EFFECT OF FOREIGN DIRECT INVESTMENT, INFLATION, REAL EXCHANGE RATE AND TRANSFER PAYMENTS ON TRADE DEFICIT IN KENYA

BY

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MA/BE/00110/2015

A RESEARCH THESIS SUBMITTED IN PARTIAL FULFILLMENT FOR THE REAWARD OF DEGREE OF MASTER OF ARTS IN ECONOMICS.

ECONOMICS DEPARTMENT

SCHOOL OF BUSINESS AND ECONOMICS

MASENO UNIVERSITY

APRIL 2021

DEDICATION

This thesis is dedicated to my family – my wife Benedette as She relentlessly took care of the family for the entire academic period, my son Branson, and my daughter Melinda. I truly appreciate them all for leaving me just enough time to finish this study.

ACKNOWLEDGEMENT

ABSTRACT

Across all the countries, the balance of trade has remained a key indicator of economic activities as it shows a country's level of competitiveness in the world market. Previous studies have entrenched that Kenya needs to attest that trade remains the base upon which her development and industrialization strategy is secured to achieve Vision 2030. Economists are divided on whether a persistent trade deficit is good or bad for a developing country like Kenya. Contrary to most of the similar previous studies, the study included trade in services as well as some of the key factors affecting trade deficit such as inflation and transfer payments and sought to establish the nature and strength of their connection with the trade deficit in Kenya as well as their respective impulse response. The study sought to establish the effect of foreign direct investments (FDI), inflation, real exchange rate and transfer payments on trade deficit in Kenya. Specifically, the study sought to individually determine the effect of FDI, inflation, real exchange rate and transfer payments on trade deficit in Kenya. The study adapted a reduced form of the balance of trade model by hypothesizing that balance of trade is a function of FDI, inflation, real exchange rate and transfer payments. In order to gauge the elements and earnestness of synergy between the variables, the study embraced an ex post facto correlational research design. The study used time series data obtained from the World Bank ranging from the year 1978 which is the year from which Kenya has since experienced incessant aggregate trade deficit up to the year 2014 with annual frequency. The study also employed use of descriptive statistics, Cointegration, Vector Error Correction Model, Granger causality, impulse response function tests as well as a range of other diagnostics tests. The study established that in the long-run, only inflation and transfer payments have significant effects on trade deficit while real exchange rate has an insignificant effect with respective adjustment coefficients of 0.001, -0.060 and -0.028 and respective *p-values* of 0.49, 0.00 and 0.36. The study also established that FDI, inflation, real exchange rate and transfer payments all have insignificant short-run effects on trade deficit with respective adjustment coefficients of -2.669, 0.002, 0.097 and -0.116 and the respective *p-values* of 0.50, 0.74, 0.86 and 0.53. The study recommended that Kenya's persistent trade deficit can be addressed in the long-run but at a cost to the economy in the form of reduced FDI in the long-run. The study concluded that trade deficit is not really bad for Kenya as measures that should reduce it actually reduce foreign direct investments which is really important for a growing economy like Kenya.

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List of Acronyms

ADF	Augmented Dickey-Fuller
ARDL	Autoregressive- Distributed Lag
BOP	Balance of Payments
CPI	Consumer Price Index
CSV	Comma Separated Values
ECM	Error Correction Model
FDI	Foreign Direct Investments
GDP	Gross Domestic Product
INFL	Inflation
OLS	Ordinary Least Squares
PP	Phillips-Perron
REXR	Real Exchange Rate
SAPs	Structural Adjustment Programmes
TRDCTS	Trade Deficit
TRF	Transfer Payments
UNCTAD	United Nations Conference on Trade and Development
RMSE	Root Mean Square Error
VECM	Vector Error Correction Model

Operational Definition of Terms

Foreign Direct Investment- Are net inflows to an economy for gaining abiding management interests of local enterprises within an economy.

Inflation- Is the annual percentage fluctuation in cost of amassing the same basket of goods and services by a consumer as measured by the consumer price index.

Real Exchange Rate- This refers to the product of domestic nominal exchange rate divided by foreign nominal exchange rate and foreign Consumer Price Index divided domestic Consumer Price Index i.e nominal exchange rate (d/f) x (CPIforeign / CPIdomestic).

Transfer Payments – Operationalized to mean the transfers recorded in the balance of payments whenever an economy provides or receives goods, services, income, or financial items without expectation or granting of a favour or advantage.

Trade Deficit- The negative difference in the value of imports in excess of value of exports of all goods and services provided by an economy to the rest of the world. This however, excludes compensation of employees and investment income and transfer payments.

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background to the Study

The role of trade on a country's economic growth cannot be overemphasized as it enables the country manage stabilization of policies, help increase national income, improve a country's capital flows and generally help improve the standard of living for the local citizens among others. Across all the countries, balance of trade has prevailed to be a key index of economic activities as it indicate the economy's level of competitiveness against the rest of the world. Exponents of trade deficit contend that it is not a bad thing as it provides the locals with a broad range of goods and services at more competitive prices thus raising their living standards and so lessening the threat of inflation.

According to (Milton Friedman, 1980), trade deficit signifies that local consumers access and enjoy a broad range of services and goods at lower prices while, a trade surplus signifies that an economy exports services and goods that locals do not get to consume thus paying higher price for the services and goods locally consumed. Pundits, however, portend that trade deficit leads to current account deficit as the country has to borrow from other countries in order to pay for her enormous imports hence a country that endlessly runs trade deficit is liquidating capital assets in order to fund current purchase of services and goods.

According to (UNCTAD, 2014), balance of trade of developing and developed countries for goods and services continue to deviate from each other with those in Africa running overall trade deficits of about $100.4 billion in 2013 while developed countries such as Europe ran an aggregate trade surplus of about $630 billion the same year. As for the Sub-Saharan Africa countries, the region has experienced trade surpluses only in the late 1980s and early 2000s over the past three decades. Since the year 2008, the region has experienced persistent trade deficit.

Scholars and policy makers argue that for Kenya to achieve her general objective of becoming middle-income by the year 2030 as envisioned in her Vision 2030 blueprint, the country needs to guarantee that trade remains the foundation upon which her development and industrialization strategy is anchored. Contrary to this, the country has experienced persistent aggregate trade deficits (including goods and services) since the year 1978.

Over the years, Kenya has embraced different policies and or strategies that affect trade. During the epoch of Kenya's pre-independence, the country produced mainly agricultural products and other primary products for Europe's manufacturing sector with some safeguard in the local market (Were *et al.*, 2003). Kenya embraced an import-substitution strategy forthwith after independence in the year 1963. It is reported that though the strategy safeguarded the country for the availability of

products that were formerly imported, it led to inadequate technical productivity, encouraged the formation of surplus capacity as well successive incapacity to infiltrate external markets (Bigsten, 2001).

At the initial years of the 1970s, Kenya faced a foreign exchange crunch which led the government to tighten organizational controls of the economy further through raising tariffs, employing price controls as well as tightening of procedures for the licensing of imports. The mediations reduced export impetus leading to the shriveling of the share of manufacturing exports of the value of manufacturing output from 40% in 1964 to approximately 10% in the early 1980s. The distortionary effects of import-substitution policy widened in the initial years of the 1980s through reducing competition, discrimination of export production, low capacity utilization among others.

According to (Were *et al,* 2009), after import substitution strategy, Kenya implemented Structural-Adjustment Programmes (SAPs) which was based on the view that the economy would reverse both the macroeconomic inequalities as well as the organizational glitches that arose from the just ended import-substitution strategy. The SAPs which was to see elimination of quantitative constraints, raising of tariffs among other measures did not flourish principally due to lack of compliance and government commitment. In 1991, the failure of SAP in export promotion became apparent with inability to correct macro-economic imbalances initiated by inadequate

fiscal controls, intensifying echelons of corruption, sluggish pace of reforms in public sector, political democratization among others. These led to the beginning to the culmination of SAP with the deferment of Balance of Payments (BOP) support in the year 1991.

The period of comprehensive trade liberalization reforms of the country's international trade followed in 1993 which entailed implementation of markets focused reforms in the main sectors including public, financial, agriculture and social sectors (Were *et al*, 2006). According to (Were *et al.*, 2006) and (Sachs *et al,* 1995), trade liberalization as it commonly known entails the closure of trade licensing requirements, foreign exchange controls among other measures which mainly took place in the year 1993. This was followed by the withdrawal of the restrictions in the capital and also current accounts. According to (Were *et al,* 2009), in as much as the interest rates, exchange rates and inflation stabilized due to trade liberalization reforms, there was a delay in return to stability mainly occasioned by lack of fiscal adjustments hence diminishing stimulus for the private sector and export-led growth.

Prior to the trade liberalization, the failures of the SAPs period was evident through deterioration in economic performance as seen in the fall in GDP growth within the period 1989 to 1991 and later 1992 from 5% to 2.1% and later to 0.5% respectively; deepening of financial and budgetary constraints following the restriction of donor funding (Were *et al,* 2009). In 1993, Kenya changed her international trade policy

opening the window for perpetual hike in imports without a commensurate hike in exports leading to incessant trade deficits. This has seen the excessive importation of both goods and services at the expense of exporting especially from the advent of her relationship with the Eastern countries e.g China hence the tenacious trade deficit.

Previous studies on the effect of real exchange rate on trade balance have revealed mixed results. (Kipkosgei, 2011) undertook a study in Kenya and found that real exchange rate was negatively significant. This is consistent by the studies by (Caporale, 2012), (Mwito, 2015), (Turkson, 2015), (Sharif, 2016) and (Magessa, 2009) which all established that real exchange rate was significant with a negative sign. However, studies by (Ogutu, 2014) and that of (Osoro, 2013) on the other hand all revealed that real exchange rate was positively significant. A different study by (Mbayani, 2016) further revealed that real exchange rate was insignificant with a negative sign. These reviewed studies excluded trade in services which is key for a developing country like Kenya. This study explored the causal effects of real exchange rate on trade deficit and includes other key variables such as foreign direct investments, inflation and transfer payments. This study also explored the impulse response of trade deficit due to shocks in FDI, inflation, real exchange and transfer payments. Even though (Turkson, 2015) included inflation and transfers, the period of study from the year 2005 to the year 2013 with annual frequency was statistically very short hence affecting the validity of the results.

Latest research on the effect of foreign direct investments on balance of trade have also reported mixed results. In as much as studies by (Kipkosgei, 2011), (Sharif, 2016) and (Osoro, 2013) all revealed that foreign direct investment were positively significant, different studies by (Magessa, 2009) and (Mbayani, 2016) established that it was insignificant with a positive sign. Additionally, (Turkson, 2015) on the other hand established that Foreign Direct Investment (FDI) was insignificant with a negative sign. These reviewed studies did not include trade in services which is key to a service economy like Kenya. In addition to determining the causal relationship between Foreign Direct Investment (FDI) and trade deficit, this study also included other variables key to trade such as transfer payments, inflation and real exchange rate.

This study by (Turkson, 2015) established that inflation was significant with a negative sign. Contrarily, (Sharif, 2016) on the other hand revealed that inflation had a positive sign and was insignificant. These studies excluded trade in services which is a key factor for service economy like Kenya. This study explores the interactions between inflation and trade deficit and also includes other key variables to Kenya's trade such as foreign direct investment, transfer payments and real exchange rate.

Lastly, all the reviewed studies excluded the interactions between transfer payments and trade deficit. This study sought to explore the causal relationship between transfer payments and trade deficit.

1.2. Statement of the Problem

The role of trade on a country's economic growth cannot be overstressed as it enables the country manage stabilization of policies, help increase national income, improve a country's capital flows and generally help improve the standard of living for the locals among others. Across all the countries, balance of trade has remained a key indicator of economic activities as it shows her level of competitiveness in the world market. Evince proliferates to the fact that trade deficit coherently engenders a deficit in the current account in a country. Despite the consequences of trade deficit, Kenya has persistently run an aggregate trade deficit since the year 1978. Previous studies that have sought to establish the key factors contributing to trade deficit have found different results but have also used different methodologies. Most of the existing studies have also neglected to establish the causal effects as well as the respective impulse responses. Additionally, most of the studies only covered trade in merchandise and left out the trade in services as well as inflation which are not only critical for a developing country like Kenya but are also key factors affecting international trade. Most of the studies

This study sought to empirically establish the effect of Foreign Direct Investments (FDI), inflation, real exchange rate and transfer payments on the aggregate trade deficit for Kenya using Vector Error Correction Module to establish both short-term and long-term equations. This study also sought to establish causal relationships as well as the respective impulse responses due to possible sudden shocks. In addition to including

most of the key factors affecting trade balance, this study included trade in services contrary to most of the similar existing studies.

