

**THE EFFECT OF SELECTED MACRO-ECONOMIC VARIABLES  
ON EXCHANGE RATES IN KENYA**

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## **DECLARATION**

I, the undersigned, declare that this is my original work and has not been presented to any institution or University other than the University of Nairobi for examination.

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## **DEDICATION**

This project is dedicated to my loving parents Mr and Mrs James and Jane Mwangi and to my three amazing brothers Emmanuel, Peter and Daniel. You are the best family I would have asked for and I always give God thanks for you

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## LIST OF ABBREVIATIONS

ANOVA	Analysis of Variance
BEERs	Behavioral Equilibrium Exchange Rates
BOPT	Balance of Payment Theory
BOT	Balance Of Trade
CBK	Central Bank of Kenya
CIRP	Covered Interest Rate Parity
FDI	Foreign Direct Inflow
FEERs	Fundamental Equilibrium Exchange Rates
FOREX	Foreign Exchange
GDP	Gross Domestic Product
KES	Kenya Shilling
KNBS	Kenya National Bureau of Statistics
NER	Nominal Exchange Rates
OTC	Over the Counter
PPP	Purchasing Power Parity
RER	Real Exchange Rate
SDR	Special Drawing Rate
SPSS	Statistical Package for Social Sciences
TOT	Terms of Trade
UCIRP	Uncovered Interest Rate Parity
UK	United Kingdom
USD	United States Dollar

## ABSTRACT

This study aimed at determination of the effect of selected macro-economic variables on exchange rates in Kenya. A rate of exchange is the rate at which one currency is exchanged for another for trading purposes. It is used for the determination of how much of a currency can be used to purchase goods and services in a country. The dependent variable in this study was Exchange rates (KSH/USD) while independent variables were inflation as determined by the consumer price index, interest rates and aggregation of trade flows as measured by balance of payments divided by GDP. The study period was for ten years from January 2006 to December 2015 using secondary data on inflation, interest rates and aggregation of trade flows as well as the spot rate for exchange rate over that period with data being collected monthly. The study employed a descriptive research design and a multiple linear regression model was used to analyze the relationship between the variables. Statistical package for social sciences version 21 was used for data analysis purposes. Results of the study showed that interest rate had a positive correlation coefficient of 0.446 with exchange rate, Inflation rate and exchange rate had a correlation coefficient of negative 0.395 while the Level of aggregation of trade flows had a correlation coefficient of positive 0.829 to the exchange rate. The value of R square was 0.745, a discovery that 74.5 percent of the deviations in exchange rates in Kenya occurred due to changes in interest rate, inflation rate and trade flows at 95 percent confidence level. Other variables not included in the model justify for 25.5 percent of the variations in exchange rates in Kenya. Also, the results revealed that there exist a strong relationship among the selected macro-economic variables and exchange rate as shown by the correlation coefficient (R) equal to 0.863. The significance value obtained was 0.00 which was less than  $p=0.05$  implying that the model was statistically significant in predicting how the macro economic variables of interest rate, inflation rate and trade flows affect exchange rates in Kenya. The study suggested that similar studies should be undertaken covering a longer period of study years and also taking into account other macro-economic variables not considered in this study.

# **CHAPTER ONE: INTRODUCTION**

## **1.1 Background of the Study**

According to Bah and Amusa (2003) the exchange rate of a country determines the growth of that country in terms of trading across borders and is a measure of its international competitive edge. Because of the importance of exchange rate in the determination of a country's level of trade, the need to study exchange rate determinants and behavior of foreign markets arises. The evaluation of the determining factors of exchange rates has been an important task for both academicians and policy makers with the major motivation of establishing the link between exchange rates and export growth. In his study, Bergen (2010) found that the most observed, analyzed and government manipulated economic variables are rates of exchange. Similarly, Kanamori (2006) in his theoretical background noted that the rate of exchange for a country is determined by macroeconomic factors, speculative factors and economic expectations.

According to Defrenot and Yehoue (2006) exchange rates have been determined by governments rather than market forces for the better part of the twentieth century. Long before World War I currencies were quoted in terms of gold and after World War II most of the world currencies were quoted in reference to the U.S. dollar. Barnett and Ho Kwag (2007) in their research noted that exchange rates are very dynamic and equilibrium in foreign markets is determined by the demand and supply forces of foreign exchange. In recent decades, rapid developments of global capital market and financial

services have been observed. Civcir (2003) found that the dynamic character of exchange rates impact the overall macroeconomic situations of various countries.

Kenya has been characterized by the evolution of exchange rate regimes together with general macroeconomic policies that have been in place ever since Kenya gained independence in 1964. Ndung'u (2001) states that from the period 1963 to 1974, the Kenyan shilling was fixed against the U.S. dollar but after discrete devaluations, the shilling was tied to the special drawing rate (SDR). However, the periods from 1974 to 1981 saw volatile movements of the nominal rate of exchange in relation to the dollar. This caused the shilling to depreciate even further and was consequently devalued in 1982. The exchange rate regime was subsequently changed in 1983 to a crawling peg system till 1993 when a floating exchange rate system was adopted. When the foreign exchange market was liberalized, Kenya gained the right to control inflation but lost the right to lock in domestic prices and thereby transmitting effects of globalization directly into the country (Moses & Leonard, 2013).

### **1.1.1 Selected Macro-Economic Variables**

Macroeconomic variables are the variables independent of the level of income. They are factors that are applicable to the whole economy and national and local level whose effects are felt by a large population rather than individuals and also affect gross domestic product (GDP), rate of inflation, rate of interest and balance of payments, rate of unemployment and the levels of income. These effects have to do with the structure of the economy, performance behaviors and the decision making of the economy at the

broad level. Their effects are felt through the national income, output levels, consumption, unemployment, inflation, savings, investment, international trade and international finance (Sharma & Singh, 2011). Macroeconomic variables act as indicators of what is currently trending in the economy (Khalid et al., 2012).

