit is not a problem to any economy. According to Bastiat, trade deficit is an indication of profits or success of an economy. The profit is achieved if a businessperson from one country exports to another country, and then buy the foreign goods (imports), selling them at a higher price making profits (Seyoum, 2009). In such a case, import price exceeds export price, hence a trade deficit. The truth is that the business person in the country with trade deficit has made profits.

Milton Friedman argued that trade deficits are not harmful to the economy in that the currency has to finally come back to the home country. Friedman explains that if there is a trade surplus, then the currency appreciates, makes the exports expensive and this helps stabilize the trade balance as the exports reduce (Itoh & Negishi, 2013). The trade deficit is thus eliminated without any investments being made locally. According to Friedman, there is even greater benefit if there is a trade deficit, considering that it would mean that a country has purchased using money (papers and coins) that are less worth the goods that have been purchased. As a country supplies more money in the economy, it becomes possible to import more goods and this causes a trade deficit.

From the monetarist's theory, remittances provide foreign currency that is used to make imports. When there are remittances, the locals use the money to buy imports, which are more worth than the paper money. This can increase the trade deficit, which is good for the locals as it means that the locals are enjoying more goods from abroad, instead of keeping paper money that is worth less than the goods (Seyoum, 2009).

The theories conflict, considering that classical theory explains that trade balance is a loss to economy as it indicates outflow of wealth. On the other hand, the Keynesian theory explains that trade deficit does not benefit any country involved in the trade. The monetarists on the other

hand explain that trade deficit is good for an economy. While there is no clear explanation of how trade balance is influenced by the remittances, it is evident that it provides a means of improving human capital that is important for improving comparative and absolute advantage as per the classical theories. Such human capital involves people getting more education using the remittances and then securing jobs that enable the economy produce goods that lead to a reduction in the trade deficit (Lovett, Alfred, Eckes, & Brinkman, 2004). For the monetarists, the remittances provide money that can be used for imports, considering that imported goods are more valuable than the paper money.

### **2.3 Empirical Literature**

Apart from the existing theories, there have been studies conducted in the past to evaluate how various variables impact on the trade balance. This section evaluates the past research, and this helps differentiate this study from past studies.

Kurshid et al. (2018) conducted a study of the low, lower-middle, and middle-income countries to find out how remittances affect their trade balance. A total of 58 countries were studied, and the method used was generalized methods of movement. The countries selected were from Africa, Asia, and the American continent. The authors used data covering from 1988 to the year 2014 (Kurshid et al 2018). The variables investigated included foreign direct investment, money supply, trade openness, inflation, and productivity in the economy. The findings indicated that the foreign remittances to these countries was causing a Dutch disease, considering that the inflow of the foreign currencies affected the exchange rates, which then adversely affected exports and the trade balance. However, the study concludes that this does not apply to all countries, and the findings are country-specific. This means that there would be a need to find out how foreign remittances in an economy affect the trade balance in that specific country.

From the studies done relating to various regions, there has been a motivation to evaluate the case for specific countries. Hien (2017) sought to find out how remittances affect the trade balance in Malaysia, which is a case of a developing country. The motivation of the study was the growth in the diaspora remittances in the economy. There was the growing view that remittances were causing Dutch disease in the developing countries. Ordinary Least square method was used in regression of the data, where the period under study covered the years 1990 and 2015. The variables used included real exchange rates, interest rates, national income, and

foreign assistance. The findings of the study were that foreign remittances had a positive impact on the trade balance in Malaysia, showing that it helped deal with a trade deficit (Hien, 2017). This was against the past studies reviewed that indicated that some developing countries were experiencing Dutch disease because of the foreign remittances. The article further explains that the findings cannot be generalized to the rest of the developing countries. This is why the aim of the study was to evaluate the case for Kenya, which will help tell whether remittances positively impact on trade balance or cause Dutch disease in the economy.

Maduka, Madichie, &Ekesiobi (2019) evaluated the impact of remittances on the trade balance in Nigeria. This was important considering that the remittances in the economy increased sharply from 2004, and even exceeded foreign direct investment. The remittances have helped solve many economic problems in Nigeria, such as reduction of poverty levels, but there was a need to find out how it affects the trade balance. The model was such that the trade balance was the dependent variable, while the independent variables used were exchange rate, gross domestic product, foreign direct investment, foreign aid, and domestic credit (Maduka, Madichie, &Ekesiobi, 2019). OLS was used in the estimation of the model. The findings were that there was a negative relationship between trade balance and remittances to the Nigerian economy. This is why there is a recommendation to have remittances saved and invested in industries that produce export goods.

Osoro (2013) evaluated the factors that influence trade balance in the Kenyan economy. This was achieved through the use of time-series data. The study was motivated by the need to close the growing trade deficit in Kenya, so as to create jobs in the Kenyan economy. A regression model was used in the study process, where the independent variable was Balance of Payments, and the independent variables used were a foreign direct investment and the exchange rates. The findings were that both variables negatively affect the trade balance, and are statistically significant (Osoro, 2013). The research, in this case, did not include many other variables that would influence the trade balance, such as money supply and gross domestic product. It also does not include foreign remittances. The research, in this case, will fill the gap by ensuring that more variables are included in the model, and also covers up to the most recent data available.

## **2.4 Overview of the literature**

From literature, foreign remittances have been growing faster than foreign direct investment. For most of the developing countries, the remittances lead to Dutch disease because it adversely affects the trade balance. However, this is not the case for all the countries, considering that some countries experience a positive relationship between remittances and trade balances. There have been studies to find out the various factors that impact trade balance in Kenya. However, these studies have ignored the role of domestic remittances. This study closes this gap by ensuring that the findings tell whether the remittances lead to a Dutch disease or positively impact on the trade balance. This will help recommend policies that can ensure that the remittances help achieve sustainable development of Kenyan economy. The choice of the model of analysis is also a factor that differentiates some other past research that has been based on descriptive statistics and past review of the literature.

## CHAPTER THREE

### METHODOLOGY

#### 3.1 Introduction

This chapter explains methodology employed in the study. This includes the theoretical framework adopted, empirical model, definition and measurement of variables, the econometric approach and the sources of data.

#### 3.2 Theoretical framework

This study adapts imperfect substitute model, which means that the goods that are traded between two countries are not perfect substitutes. This is the model recommended by Goldsten and Kahn (Stučka, 2004). This means that goods made in Kenya are not similar to those made in the rest of the world, and that it is possible for the two countries to exchange the goods. It is known that trade balance is the difference between exports and imports (X-I). From theories and literature reviewed, factors such as output, Money supply, Domestic credit, Gross fixed capital formation and prices (exchange rates) influence trade balance. The implication is the following model:

$$X=f(Y_f, P_f, T)$$

And

$$I=g(Y_d, P_d, T)$$

Where;

X- Exports

$Y_f$ -international output

$P_f$ - international prices

$Y_d$ =Domestic output

$P_d$ =Domestic prices



T-policies such as monetary policy, tariffs and other factors that affect demand for imports and exports in an economy

The past empirical studies indicate that higher GDP (Y) raise demand for foreign goods. Also, money supply increase demand for foreign goods. Negative relationship exists between prices and demand for imports. International prices can be measured by the exchange rates and income in the economy can be measured by GDP.