1.3. Research Hypotheses

1. What is the effect of FDI on Trade deficit in Kenya?

2. What is the effect of inflation trade deficit in Kenya?

3. What is the effect of real exchange rate on trade deficit?

4. What is the effect of transfer payments on trade deficit?

1.4 Objectives of the Study

The broad objective of this study was to establish the effect of foreign direct investment, inflation, real exchange rate and transfer payments on trade deficit in Kenya.

The Specific Objectives of the Study were;-

i. Establish the effect of Foreign Direct Investment (FDI) on trade deficit in Kenya

ii. Determine the effect of inflation on trade deficit in Kenya

iii. Establish the effect of real exchange rate on trade deficit in Kenya

iv. Determine the effect of transfer payments on trade deficit in Kenya

1.5 Significance of the Study

This study aimed to suggest policies to enhance on the trade deficit, FDI, inflation, real exchange rate and transfer payments adjustment mechanism that may improve the competitiveness in the world market. Additionally, this study improves future development by generating more knowledge and adding to the existing knowledge in the relationship of trade deficit with FDI, inflation, real exchange rate and transfer payments. Other studies that have been carried out did not establish whether persistent trade deficit is good or bad for a developing economy like Kenya. Such studies include This imply that there still exists unresolved discussion with regard to persistent trade deficit and this study contributes too to this debate and adds new knowledge to the existing knowledge.

1.6 Scope of the study

This study sought to establish the effect of foreign direct investment, inflation, real exchange rate, transfer payments on trade deficit in the Kenyan Economy for the period 1978-2014. The year 1978 was selected for this study since it's the post years after Kenya had faced a foreign exchange crunch which led the government to tighten organizational controls of the economy further through raising tariffs, employing price controls as well as tightening of procedures for the licensing of imports. It is also the period from1978 that Kenya has experienced persistent trade deficit.

1.7 Theoretical Framework

This study sought to establish the effect of foreign direct investment, inflation, real exchange rate and transfer payments on trade deficit in Kenya. This study hypothesized that balance of trade is a function of foreign direct investment, inflation, real exchange rate and transfer payments. The study adopted the use a reduced form of the trade balance model that was developed by (Goldstein & Khan, 1985) and later modified by (Bahmani & Wang, 2006). The (Goldstein & Khan, 1985)'s model is illustrated as indicated below in which equation 1.1 represents the import demand function while equation 1.2 represents the export demand function.

$$lnM^d{}_{it} = a_0 + a_1 ln(PM_i/PD_i)_t + a_2 ln Y_{it} + U_t \dots\dots\dots\dots\dots\dots\dots\dots(1.1)$$

$$lnX^d{}_{it} = b_0 + b_1 ln(PX_i/PW_i)_t + b_2 ln W_{it} + Z_t \dots\dots\dots\dots\dots\dots\dots(1.2)$$

Where;

$M^d{}_{it}$ – Quantity if imports of country (i) at time (t)

$X^d{}_{it}$ – Quantity if exports of country (i) at time (t)

PM_{it} – Unit value of imports of country (i) at time (t)

PX_{it} – Unit value of exports of country (i) at time (t)

PD_{it} – Domestic Price level of country (i) at time (t)

PW_{it} – World Price level of country (i) at time (t)

Y_{it} – Real Gross National Product of country (i) at time (t)

W_{it} – Real world income of country (i) at time (t)

U_t/Z_t – The error term associated with each observation at time (t)

The (Bahmani & Wang, 2006) model is illustrated as indicated below in which equation 1.3 represents the import demand function and equation 1.4 represents the export demand function.

$$lnM^d{}_t = a + b \ln Y_t + c \ln(PM/PD)_t + d \ln E_t + U_t \ldots\ldots\ldots\ldots\ldots\ldots(1.3)$$

$$lnX^d{}_t = a + b \ln YW_t + c \ln(PX/PXW)_t + d \ln E_t + Z_t \ldots\ldots\ldots\ldots\ldots(1.4)$$

Where;

$M^d{}_t$ – Quantity if imports at time (t)

$X^d{}_t$ – Quantity if exports at time (t)

PM_t – Imports Price at time (t)

PX_t – Exports Price at time (t)

PD_t – Domestic Price at time (t)

Y_t – Real GNP at time (t)

YW_t – Weighted average GNP of the country's trading partners at time (t)

PXW_t – Weighted average Export Prices at time (t)

Y_t – Real Gross National Product of at time (t)

W_t – Real world income at time (t)

E_t – Export weighted effective exchange rate at time (t)

U_t/Z_t – The error term associated with each observation at time (t)

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Introduction

This section present a review of methodologies, issues and studies related to trade balance, foreign direct investment, inflation, exchange rate and transfers. Specifically, section 2.2 is devoted to presentation of the theoretical framework that guides this study. Section 2.3 examines some empirical studies which have been done in and outside Kenya's economy. The deficiency of the previous studies and gaps to be filled in this study are presented in section 2.3.

2.2 Theoretical Literature Review

There exist several definite theoretical approaches for forecasting the expected results of policy changes on trade balance.

2.2.1 Absorption Approach

The absorption approach which was established by (Alexander, 1952) lays significance on income effects of devaluation. It contends that the level to which a country's supply of local output surpasses absorption is what determines her foreign surplus and in this regard, devaluation should influence absorption or income for it to influence the current account i.e should sustain expenditure changing and expenditure substituting effects. Additionally, it postulates that elasticities should be significantly

high in order for the expenditure substituting to arise while changes in expenditure contrarily arise through variations in real income. Substitution of expenditure therefore arises from the effect of devaluation on comparative prices of imported and local goods as devaluation not only raises external demand for local goods by foreigners but also lessens demand for imports hence correcting the balance of payment.

Absorption and elasticities approach diverge in that in as much as the latter includes the general equilibrium, the former does not. Both approaches do not acknowledge the inflationary influences of devaluation which is a similar weakness for them. Additionally, according to (Johnson, 1972), the role of money determination of the balance of payment is also not considered by both of the approaches.

2.2.2 Elasticity Approach

The elasticity approach is entrenched in a partial and static equilibrium approach and outlines the effects of variations in exchange rate on balance of trade. The approached is based on the Marshall-Lerner Condition which states that beginning from a balanced trade state if a country's price elasticity of demand for imports plus the country's price elasticity of demand for her exports are greater than one, then depreciation of her currency would improve trade balance. On the other hand, it postulates that trade balance is worsened by devaluation if the sum of the elasticities is less than one while there is no effect on trade balance if the sum of the elasticities is equal to one (Robinson, 1947) and (Bickcrdikc, 1920). The view is based on the principle that the substitution effects in consumption and production prompted by the variations in the

comparative price i.e domestic against external triggered by a devaluation. We can, therefore, conclude that there exists extra supply of foreign exchange when the exchange rate is beyond equilibrium while there is an extra demand of foreign exchange when the exchange rate is lower than equilibrium if the Marshall-Lerner condition holds which states that in the long haul, devaluation of a Country's currency improves her balance of trade if the sum of price elasticities of exports and imports in absolute terms is greater than unitary (Mahmud, Ullah & Yucel, 2004). The condition equates trade account to the current account as it assumes unilateral transfers, trade in services and investment income flows to be equal to zero. It also assumes that a steady exchange rate to be one that can improve trade balance.

2.2.3 Structuralist Approach

The structuralist approach on the other hand which was established in 1950's by (Myrdal, 1957), (Singer, 1950), (Rodan & Rosenstein, 1943), (Lewis, 1954), (Chenery, 1975) in an effort to expound why conventional stabilization policies may not realize the expected goals as originally forecast. The models postulate that expenditure changing and reducing effects may not be induced by devaluation as forecasted since low elasticities of supply and demand as well as operational inflexibilities, appropriate adjustments may not take place in most developing countries as predicted.

According to the structuralists, devaluation does have contractionary effects hence affecting productivity over demand side by reducing real wages which in turn

reallocate income from the personnel to industrialists and subsequently dipping domestic absorption. This implies that for economies that rely on foreign investments, a large proportion of the redistributed income is repatriated back to their parent countries.

According to the (Chenery, 1975), contractionary effects can also be brought by devaluation coupled with a strict monetary policy as it leads to increase in the working capital related costs.

In as much as devaluation may possibly lead to deterioration of balance of payments, empirical studies like (Khan & Knight, 1983) revealed that in some exceptional incidences, demand and supply responses are sufficient for enabling devaluation to be a solution. The structuralist approach's main limitation is that their equations are founded on extemporary assumptions on economic behavior rather than in the context of optimization by economic players.

2.2.4 J-Curve Approach

The J-curve approach states that in short term, depreciation of a country's currency leads to deterioration of her balance of trade while it may improve in the long haul. It assumes that the import prices of a country would increase faster than prices of export in the short term while trade quantities only respond with time (Isard, 1995) and (Jha, 2003). The proponents of the approach argue that devaluation makes imports expensive hence an adverse influence on the balance of trade. The quantity of the country's export can start to rise afterward due to their relatively low comparative

prices in the international market, therefore, leading to low imports by local consumers thus improving the balance of trade. Additionally, due to their lower relative prices, the international consumers may opt to purchase the exported goods to their mother country (Hacker & Hatemi, 2004). It is however argued that devaluation may at times lead to a decline in economic growth due to reduced investment.

2.2.5 Eciectic Paradigm / OLI-Model

The eciectic model was developed by John Dunning and explains the effect of foreign direct investment (FDI) and trade balance by focusing on the incentives that an individual enterprise is faced with. The model summarizes the OLI (Ownership, Location, and Internalization) criteria. The ownership leverage focuses on why some particular firms but not others go overseas, and indicate that prosperous multinational enterprises have some firm-specific leverages allowing it to overcome the costs of operating in a foreign country. Location leverages on the other hand focuses on where a multinational enterprise prefers to locate while internalization leverages focuses on how the enterprise chooses to operate in a foreign country (Dunning, 2001). In summary, the theory postulate that there exist a positive relationship between FDI and trade balance.

2.2.6 The Purchasing Power Parity Theory

Purchasing power parity theory indicate how changes in price levels or rather inflation affect exchange rate thereby inferring leads to changes in exchange rate. It is argued

that rate of inflation for a given economy is affected by another economy's rate of inflation and changes in the rate of exchange. In a flexible exchange rate regime, the monetary authority can either overvalue or undervalue the country's currency. Overvaluing of a country's currency makes the local goods to be expensive thus higher level of inflation hence making the country's exports to be relatively expensive and imported goods cheaper and the reverse is true if the currency is undervalued. In summary, inflation has negative effects on trade balance as it stimulates import spending as imports appear relatively cheaper and dampens export sales as exports appear more expensive in the international market (Johnson, 1977).

2.2.7 The Payments Approach

The payments approach was established by (Johnson, 1977) and focuses on the monetary implications of transfers and how it affects the level of economic activity. According to the approach, as residents issue transfer payments to foreigners, the cash balances of the locals reduces to the minimum that the economy is prepared to hold leading to increase in interest rate hence decline in aggregate expenditure and exports. On the other hand, as residents receive transfers from abroad, cash balances of the locals increase to the maximum that the economy is prepared to hold leading to a decline in interest rate hence increase in aggregate expenditure and exports.

The divergent perspectives presented above show that an economy's trade balance is affected by changes in the real exchange rate, foreign direct investment (FDI), inflation and transfer payments. In cognition to these perspectives, this study developed a model that concurrently

integrate all the four perspectives and uses it to analyze Kenya's trade deficit. The reason for integrating all the four perspectives into one model is to authenticate their empirical relevance and efficacy as well as reduce the enduring unexplained divergence in the trade balance model.