Inflation refers to the sustained increase in general prices in the economy. The inflation rate differential is the difference or gap in inflation between two economies and is computed as the difference between the domestic country's inflation minus the foreign country's inflation. A negative value of inflation rate differential means that the domestic country's inflation rate is lower than the foreign country's inflation rate; while a positive value means that the domestic inflation is higher as compared to the foreign country inflation rate (Sharma & Singh, 2011).

Interest rate differential is the difference between two similar interest bearing assets. It is used by traders in the forex market to price forward rates of exchange. Drawing from the concept of interest rate parity, a trader is able to speculate a future rate of exchange between two currencies and be able to set a premium or a discount on the futures contracts (Sharma & Singh, 2011).

The balance of payments (BOP) shows the net inflows and outflows of foreign currencies which are the results of international trade in goods and services (Makin, 2004). The BOP consists of the financial, capital and current accounts. Current accounts are composed of services, incomes, merchandise and transfer payments. Inflows to the

account are credited and outflows debited and the net effect of this is the surplus or deficit of the account for a given year. The capital account on the other hand keeps a record of capital transfers, acquisition and/or disposals of assets which are not considered financial assets. Lastly the financial account keeps a record of the foreign direct payments and portfolio investment inflows and outflows. The above three accounts determine the level of a country's foreign reserves (Tenreyro, 2007).

### **1.1.2 Exchange Rates**

A primary condition that is needed for currencies to trade in a common market is that one must be quoted in terms of the other. A rate of exchange is the price of one currency quoted in terms of another (Mishkin & Eakins, 2009). Exchange rate quotations can be direct that is the quantity of home currency needed to buy a unit of the foreign currency or an indirect quotation that is how much of the foreign currency is obtainable from the home currency (Howells & Bain, 2007). Exchange rate is called the nominal rate of exchange when inflationary effects are included in the rate and is referred to as the real rate if these effects have not been included in the rate. Before the year 1972, countries in the world operated on a fixed rate regime where every country's currency was quoted against the dollar (Lothian & Taylor, 1997).

The significance of exchange rate is that it allows the exchange rate to be adjusted continuously relative to demand and supply of foreign exchange in a given economy. It generates equilibrium between demand and supply by affecting the exchange rate rather without influencing the reserve level. This allows a country to be flexible in the pursuit of monetary policy without being concerned about effects on the balance of payments.

Exchange rate movements reflect external shocks and imbalances which do not have an effect on movement in reserves and does not need the intervention of the central bank to control the process of adjustment. By use of the flexed exchange rate system, pricing of currencies is hence a result of demand and supply forces of the forex market (Ndungu, 2001).

### **1.1.3 Effect of Selected Macro-economic Variables on Exchange Rates in Kenya**

Exchange rates are determinable through demand and supply. Levich (2001) asserts the importance of exchange rate as the single most important price in the economy because of its ability to determine the international balance of payments. Youngblood (2004) noted a negative association between the spot rate of exchange (domestic currency price of foreign currency) and the differential of the nominal rate of interest (the domestic interest rate minus the foreign interest rate) within short periods and at short time scales where prices are sticky. At the same time, the study showed a positive association when periods are longer and prices are flexible. According to the international fisher effect, the expected change in the current rate of exchange between any two countries is equal to the difference in the nominal rates of interest at that time. The rationale according to the IFE is that for countries that have higher interest rates, they will also experience high inflation levels that will cause their currencies to depreciate against those countries with lower levels of interest.



Razin and Collins (2007) noted that exchange rate deviations from purchasing power parity valuation are similar to price based on supply and demand of currency. Demand and supply relationship is based on a number of factors. Multiple factor rate of exchange reflects its relationship with other economic categories - cost, price, money, interest, the balance of payments. Tucker (2007) defines inflation as increases in price of goods and services in the economy in a consistent and general manner. Sloman and Kevin (2007) in explaining demand pull and cost push inflation mention that demand pull arises from persistent rise in aggregate demand and thus firms react by raising prices and to a small extent output. In contrast, cost push inflation causes an increase in costs associated with production. This was also noted by Henry (2006).

When a country experiences negative balance of payments, in its current account, it signifies overspending on foreign trade as compared to earnings from abroad. This causes an excess demand for foreign currency hence lowering its exchange rate (Taylor, 2001). A negative balance of payments hence causes the depreciation of the local currency. If prices of exports rise at a greater rate than that of imports, terms of trade improve showing greater exports demand and hence results in increased export revenues. This increase in turn increases demand for a country's currency. If export prices rise at a lower rate as compared to imports, currency will be devalued in comparison to trade partners (Bergen, 2010). According to Edwards (1988) if the terms of trade deteriorate, exchange rates depreciate.

### **1.1.4 Exchange Rates in Kenya**

In the era of the fixed exchange rate; 1966-1992, Kenya was forced to devalue its currency like many other countries. Adam (1992) noted that the process of liberalization in Kenya shows that domestic exchange rates have still remained high even with declining inflation. The shilling was pegged to the dollar up to 1974 but was later pegged to the Standard Drawing Rate (SDR). Elbadawi and sato (2005) in their explanation stated that there has been a deflation of the economy since 1997 characterized by volatility in the exchange rate. In this period, Kenya has experienced short run inflows of capital causing interest rate differential.