### **3.3 Empirical model**

From the literature review, it was possible to find out the various variables that would impact trade balance. The variables of interest in the study are trade balance (measured by trade deficit) and Diaspora remittances. The aim is to find out the relationship between trade deficit and Diaspora remittances. Control variables are exchange rate, money supply, gross fixed capital formation, domestic credit to the private sector and GDP. The following is the summary of the model;

$$TB = \beta_0 + \beta_1 RR + \beta_2 EX + \beta_3 GDP + \beta_4 BM + \beta_5 GC + \beta_6 DC + \varepsilon$$

Where;

TB=log Trade deficit

$\beta_0$ = constant

$\beta_1, \beta_2, \beta_3,$  and  $\beta_4,$  are the coefficients that are to be estimated.

RR=log Diaspora remittances

EX= Log Exchange rates

BM=log broad money

GDP=log Gross domestic product

GC=Log Gross fixed capital formation

DC=Log Domestic credit

$\epsilon$ = the error term

The model was thus estimated to show how the various variables impact on trade balance. It should be noted that all the variables in the model are endogenous, considering that even trade balance influence exchange rates and vice versa. Remittances also affect exchange rates and the exchange rates affect the amounts of remittances received in Kenyan shilling. The volume of past money supply forms the basis of future money supply. Past trade deficit is also a factor that influence future exports. The past income influences the current and future GDP. Variables in the model are thus affected by their lags and lags of other variables. As such, vector autoregressive model is adapted in estimating the model. This is considering that there is no clear theory that explains the factors that influence trade balance.

### 3.3 Definition and measurement of the variables

The following is the summary of the variables, their definition, how they are measured and the expected sign;

**Table 1** Definition and measurement of variables

| Variable             | Definition  | Measurement   | Expected sign        |
|----------------------|---|---|----------------------|
| Trade deficit (TB)   | The difference between exports and imports. If the difference is negative, then it is a trade deficit and this is the case for Kenya currently. This is taken as the dependent variable | Trade deficit is obtained by subtracting exports from imports (Zhang, 2008). The amount is measured in US dollars. The values are available in the World Bank website.  |                      |
| Money supply (BM)    | Money in circulation in the economy whether in form of currency or deposits   | Broad money will be used to measure money supply. This is money in banks and in form of notes and coins in the economy at a given time (Zhang, 2008). The values are available in world bank website and measured in dollars. | Positive             |
| Diaspora remittances | Money sent from a foreign country by citizens residing abroad   | Total sum of the money sent by citizens and companies working abroad.   | Positive or negative |
| Exchange rates       | The price of a currency against the other. A decrease in exchange rate shows  | The price of one dollar against the shilling. The values are provided for in the  | Negative             |

|                               |   |  |          |
|-------------------------------|---|--|----------|
|                               | depreciation in Kenyan currency.        | world bank website.  |          |
| GDP                           | Total output in an economy              | The value of produced goods and services in Kenya, as provided in the world bank website | Positive |
| Gross fixed capital formation | Measures net investments in the economy | Total investment in the economy less disposed assets for the year                        | Positive |
| Domestic Credit               | Loans offered to the private sector     | The sum of loans offered to private investors annually                                   | Positive |

Source: Author

### 3.4. Econometric approach

The study used time series data, which often suffers the problem of co-integration. This means that there can be both long run and short run relationships within the model. The problem of endogeneity can arise. While dependent variable was taken as trade deficit, it can influence exchange rates and even GDP. As such, the best method of estimate the empirical model is by the use of multivariate vector autoregressive model. If there was co-integration in the model, the estimation would be based on Vector Error correction Model (Lütkepohl, & Krätzig, 2004). Various tests were done before and after estimation of the model.

#### 3.4.1 Pre-estimation tests

##### *Stationarity tests*

Non stationary data means that the regression results give spurious results that cannot be relied on. The augmented dickey-fuller test was used to find out whether the data was stationary, and if not, the data was differenced. With stationary data, it was possible to estimate the model and get reliable results (Urbain, 1993). Differencing leads to loss of the long-run relationship and this is why VECM was adapted. In the use of VECM, it was expected that the variables become stationary after differencing once.

##### *Co-integration analysis*

Co-integration implies existence of a long-run relationship, and using Ordinary Least square method would lead to a spurious regression. VECM is used when at least one of the models is co-integrated. The aim was to find out the long-term relationship between the variables in the equation (Lütkepohl, & Krätzig, 2004). Co-integration test was done using Johansen test. If co

integration was absent, vector autoregressive (VAR) model would be estimated. If there was co-integration, VECM would be estimated.

### **3.4.2 Post estimation tests**

Three diagnostic tests were done after the model was estimated;

LM test for residual autocorrelation is the first diagnostic test that will be done. This was to find out whether there is a relationship between the error terms (Pfaff, 2008). If there was autocorrelation, this would mean that the estimates are unbiased but the standard errors would be biased, and this could affect the testing of hypothesis.

The second test is the normality test that evaluates whether the error terms in the model are normally distributed. In this case, Jacque-bera test was used (Urbain, 1993).

The final test was heteroskedasticity test. In this case, Breusch-pagan test was done to find out whether the error terms are constant. This ensures that the p-values are not smaller than they are expected to be.

### **3.5 Sources of data**

The study used time series data from the year 1980 to the year 2018. Annual data was used in the study. The choice of the data was based on its availability on the World Bank website. The World Bank data base was thus the source of data for this study. The choice of World Bank is based on the fact that it is an independent organisation that can provide reliable data for study.

# CHAPTER FOUR

## EMPIRICAL FINDINGS

### 4.1 Introduction

This chapter presents the findings. The first part presents the descriptive statistics and correlation analysis while the rest of the chapter estimates vector error correction model.