2.3 Empirical Literature Review

This section focuses on the empirical studies undertaken with an objective of establishing the relationship between trade balance and various factors of the economy including Foreign Direct Investment (FDI), inflation, real exchange rate and secondary income. The studies undertaken established different results which are explained as below;

(Kipkosgei, 2011) undertook a study in Kenya using annual data for the period from the year 1970 to the year 2010 based on trade balance model approach. The study employed Cointegration and Error Correction Model (ECM) and other nonparametric method model and found that real exchange rate was negatively significant, government expenditure was positively significant, foreign direct investments was positively significant, domestic income as well as money supply were also both significant with a negative and positive sign respectively. The study established that though foreign income had a positive sign, it was not significant and recommended that trade balance could be improved through policies on income or growth and money supply rather titan exchange rate regime. The study however did not include trade in services which is key given the rise of service sector in developing countries such as Kenya. Additionally, the period of this study that is from the year 1970 to the year

2010, Kenya experienced both surplus and deficit balance of trade and so leaves out the aspect of persistent trade deficit. Finally, the study excluded other key factors such as Inflation, transfers among others. This study focused on the periods that Kenya has experienced persistent trade deficit and included trade in both goods and services. This study also included inflation and transfer payments among others which are considered key factors that influence balance of trade.

According to (Caporale, 2012) who examined the Marshall-Lerner (ML) condition for the Kenyan economy using quarterly data for the time period first quarter of the year 1996 to the fourth quarter of the year 2011. The study employed fractional integration and cointegration methods among other techniques based on the concept of long memory or long-range dependence and established that real exchange rate, as well as relative income, were both significant with a negative sign. The study concluded that exchange rate can be used to address external balance as depreciation leads to a reduction of import expenditure and an increase in export sales. The techniques used in the analysis i.e mainly fractional integration and cointegration are empirically known to be very general allowing only for integer degrees of differentiation which is their main undoing. This study employed the use of vector error correction model which helped to reduce the absolute error in the model hence tranquilizing the assumption of homoscedasticity.

Mwito, (2015) conducted a study using panel data for the time period from the year 1970 to the year 2013 for Kenya's bilateral trade. The study employed extended trade balance model as well as cointegration with Autoregressive- Distributed Lag (ARDL) model and extended trade balance model. The study established that bilateral real exchange rate was significant with a negative sign while both incomes of the trading partner as well as the per capita income of the trading partner were both significant with a positive sign. The study concluded that in addition to maintaining a stable exchange rate, maintaining a highly overvalued bilateral exchange rate could help discourage exports. Additionally, the study also recommended currency devaluation in bilateral terms as a way of improving the trade balance. The study was however limited to a few factors as it excluded other key factors such as foreign direct investment, Inflation, transfers among others. This study sought to include all the excluded key factors that is foreign direct investment, inflation as well as transfer payment.

Ogutu, (2014) undertook a study in Kenya using annual data for the period from the year 1963 to the year 2013 to establish the relationship and effect of the real exchange rate on trade the trade balance. The study employed a two-country imperfect substitute model of Rose & Yellen, (1989) and also used cointegration vector autoregressive and vector error correction modeling. The study established that real exchange rate and foreign income were both significant with a positive sign while domestic income, as well as broad money supply, were both insignificant with a negative and positive sign

respectively. Exchange rate regime was also found to be insignificant with a negative sign. The study concluded that both monetary and exchange rate policies need to be implemented together to enhance the better position of trade balance. The resultant sign on domestic income was however inconsistent with the monetary approach in which the rise in domestic income raises money demand hence increasing exports. The study also used an incorrect formula for calculating real exchange rate. This study sought to use the correct formula in calculating the real exchange rate before subjecting it to the analysis along the other key factors.

(Magessa, 2009) undertook a study to identify the main factors that cause trade deficit in Tanzania using annual data for the period from the year 1970 to the year 2006. The study employed simple reduced form model of the trade balance as well as cointegration procedure and Error Correction Modeling (ECM). The study established that household consumption expenditure, government expenditure and income from the rest of the world were all significant with a positive sign while real exchange rate was found to be significant with a negative sign. It established that foreign direct investment and trade openness were both insignificant with a positive and negative sign respectively. The study concluded that fiscal discipline can help improve trade balance and should entail efficient collection of revenue accompanied with strict expenditure management and controls with expenditures being geared towards productive activities. The sign for government expenditure was, however, not as per the priori expectations. Moreover, the study only covered merchandise trade and left

out trade in services which is currently key for most developing countries. The study excluded the trade in both goods and services since service sector is considered one of the sectors for developing countries.

(Turkson, 2015) sought to identify and estimate the factors affecting the Ghanaian trade balance using annual data for the period from the year 2005 to the year 2013. This study employed Ordinary Least Squares (OLS) and other nonparametric method model and established that Foreign Direct Investment (FDI) was not significant with a negative sign while government expenditure, net income, real exchange rate and inflation were all significant with a negative sign. Household consumption expenditure was however found to be significant with a positive sign. This study concluded that there is need to reduce both government and household consumption expenditure to improve the balance of trade.

(Mbayani, 2016) employed cointegration in undertaking a study in Tanzania on determinants of trade balance using annual data for the period from the year 2070 to the year 2013. The study revealed that government expenditure, as well as income from rest of the world, were both significant with a positive sign while household consumption expenditure and trade liberalization were both significant with a negative sign. The study however established that real exchange rate and foreign direct investment were both insignificant with a negative and positive sign respectively. The study concluded that government expenditure and private consumption are the main

contributing factors to trade deficit. The study however excluded other key factors such as Inflation, transfers among others.

(Sharif, 2016) undertook a study on determinants of Trade Balance in Somalia using annual data for the period from the year 2070 to the year 2010. The study employed OLS and two-country imperfect substitute model and established that real exchange rate and foreign direct investment were both significant with a negative and positive sign respectively. Though inflation was having a positive sign, it was insignificant. The study concluded that export promotion strategies, as well as currency stabilization, are critical in improving the trade balance. The study was, however, only limited to three factors affecting trade balance yet there are so many factors that influence trade balance.

(Osoro, 2013) used annual data for the period from the year 1963 to the year 2012 to establish the major determinants of trade balance in Kenya. The study employed Marshall-Lerner condition approach as well as cointegration approaches and Error correction modeling (ECM). The study established that foreign direct investment as well as real effective exchange rate to be both significant with a positive sign while the budget deficits was insignificant with a positive sign. The study concluded that the country should formulate and adjust external trade policies to address issues such as social and physical infrastructure, reduce price of electricity, reduce high rates of interest adjust tax and tariff structures accordingly. The study was, however, limited

to testing the Marshall -Lerner condition in Kenya and so did not test the relationship of the real exchange rate on the trade balance.

2.4 Overview of Literature Review

The above literature review reveals a number of valuable studies on trade balance and foreign direct investment, inflation and real exchange rate. As noted previously, in a bid to establish the relationship and effect of the real exchange rate on trade balance, though Ogutu, (2014) found the resultant sign on domestic income to be inconsistent with monetary approach, based on the data made public by the researchers, this study employed an incorrect formula for real exchange rate of the product of the ratio of domestic to foreign nominal exchange rate and the ratio of domestic to foreign consumer price index instead of the conventional one which should be the ratio of domestic to foreign nominal exchange rate and the ratio of foreign to domestic consumer price index.

A separate study by (Magessa, 2009) that sought to identify the main factors that cause trade deficit in Tanzania on the other hand, only covered merchandise trade and left out trade in services which is currently key for most developing countries. This study also left out key factors affecting international trade such as inflation. Another study by (Mbayani, 2016) that also sought to establish the factors affecting the trade balance for Tanzania also excluded other key factors such as Inflation, transfers among others. Additionally, a study by (Sharif, 2016) that sought to establish the main determinants

of trade balance in Somalia was only limited to three factors affecting trade balance yet there are so many factors that influence trade balance such as transfers.

This study by (Osoro, 2013) that sought to establish the major determinants of trade balance in Kenya was limited to testing the Marshall -Lerner condition in Kenya and so did not test the relationship of the real exchange rate to trade balance. Finally, a study by (Kipkosgei, 2011) that sought to empirically examine the determinants of the trade balance in Kenya just examined the effect of the variables considered but not the relationship as well as the impulse response due to sudden shocks. This study also excluded trade in services as well as other key factors affecting international trade such as Inflation, transfers among others and also sought to establish the causal relationships and the impulse responses.

Based on the foregoing shortcomings, this study sought to establish the effect of foreign direct investments, inflation, real exchange rate and transfer payments on trade deficit using Vector Error Correction Model (VECM) that establishes both long and short-term effects. Contrary to most of the similar studies, this study included trade in services as well as some of the key factors affecting trade balance such as inflation and transfer payments. The review also indicated that there is limited empirical studies that addresses the causal relationship as well as impulse response due to sudden shocks between the variables under study. This study also sought to establish the relationship

between the independent variables and dependent variable and employed a correct formula for the real exchange rate.

CHAPTER THREE

3.0 METHODOLOGY

3.1 Introduction

In this section, methods used in this study are duly explained out. Section 3.2 presents the research design, the data types, sources and collection methods, and their limitations are presented in section 3.3 whereas section 3.4 presents the methods of data analysis. Section 3.5 outlines and discusses the model used to test the hypotheses.

3.2 Research Design

This study employed an ex post facto correlational research design as described by Patti, Robert, Julie, (2013):

> Correlational research design evaluates the nature and extent of association between two or more naturally occurring variables.

Therefore, this study involved analyzing the relationship between foreign direct investment, inflation, real exchange rate, transfer payments and trade deficit in Kenya for the period 1978 to 2014. Any determined differences were considered to be ex post facto in nature in that they stemmed from differences in results in the measurement efforts of the variables.

3.3 Data Type and source

This study used time series data obtained from the World Bank data bank. Years were chosen from the year 1978 which is the year when the Country began to have persistent trade deficit up to the year 2014 with annual frequency due to data availability. The real exchange rate was calculated from the nominal exchange rates and the CPIs for both Kenya and the United States.

3.3.1 Measurement of Variables

Trade deficit was measured as the difference between Kenya's exports and imports of all goods and services including the value of all goods and other market services provided to the rest of the world e.g. value of merchandise, freight, insurance, transport, travel, royalties, license fees, and other services, such as communication, construction, financial, information, business, personal, and government services. It, however, excludes compensation of employees and investment income (formerly called factor services) and transfer payments.

Foreign Direct Investment (FDI) was measured as the summation of equity capital, short-term capital, other long-term capital, and reinvestment of earnings as displayed in the balance of payments.

Inflation was measured as per the World Bank data portal definition and is the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals, such as yearly.

Real Exchange Rate was measured as the product of domestic nominal exchange rate divided by foreign nominal exchange rate and foreign Consumer Price Index divided domestic Consumer Price Index i.e nominal exchange rate (d/f) x (CPIforeign / CPIdomestic) in which the foreign country was USA.

Transfer Payments was operationalized to mean the transfers recorded in the balance of payments whenever an economy provides or receives goods, services, income, or financial items without expectation or granting of a favour or advantage.

3.4 Data Analysis

The data obtained was then carefully arranged in a CSV file of excel from year followed by variables in the model and so as to be estimated using STATA version 14 which is a statistical package for econometric analysis.

3.4.1 Descriptive Analysis

Descriptive statistical analysis was undertaken to establish the measures of central tendency. This included establishing the mean, median, minimum and maximum values of all the variables under study. The skewness and kurtosis analysis were also undertaken as well as the trends analysis.

3.4.2 Correlation Analysis

A pairwise correlation analysis was conducted to ascertain the statistical relationship between each of the variables under study. The correlation coefficient of a variable y in relation to x ranges between −1 and +1 where zero signifies absence of correlation while ±1 suggests a perfect correlation.