Mungule (2004) states that liberalization of the financial foreign exchange and domestic goods market was made by the Kenyan government in the year 1990. This process was gradual and went on till the period 1983- 1993 before the adoption of a floating exchange regime in 1993. Kenya could hence control inflation through monetary policies but could not tie domestic prices down thereby global effects could directly be transmitted into the country. Killick and Mwenga (2009) show that real exchange rate of the Kenyan shilling has undergone several phases since 1993. It has depreciated by 21% in 1995 to 1999 and relatively stabilized from October 1999 to December 2004. Between December 2004 and 2007 it strongly appreciated before declining again in 2008 and has been volatile ever since. Since introduction of the flexed exchange rate system, the Kenyan shilling vs the US dollar exchange rate has experienced volatility. Since its implementation, the shilling depreciated against the dollar gradually from 1995 to 1998 then sharply from 1999 to 2000. It stabilized between 2001 and 2005 and rose against

the dollar from 2006 to 2008 before declining sharply in 2009. In 2012, the shilling appreciated and depreciated again in 2013, 2014 and 2015.

## **1.2 Research Problem**

Exchange rate determination as an area of international finance has seen a major research interest. According to Razin and Collins (2007) many developing economies have experienced challenges in handling the exchange rate equilibrium. Killian and Taylor, (2001) notes that the growing interest by researchers in interest rate determination arises for the fact that it is difficult to predict future exchange rates. Elbadawi noted that real exchange rate is endogenous and responds to exogenous factors and induced by policies that prolong the misalignment of the real rate of exchange and generate macroeconomic disequilibrium.

Kenya has had its share of external shocks characterized by worsening of terms of trade arising from fluctuating commodity prices, oil price shocks and capital flow volatility that have made the management of macroeconomic policies difficult. There have been fluctuations of the Kenyan shilling against the dollar with the lowest being 107 units in late 2011. Because of this, the CBK tripled the base rate to 18% causing increase in costs of borrowing and slowing uptake of credit and economic growth in 2012. In the year 2015, the Kenya shilling depreciated from the rate of Ksh 90.70 in January to the rate of Ksh 105 in September 2015. This came after a successful issuance of the sovereign bond in June 2014 and at a time when there was increased flow of diaspora remittances. A decline in international oil prices that lend to a lower import bill was expected to exert a downward pressure on the exchange rate but the converse has been experienced (CBK,

2015).

A study by Pattnaik and Mitra (2001) noted that the rate of inflation, the rates of interest and rates of exchange show a high correlation. The central bank can manipulate the rate of inflation and rates of exchange by the manipulation of the rates of interest. The real rate of exchange is defined as the actual rate that is inclusive of inflationary effects in the concerned countries. Mkenda (2001) in the analysis of the determinants of real rates of exchange in Zambia made an estimation of the degree of misalignment in the real rate of exchange. Findings of the study show that the trade terms and government consumption were responsible for the depreciation of the real rate of exchange and while investment share, growth of real GDP, central bank reserves and trade taxes were responsible for appreciating the real rate of exchanges. Kia (2013) undertook to study the determinants of real rate exchange in Canada and his results showed that in the long run, real money supply, the rate of interest in both the domestic and foreign countries, real GDP, real government expenditure, deficit per GDP, the outstanding standing debt for both the domestic and foreign countries per GDP, domestic and foreign externally financed debt per GDP and prices for commodities were responsible for changes in the real rate of exchange

Empirical studies on how macroeconomic variables affect exchange rates in Kenya have been limited despite the numerous studies in the area. Amdany (2007) focused on the factors that cause variations in the real and nominal rates of exchange in Kenya. Kiptoo (2007) studied the volatility of the real exchange rate, and how it impacts international trade and investment in Kenya. Kiptui and Kipyegon (2008) conducted a study of how external shocks affect the real rates of exchange in Kenya. Jattani

(2013) studied the correlation between a selected sample of macroeconomic variables and exchange rates in Kenya. Thus it suffices to conclude here that not much study exists on the macro-economic variables that determine exchange rates in Kenya. Unlike previous related studies, this study will focus on selected macro-economic variables that affect exchange rates in Kenya. A gap in literature motivates this study as the study seeks to answer the research question, “What are the effects of selected macro-economic variables on exchange rates in Kenya?”

### **1.3 Objective of the study**

To establish how selected macroeconomic variables affect exchange rates in Kenya.

### **1.4 Value of the study**

This study is of significance to both current and potential Kenyan and foreign investors for from the findings of the study, they can learn how exchange rate is determined hence they would consider the macro-economic variable in their investment decision. The study will act as a guide to various banking sector policymakers key being the Central Bank of Kenya and the Treasury in formulation of the policies which will manage exchange rates and spur growth and profitability in this sector. The monetary policy decision makers can innovatively formulate foreign exchange strategies that ensure that the exchange rate in the financial market at anytime do not negate investments in the economy.

This study is of importance to Kenyan scholars and academician for the knowledge it adds in the area as there are very few studies that has concentrated on exchange rates.

This study helps researchers to know how the real exchange rate responds to inflation, trade flows and interest rates and hence inform in prescribing effective economic policies.

## **CHAPTER TWO: LITERATURE REVIEW**

### **2.1 Introduction**

This chapter discusses previous studies related to the area of the study. It seeks to identify potential variables that are likely to have an influence on exchange rates. The chapter has five sections. The first being the various literature attributed to the determination of exchange rate, while the second and third section covers the determinants of exchange rates and the empirical literature respectively. The fourth section covers the conceptual framework while the last section concludes with the summary of literature review focusing on the gap to be filled.

### **2.2 Theoretical Review**

In the literature of the exchange rates, there are various theories of determination of exchange rates. These theories include: Purchasing Power Parity (PPP), Interest Rate Parity, the Balassa-Samuelson Model and Balance of Payment Theory (BOP).