### 4.2 Descriptive statistics

Descriptive statistics presents mean of each variable and the standard deviation, as well as the maximum and minimum values for the period of 38 years that is under study. The following is the summary of descriptive statistics;

The descriptive statistics in tell how the study variables are distributed. The standard, minimum and maximum variables tell the variables are distributed far from the mean. The Kurtosis, Skewness and Jarque Berra test tell whether the variables mirror a normal distribution. Skewness between -1 and +1 is considered to be near normal distribution, while Kurtosis that is between -3 and +3 is also considered to mirror normal distribution (Meyers, Gamst, &Guarino, 2006). The following is the summary statistics for the data;

**Table 2 Descriptive statistics**

| Variable    | Trade deficit | Remittances received | Exchange rates | Gross domestic product growth | Broad money | Gross fixed capital formation | Domestic credit to private sector |
|-------------|---------------|----------------------|----------------|-------------------------------|-------------|-------------------------------|-----------------------------------|
| Mean        | 9.2933        | 8.3898               | 0.0316         | 3.9362                        | 9.7574      | 9.5051                        | 9.5897                            |
| Std. Dev.   | 0.5291        | 0.5727               | 0.0308         | 2.3033                        | 0.4205      | 0.3705                        | 0.4493                            |
| Min         | 8.3369        | 7.4428               | 0.0097         | -0.799                        | 9.2140      | 9.0056                        | 9.0269                            |
| Max         | 10.1226       | 9.4345               | 0.1348         | 8.406                         | 10.5179     | 10.1829                       | 10.3906                           |
| Skewness    | -0.1487       | 0.1889               | -0.4057        | -0.6004                       | 0.4591      | 0.6621                        | 0.5140                            |
| Kurtosis    | 1.8531        | 1.6041               | 2.7500         | 2.4867                        | 1.8333      | 1.9113                        | 1.8955                            |
| Jarque-Bera | 1.7400        | 1.7790               | 1.267          | 2.8060                        | 1.3970      | 0.5740                        | 0.3520                            |
| Probability | 0.4190        | 0.4108               | 0.5306         | 0.7989                        | 0.4974      | 0.7506                        | 0.8385                            |
| Obs.        | 38            | 38                   | 38             | 38                            | 38          | 38                            | 38                                |

The analysis shows that the mean of the trade deficit was 9.2933, with a standard deviation of 0.5291, and this shows that the data is not spread out far from the mean. The minimum and maximum values for trade deficit were 8.3369 and 10.1226 respectively, and this shows that the values are not distributed far from the mean. The Skewness of -0.1487 means that the data is skewed to the left but the value is close to zero hence the data mirrors a normal distribution. The Kurtosis of 1.8531 is also closer to 3, and this implies a normal distribution. The Jarque-Bera test (1.74) shows that the null hypothesis cannot be rejected since the p value is more than 0.05, and this means that the data mirror a normal distribution.

With mean of received remittances at 8.3898 with standard deviation of 0.5727 and minimum and maximum values of 7.4428 and 9.4345 respectively, it implies that the data is not distributed far from the mean values. Skewness of 0.8543 also means that the data is skewed to the right, but near zero hence near normal in terms of distribution. The Kurtosis of 1.6041 shows that data is within range of +3 and -3 hence mirrors a normal distribution. This shows that there are no outliers in the data. The Jarque bera test of 1.6080 with probability of 0.4108 means that the data is normally distributed.

The mean of exchange rate was 0.03160 with a standard deviation of .03083. The minimum and maximum values were 0.0096 and 0.1348, and this means that the data is not distributed far from the mean. The Skewness of 0.4057 shows that the variable has normal distribution since the value is near zero, although the data is slightly skewed to the right. The kurtosis of 2.7500 also shows that the data is near normal distributed. The Jarque bera test result was 1.2670 and the p-value that is greater than 0.05 shows that the null hypothesis cannot be rejected; hence the data is normally distributed.

The mean value for GDP growth was 3.392% and the standard deviation was 2.3033%. The minimum and maximum values were -0.799 and 8.406% respectively, implying that the data is distributed around the mean. The Skewness was -0.6004, which is near zero showing that it is moderately skewed to the left, but mirrors a normal distribution. Kurtosis of 2.4867 which is near 3 and this also confirms that there are no outliers in the data. The Jarque bera test of 2.8060 also shows that the data is normally distributed considering that the p-value was 0.7989.

The broad money has a mean of 9.7574 with a standard deviation of 0.4205. The minimum and maximum values are 9.2140 and 10.5179, showing that the data is not distributed far from the mean. Skewness of 0.4591 is positive and moderate, since it is near zero and this shows that it mirrors normal distribution. The kurtosis is 1.8333, which is closer to 3; hence there are no outliers in the data. The Jacque bera test of 1.3970 and p-value of 0.4974 shows that the data is normally distributed.

Gross fixed capital formation mean was 9.5051 and standard deviation was 0.3705. Low standard deviation shows that the data is distributed around the mean, which is also reflected by the minimum and maximum values of 9.0056 and 10.1829 respectively. The Skewness was 0.6621, which is moderate right skewed data, which mirrors normal distribution. The kurtosis was 1.9113, which is near 3 hence there is no outliers in the data. The Jacque Bera test of 0.5740 and p-value of 0.7506 shows that the data is normally distributed.

For the case of domestic credit, the mean was 9.5897 and standard deviation was 0.4493, showing that the values are distributed near the mean and this is also reflected in the minimum values of 9.0269, and 10.3906, which are all near the mean. The Skewness (0.5140) is moderate but positive and since it is near zero, the data mirrors a normal distribution. The kurtosis of 1.8955 shows absence of outliers in the data. Jacque Bera test was 0.3520 and p-value of 0.8385, which means that the data is normally distributed.

#### **4.3 Correlation matrix (Pearson's correlation)**

Correlation measures the level of independence of the variables. It tells how two variables are related and the extent to which they are related. For regression to be done, there is a need to ensure that the variables are independent, meaning they are not highly correlated. Variables are highly correlated if their correlation is above 0.9. Correlation of between  $\pm 0.30$  and  $\pm 0.49$  is moderate while correlation below  $\pm 0.30$  is considered low (Meyers, Gamst, & Guarino, 2006). The following is the correlation matrix of the data (log of the variables);