3.4.3 Cointegration and Vector Error Correction Model

The Johansen's, (1995) maximum likelihood technique was used to establish if the non-stationary variables are cointegrated. This also helped to determine the number of cointegrating equations to be used in the vector error-correction model (VECM). The Vector Error Correction Model was undertaken to establish both short-run and long-run relationships of the variables under study which has restricted VAR representation. The VECM is determined by differencing the series and is given by the below equations 3.1, 3.2, 3.3, 3.4 and 3.5 as mirrored in the works of (Ogutu, 2014).

$$\Delta TRDCTS_t = \alpha + \sum_{i=1}^{k-1} \beta_i \Delta TRDCTS_{t-i} + \sum_{j=1}^{k-1} \phi_j \Delta FDI_{t-j} + \sum_{m=1}^{k-1} \lambda_m \Delta INFL_{t-m} + \sum_{n=1}^{k-1} \mu_n \Delta REXR_{t-n} + \sum_{p=1}^{k-1} \varrho_p \Delta TRF_{t-p} + \Pi_1 ECT_{t-1} + u_{1t} \ \dots\dots\dots\dots\dots\dots\dots\dots 3.1$$

$$\Delta FDI_t = \alpha + \sum_{i=1}^{k-1} \beta_i \Delta TRDCTS_{t-i} + \sum_{j=1}^{k-1} \phi_j \Delta FDI_{t-j} + \sum_{m=1}^{k-1} \lambda_m \Delta INFL_{t-m} + \sum_{n=1}^{k-1} \mu_n \Delta REXR_{t-n} + \sum_{p=1}^{k-1} \varrho_p \Delta TRF_{t-p} + \Pi_2 ECT_{t-1} + u_{2t} \ \dots\dots\dots\dots\dots\dots\dots\dots 3.2$$

$$\Delta INFL_t = \alpha + \sum_{i=1}^{k-1} \beta_i \Delta TRDCTS_{t-i} + \sum_{j=1}^{k-1} \phi_j \Delta FDI_{t-j} + \sum_{m=1}^{k-1} \lambda_m \Delta INFL_{t-m} + \sum_{n=1}^{k-1} \mu_n \Delta REXR_{t-n} + \sum_{p=1}^{k-1} \varrho_p \Delta TRF_{t-p} + \Pi_3 ECT_{t-1} + u_{3t} \ \dots\dots\dots\dots\dots\dots\dots\dots 3.3$$

$$\Delta \boldsymbol{REXR_t} = \alpha + \sum_{i=1}^{k-1} \beta_i \, \Delta TRDCTS_{t-i} + \sum_{j=1}^{k-1} \phi_j \, \Delta FDI_{t-j} + \sum_{m=1}^{k-1} \lambda_m \, \Delta INFL_{t-m} +$$

$$\sum_{n=1}^{k-1} \mu_n \, \Delta REXR_{t-n} + \sum_{p=1}^{k-1} \varrho_p \, \Delta TRF_{t-p} + \boldsymbol{\Pi_4} ECT_{t-1} + u_{4t} \ldots\ldots\ldots\ldots\ldots\ldots\ldots.3.4$$

$$\Delta \boldsymbol{TRF_t} = \alpha + \sum_{i=1}^{k-1} \beta_i \, \Delta TRDCTS_{t-i} + \sum_{j=1}^{k-1} \phi_j \, \Delta FDI_{t-j} + \sum_{m=1}^{k-1} \lambda_m \, \Delta INFL_{t-m} +$$

$$\sum_{n=1}^{k-1} \mu_n \, \Delta REXR_{t-n} + \sum_{p=1}^{k-1} \varrho_p \, \Delta TRF_{t-p} + \boldsymbol{\Pi_5} ECT_{t-1} + u_{5t} \ldots\ldots\ldots\ldots\ldots\ldots.3.5$$

Where;

$\boldsymbol{k-1}$ = is the lag length reduced by 1

$\boldsymbol{\beta_i, \phi_j, \lambda_m, \mu_n, \varrho_p}$ = Are the short-run dynamics coefficients of the model's

adjustment long-run equilibrium.

$\boldsymbol{\Pi_i}$ = Is the speed of adjustment parameter.

$\boldsymbol{ECT_{t-1}}$ = Is the error correction term.

$\boldsymbol{u_{it}}$ = Are the stochastic error terms.

3.4.4 Causality Tests

The Granger causality test was conducted in order to establish the causal relationships between the variables under examination. In this test, for a given pair of variables, variable X is said to granger cause variable Y if the estimation for variable Y can be improved by the lags of variable X. Impulse response functions (IRF) was also conducted to establish the effects of possible shock of the variable over a period.

3.4.5 Diagnostic tests

Given that this study employed the use of secondary data, the augmented Dickey-Fuller unit-root test was used to test the stationarity of the data. Breusch and Godfrey, (1978) test was used to test for autocorrelation. Breusch-Pagan, (1979) test also known as Cook's Weisberg's (1983) test was used to test for heteroskedasticity. In order to test for multicollinearity, the Variance Inflation Factors was checked which indicate the proportion of an X variable's variance that is independent of all the other x variables. In order to check for any possible specification error in the model link test was conducted.

3.5 Specification of the Model

The specification of the model for this study mirrors the works of (Mwito, 2015), (Kipkosgei, 2011) and (Jha, 2003). It was modified to fit this study by including foreign direct investment, inflation and transfer payments. The simple reduced form of trade balance model is specified as below (Jha, 2003):

$$TB = f(REXR, Y, Y^*)\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots(3.6)$$

Where;

TB – Trade Balance

REXR – Real exchange rate

Y- National Income

Y^*- Real National Income

For purposes of this study, the model was adopted to include foreign direct investment, inflation, real exchange rate and transfer payments as indicated below.

$$TRDCTS = f(FDI, INFL, REXR, TRF) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(3.7)$$

When we incorporate the coefficients to the equation, the trade deficit equation becomes:

$$TRDCTS_t = \lambda_0 + \lambda_1 FDI_t + \lambda_2 INFL_t + \lambda_3 REXR_t + \lambda_4 TRF_t \ldots\ldots\ldots\ldots(3.8)$$

Our priori expectation is that; $\lambda_2, \lambda_3, \lambda_4 > 0$ and $\lambda_1 < 0$

Where:

λ_0 = the intercept

$\lambda_1, \lambda_2, \lambda_3,$ and λ_4 = the coefficients of the regression equation;

$TRDCTS_t$ = Trade Deficit at time (t) which represents the dependent variable;

The independent variables are: Foreign Direct Investment (*FDI*), Inflation (*INFL*), Real Exchange Rate (*REXR*), and Transfer Payments (*TRF*).

CHAPTER FOUR

4.0 RESULTS AND DISCUSSIONS

4.1 Introduction

In this chapter, the descriptive and empirical estimates of the variables in the model are presented. Section 4.2 outlines the descriptive statistic estimates while section 4.3 and section 4.4 present the correlation analysis and the trends analysis respectively. The cointegration test results are in section 4.6 while section 4.7 and section 4.8 present the Vector Error Correction Model and the diagnostic test results respectively. Section 4.9 and section 4.10 presents the causality test results and the analysis of impulse response functions respectively.

4.2 Descriptive Statistics

Table 4.2 below show the summary of the main variables that have been used in estimation of the model.

Table 4.1: Descriptive Statistics

	Obs	Mean	Sd	Min	Max	skewness	kurtosis
Trdcts	37	-2092760875	2399956155	-9434174775	-4437393	-1.5	4.3
Infl	37	13	8.6	1.6	46	1.9	7.5
Fdi	37	-113228358	210554625	-1022812635	1803111	-3	12
Rexr	37	129	34	68	199	-0.45	2.1
Trf	37	1117696551	993635170	92313517	3777207994	0.89	2.9

Source: Author, 2021

Table 4.1 indicate the mean for trade deficit, inflation, foreign direct investment, real exchange rate and transfer payments were -2092760875, 13, -113228358, 129 and 1117696551 respectively with their respective standard deviations being 2399956155, 8.6,

210554625, 34 and 993635170. The values of inflation and real exchange rate are both given in percentages while trade deficit, foreign direct investment and transfer payments are values in USD ($). The minimum for trade deficit, inflation, foreign direct investment, real exchange rate and transfer payments were -9434174775, 1.6, -1022812635, 68 and 92313517 respectively with their respective maximum values being -4437393, 46, 1803111, 199 and 3777207994. The results indicate trade deficit was the most spread followed by transfer payments and then followed by foreign direct investment and then real exchange rate and finally inflation has the least spread.

The results for skewness which shows the distributions of the observations for trade deficit, inflation, foreign direct investment, real exchange rate and transfer payments were -1.5, 1.9, -3, -0.45 and 0.89 which indicate that all the variables are asymmetric since they are all non-zero. The results also indicate that the trade deficit, foreign direct investment and real exchange rate are skewed towards the left while inflation and transfer payments are skewed towards the right. Kurtosis measures the heaviness of the tails of distribution of the variables. The results for the kurtosis for trade deficit, inflation, foreign direct investment, real exchange rate and transfer payments were 4.3, 7.5, 12, 2.1 and 2.9 respectively which indicate that trade deficit, inflation and foreign direct investment have heavy tailed distributions as their respective kurtosis are greater than three. Real exchange rate and transfer payments are light tailed distributions given that they have kurtosis that are less than three.

Given the results of the skewness and kurtosis as well as the fact that the variables are all in different units, the descriptive statistics analysis may not inform much. The data was therefore log transformed to normalize it before being subjected to further analysis.

4.3 Correlation of variables

The pairwise correlation analysis was conducted to establish the statistical relationship between each of the variables under study. The results of the pairwise correlation analysis are presented as indicated in the Table 4.2 below;-

Table 4.2: Pairwise Correlation Analysis

	LN_TRDCTS	INFL	LN_FDI	LN_REXR	LN_TRF
LN_TRDCTS	1.000				
INFL	0.200	1.000			
	(0.235)				
LN_FDI	0.839*	0.144			
	(0.000)	(0.395)	1.000		
LN_REXR	0.699*	0.231	0.607*		
	(0.000)	(0.169)	(0.000)	1.000	
LN_TRF	-0.639*	-0.107	-0.504*	-0.465*	
	(0.000)	(0.530)	(0.002)	(0.004)	1.000

*Note: * denotes significant correlation at 5% significance level*
Source: Author, 2021

Table 4.2 indicate that the Pearson correlation coefficient for trade deficit and inflation to 0.200 with *p-value* of 0.235 indicating there was an insignificant positive relationship between trade deficit and inflation implying a weaker correlation. The Table also indicate that Pearson correlation coefficient for trade deficit and foreign direct investment was 0.839 with *p-value* of 0.000 indicating there was a statistically significant positive relationship between trade deficit and foreign direct investment implying a stronger correlation. The Pearson correlation coefficients for trade deficit and real exchange rate as well as trade deficit and transfer payments are 0.699 and - 0.639 respectively with *p-values* of 0.000 indicating there was a positive and a negative statistically significant relationship between trade deficit and real exchange rate as well as trade deficit and transfer payments implying that there was a stronger correlation between trade deficit and real exchange as well as trade deficit and transfer payments.

4.4 Trend Analysis

Figure 4.1 below present the trend of the log transformed trade deficit, inflation, foreign direct investment, real exchange rate and transfer payments.

Figure 4.1: Trend analysis for Trade Deficit, Inflation, FDI, REXR & Transfer Payments
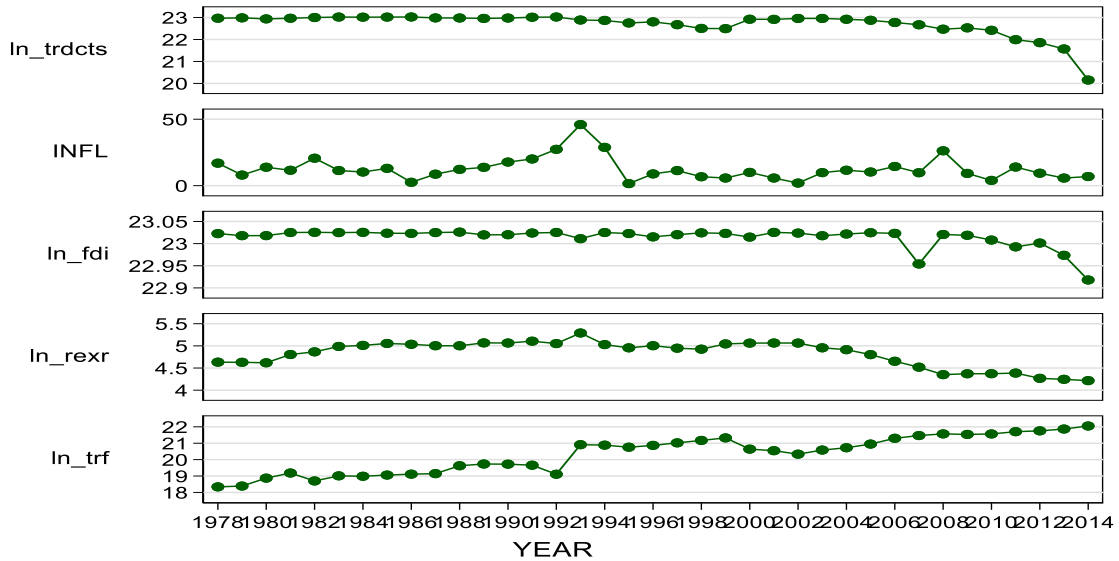
Source: Author, 2021

The Figure 4.1 indicate that both trade deficit, foreign direct investments and transfer payments are stable within this study period up to the year 1992 before they both diverged with trade deficit and foreign direct investments beginning to decline steadily while transfer payments on the other hand started to rise steadily. Real exchange rate was stable at various levels before beginning to decline steadily. Inflation can be seen to have been intermittent but has also been on the decline towards the end of this study period. Nevertheless, we cannot deduce any meaningful conclusion from these trends thus further econometric analysis has been undertaken to establish the effect of foreign direct investment, inflation, real exchange rate and transfer payments on trade deficit in Kenya.