#### **2.2.1 Purchasing Power Parity**

The theory is based on the law of one price whereby in the absence of transaction costs, identical goods will trade at similar prices in different markets and every price of a good across countries will be equalized in terms of a common currency. Swedish economist Cassel (1918) was the originator of this theory defining the theoretical nominal exchange rate as a report between national and foreign prices, however the market value of the exchange rate could deviate from the former value (over or under deviations) of the national currency. Cassel (1918) selected various hypotheses that needed to be fulfilled

before validating the theory. These hypotheses included the working of the international arbitrage mechanism, presence of perfect competition in both home and foreign countries and capital movements free from barriers such as taxes or any other restrictions. Consequently, non- tradable goods will trade at a lower price than those in more developed countries.

According to Korsu and Braimah (2005) literature on exchange rates in developed countries uses the purchasing power parity (PPP) approach to determine the equilibrium exchange rate and its misalignment without keeping focus on the determinants of the real rates of exchange. Elbadawi (1994) and Montiel (1997) were responsible for the upcoming of more literature on the case of developing countries.

TehKok and Shanmugaratnam (1992) show that important concepts that need understanding in the evaluation of the economic health of nations together with the dynamism of international markets is the concept of purchasing power parity (PPP) which states that countries be viewed through a common reference point. Since it is being taken as a long term theory, the expectation is that all prices of common goods around the world will converge for equilibrium to take effect and to mitigate costs of arbitrage. Blair (1994) says that the reader will be provided with a deeper understanding of the working of the purchasing power parity and its practical applications flaws surrounding the application, and the relationship between PPP and real exchange rates.



According to Allsopp and Zurbruegg (2003) and Abdullah (2008), purchasing power parity stands as the oldest most popular theory that explains the determination of exchange rates. It does this by comparing average goods and service costs between countries. It is a theory of the determination of the rates of exchange by comparisons of the average costs of goods and services between countries. According to Ghura and Grennes (1992) spot rate determination between two countries is done through a comparison of the price index of baskets of similar goods and services. An important point to consider is that price index should consist of the “similar” goods and services” in consumption by the residents of both countries. If the actual spot rate of exchange is similar to that computed by the PPP, then PPP holds true. However, empirical results show that PPP in its absolute form calculated on a single product or price index does not hold.

### **2.2.2 Interest Rate Parity Theory**

Keynes (1923) developed this model in order to provide the link between the rate of exchange, rates of interest and the level of inflation. According to this theory, the premium/discount of one currency relative to another should be a reflection of the interest rate differential between the two countries. The lower interest country’s currency should trade at a premium to that of the country with the higher interest rate. Two forms of the theory can also be identified: covered interest rate parity (CIRP) and uncovered interest rate parity (UCIRP). CIRP shows the relation between the spot and forward market rates of exchange relative to the rates of interest on bonds in two separate economies.

Covered interest rate parity seeks to ensure that returns on the foreign investment that is hedged will be equal to the rates of interest on domestic countries with similar investments with identical risk. This goes to show that the disparity between the rate of interest in the domestic country and the hedged foreign rate is zero. In environments characterized with uncertainty, an un-hedged interest rate parity condition may hold. Just like PPP, the UCIRP does not accommodate investor's preferences because in its derivation, investors are assumed to be risk neutral. This goes to show that agents will be indifferent between investments that yield secure returns and those with the prospects of offering identical returns on average.

Kiguel (1992) says that in an efficient market with zero transaction costs, rate of interest differentials should be similar to the forward differential according to interest rate parity condition. If this happens, equilibrium will prevail in the money markets. Interest rate parity theory therefore holds that the discount or premium of the forward market should be equal to the interest differentials between the two currencies. From a different perspective, interest rate parity presupposes that the spot, forward or futures of a currency should include any differentials in the interest rates between two currencies in the absence of transaction costs and taxes. Interest rate parity says that high and low rates of interest on a currency will be offset by forward discounts and premiums respectively.

### **2.2.3 Exchange Rate and Productivity: The Balassa-Samuelson Model**

Balassa and Samuelson (1964) proved that in practice, the PPP is not compulsory. According to them, the economy is categorized into two sectors that is the tradable sector and the non-tradable sector. Demand and supply forces control the two sectors; wages are directly related to the productivity level in the open sector; tradable prices are equal in each country, thereby the PPP holds in this the open sector; while the productivity of labor is higher in the tradable sector as compared to the non-tradable sector; wages tend to equalize between sectors. Also in their consideration, they studied why developing economies have lower productivity in the open sector than the developed economies. Because the forces of demand and supply stem from both the behavior of producers and consumers, the study of determinants of exchange rates should begin by studying the behavior of consumers and producers which are the foundations of exchange rate theory.

Balassa and Samuelson (1964) note that productivity is key in the real rate of exchange. It tends to increase in the open sector increasing the possibility of wage increase in the tradable sector without any effects of inflation. However, due to the assumption that wage equalizes between sectors, the gain in terms of productivity in the open sector will cause inflationary effects to trickle down to the non-market based sector. Consequently prices domestically will rise faster than those in the foreign country as a result of the increased productivity, and thereby causing the domestic real rate of exchange to rise. This phenomenon has been given the Balassa-Samuelson effect to which much of exchange rate in developing countries is attributed to.

## **2.2.4 Balance of Payment Theory**

According to this theory, a consistent adverse movement in the balance of payments will cause a depreciation of the currency and consistent surplus in the balance of payments will result in the appreciation of the currency in the near future. Macdonald (2000) discussed the advantages and disadvantages of the various methods of calculation of equilibrium such as FEERs (Fundamental Equilibrium Exchange Rates). According to his study, in the absence of foreign exchange market intervention, the standard balance of payment holds.