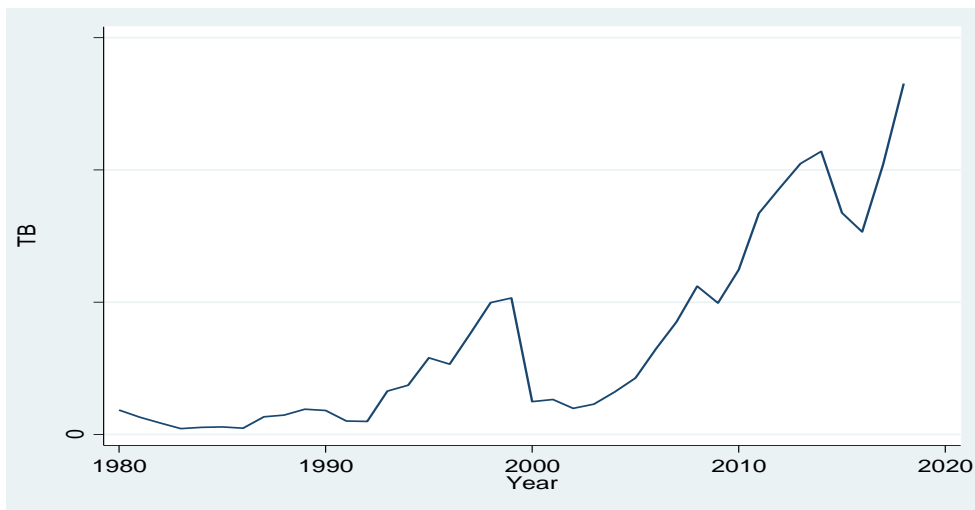
|                               | Trade deficit | Remittances received | Exchange rates | Broad money | Gross fixed capital formation | Domestic credit | Gross domestic product |
|-------------------------------|---------------|----------------------|----------------|-------------|-------------------------------|-----------------|------------------------|
| Trade deficit                 | 1             |                      |                |             |                               |                 |                        |
| Received remittances          | 0.2044        | 1                    |                |             |                               |                 |                        |
| Exchange rate                 | -0.0455       | -0.1179              | 1              |             |                               |                 |                        |
| Broad money                   | 0.1593        | -0.1739              | -0.1151        | 1           |                               |                 |                        |
| Gross fixed capital formation | 0.1965        | -0.0551              | 0.1276         | -0.0928     | 1                             |                 |                        |
| Domestic credit               | 0.0159        | -0.0396              | -0.0851        | 0.05149     | 0.1399                        | 1               |                        |
| Gross domestic product        | 0.0371        | -0.0122              | -0.4903        | -0.0652     | 0.0137                        | 0.0247          | 1                      |

The results show a positive correlation between trade deficit and received remittances. There is also positive correlation between trade deficit and broad money, gross fixed capital formation, domestic credit and gross domestic product. There is also correlation between the independent variables, but the correlation coefficients are below 5, and this indicates that the correlation is weak. The weak correlation between these variables means that there is no multi-coliniarity between the variables.

#### 4.4 Graphical analysis

The graphical analysis in this case helps visualize the trend of the data over the years.

Figure 3 Trade Deficit

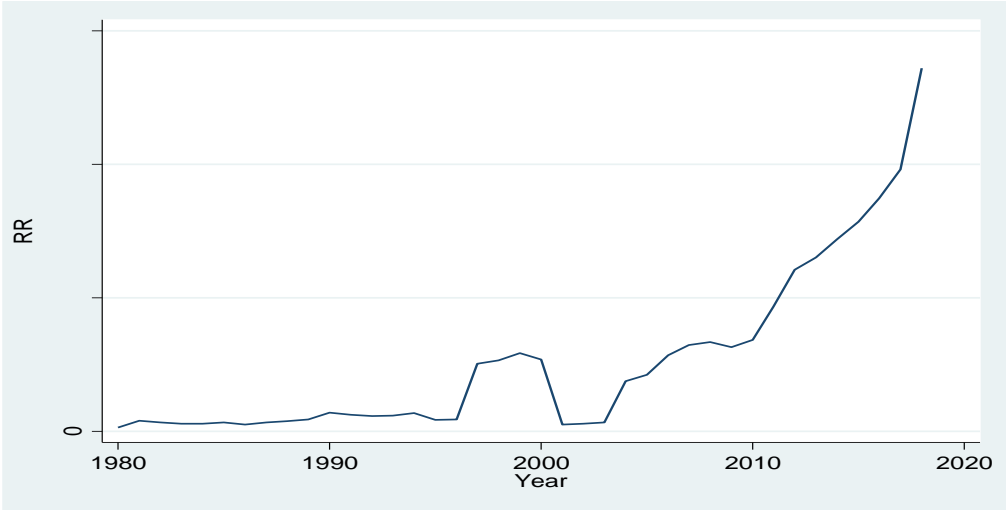


Source: World Bank



From the chart, there is a positive trend in the data over the years, and this means that differencing is necessary to remove the trend before data is analyzed. From 1980s, the trade deficit was growing at low rate, but declined in 1998 to 2001. However, the trade deficit increased sharply from the year 2002 as shown in the chart. The liberalisation of the economy in the 2000s is the reason for the fast growth in the trade deficit as there were more imports than exports in the economy.

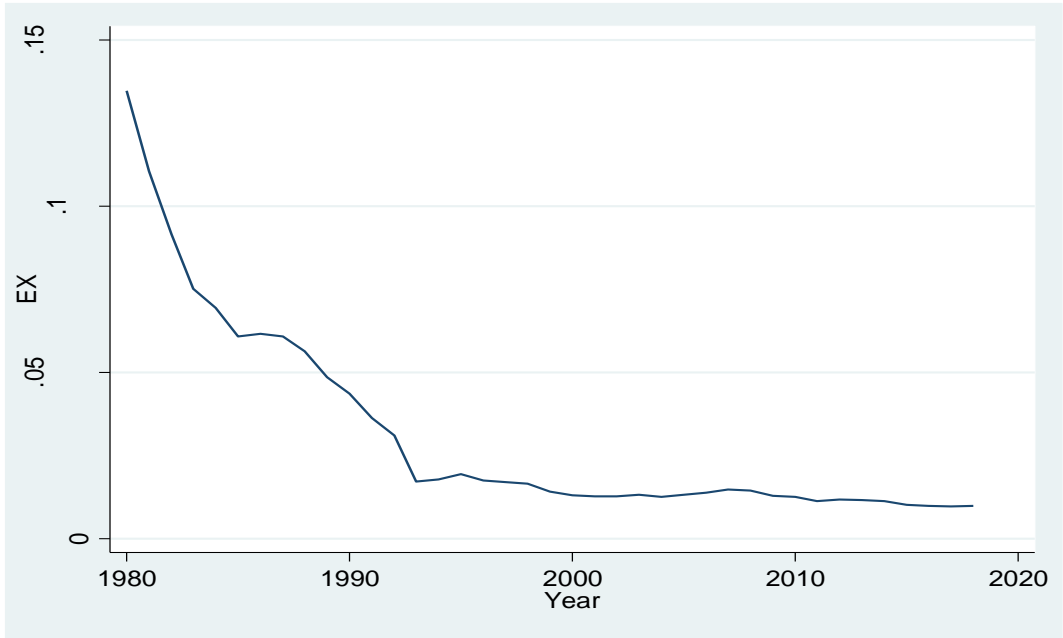
**Figure 4 Received Remittances**



Source: World Bank

The remittances grew at a slow rate from 1980s. However, there was a sharp increase in remittances from the year 2003, showing that more money was remitted to families in Kenya since the year 2004. The rise in the recent years, from 2013 has been even higher than the previous growth. The overall trend is positive showing a growth in remittances over the years. To analyze the data, there will be a need to difference it.