4.5 Stationarity Analysis

Several diagnostic tests were carried out to establish features of the data used. Unit root tests were the initial tests conducted to establish the stationarity or non-stationarity of the time series

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data as well as identify the integration order before undertaking the cointegration procedure (Gujarati, 2011) and (Wooldridge, 2010). In this regard, this study employed the Augmented Dickey-Fuller (ADF) test and Phillips-Perron (PP) test which both give almost similar conclusions. The results are given as shown in the Table 4.3 below;-

Table 4.3: Unit root test results at levels

		ADF TEST			
	Test Statistics	**1% Critical Value**	**5% Critical Value**	**10% Critical Value**	**P-Value Z(t)**
LN_TRDCTS	3.664	-4.279	-3.556	-3.214	1.000
INFL	-3.566	-4.279	-3.556	-3.214	0.033
LN_FDI	-2.440	-4.279	-3.556	-3.214	0.359
LN_REXR	-1.490	-4.279	-3.556	-3.214	0.832
LN_TRF	-3.266	-4.279	-3.556	-3.214	0.072
		PP TEST			
LN_TRDCTS	4.734	-4.279	-3.556	-3.214	1.000
INFL	-3.560	-4.279	-3.556	-3.214	0.033
LN_FDI	-2.310	-4.279	-3.556	-3.214	0.428
LN_REXR	-1.445	-4.279	-3.556	-3.214	0.847
LN_TRF	-3.278	-4.279	-3.556	-3.214	0.070

Source: Author, 2021

Table 4.3 above present results on both ADF and PP which indicate that we reject the null hypothesis that inflation was a random walk process with a drift since the *p-value* of test statistic was less than 0.05. The results is consistent with the works of (Gujarati, 2011) and (Wooldridge, 2010) and further indicate that on both Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP), we accept the null hypothesis that trade deficit, foreign direct investments, real exchange rate and transfer payments are all random walk

processes with possible drifts since their respective p-values of the test statistics are all more than 0.05.

The results for the unit root tests for the difference at different levels are shown in Table 4.4 below.

Table 4.4: Unit root test results after differencing

	Test Statistics	1% Critical Value	5% Critical Value	10% Critical Value	P-Value Z(t)
ADF TEST					
D2LN_TRDC					
TS	-4.815	-4.279	-3.564	-3.218	0.000
INFL	-3.566	-4.279	-3.556	-3.214	0.033
DLN_FDI	-7.492	-4.288	-3.560	-3.216	0.000
DLN_REXR	-6.599	-4.288	-3.560	-3.216	0.000
DLN_TRF	-7.233	-4.288	-3.560	-3.216	0.000
PP TEST					
LN_TRDCTS	-4.262	-4.297	-3.564	-3.218	0.004
INFL	-3.560	-4.279	-3.556	-3.214	0.033
DLN_FDI	-8.058	-4.288	-3.560	-3.216	0.000
DLN_REXR	-6.593	-4.288	-3.560	-3.216	0.000
DLN_TRF	-7.584	-4.288	-3.560	-3.216	0.000

Source: Author, 2021

The results in shown in Table 4.4 indicate that FDI, real exchange rate and transfer payments all become stationary at first difference hence integrated of order I(1) and so we reject the null hypothesis of non-stationarity at first difference. The endogenous variable trade deficit on the other hand become stationary at second difference hence integrated of order I(2) and so we reject the null hypothesis of non-stationarity. The results are consistent with the work of (Makton et al, 2018) who also found real exchange rate to be integrated of order I(1).

4.6 Cointegration

Prior to conducting the cointegration test, the lag length was established. The lag length was identified by the selection criterion which comprises of the Likelihood Ratio (LR) tests, Final Prediction Error Criteria (FPE), the Akaike's Information Criteria (AIC), Hannan-Quinn Information Criteria (HQIC) and Swartz-Bayesian Information Criteria (SBIC). These set of criteria are used to outline the optimal lag length where a criterion that has lowest value in every was selected (Gujarati, 2011). The results for all the lag selection criteria are as indicated in the Table 4.5 below.

Table 4.5: Optimal Lag Selection Criterion

Lag	LL	LR	Df	P	FPE	AIC	HQIC	SBIC
0	-81.783				0.000	4.959	5.0356	5.181
1	39.022	241.61	25	0.000	0.000*	-0.516*	-0.055*	0.818*
2	59.696	41.348*	25	0.021	0.000	-0.268	0.575	2.176

*Note: * denotes the optimal lag length in the criteria.*
Source: Author, 2021

From the Table 4.5 above, the results indicate the optimal lag length to be 1 since all the selection criteria Final Prediction Error (FPE), Akaike's Information Criterion (AIC), Schwarz's Bayesian Information Criterion (SBIC) and Hannan and Quinn information criterion (HQIC) all except Likelihood Ration (LR) criteria tests have the lowest value at the lag length of 1. We therefore conclude the optimal lag length to be 1 (Gujarati, 2011). Given that the optimal lag length has been established, the Johansen cointegration test using trace statistics was conducted to establish the number of possible cointegrating equations and the results presented in the Table 4.6 below.

Table 4.6: Johansen's cointegration Test using Trace Statistics

Max. rank	Parms	LL	Eigenvalue	Trace Statistic	5% Level	1% Level	Max Statistic	5% Critical value	1% Critical value
0	5	-13.734	-	109.455	68.52	76.06	53.747	33.46	38.77
1	14	13.140	0.775	55.708	47.21	54.46	26.546	27.07	32.24
2	21	26.413	0.522	29.162[*1*5]	29.68	35.65	19.687	20.97	25.52
3	26	36.257	0.421	9.474	15.41	20.04	9.103	14.07	18.63
4	29	40.808	0.223	0.371	3.76	6.65	0.371	3.76	6.65
5	30	40.994	0.010	-	-	-	-	-	-

*Note: [*5] denotes presence of cointegration at rank 2 at 5% significance level*
Source: Author, 2021

From Table 4.6, the results indicate that there exists a rank of 2 in trace test and hence we reject the null hypothesis of no cointegrating equation and accept the alternative hypothesis that there are at least more than one cointegrating equations in the multivariate model. Since there was a cointegrating equations at 5% significance level, the series can be combined in a linear fashion and that there was both long-run and short-run relationship among the variables; trade deficit, inflation, foreign direct investment, real exchange rate and transfer payments. The existence of cointegrating equation also imply that even if there are shocks in the short-run that may affect the movement in the individual series, that they would converge with time in the long-run. The results presented above indicate that the residuals are non-stationary and given that cointegration in the multivariate model has been established, Vector Error Correction Model (VECM) was conducted to establish bot short-run and long-run adjustments, (Maddala, 1998).

4.7 Vector Error Correction Model (VECM)

The Johansen's cointegration test results presented in sub-section 4.5 indicate that the

Vector Error Correction Model (VECM) should be based on two rank and one lag.

Below is the equation that generated the VECM.

Table 4.7: Cointegrating Equations

2 Cointegrating Equation(s):		Log likelihood	27.745	
Normalized cointegrating coefficients *(standard error in parentheses)*				
D2LN_TRDCTS	DLN_FDI	INFL	DLN_REXR	DLN_TRF
1.000	0.000	-0.002	0.106	0.486
		(0.002)	(0.164)	(0.058)
0.000	1.000	-0.090	0.017	0.012
		(0.000)	(0.013)	(0.005)

Source: Author, 2021

Table 4.8 below indicate the vector error correction model results as well as the VECM

short-run equations.

Table 4.8: Vector Error Correction Model Short-run Equations

		Coef.	Std. Err.	Z	P>z	[95% Conf. Interval]	
D_dln_trdcts	dln_fdi_LD.	-2.669	3.967	-0.67	0.501	-10.444	5.106
	infl_LD.	0.002	0.007	0.33	0.741	-0.012	0.016
	dln_rexr_D.	0.097	0.539	0.18	0.857	-0.959	1.153
	dln_trf_LD.	0.116	0.184	0.63	0.530	-0.245	0.476
	_CONS	-0.034	0.051	-0.67	0.503	-0.133	0.065
D_dln_fdi	dln_trdcts_LD.	-0.028	0.023	-1.2	0.231	-0.073	0.018
	infl_LD.	0.000	0.001	0.04	0.972	-0.001	0.001
	dln_rexr_LD.	-0.010	0.045	-0.21	0.832	-0.098	0.078
	dln_trf_LD.	0.013	0.015	0.83	0.406	-0.017	0.043
	_CONS	-0.002	0.004	-0.45	0.65	-0.010	0.006
D_infl	dln_trdcts_LD.	2.205	7.740	0.28	0.776	-12.965	17.375
	dln_fdi_LD.	64.960	110.859	0.59	0.558	-152.319	282.240
	dln_rexr_LD.	31.934	15.060	2.12	0.034	2.417	61.451
	dln_trf_LD.	5.000	5.142	0.97	0.331	-5.079	15.079
	_CONS	-0.001	1.412	0.00	0.999	-2.768	2.765
D_dln_rexr	dln_trdcts_LD.	0.075	0.086	0.87	0.386	-0.094	0.243
	dln_fdi_LD.	0.740	1.232	0.60	0.548	-1.674	3.154
	infl_LD.	-0.004	0.002	-1.60	0.109	-0.008	0.001
	dln_trf_LD.	-0.005	0.057	-0.09	0.930	-0.117	0.107
	_CONS	-0.005	0.016	-0.33	0.738	-0.036	0.025
D_dln_trf	dln_trdcts_LD.	1.014	0.325	3.12	0.002	0.377	1.650
	dln_fdi_LD.	-5.465	4.651	-1.18	0.240	-14.580	3.650
	infl_LD.	0.005	0.008	0.59	0.554	-0.011	0.021
	dln_rexr_LD.	-0.037	0.632	-0.06	0.953	-1.276	1.201
	_CONS	0.013	0.059	0.22	0.830	-0.103	0.129

Source: Author, 2021

The first panel row of Table 4.8 above indicate the respective coefficients for inflation, real exchange rate and transfer payments to be 0.002, 0.097, and 0.116 which are all positive except for FDI with a coefficient of -2.669 implying that in the short-run, as inflation, real exchange rate and transfer payments increases, trade deficit increase and that as FDI increase, trade deficit decreases. The *p-values* for the first lag of FDI, inflation, real exchange rate, and transfer payments are 0.501, 0.741, 0.857 and 0.530

respectively which are all greater than 0.05 suggesting insignificant short-term effects of FDI, inflation, real exchange rate and transfer payments on trade deficit. The sign for the coefficient for inflation in the short-run was consistent with the coefficient in the long-run results while the coefficients for real exchange rate and transfer payments are inconsistent with the respective coefficients in the long-term. The results of short-run effects of FDI, inflation, real exchange rate and transfer payments on trade deficit are all consistent with priory expectations (Muzurura, Sikwila and Nesongano, 2014).