The process of forecasting Exchange Rates is very important for multinationals in their borrowing and investment requirements, hedging strategies and formulation of international financial policies. Forecasting of Exchange rates in the short term is based on three key methods. Pilbeam (1992) suggests the Method of Advanced Indicators: - the ratio of a country's reserves (gold, foreign currencies and SDRs) to its imports for forecasting. Use of Forward to predict the Future Spot Rate: Ohno (1990) believes in market efficiencies and that forward rates are likely to predict future spot rates without bias. Forecasting exchange rate in short-term graphical methods: Rate-time curve bar chart curve of resistance curve of support the charts or graphs are prepared in order to understand fluctuation trends and to enable forecasting of when the trend is likely to reverse.

## **2.3 Determinants of Exchange Rates**

The economic health of a country is determined to a great extent by the exchange rate. It is important in trade which is mostly a main economic activity that is of utmost importance to most free market economies. Exchange rates are equally important in a smaller scale because they impact the returns to an investor. The following are some of the main factors that affect exchange rates:

### **2.3.1 Inflation Rates**

According to Elbadawi and Sato (2005) exchange rates move relative to the compensation required for relative rates of inflation. For instance, in the case of an already overvalued currency, to offset this position, depreciation must occur to correct the position and vice versa. Exchange rate is a relative price and as a result it weighs all relative factors in relative terms. The reason for this conclusion is that high inflation will reduce a country's competitive edge and will weaken its ability to market its products internationally. The domestic currency will thus depreciate due to decreased demand for it relative to the increased demand for foreign currency. In general, countries that experience lower rates of inflation will have their currency increase in value due to increased purchasing power as compared to currencies of other countries. In the last period of the twentieth century, countries that experienced low inflation levels included Japan, Germany and Switzerland, while a decrease in the level of inflation in the U.S. and Canada was felt much later. Countries that experience higher inflation levels experience currency devaluation relative to their trading partners and consequently face higher rates of interest.

### **2.3.2 Trade Flows**

Kempa (2005) notes that net inflows to a country is responsible for the strengthening of the home currency as compared to other currencies. This is due to the fact that supply of foreign currency will be higher than demand. The balance of payments is used to ascertain this fact. A positive balance of payments shows an increase in foreign reserve and thus the home currency will be much stronger. A ratio of comparison of export to import prices, the terms of trade has a relationship with current accounts and the balance of payments. If prices of exports in a country rise greater than imports, the terms of trade are deemed favorable, and hence demand for exports increase this is in turn responsible increasing revenues from which this causes the demand of a country's currency to increase (and its value to increase too). If export prices rise by a smaller margin compared to imports, currency value will decrease.

### **2.3.3 Interest Rates**

Interest rates are important in the determination of exchange rate movements. It is highly correlated with inflation and exchange rates. The central bank can exert influence over the level of inflation by manipulating interest rate thereby affecting currency values. Lenders in an economy facing high interest rate levels benefit from high interest rates since their returns are increased relative to other countries. As a result of this foreign capital is attracted forcing the exchange rates to rise. According to Razin and Collins (2007) the impact caused by high rates of interest is reduced if inflation ranks higher in the country than in others, or if there are other additional factors that drive the currency down. The opposite is true for falling rates of interest.

### **2.3.4 Unemployment Rate**

The level of unemployment is considered to be another factor that affects the level of exchange rates. A consistent number of workplaces signal economic growth and hence companies need to expand their employment capacity to handle the rising consumer needs. The number of available workplaces is the foundation for the connection between employment and exchange rates (Shambaugh, 2004).

### **2.3.5 Political Factors**

Youngblood (2004) noted the effect of political and psychological factors on exchange rates. One of the currencies that have a history of behaving in this manner is the US dollar which moves up or down in the event of a political crisis. Exchange rates also move in response to changes in governments. Foreign investors are usually attracted to countries that are economically stable to invest their funds. This can only occur in countries which are politically stable with little political and economic risks. Political turmoil causes a loss of confidence in a currency which moves capital to more stable economies.

### **2.3.6 Relative Income Levels**

An increase in income levels in a country causes demand for both local and foreign products to increase. Other factors remaining the same, an increase in individual incomes in a country causes the demand for foreign currency to increase which leads to a shift in exchange rate in favor of the foreign currency (Madura, 2010).

### **2.3.7 Government Controls**

Governments affect the equilibrium rate of exchange in many ways such as direct intervention in the buying and selling of foreign currencies in forex markets, introducing barriers to the markets both in the foreign exchange and in foreign trade and also by influencing the macro variables such as inflation, interest rates and income levels (Madura, 2010).

### **2.3.8 Public Debt**

Deficit financing is usually used to a large extent by countries in order to pay for projects in the public sector and government funding requirements. While this activity acts to stimulate domestic economic growth, investors shy away from investing in such nations. Large debt levels are responsible for increasing inflation levels. The debts are eventually serviced and paid off with cheaper real dollars in the future. Governments may also decide to print more money to pay off the large debt which worsens the inflation levels by increasing money supply. Inability by a government to service its debts through local financing will force it to increase the sale of securities to foreigners thereby bringing down their prices. Large debts make foreign investors to shy away if they foresee defaults by the government on its obligations. Foreigners are therefore unwilling to hold securities quoted in that currency if the risk of default is great (Bergen, 2010).