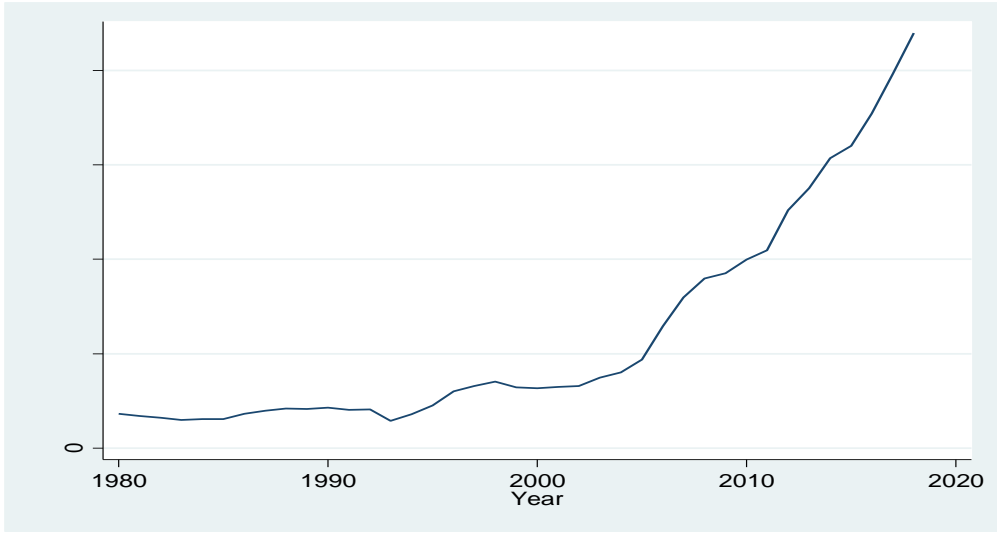
**Figure 5 Exchange rate**



Source: World Bank

The data shows a negative trend over the years, where the value of the Kenyan shilling decreased (depreciated) over the years. Differencing the data is thus important in this case before analysis is done. From 1980, the depreciation was steep up to the year 1992. The depreciation from 1992 to 2018 has been slower. The steep decline in the exchange rate can be associated with the transition period from fixed exchange rate to flexible exchange, from when the rates stabilized.

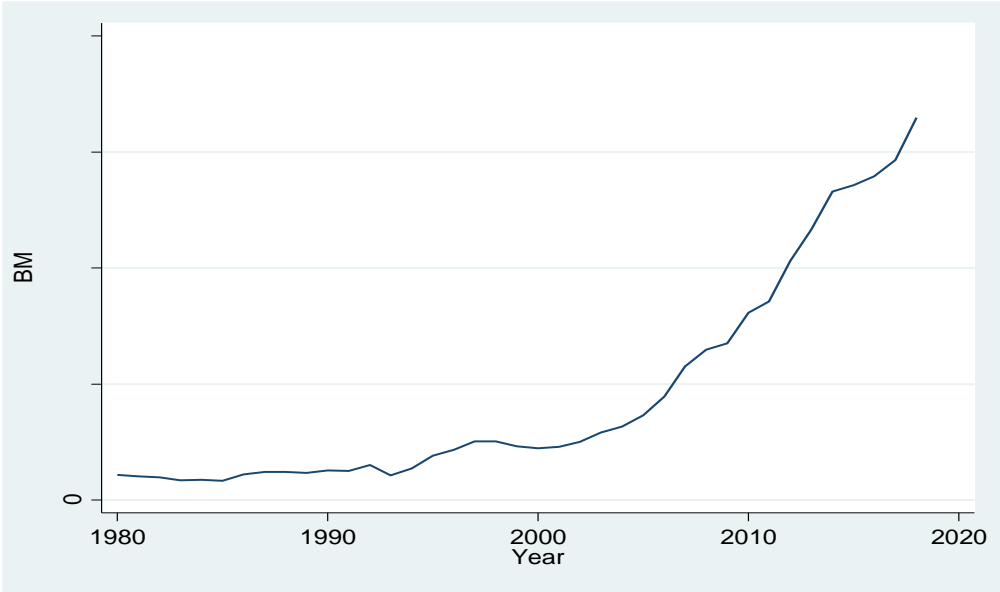
**Figure 6 GDP**



Source: World Bank

The GDP for Kenya fluctuated from the year 1980 to the year 2004, from when there was a steep rise up to the year 2018. There was thus an overall positive trend in the GDP over the years, and de-trending would require that the data is differenced. The data shows a progress in the income of the economy which is good for the economy. Economic reforms coupled with infrastructure developments in the 2000s are the reason for the faster growth in the economy.

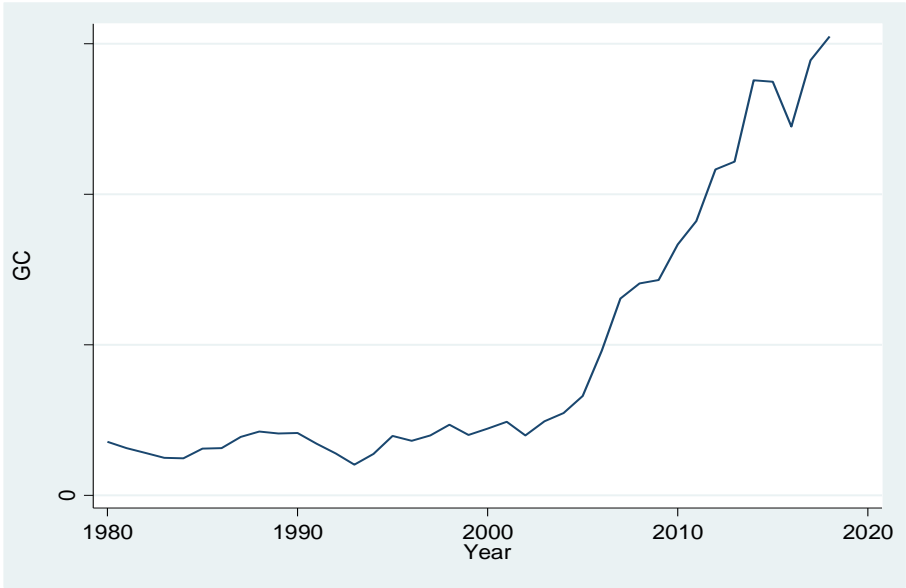
**Figure 7 Broad money**



Source: World Bank

The chart shows a positive trend for the data over the years, and the variables would need to be differenced to remove the trend. Broad money supply has been growing slowly from the year 1980 to 2000s, from when the supply increased at a steady rate. The growth in money supply is associated with the growth in gross domestic product which ensures that there is no deflation in the economy.