The second panel row in Table 4.8 indicate the coefficients for trade deficit, inflation, real exchange rate and transfer payments are -0.028, 0.000, -0.010, and 0.013 respectively which are all negative except for inflation and transfer payments suggesting that in the short-run, FDI increase as inflation and transfer payments increase while it decrease as trade deficit and real exchange rate increase. The *p-values* of the first lag of trade deficit, inflation, real exchange rate and transfer payments are 0.231, 0.972, 0.832 and 0.406 respectively which are all over 0.05 indicating insignificant short-term causality between each of the trade deficit, inflation, real exchange rate and transfer payments on FDI. The signs for the coefficients for inflation and real exchange rate in the short-run are consistent with the respective signs in the long-run results while that of transfer payments was inconsistent with the respective coefficient sign in the long-run results. The sign for inflation in the short-term was inconsistent with the priori expectations while that of trade deficit, real exchange rate

and transfer payments are all consistent with the long-run priori expectations (Khan & Mitra, 2014).

The third panel row in Table 4.8 indicate the coefficients for trade deficit, FDI, real exchange rate and transfer payments are 2.205, 64.960, 31.934 and 5.000 which are positive implying that in the short-run inflation increase as trade deficit, FDI, real exchange rate and transfer payments increase. The respective *p-values* of trade deficit, FDI, and transfer payments are 0.776, 0.558 and 0.331 which are all greater than 0.05 suggesting insignificant short-term causality between each of the trade deficit, FDI and transfer payments on inflation. The *p-value* for real exchange rate was 0.034 which imply a significant short-run effects of real exchange rate on inflation. The signs for trade deficit, real exchange rates and transfer payments in the short-run are consistent with the long-term priori expectations while that of FDI was inconsistent with the long-term priori expectations (Khan & Mitra, 2014).

The fourth panel row in Table 4.8 indicate the respective coefficients for trade deficit, FDI, inflation, and transfer payments to be interpreted as 0.075, 0.740, -0.004, and -0.005 which are all positive except for inflation and transfer payments which are negative suggesting that in the short-run, real exchange rate depreciates as trade deficit, FDI, and inflation increase while it appreciates as trade deficit and FDI increases. The *p-values* of trade deficit, FDI, inflation, and transfer payments are 0.386, 0.548, 0.109, and 0.930 respectively which are all greater than 0.05 indicating

insignificant short-term effects between trade deficit, FDI, inflation, and transfer payment with real exchange rate. The signs for FDI, inflation and transfer payments in the short-run are inconsistent with the long-term priori expectations while only that trade deficit was consistent with the priori expectations (Yuen-Ling, Wai-Mun and Geoi-Mei, 2009).

The last panel row in Table 4.8 indicate the coefficients for trade deficit and inflation which are interpreted to be 1.014 and 0.005 which are both positive implying that in the short-term transfer payments increase as trade deficit and inflation increases. The coefficients for FDI and real exchange rate are -5.465 and -0.037 which are both negative suggesting that in the short-run transfer payments decrease as FDI and real exchange rate increases. The respective *p-values* of FDI, inflation, and real exchange rate are 0.240, 0.554, and 0.953 which are all greater than 0.05 suggesting insignificant short-run effects between FDI, inflation, and real exchange rate with transfer payments. The *p-value* for trade deficit was 0.002 suggesting significant short-run effects of trade deficit on transfer payments. The signs for trade deficit and inflation in the short-run are consistent with the long-term priori expectations while that of FDI and real exchange rate are inconsistent with the priori expectations (Lopez, Molina & Bussolo, 2007).

Table 4.9: Cointegration Analysis

Beta	Coef.	Std. Err.	Z	T-Value	P>z	[95% Conf.	Interval]
dln_trdcts	1	.	.	.	.	.	.
dln_fdi	0	(omitted)					
Infl	0.011	0.004	2.64	52.64	0.008	-0.019	-0.003
dln_rexr	-0.620	0.376	-1.65	33.50	0.099	-0.116	1.357
dln_trf	-0.930	0.130	-7.18	21.80	0.000	0.677	1.184
_CONS	-0.074	.	.	.	.	.	.
dln_trdcts	0	(omitted)	.	.	.	.	.
dln_fdi	1	.	.	.	.	.	.
infl	0.001	0.000	1.97	69.70	0.049	-0.001	-0.000
dln_rexr	-0.028	0.031	-0.92	40.80	0.360	-0.032	0.088
dln_trf	-0.060	0.011	-5.66	6.60	0.000	0.039	0.080
_CONS	-0.005	.	.	.	.	.	.

Source: Author, 2021

Table 4.9 above indicate the existence of two cointegrating equations. The signs of the coefficients of the cointegration with imposed normalization restriction since the normalization renders the model to be related to the dependent variable (Hunter, 2015). These equations can be illustrated as indicated below.

$$dln\_trdcts = -0.074 + 0.011infl - 0.620dln\_rexr - 0.930dln\_trf ....4.1$$

$$dln\_fdi = -0.005 + 0.001infl - 0.028dln\_rexr - 0.060dln\_trf ……..…....4.2$$

The Vector Error Correction term equations for the two cointegrating equations are as illustrated below;-

$$ECT_{t-1} = [1.000TRDCTS_{t-1} + 0.000FDI_{t-1} - 0.005INFL_{t-1} - 0.091REXR_{t-1} + 0.131TRF_{t-1} - 24.924]$$
………………………………………………..…………………..…………4.3

$$ECT_{t-1} = [1.000FDI_{t-1} + 0.000TRDCTS_{t-1} + 0.000INFL_{t-1} - 0.012REXR_{t-1} + 0.000TRF_{t-1} - 22.969]$$ ……..………………………………………………………4.4

From cointegration Equation 4.1, the coefficient for inflation was 0.011 with a *p-value* of 0.008 implying a positive significant effect and so in the long-run, a percentage increase in inflation results in increase in inflation by trade deficit by 0.011%. This result was inconsistent with the priori expectation which should be a positive relationship implying that inflation makes the exports to be costly as the imports become cheaper hence leading to an increase in trade deficit (Mahmud *et al.,* 2004). This was contrary to (Turkson, 2015) who found negative significant effects as well as that of (Sharif, 2016) who found positive insignificant effects of between inflation and trade deficit. The error correction term equation for 4.3 indicate that the previous periods deviation from long-ren equilibrium is corrected in the current at an adjustment speed of 0.5%.

The Equation 4.1 further indicate the coefficient for real exchange rate was -0.620 with *p-value* of 0.099 implying a negative insignificant effect of real exchange rate to trade. The insignificant result was contrary to the results from (Kipkosgei, 2011), (Caporale, 2012), (Mwito, 2015), (Turkson, 2015) and (Magessa, 2009) who all found negative significant effects of real exchange rate on trade deficit. The negative effect was also contrary to our priori expectations and was also contrary to results from (Sharif, 2016), (Ogutu, 2014) and (Osoro, 2013) who all found positive significant effects of real exchange rate on trade deficit as well as (Mbayani, 2016) that found

insignificant negative effects. Equation 4.3 indicate that the previous period's deviation of real exchange rate from the long-run equilibrium is converted on the current at an adjustment speed of 9.1%.

The Equation 4.1 also indicate the coefficient for transfer payments was as -0.930 with the p-value of 0.000 implying a significant negative effects of transfer payments on trade deficit hence a percentage increase in transfer payments leads to decline of trade deficit by 0.930%. The result was contrary to (Mbayani, 2016) and (Boettke *et al.* 1998) who both found a positive significant effect of transfer payments on trade deficit. Equation 4.3 indicate that previous period's deviation of inflation from the long-run equilibrium is converted in the current at an adjustment speed of 13.1%.

From cointegrating equation 4.2, the coefficient for inflation was 0.001 with a *p-value* of 0.049 implying a positive significant effect of inflation on foreign direct investment and so in the long run a percentage increase in inflation increase foreign direct investment by 0.001%. The coefficient for transfer payments was -0.060 with the *p-value* of 0.000 implying a negative significant effect of transfer payments on foreign direct investment and so a percentage increase in transfer payments decrease the foreign direct investment by 0.060%. The coefficient for the real exchange rate on the other hand was -0.028 with *p-value* of 0.360 implying a negative insignificant effect of real exchange rate on foreign direct investment. The error correction term equation 4.4 indicate that previous period's deviation of real exchange rate from long-run

equilibrium is corrected in the current at an adjustment speed of 1.2% while that of inflation and transfer payments are converted at adjustment speeds close to 0%.

4.8 Diagnostic Tests

4.8.1 Autocorrelation Test

In order to establish the degree of similarity between each of the variables with the other variables under study, autocorrelation test of the residuals was conducted. The results of the (Breusch and Godfrey, 1978) LM test which tests for higher-order serial correlation is presented in Table 4.10 below; -

Table 4.10: Serial correlation test

Breusch-Godfrey LM test for autocorrelation

F-Statistics	1.52	Prob. F(4,30)	0.221
Obs*R-squared	0.058	Prob. Chi-Square	0.045

Source: Author, 2021

The Table 4.10 above indicate that the *p-value* to be 0.0451 which was less than 0.05 and so we accept the null hypothesis that there was no serial correlation of the residuals. This was inconsistent with (Osoro, 2013) that found the *p-value* of 0.3107 which was greater than 0.05.

4.8.2 Heteroskedasticity

This study used the (Breusch-Pagan, 1979) and (Cook-Weisberg, 1983) test to test for heteroskedasticity. The null hypothesis is that there is no heteroskedasticity which

means that the error variances are all equal. The results of the Breusch-Pagan and Cook-Weisberg test is presented in the Table 4.11 below.

Table 4.11: Heteroskedasticity Test

Breusch-Pagan / Cook-Weisberg test for heteroscedasticity

F-Statistics	1.93	Prob. F(4,30)	0.174
Obs*Chi-squared	1.94	Prob. Chi-Square	0.164

Source: Author, 2021

Table 4.11 above indicate that the *p-value* is 0.164 which is more than 0.05 and so we accept the null hypothesis that there is no heteroskedasticity. The *chi-square* value is small at 1.94, indicating that heteroskedasticity is probably not a problem (or at least that if it is a problem, it isn't a multiplicative function of the predicted values).

4.8.3 Variance Inflation Factors (VIF) Tests

The Variance Inflation Factors (VIF) tests was used to calculate the centered or uncentered variance inflation factors (VIFs) for the independent variables specified in the linear regression model. The results of the VIF test is presented in Table 4.12 below;-

Table 4.12: Variance Inflation Factors

Variable	VIF	1/VIF
dln_trf	1.27	0.788
dln_rexr	1.25	0.797
dln_fdi	1.19	0.837
Infl	1.15	0.869

Source: Author, 2021

The VIF results presented in Table 4.12 indicate that all the independent variables have a VIF under 15 that is 1.27, 1.25, 1.19 and 1.15 for transfer payments, real exchange rate, FDI, and inflation respectively hence we conclude that there is no multicollinearity. The results are also consistent with the (Belsley, Kuh, and Welsch's, 1980) test aimed at evaluating collinearity in the linear regression.

4.8.4 Model Specification Error Tests

The link test is a test that, conditional on the specification, test that the independent variables are specified incorrectly. The results of the test is presented in Table 4.13 below;-

Table 4.13: Link Test Results

Source	SS	Df	MS	Number of obs		35
				F(2, 32)		29.46
Model	0.002	2	0.001	Prob > F		0.000
Residual	0.001	32	0.000	R-squared		0.648
				Adj R-squared		0.626
Total	0.004	34	0.000	Root MSE		0.006

DTRDCTS	Coef.	Std. Err.	T	P>|t|	[95% Conf. Interval]	
_hat	0.653	0.255	2.59	0.015	0.134	1.173
_hatsq	-7.751	4.861	-1.59	0.121	-17.653	2.150
_cons	0.009	0.010	0.90	0.374	-0.012	0.030

Source: Author, 2021

The results in Table 4.13 indicate the *p-value* for *_hat* to be 0.015 which is significant and that of *_hatsq* to be 0.121 which is insignificant hence we conclude that both dependent and independent variables are specified correctly. This result is also consistent with the (Ramsey, 1969) regression specification-error test (RESET) which

tests for omitted variables which indicated the *p-value* for *_hatsq* to be 0.382 which was greater than 0.05. We therefore accept the null hypothesis that there are no omitted values in the regression and hence no need to add more variables.