## **2.4 Empirical Review**

Edwards (1989) came up with fundamental models for determining the real rate of exchange in countries considered to be developing nations. He created a model that



would aid in the determination of the real rates of exchange and undertook to estimate its value at equilibrium for a selection of 12 countries classified as developing countries by the use of conventional co-integration tests on the time series data. He partly adjusted the model in order to examine the real and nominal variables and how these affect the short and the long run real rates of exchange. The study findings showed that equilibrium real exchange in the long run was influenced by real variables while in the short run, variance in the equilibrium rate of interest was expounded by both real and nominal factors. To be more exact, usually an increase in consumption by government, inflows of capital, terms of trade, decline in technological progress and transparency will cause the real rate of exchange to rise.

Elbadawi (1994) also constructed a model to determine the long run real rate of exchange equilibrium value whereby factors that were key in the determination of the model included the terms of trade, transparency, the inflow of capital in relation to the GDP, government expenditure in GDP and the exports growth rate as a measure of productivity. Elbadawi applied annual data for Chile, Ghana and India to empirically estimate his model. The finding of the study was that the real rate of exchange and the model's variables exhibited non-stationarity properties and were co-integrated in all the three countries. To add to this, the qualitative signs of these fundamentals' coefficients were in accord with theoretical forecasting in the co-integrating regressions.

Odadan (1994) formed a simple econometric model and a random walk model that was used to determine the real rate of exchange where empirical estimation was done to

come up with information of how macro factors determine the rate of exchange in Nigeria. Both models were estimated using the least squares regression with the data drawn from 1970 – 1988. The drawbacks of the study included the fact that it did not test for stationarity in the variables and also failed in the determination of the equilibrium real rate of exchange. Arising from this failure, the study results also indicated that variations that prevail in the bilateral real rates of exchange and multilateral effective real rates of exchange could be explained by structural and short run factors. The most important factors as shown by the results included the international trade terms, net inflows of capital, the policy on the nominal rate of exchange and monetary policy. Obadan found that by improving trade terms, the nominal exchange rate will improve and increased capital inflows will appreciate the real exchange rate.

Mkenda (2001) analysis was on what determines the real exchange rate in Zambia. He used a model which was based on the three- good structure of production and analyzed using co-integration to investigate the long term determining factors of the real rates of exchange for both imported goods and exported goods, and of the internal real rate of exchange. The results provided evidence that (i) the depreciation of the real rate of exchange for imports was caused by the declining terms of trade and level of consumption by the government, while increased in investments caused the real rate of exchange for imports to appreciate; (ii) decreasing terms of trade, a reserve increase by the central bank and taxes imposed on trade causes the exports real rate of exchange to rise in the long run; (iii) the internal real rate of exchange rate is in the long run,

strengthened by decreasing trade terms; (iv) the indices of the real rate of exchange depreciated in the short run, because of aid and transparency.

Joyce and Kamas (2011) in their study of re-investigating the real rate of exchange determining factors in Argentina, Colombia and Mexico, they distinguished between real factors and nominal factors that determine the exchange. The study applied various analyses such as co-integration analysis, variance decompositions and impulse response analysis. Co-integration resulted to an equilibrium relation between the real rate of exchange relative to real variables such as trade terms, inflows of capital, efficiency in production and government share of GDP, with the exclusion of nominal variables and intervention by the central bank. Also, the real rate of exchange was appreciated by increasing real variables to the model. Variance decompositions showed that trade terms, level of productiveness etc, were responsible for variation in the real rates of exchange.

Ghura and Grennes (2013) employed several countries from Sub-Saharan Africa in their study, with the exclusion of South Africa, in an investigation of the real rate of exchange determinants and how real exchange rate misalignment affects the level of economic performance. A classical regression model was used and the results showed that appreciation in the real rate of exchange is caused (i) Trade terms improvements, (ii) internal flows of capital, (iii) decreased transparency, (iv) increased excess domestic credit, and (v) technological improvements. However, only the nominal devaluation as a variable in their model depreciated the real rate of exchange. On the issue of the

misalignment and variability of the real rate of exchange, they found that this has a negative effect on growth in income, imports and exports, and savings and investments.

MacDonald (2014) constructed a simplification of the real rate of exchange in the determination of real rates of exchange in the long run. In his model, he selected the determinants to be the differentials of productivity, effects of trade terms, fiscal balances, net assets in foreign countries and real rate of interest differentials. He employed multivariate co integration methods and used the model for determining the effective real rate of exchange rates from 2004 to 2007. The result outcome showed that the model showed that the fundamental determinants impacted the real rates of exchange. All the variables showed a positive correlation to the real rate of exchange. This meant that any increases in the variables caused the real rate of exchange to appreciate.

In Kenya, studies that have analyzed the macro-economic real rate of exchange determinants remain very few. The several researches that have examined the determinants of the Kenya shilling rates of exchange and these include Mwega (1990). Musyoki, Pokhariyal and Pundo (2000) in their study as mentioned in the empirical literature, they found out that, real variables only in the long run affect the equilibrium real rates of exchange of a panel of 12 countries considered developing nations, inclusive of Kenya, while real rates of exchange in the short run are driven by nominal factors and real factors. However, one of the setbacks of this study was the use of panel methods which did not specify the results for Kenya.

Ndung'u (2001) sought to undertake an examination of the quarterly real rate of exchange determinants in Kenya for the short and long run periods for the years between 1970 and 1995. He employed a co-integration framework with single equation equilibrium error. According to his result findings, increased trade terms, government share, tariffs, inflows of capital and more advanced technology were responsible for increasing real rate of exchange value in Kenya, while increased transparency and the rate of nominal depreciation served to reduce the value of the real rate of exchange. In his findings, increases in the trade terms cause the real rate of exchange to appreciate exchange rate suggesting that the income effect has more impact than the substitution effect in Kenya.