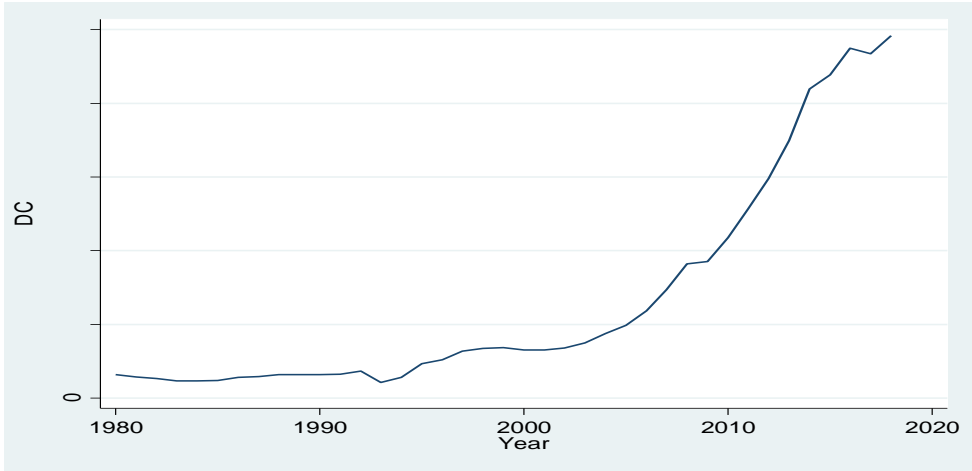
**Figure 8 Gross Fixed Capital Formation**



Source (World Bank)

The chart shows a growth in the gross fixed capital formation. There is thus a positive trend in the data that can be removed by differencing. While the gross fixed capital formation has remained relatively constant from 1980 with little fluctuations, there was a sharp rise in gross fixed capital formation from the year 2001. This shows that there was a rise in investments in the economy for the period.

**Figure 9 Domestic credit**



Source: World Bank

The chart shows that the supply of domestic credit in the economy remained stable from 1980s to the year 2001, from when there was a steady rise in the supply for credit. This can be associated

with the growth in the economy that was also coupled with investments by the private sector. There is thus an overall trend in the data, meaning that differencing is necessary to remove the trend.

#### 4.5.1 Stationarity test

Time series data is usually associated with non-stationarity, which can lead to a spurious regression. Unit root test was important in finding out whether the time series data used is stationary or not. Differencing is used to make the data stationary, but this leads to loss of long-run relationships and this is why vector error correction model is run (Gujarati, 2011). In order to run the selected model, there is a need to ensure that the data is stationary after differencing. If the data is not stationary, then differencing is required and it is a requirement that the data is stationary at the first difference, if Vector error correction model is to be run. Augmented Dickey fuller test was run in this case and the following were the results;

From the charts, it is clear that all the variables have a trend and intercept. This is thus considered in the testing for unit root. Augmented dickey-fuller test with lag value of 1 was done, where a trend was included in the analysis. The constant was not suppressed. The following were the results of the analysis;

**Table 3 Unit root test**

| Variable | ADF Statistic | 1%    | 5%     | 10%    | P-Value | Remarks |
|----------|---------------|-------|--------|--------|---------|---------|
| TD       | -3.204        | -4.27 | -3.552 | -3.211 | 0.0836  | I(1)    |
| RR       | -3.753        | -4.27 | -3.552 | -3.211 | 0.0191  | I(0)    |
| EX       | -1.505        | -4.27 | -3.552 | -3.211 | 0.8274  | I(1)    |
| GDP      | -2.16         | -4.27 | -3.552 | -3.211 | 0.5123  | I(1)    |
| BM       | -2.552        | -4.27 | -3.552 | -3.211 | 0.3024  | I(1)    |
| GC       | -1.974        | -4.27 | -3.552 | -3.211 | 0.6155  | I(1)    |
| DC       | -2.637        | -4.27 | -3.552 | -3.211 | 0.263   | I(1)    |

Based on the results, the p values are greater than 0.05 except for the case of received remittances; hence we fail to reject the null hypothesis at the levels of significance 1%, 5% and 10%. This means that the variables are all non-stationary except for received remittances, and

there is a need to difference them and continue to estimating the model. The data was differenced and the results tested for stationarity as shown in Table 4;

**Table 4 Differenced data**

| Variable | ADF<br>Statistic | 1%    | 5%     | 10%    | P-Value | Remarks |
|----------|------------------|-------|--------|--------|---------|---------|
| DTD      | -3.807           | -4.27 | -3.552 | -3.211 | 0.0162  | I(0)    |
| RR       | -3.753           | -4.27 | -3.552 | -3.211 | 0.0191  | I(0)    |
| DEX      | -4.204           | -4.27 | -3.552 | -3.211 | 0.0044  | I(0)    |
| DGDP     | -3.517           | -4.27 | -3.552 | -3.211 | 0.0376  | I(0)    |
| DBM      | -4.034           | -4.27 | -3.552 | -3.211 | 0.0079  | I(0)    |
| DGC      | -4.241           | -4.27 | -3.552 | -3.211 | 0.0039  | I(0)    |
| DDC      | -4.511           | -4.27 | -3.552 | -3.211 | 0.0014  | I(0)    |

Based on the results, the P-values are all less than 0.05, and this means that all the variables are stationary when differenced once (at 5% significance level). This means that the data is suitable to run a vector autoregressive model and vector error correction model. To decide whether to run VAR or VECM, it was important to find out whether the variables are co-integrated.

#### 4.4 Co-integration test

Before test was done, the optimal lag for the model was necessary. This is important in enhancing the multivariate co-integration test. Using many lags means that one would lose the degrees of freedom, and there would be statistically insignificant coefficient. Too small lags means that model would suffer specification errors. There was a need to use information criterions (AIC, SC, HQIC) to determine optimal lags. The following table summarises the optimal lags as per the information criterions;

**Table 5: VAR Lag Length Selection**

| Lag | LL      | LR      | DF | P     | FPE       | AIC      | HQIC     | SBIC     |
|-----|---------|---------|----|-------|-----------|----------|----------|----------|
| 0   | 218.666 |         |    |       | 1.3e-14   | -12.0952 | -11.9878 | -11.7841 |
| 1   | 438.201 | 439.07  | 49 | 0.000 | 8.2e-19   | -21.8401 | --20.981 | 19.3515* |
| 2   | 487.599 | 98.796  | 49 | 0.000 | 1.1e-18   | -21.8628 | -20.2521 | -17.1968 |
| 3   | 579.345 | 183.49* | 49 | 0.000 | 3.1e-19   | 24.3055* | 21.9431* | -17.4619 |
| 4   | -       | -       | 49 | -     | -4.9e-36* | -        | -        | -        |

\* indicates lag order selected by the criterion  
 LR: sequential modified LR test statistic (each test at 5% level)

FPE: Final prediction error  
 AIC: Akaike information criterion  
 SC: Schwarz information criterion  
 HQ: Hannan-Quinn information criterion