4.9 Causality Tests

In a bid to establish the causality of each pair of the variables, granger causality Wald tests was conducted. In this test, for a given pair of variables, variable X is said to granger cause variable Y if the estimation for variable Y can be improved by the lags of variable X. The results are presentenced in Table 4.14 below.

Table 4.14: Granger causality Wald tests

Equation	Excluded	chi2	Df	Prob > chi2	Decision
dln_trdcts	dln_fdi	6.462	2	0.040	FDI granger-cause trade deficit
dln_trdcts	Infl	0.152	2	0.927	Inflation does not granger-cause trade deficit
dln_trdcts	dln_rexr	2.137	2	0.344	REXR does not granger-cause trade deficit
dln_trdcts	dln_trf	0.041	2	0.980	TRF does not granger-cause trade deficit
dln_trdcts	ALL	8.412	8	0.394	All jointly does not granger-cause trade deficit
dln_fdi	dln_trdcts	1.841	2	0.398	Trade deficit does not granger-cause FDI
dln_fdi	Infl	1.896	2	0.388	inflation does not granger-cause FDI
dln_fdi	dln_rexr	2.313	2	0.315	REXR does not granger-cause FDI
dln_fdi	dln_trf	1.206	2	0.547	TRF does not granger-cause FDI
dln_fdi	ALL	5.352	8	0.719	All jointly does not granger-cause FDI
Infl	dln_trdcts	0.927	2	0.629	Trade deficit does not granger-cause inflation
Infl	dln_fdi	9.603	2	0.008	FDI granger-cause inflation
Infl	dln_rexr	3.951	2	0.139	REXR does not granger-cause inflation
Infl	dln_trf	7.590	2	0.022	TRF granger-cause inflation
Infl	ALL	18.173	8	0.020	All jointly granger-cause inflation
dln_rexr	dln_trdcts	0.920	2	0.631	Trade deficit does not granger-cause REXR
dln_rexr	dln_fdi	5.960	2	0.051	FDI granger-cause REXR
dln_rexr	Infl	0.362	2	0.834	inflation does not granger-cause REXR
dln_rexr	dln_trf	13.965	2	0.001	TRF granger-cause REXR
dln_rexr	ALL	31.964	8	0.000	All jointly granger-cause REXR
dln_trf	dln_trdcts	3.341	2	0.188	Trade deficit does not granger-cause TRF
dln_trf	dln_fdi	8.457	2	0.015	FDI granger-cause TRF
dln_trf	Infl	13.61	2	0.001	inflation granger-cause TRF
dln_trf	dln_rexr	9.520	2	0.009	REXR granger-cause TRF
dln_trf	ALL	25.643	8	0.001	All jointly granger-cause TRF

Source: Author, 2021

Table 4.14 indicate that in as much as FDI granger cause trade deficit in the short-run,

trade deficit does not granger cause FDI at 5% significance level with *p-values* of

0.040 and 0.398 respectively. This result is consistent with (Jayachandran *et al.*, 2010)

who established that lack of mutual causality between FDI and trade deficit. Inflation

does not granger cause trade deficit and the reciprocal causality does not exist either

at 5% significance level with the respective *p-values* of 0.927 and 0.629. In the same way, real exchange rate does not granger cause trade deficit with no reverse causality with respective *p-values* of 0.344 and 0.631. Transfer payments also does not granger cause trade deficit with no mutual causality at 5% significance level with respective *p-values* of 0.980 and 0.188. FDI, inflation, real exchange rate and transfer payments jointly does not jointly granger cause trade deficit at 5% significance level with a *p-value* of 0.394. These results are in coherence with (Mohammed *et al.,* 2014) who also established that FDI granger cause inflation, but the results are inconsistent with the results of (Kosteletou *et al.,* 2000) who established that FDI granger cause real exchange rate.

Table 4.14 also indicate that in as much as FDI granger cause inflation, there is no reciprocal causality between FDI and inflation at 5% significance level with the respective *p-values* of 0.008 and 0.388. Though real exchange rate does not granger cause FDI, there was reciprocal causality at 5% significance level with respective *p-values* of 0.315 and 0.051. Results further indicate that in as much as transfer payments granger cause FDI, the reverse causality does not exist at 5% significance level with the respective *p-values* of 0.015 and 0.541. All the variables trade deficit, inflation, real exchange rate and transfer payments jointly does not jointly granger cause FDI with a *p-value* of 0.719.

Table 4.14 further indicate that inflation granger cause transfer payments and that there is a reverse causality at 5% significance level with respective *p-values* 0.022 and 0.001 which is consistent with our priori expectations. The results further indicate that real exchange rate does not granger cause inflation and there is no feedback causality either with respective *p-values* of 0.139 and 0.834. This is contrary to results by (Emmanuel *et al.,* 2015) who established that real exchange rate granger cause inflation without a reverse causality. The results also indicate that real exchange rate granger cause transfer payments and that there is a reverse causality with the respective p-values of 0.09 and 0.001. All the variables trade deficit, FDI, real exchange rate, and transfer payments jointly granger cause inflation with a *p-value* of 0.020. Additionally, all the variables trade deficit, FDI, inflation and transfer payments jointly granger cause real exchange rate at 5% significance level with a *p-value* of 0.000. Lastly, all the variables trade deficit, FDI, inflation, and real exchange rate jointly with a *p-value* of 0.001 granger cause transfer payments at 5% significance level.

4.10 Impulse Response Functions

In order to establish how the shocks on the foreign direct investments, inflation, real exchange rate and transfer payments affect the trade deficit over time, impulse response function was conducted (Lütkepohl, 2008). Figure 4.2 below indicate the impulse response graphs for the variables under study.

Figure 4.2: Impulse Response Functions
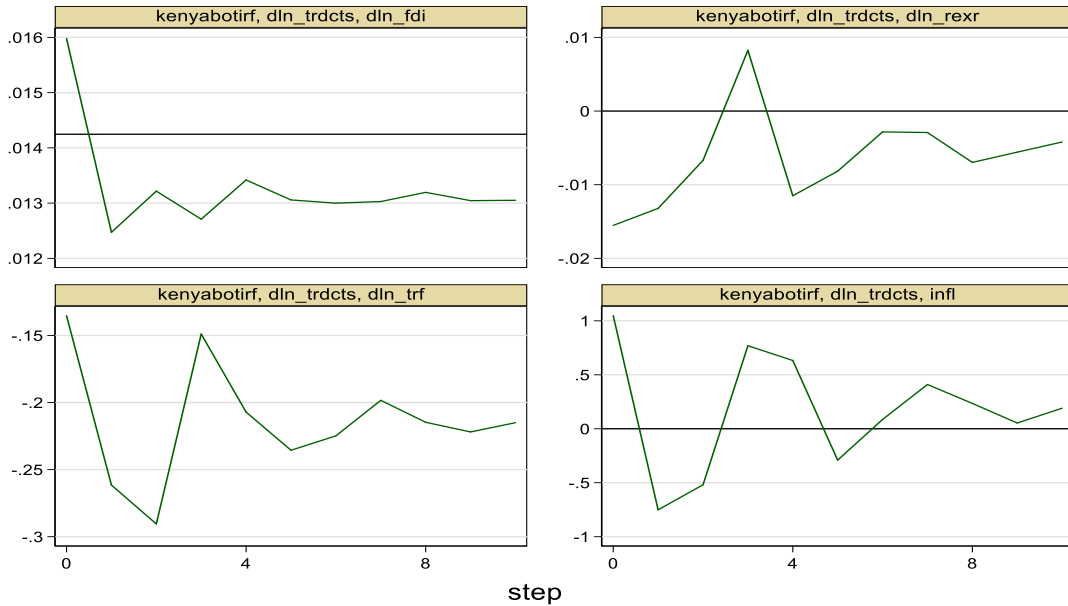
Graphs by irfname, impulse variable, and response variable

Source: Author, 2021

From the top-left graph in Figure 4.2 above, the impulse response function between trade deficit and FDI indicate that an unexpected increase in FDI yields a short sharp negative bump on trade deficit in the first year followed by a slight sharp positive bump and another slight sharp negative bump before another slight positive bump in the second, third and fourth year respectively. The effect dies out from the fifth year after a slight dip throughout the tenth-year period.

The Graph on the top-right in Figure 4.2 indicate the impulse response function between trade deficit and real exchange rate and illustrate that an unanticipated increase in real exchange rate will result in a steady rise in the trade deficit through the second year before a sharp bump on trade deficit in the third year followed by a sharp

negative bump on trade deficit between the third and the fourth year. This is followed by a slight steady rise in the trade deficit through to the seventh year before a very slight sharp negative bump in the eighth year followed by a slight sharp rise from the eighth year through to the tenth-year period.

The Graph in the bottom-left of Figure 4.2 indicate the impulse response function between trade deficit and transfer payments which illustrates that an unanticipated increase in transfer payments will result in a sharp negative punch on trade deficit through to the second year before a sharp increase in the third year. This is followed by a steady decline in trade deficit through to the fifth year before another slight steady rise through to the seventh year. From the seventh year, there is a very slight negative bump on trade deficit through to the tenth-year period.

Lastly, the Graph on the bottom-right of Figure 4.2 presents the impulse response function between trade deficit and inflation and illustrates that an unanticipated increase in inflation will result to a sharp decline on trade deficit in the first year before a slight sharp increase in the second year followed by a very sharp increase in trade deficit in the third year. The fourth year exhibits a slight decline followed by a sharp negative and then positive bump on trade deficit in the fifth and the sixth-seventh year respectively. This is followed by a steadily sharp slight through to the ninth year followed by a slight increase in the tenth year.

CHAPTER FIVE

5.0 SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

In this chapter, the summary of the findings, conclusion and the policy recommendations are presented. Section 5.2 and 5.3 presents the summary and the conclusion respectively. Section 5.4 outlines recommendations and policy implications while section 5.5 present the contributions of this study. Section 5.6 present the suggestions for further research.

5.2. Summary

This study examined the effects of Foreign Direct Investments (FDI), inflation, real exchange rate and transfer payments in addition to the nature and strength of their connection with the trade deficit in Kenya as well as their respective impulse response. The study included trade in services which most of the similar previous studies avoided in as much as trade in services forms a significant component of Kenya's international trade. The study used secondary data obtained from the World Bank for the period since which Kenya has been experiencing persistent trade deficit that ranges from the year 1978 to 2014 with annual frequency.

From the Vector Error Correction Model results, we observed that foreign direct investment has negative insignificant effect on trade deficit with an adjustment coefficient of -2.669 and *p-value* of 0.5. FDI also granger-cause trade deficit in the short-run with a *p-value* of 0.040. The impulse response function on the other hand established that an unexpected increase in FDI yields immediate fluctuations on trade deficit which only die out from the fifth year after a slight dip throughout the tenth-year period.

The results further indicate that inflation has significant positive effect and an insignificant positive effect on trade deficit in the long-run and short-run respectively with the respective *p-values* of 0.008 and 0.074. Regarding causality, inflation was found not to granger-cause trade deficit with *p-value* of 0.927. The impulse response function between trade deficit and inflation indicated that an unanticipated increase in inflation will result in sharp alternating changes on trade deficit through to the sixth year before the effects slows down through to the tenth-year.

The results also indicate that real exchange rate has insignificant negative effect and an insignificant positive effect on trade deficit in the long-run and short-run respectively with the respective *p-values* of 0.09 and 0.86. Regarding causality, real exchange rate was found not to granger-cause trade deficit with *p-value* of 0.344. The impulse response function between trade deficit and real exchange rate indicated that

an unanticipated increase in real exchange rate will result in a combination of huge steady and sharp fluctuations on trade deficit through to the sixth year before the effects slows down through to the tenth-year.

Lastly, the result indicated that transfer payment has significant negative effect and an insignificant negative effect on trade deficit in the long-run and short-run respectively with the respective *p-values* of 0.00 and 0.53. Regarding causality, transfer payment was found not to granger-cause trade deficit with *p-value* of 0.980. The impulse response function between trade deficit and transfer payments indicated that an unanticipated increase in transfer payments will result in sharp alternative punches on trade deficit through to the fifth year before the effects slows down through to the tenth-year.