Kiptoo (2007) estimated the equilibrium real rate of exchange for Kenya using the Johansen co-integration model and his study period covered 1970-2006. The real rate of interest was taken as the predictor variable together with GDP per capita, real prices of commodities, transparency and the ratio of fiscal balance to GDP. Based on the analysis of the results; the behavior of the real rate of exchange in the long run in South Africa is attributed to the differentials in interest rate relative to the variables studied. Similar to other empirical studies, their results showed that a rise in the real rate of interest differential, efficiency in production and trade terms causes the real rate of exchange in Kenya to appreciate, while increased transparency causes it to depreciate. They further found that the variance of the real rate of exchange can be reverted fairly quickly if further shocks are not experienced.

Kiptui and Kipyegon (2008) conducted a study and examined the impact of external shocks on the real rate exchange in Kenya. They applied Co-integration and error correction models to determine their effects on the real rate of exchange and according to their findings, there is a significant effect of oil prices and openness on the real exchange rate. Oil price increases, being a signal for the deterioration of terms of trade, resulted in depreciation of the real exchange. Openness, which tends to cause the prices of traded goods to fall, caused the real exchange rate to appreciate. Capital inflows increase both the short term and long run have a positive effect on the real rate of exchange in short and long-run periods but are less significant in the short-run. It was found even though external shocks affect the real rate of exchange greatly, domestic shocks also play a role.

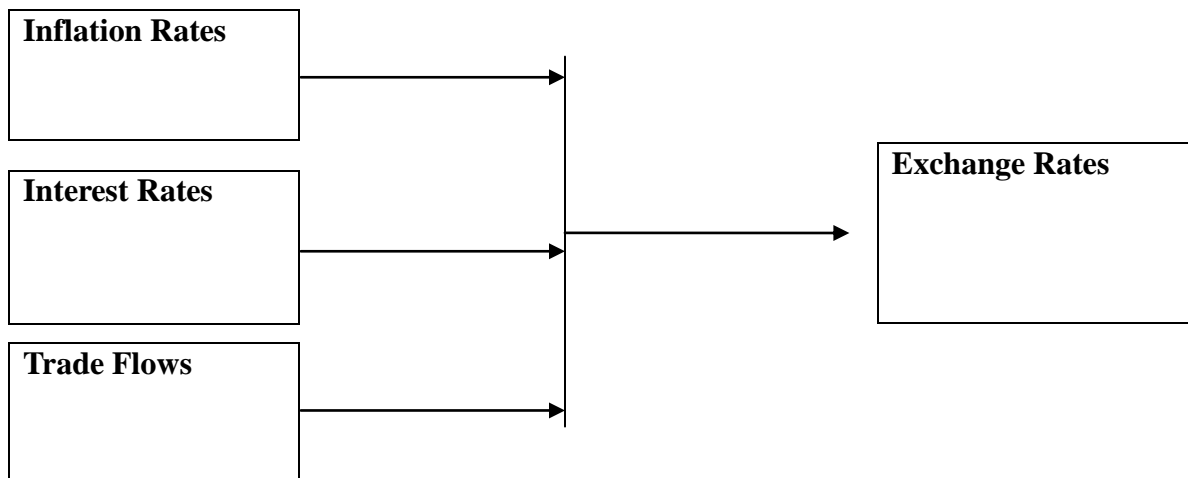
Jattani (2013) studied the relationship between exchange rates and selected macro-economic variables in Kenya. The Macro economic variables considered were interest rates, inflation rates, balance of payment and political factor. Linear regression was used and the findings were that exchange rates in Kenya were significantly affected by political factor, balance of payment, interest rate and inflation rate.

## **2.5 Conceptual Framework**

The general rule is that a rising currency value is contributed by a country having a consistently lower inflation rate and as a result its purchasing power increases relative to other currencies. So, the home currency will tend to strengthen vis-à-vis other currencies when there are net inflows of foreign currency. Lenders in an economy will be offered

higher returns relative to other countries when the interest rates are high. Therefore, increasing interest rates is a form of attracting foreign capital that will cause the exchange rate to rise. This study seeks to confirm whether this expected relationships hold and if so to then determine the effect of each on exchange rates.

**Figure 2.1: Conceptual Framework**



**Independent variables**

**Dependent variable**

Source: Author, 2016

The four determinants in the model are; interest rates, inflation rates and trade flow. An exchange rate is the dependent variable and it will be measured in terms of USD. The study will use USD since it is the major currency in trade globally. The USD is highly favored due to its stability against other world currencies.

## **2.6 Summary of the Literature Review**

In this chapter, the main objective has been to examine the several factors affecting the exchange rate. Various models have tried to provide an explanation for the determination of the real rates of exchange and also provided measurement

basis, of all those, the fundamentals models have been used to empirically analyze this relationships. These theoretical models have joined various other models to create a key determinant of real rates of exchange.

Empirical estimates on the fundamental models have been done by previous researchers who only selected the variables that fit their different situations. In developing countries, the main determinants of the long run real rate of exchange are the changes in the trade terms, real interest rate differentials and productivity in terms of technological progress relative to their trading partner countries, fiscal policy, cross-border capital transfers and inflows of capital and the amount of assets in the foreign country. However, various factors may hinder the real rate of exchange from moving along its path such as monetary policy changes and policies governing the nominal rate of exchange, although their effects will only be transitory.

The Local studies do not fully cover the post-multiparty period, although they do not employ other analytical methods, such as multivariate regression model, which give an insight on changeable effects on the real rate of exchange. Further, this research will include several variables that have not been used by other researchers analyzing the determinants of foreign exchange, such as inflation rates, trade flows and interest rates. These among other gaps that have already been outlined will be resolved in this study. It is important to note that as discussed from the literature review, many factors are responsible for variances in the real rate of exchange.