AIC criteria was adapted and the recommended number of lags is 3. This value was then be used in finding the Co-integration rank of the model. Co-integration test was run to find out whether there are long run relationships in the model. This helped make a decision that vector autocorrelation model was not suitable, but vector error correction model should be adapted (Pfaff, 2008). The requirement is that if there is Co-integration, then VECM should be run and not VAR model. Johansen test for Co-integration was run. The null hypothesis is that there is no Co-integration. The following were the results of the Johansen test;

**Table 6** Co-integration test  
 Unrestricted Co-integration Rank Test (Trace)

| Hypothesized No. of CE(s) | Parms | LL        | Eigenvalue | Trace Statistic | Critical Value |
|---------------------------|-------|-----------|------------|-----------------|----------------|
| None                      | 105   | 460.72188 |            | 211.2564        | 124.24         |
| At Most 1                 | 118   | 492.58181 | 0.82967    | 147.5366        | 94.15          |
| At Most 2                 | 129   | 518.84426 | 0.76754    | 95.0117         | 68.52          |
| At most 3                 | 138   | 537.07974 | 0.63690    | 58.5407         | 47.21          |
| At most 4                 | 145   | 548.88399 | 0.48097    | 34.9322         | 29.68          |
| At most 5*                | 150   | 559.07932 | 0.43244    | 14.5415*        | 15.41          |
| At most 6                 | 153   | 566.17037 | 0.32561    | 0.3595          | 3.76           |
| At most 7                 | 154   | 566.3501  | 0.00994    |                 |                |

- Trace test indicates 5 co-integrated equations at 5% level

**Unrestricted Co-integration Rank Test (Maximum Eigenvalue)**

| Hypothesized No. of CE(s) | Parms | LL        | Eigenvalue | Max-Eigen value statistic | Critical Value |
|---------------------------|-------|-----------|------------|---------------------------|----------------|
| None                      | 105   | 460.72188 |            | 63.7198                   | 45.20          |
| At Most 1                 | 118   | 492.58181 | 0.82967    | 52.5249                   | 39.37          |
| At Most 2                 | 129   | 518.84426 | 0.76754    | 36.4710                   | 33.46          |
| At most 3                 | 138   | 537.07974 | 0.63690    | 23.6085                   | 27.07          |

|            |     |           |         |          |       |
|------------|-----|-----------|---------|----------|-------|
| At most 4  | 145 | 548.88399 | 0.48097 | 20.3907  | 20.97 |
| At most 5* | 150 | 559.07932 | 0.43244 | 14.1821* | 14.07 |
| At most 6  | 153 | 566.17037 | 0.32561 | 0.3595   | 3.76  |
| At most 7  | 154 | 566.3501  | 0.00994 |          |       |

- Trace Max-eigenvalue test indicates 5 co-integrated equations at 5% level

At rank 5, the maximum eigenvalue is less than the critical value at 5% degrees of freedom, and the trace statistic is starred (14.5415\*). This means that there are five co-integrated equations in the model. As a result, VAR model cannot be run and instead VECM model had to be run considering the results.

#### 4.5 Vector Error Correction Model

**Table 7** Effects of Diaspora remittances on Trade deficit

| Variable                          | Notation | Long-run model | P-Value (95% conf.) | Notation           | Short-run model | P-Value (95% conf.) |
|-----------------------------------|----------|----------------|---------------------|--------------------|-----------------|---------------------|
| Constant                          | C        | -0.761751      |                     | C                  | -0.0082081      | 0.8100              |
| Received remittances              | RR       | 0.6226649      | 0.0000              | DRR                | 0.03987574      | 0.0230              |
| Exchange rates                    | EX       | -0.1331485     | 0.4250              | DEX                | -0.033078       | 0.1640              |
| Broad money                       | BM       | 8.749922       | 0.0000              | DBM                | -0.4915094      | 0.0960              |
| Gross fixed capital formation     | GC       | 0.7247752      | 0.1310              | DGC                | 0.05340112      | 0.0370              |
| Domestic credit to private sector | DC       | 6.229993       | 0.0000              | DDC                | 0.1970201       | 0.0820              |
| Gross domestic product            | GDP      | 2.675089       | 0.0070              | DGDP               | -0.113742       | 0.4720              |
| Error correction term             |          |                |                     | ECT <sub>t-1</sub> | -0.9710899      | 0.002               |

##### 4.5.1 Long-run Analysis

The analysis shows that a unit increase in remittances received leads to an increase in trade deficit by 0.6226, which means that remittances cause Dutch disease as is the case with many sub-Saharan African countries such as Nigeria (Maduka, Madichie, & Ekesiobi, 2019). There is thus a reason to intervene and ensure that the remittances to the economy create sustainable benefits. The p value is less than 0.05 and this means that the impact by remittances on trade balance is statistically significant.



On the other hand, there is a negative and insignificant long-run relationship between exchange rates and trade deficit, as projected in the literature and previous studies. Money supply measured by broad money on the other hand has a positive long-run relationship with trade deficit, in that a unit increase in money supply increases trade deficit by 8.75 units. The relationship is significant as the p value is 0.0000. This means that increasing money supply in the economy worsen the trade balance which is in agreement with the study by Abbas Ali, Johari, & Haji Alias (2014).

For gross fixed capital formation, the impact is not statistically significant.

For domestic credit to private investors and GDP for the economy, there is a positive relationship with trade deficit in that a unit increase in the two variables increases the trade deficit by 6.2300 and 2.6751 respectively. The impact is statistically significant as the p-values are all below 0.05. This also matches the study by Tang (2018) which observes that increase in GDP and domestic credit increases the imports in the economy, leading to worsening of trade deficit. The following is the summary of the resulting long-run relationship

$$TB = -0.7618 + 0.6227RR - 0.1332EX + 8.7500BM + 0.7248GC + 62300DC + 2.6751GDP$$

#### **4.5.2 Short-run analysis**

The error correction term in the model is -97.11%, and this shows that when there are deviations, the model corrects 97% of the deviations annually.

In summary, diaspora remittances has a negative long run effects on the trade balance, and also has a negative short run adjustment that is statistically significant. This shows that trade deficit worsen the trade balance in the Kenyan economy, hence it is important to have policies to ensure that the remittances contribute to sustainable development of the economy.

#### **4.5 Post estimation tests**

Other tests are done to find out additional information that can be derived from the estimated model. Several tests are adapted in this case as discussed;

#### 4.5.1 Breusch-Godfrey LM test for residual autocorrelation

Autocorrelation evaluates whether there is a correlation of a variable with its past values. This is considering that some variables are influenced by their past values.

**Table 8 Autocorrelation**

| Lag | Chi2    | Df | Prob>chi2 |
|-----|---------|----|-----------|
| 1   | 22.8863 | 25 | 0.5056    |
| 2   | 23.2008 | 25 | 0.5134    |

H0: No Autocorrelation at lag order

There is no autocorrelation since the probability is more than 0.05. There is no autocorrelation in the model.