5.3. Conclusion

This study concluded that in as much as only FDI granger causes trade deficit with a *p-value* of 0.040, in the short run FDI *(p-value 0.5)*, inflation *(p-value 0.74)*, real exchange rate *(p-value 0.86),* and transfer payments *(p-value 0.53)* all do not affect trade deficit in the short-run with respective short-run adjustment coefficients of -2.669, 0.002, 0.097 and -0.116. However, in the long-run only inflation *(p-value 0.008)* and transfer payments *(p-value 0.000)* significantly affect trade deficit, but real exchange rate *(p-value 0.09)* has insignificant effects on trade deficit in the long-run.

The impulse response functions indicate that sudden shocks in any of the variables would possibly have effects on the other pair of variables within the initial years across all pairs of the variables. We begin to see the effects dying out or becoming lest intense from the fifth year across all the pairs. In this regard, we conclude that persistent trade deficit is not really bad for Kenya as measures that should arrest it actually reduces foreign direct investments which is really important for the economy.

5.4 Recommendations and Policy Implications

Kenya's persistent trade deficit can be addressed in the long-run by increasing transfer payments as well as reducing inflation. However, addressing the trade deficit would come at a cost to the economy in the form of reduced foreign direct investments. In this regard, instead of focusing on addressing the trade deficit, it makes sense for Kenyan policy makers to take measures that would help increase FDI in the long-term.

Given that only FDI cause trade deficit in the short-tun and that FDI, inflation, real exchange and transfer payments does not affect trade deficit and so trade deficit should be looked at mainly from the long-term perspective. The This study also revealed that any shocks need to be addressed within the shortest possible timeframe as the impulse response functions indicate the effects being adverse within the first few years as effects only begin to die out from the fifth year.

5.5 Contributions of the study

This study adds more knowledge to the existing literature on the effect of foreign direct investment, inflation, real exchange rate and transfer payments on trade deficit in Kenya. It also guide both academicians in Kenya as well as the policy makers in addition to providing the much-needed insights of the new measures that can be taken to reduce Kenya's unfavorable balance of trade as we work towards attaining trade surplus. Finally, this study will guide the multinationals based in Kenya as well as those planning to invest in the country on the potential effect of their Foreign Direct Investments on trade deficit of the country.

5.6 Limitations of the study

This study was limited by the availability of Kenya's trade data, especially on exchange rate, which started from late 1980s and 1990s. Additionally, though the real exchange rate was calculated using the Consumer Price Index (CPI) and the data was also obtained the data from a credible source which is the World Banks data portal, the study would have been enriched if data on Harmonized Index of Consumer Prices would have been available.

5.7. Suggestions for Further Research

This study mainly focused on establishing the effects of foreign direct investment, transfer payments, inflation and real exchange rate on trade deficit, their causalities as well as the timeframe for the respective impulse responses. This study has revealed

that the measures required for Kenya to address the persistent trade deficit would negatively impact on other key economic development indicators like foreign direct investments. In this regard, future study should assess how the economy's trade deficit, FDI and inflation affects the per capita income. Additionally, this study was also limited to data availability and so future studies on trade deficit should use weighted real effective exchange rate that is based on Kenya's fundamental trade associates. Given the recent upsurge entry of individual foreigners into the country, future research on trade deficit should also focus on the effect of net foreign assets on trade deficit if reliable data can be found.

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APPENDICES

Appendix A: Summary of related studies

Table A1: Summary of related studies

Author and year	Country	Theoretical approach	Method of analysis	Independent variable(s)	Sign and Significance (5 % level)	Remarks
Kipkosgei T. S. (2011)	Kenya	Trade Balance Model	Cointergration and Error Correction Model (ECM) and other non-parametric method model using annual data for the period 1970 – 2010	Real exchange rate	(-) Significant	The study sought to examine the effect of the variables considered but not the relationship. The study excluded trade in services. It also excluded other key factors such as Inflation, transfers among others. Recommendation: Trade balance could be improved through policies on income or growth and money supply rather titan exchange rate regime.
				Government expenditure	(+) Significant	
				FDI	(+) Significant	
				Foreign Income	(+) Insignificant	
				Domestic Income	(-) Significant	
				Money Supply	(+) Significant	
Caporale G. M., Alana L. A. and Mudida (2012)	Kenya	Marshall-Lerner condition approach	Fractional integration and cointegration methods among other techniques based on the concept of long memory or long-range dependence using quarterly data for the time period 1996q1 – 2011q4	Real Exchange Rate	(-) Significant	The study sought to examine the Marshall-Lerner (ML) condition for the Kenyan economy. The techniques used in the analysis i.e mainly fractional integration and cointegration are very general allowing only for integer degrees of differentiation. Recommendations: Exchange rate can be used to address external balance as depreciation leads to reduction in import expenditure and an increase in export sales.
				Relative Income	(-) Significant	
Mwito M. M., Muhia, Kiprop R. N., S., Kibet L. (2015)	Kenya	Extended Trade Balance Model	Cointegration with ARDL model and Extended Trade Balance Model using panel data for the time period 1970 – 2013	Bilateral real exchange rate	(-) Significant	The study sought to examine the Marshall-Lerner condition in Kenya's bilateral trade. Recommendation: In addition to maintaining a stable exchange rate, maintaining a highly overvalued bilateral exchange rate could help discourage exports. Additionally, the study also recommended currency devaluation in bilateral terms.
				income of the trading partner	(+) Significant	
				per capita income of the trading partner	(+) Significant	
Turkson L. (2015)	Ghana	Determinants of Balance of Trade	OLS and other non-parametric method model using annual	FDI	(-) Insignificant	The study sought to identify and estimate the factors affecting the Ghanaian trade balance.
				Government Expenditure	(-) Significant	
				Net Income	(-) Significant	

Author and year	Country	Theoretical approach	Method of analysis	Independent variable(s)	Sign and Significance (5 % level)	Remarks
			data for the period 2005-2013	Household Consumption Expenditure	(+) Significant	The period of study was statistically very short
				Real Exchange Rate	(-) Significant	Recommendation: There is need to reduce both government and household consumption expenditure to improve on the balance of trade
				Inflation	(-) Significant	
S. Mbayani (2016)	Tanzania	Determinants of Trade Balance	Cointegration using annual data for the period 2070-2013	Real Exchange Rate	(-) Insignificant	The study sought to establish the factors affecting the trade balance for Tanzania.
				Household Consumption Expenditure	(-) Significant	Government expenditure and private consumption are the main contributing factors to trade deficit.
				Government Expenditure	(+) Significant	
				Income from rest of the world	(+) Significant	The study excluded other key factors such as Inflation, transfers among others.
				FDI	(+) Insignificant	
				Trade liberalization	(-) Significant	
Sharif M. N. and Ali Yassin Sheikh Ali (2016)	Somalia	Determinants of Trade Balance	OLS and two-country imperfect substitute model using annual data for the period 1970-2010	Real Exchange Rate	(+) Significant	The study sought to establish the main determinants of trade balance in Somalia.
				Foreign Direct Investment	(-) Significant	The study was only limited to three factors affecting trade balance yet there are so many factors that influence trade balance.
				Inflation	(+) Insignificant	Recommendation: Export promotion strategies as well as currency stabilization are critical in improving the trade balance.
Grephas O. Ogutu et al (2014)	Kenya	Two country imperfect substitute model of Rose and Yellen (1989)	Cointegration Vector Autoregressive and Vector Error Correction modelling using annual data for the period 1963-2013	Real Exchange Rate	(+) Significant	The study sought to establish the relationship and effect of the real exchange rate on trade the trade balance.
				Domestic Income	(-) Insignificant	The resultant sign on domestic income is inconsistent with monetary approach that the rise in domestic income raises money demand hence increasing exports.
				Foreign Income	(+) Significant	
				Broad Money Supply	(+) Insignificant	The formula used in calculating real exchange rate is not right (used REXR= nominal exchange rate (d/f) x (CPIdomestic /CPIforeign)
				Exchange Rate Regime	(-) Insignificant	The resultant sign on broad money supply is inconsistent with Keynesian approach's priori expectations.

Author and year	Country	Theoretical approach	Method of analysis	Independent variable(s)	Sign and Significance (5 % level)	Remarks
						Recommendations: both monetary and exchange rate policies needs to be implemented together to enhance better position of trade balance
Sayi Katwale Magessa (2009)	Tanzania	Simple reduced form model of the trade balance	Cointergration procedure and Error Correction Modeling (ECM) using annual data for the period 1970-2006	Household consumption expenditure	(+) Significant	The study sought to identify the main factors that causes trade deficit in Tanzania. The study only covered merchandise trade and left out trade in services which is currently key for most developing countries. The sign for government expenditure not as per the priori expectations. Recommendations: Fiscal discipline can help improve trade balance and should entail efficient collection of revenue accompanied with strict expenditure management and controls with expenditures being geared towards productive activities.
				Government expenditure	(+) Significant	
				FDI	(+) Insignificant	
				Real exchange rate	(-) Significant	
				Openness	(-) Insignificant	
				Income from the rest of the world	(+) Significant	
Osoro Kennedy (2013)	Kenya	Marshall-Lerner condition approach	Cointegration approach and Error correction modeling (ECM) using annual data for the period 1963-2012.	FDI	(+) Significant	The study sought to establish the major determinants of trade balance in Kenya. The study was limited to testing the Marshall -Lerner condition in Kenya but did not test the relationship of the real exchange rate on trade balance. Recommendation: The country should formulate and adjust external trade policies to address issues such as social and physical infrastructure, reduce price of electricity, reduce high rates of interest adjust tax and tariff structures accordingly.
				Real Effective Exchange Rate	(+) Significant	
				Budget deficits	(+) Insignificant	

Appendix B: Data

Table B.1: raw data

YEAR	TRDCTS	INFL	FDI	REXR	TRF
1978	-563951846	16.93	-32085353.95	102.77	92313516.6
1979	-401856289	7.98	-78123859.1	102.42	96883157.53
1980	-839062355	13.86	-77895605.75	101.35	157138886.3
1981	-575407677	11.6	-8289584.29	122.15	214866024.7
1982	-258003676	20.67	-3387557.14	129.74	132206283.9
1983	-43270801.9	11.4	-9240119.15	146.5	180520376.5
1984	-101083158	10.28	-3885145.39	150.05	176010961.7
1985	-60917289	13.01	-23429726.54	156.76	189506931
1986	-4437393.46	2.53	-27795339.61	153.77	200299010.5
1987	-426084266	8.64	-8629862.46	148.91	206569736
1988	-460525945	12.26	1803111.49	148.8	334589876.7
1989	-643675852	13.79	-60828874.84	158.9	371613191.7
1990	-476548601	17.78	-57081096.18	158.39	367797766.5
1991	-130246378	20.08	-18830976.84	165.04	345668390.6
1992	-21696732	27.33	-6363133.15	156.4	199429904.7
1993	-1296327284	45.98	-145655517.1	198.58	1209276457
1994	-1453451893	28.81	-7432412.6	152.86	1175055189
1995	-2395870744	1.55	-30934107.64	141.98	1036852835
1996	-2000541132	8.86	-105913755.1	149.08	1157150736
1997	-2970948723	11.36	-56143650.64	140.88	1350833853
1998	-4064850081	6.72	-14423846.26	137.79	1567854960
1999	-4119475591	5.74	-27391207.59	155.13	1826104490
2000	-987045307	9.98	-110904550.4	157.94	920763349.4
2001	-1036959028	5.74	-5302622.94	158.4	838338092
2002	-651650570	1.96	-20202582.1	158.2	677152377.4
2003	-649327981	9.82	-79662930.62	142.06	870349830.6
2004	-1007314078	11.62	-41647828.35	136.25	1002059820
2005	-1396557728	10.31	-11524455.87	121.86	1252694667
2006	-2225255504	14.45	-26717027.61	104.88	1784901658
2007	-2996249358	9.76	-693011390.5	91.76	2108387103
2008	-4268637872	26.24	-51819059.31	77.56	2331244300
2009	-3916539738	9.23	-70269794.39	79.12	2258524049
2010	-4548264829	3.96	-176486731.9	79.23	2327220053
2011	-6442234812	14.02	-325817308.1	80.35	2671149554
2012	-6894118908	9.38	-242549587.1	71.36	2809649580
2013	-7669588171	5.72	-508763130.8	69.78	3136587441

| 2014 | -9434174775 | 6.88 | -1022812635 | 67.74 | 3777207994 |