#### 4.5.2 Normality test

This test evaluates whether the error term is normally distributed around its mean. It tells whether there are outliers in the data and this can tell whether the data was selected randomly.

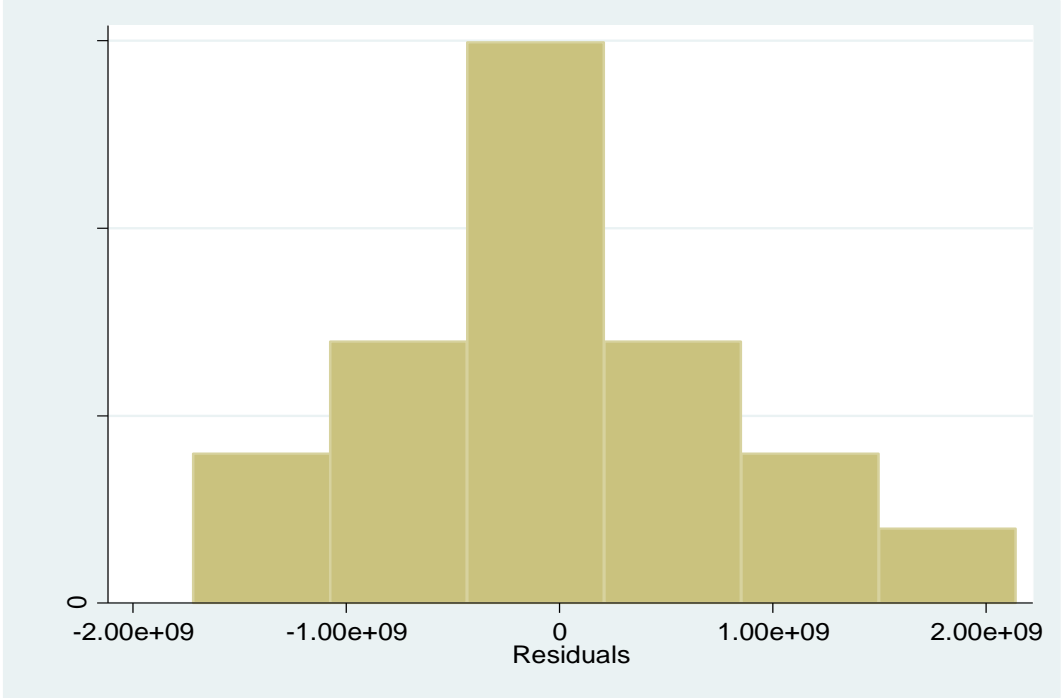
**Table 9Jarque-Bera test for Normality test**

| Equation | Chi 2   | DF | Prob>Chi 2 |
|----------|---------|----|------------|
| TD       | 1.740   | 2  | 0.41896    |
| RR       | 1.779   | 2  | 0.41078    |
| EX       | 1.608   | 2  | 0.44763    |
| BM       | 2.780   | 2  | 0.24910    |
| GC       | 1.397   | 2  | 0.49737    |
| DC       | 0.574   | 2  | 0.75059    |
| GDP      | 0.352   | 2  | 0.83852    |
| ALL      | 11.3780 | 10 | 0.74521    |

The errors for trade deficit, the exchange rate, broad money, Diaspora remittances and GDP, domestic credit and gross fixed capital formation are normally distributed. The errors for the

overall model is also normally distributed which is good for the model. The following chart also summarises the distribution of the residuals, and shows a normal distribution;

**Figure 10 Normality test**



**4.5.3 Heteroskedasticity**

Homoscedasticity is the assumption that the variance of error term does not change in the distribution. If the variance changes over time, it means that there is heteroskedasticity hence the estimates are unbiased but standard errors are not correct.

**Table 10 Breusch-Pagan / Cook-Weisberg test for Heteroskedasticity**

|             |   |        |
|-------------|---|--------|
| chi2(1)     | = | 1.12   |
|             |   |        |
| Prob > chi2 | = | 0.2892 |
|             |   |        |

The results show that there is no heteroskedasticity considering that the p-value is 0.2892, which is greater than 0.05. The null hypothesis cannot be rejected in this case.

## **CHAPTER FIVE**

### **CONCLUSIONS**

#### **5.1 Introduction**

This chapter presents the study conclusions. This includes key findings, policy recommendations, conclusion and areas for further research

#### **5.2 Summary of the key findings**

From the analysis, broad money has a positive impact on trade deficit, as per the projections of literature reviewed and in line with past studies (Mutana, Winrose, &Saina, 2018). Domestic credit and GDP had a negative impact on the trade deficit, which is not as per the projections of literature review. The interest was to find out the relationship between the trade deficit in the Kenyan economy and the Diaspora remittances. The findings show that there is a positive relationship between these variables, and this means that the remittances lead to an increase in trade deficit, which is termed as a Dutch disease in the developing economies. It is thus clear that Diaspora remittances need to be managed so that there are positive benefits to the overall economy.

#### **5.3 Policy implications**

Based on the findings, Diaspora remittances adversely affect the trade balance by encouraging imports instead of local consumption. The remittances also negatively affect the export sector, so that there is less export from the Kenyan economy, and this increases the trade deficit. It is important to manage the inflow of remittances so that it does not discourage local production and export of goods, considering that this leads to slow economic growth and lower GDP of the economy. Remittances have to be invested to create jobs locally hence achieve sustainable development.

With the increasing remittances to the Kenyan economy, the banking sector needs to improve the way the Kenyans can receive the money sent by their relatives abroad. To encourage more remittances, the methods of transfer should be safe, faster and cheaper. This can include

encouraging them to save and invest. Savings can encourage investments and capital formation in the economy. Savings can help reduce consumption of imported goods, and this can ensure that the trade deficit does not worsen as remittances increase. Considering that the remittances adversely affect the import sector, policies such as taxation can help the government generate some income so that investments can be made to benefit the public. This can help reduce the negative impact that is caused by the remittances in the economy.

#### **5.4 Conclusion**

The study observes that the diaspora remittances adversely affect the trade balance, hence can be said to be causing the Dutch disease. The remittances are used for imports instead of local investments and this leads to more imports than exports. The government needs to intervene and collect revenues from the remittances, since this can boost government investments that create jobs in the economy. There is also a need to manage the money supply in the economy as well as lending to ensure that there is no appetite for imports which worsen the Kenyan trade deficit.

#### **5.5 Areas for further research**

There is need to further study how the remittances are affecting the society. Considering that there has been little field studies to find out how remittances have benefited families and individuals, there is a need to conduct such a study. It is crucial to find out why relatives such remittances and how they are used. It would be possible to understand how the remittances are invested locally. This can help appreciate that the remittances help in encouraging investments and reducing imports to the economy.

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