## **CHAPTER THREE: RESEARCH METHODOLOGY**

### **3.1 Introduction**

This chapter outlines the methodology used in this study to find solutions to the research question. The order of the research methodology is as follows, the research design of the study, target population of the study, methods and instruments of data collection and finally the analysis of the data.

### **3.2 Research Design**

A research design is a schedule used to provide a guide to the researcher in collecting, analyzing and interpreting the observations of the study (Orotho, 2003). The research design that was used is descriptive cross-sectional design. A descriptive study involves describing a phenomena or characteristics connected with the subject population. It therefore allows for estimation of the proportions of a population that exhibit these characteristics. It is also possible to discover associations among different variables whereby, one can determine whether or not variables are independent (or unrelated) and if they are not, then one can determine the magnitude or strength of the relationship. According to Cooper and Schindler (2008) cross sectional studies are one time studies therefore they show a snapshot at a particular point in time.

### **3.3 Population**

Mugenda and Mugenda (2003) describe a population as an entire set of individuals, objects or cases with some shared observable attributes. It's also referred to as a

universe. Target population is therefore the specific population about which information is desired.

This study focused on aggregate data collected from the Kenya economy between 2006 and 2015. This length of time is desirable as it is long enough to provide sufficient variables needed in confirming the how the selected macro-economic variables on exchange rates in Kenya. Selection of this length of time considered the availability of the most recent data so as to give results that are decisive and that represent the current trend.

### **3.4 Data Collection Methods**

According to Cooper (2008), data refers to the fact of information employed as a basis for reasoning, discussion or calculation. Mugenda and Mugenda (2003) identified two types of data which are: primary and secondary data. This study used secondary data obtained from published bulletin and other publications by CBK and KNBS. Data for inflation, consumer price index (proxy for inflation) was obtained from KNBS while interest rates and exchange rates were obtained from CBK.

### **3.5 Data Analysis**

The data was sorted, classified, coded and then organized into tables for easy analysis. Collected data was analyzed using both descriptive and inferential statistics. The SPSS (version 21) computer software was used in the analysis since it's more user-friendly. The data was examined using descriptive, correlation and regression analyses. In descriptive statistics, the researcher used mean, standard deviation and scatter plot. In

inferential statistics, the researcher used multivariate regression analysis to determine the relationship between the dependent variable (Exchange Rate) and independent variables: Interest Rates, Inflation Rate and trade flows.

The three determinants in the model were; interest rates, inflation rates and trade flows. The study used USD since it is the major currency in trade globally. The USD is highly favored due to its stability against other world currencies. Other major currencies like Euro are highly susceptible to economic distortions in the European region. To determine the relative significance of each of the explanatory variables with respect to exchange rate in Kenya, a multivariate regression model was applied.

The multivariate regression model was;  $Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \epsilon$

**Where:**

Y was Exchange Rate as measured by average monthly exchange rates (KSH/USD)

$\beta_0$  was the regression constant (parameter of the function)

$\beta_1$ ,  $\beta_2$  and  $\beta_3$  are the coefficients of independent variables,

$X_1$  was average monthly inflation rates as measured by CPI

$X_2$  was average monthly interest rates as measured by bank rates

$X_3$  was Level of aggregation of trade flows as measured by balance of payment divided by gross domestic product

$\epsilon$  was the error term

However, the literature further suggests including variables such as public debt, terms of trade, government controls, political factors, income levels and unemployment rates to the determinants list, but as a result of unavailable appropriate data, these variables were controlled under the idiosyncratic error term.

### **3.5.1 Tests of Significance**

This research used ANOVA as the most preferred because it is applied to examine differences among the means of several different groups at once. The researcher opts to use it as it is used to test independent variables. The correlation coefficients from the regression showed the effect (whether positive or negative) of the independent variables on the dependent variable.

## CHAPTER FOUR: DATA ANALYSIS, RESULTS AND DISCUSSION

### 4.1 Introduction

The chapter discussed the analysis of data, findings, interpretations and presentation. The objective of this study was to determine the effect of selected macro-economic variables on exchange rates in Kenya. The chapter starts with data analyzed using descriptive statistics, then regression analysis. The data was gathered exclusively from a secondary source.

### 4.2. Descriptive Statistics

Descriptive statistics gives a presentation of the average, maximum and minimum values of variables applied together with their standard deviations in this study.

**Table 4.1 Descriptive Statistics**

	N	Minimum	Maximum	Mean	Std. Deviation
Exchange Rates	120	61.899	105.275	81.07531	9.902325
Inflation Rates	120	3.18	31.50	10.6818	6.89727
Interest Rate	120	1.60	21.65	8.2562	3.54035
Trade flows	120	-0.81	-0.16	-0.55	0.22
Valid N (listwise)	120				

Source: Research Findings

Table 1 above shows the descriptive statistics for the variables applied in the study. An analysis of all the variables was obtained using SPSS 21 software for the period of ten years (2006 to 2015). The exchange rate had a mean of 81.07 with a standard deviation of 9.90. The interest rate recorded a mean of 8.25 with a standard deviation of 3.54. Inflation rate resulted to a mean of 10.68 with a standard deviation of 6.89. The Level of aggregation of trade flows as measured by balance of payment divided by gross domestic product had a mean of -0.55 and standard deviation of 0.22.

### **4.3 Correlation Analysis**

Correlation analysis is used to establish if there exists a relationship between two variables which lies between (-) strong negative correlation and (+) perfect positive correlation. Pearson correlation was employed to analyze the level of association between the exchange rate and the selected macroeconomic variables.

The findings of correlation analysis indicate that there was a correlation of all the predictor variables to the response variable. From the table, the interest rate showed a positive correlation coefficient of 0.446 with exchange rate. The inflation rate and exchange rate had a correlation coefficient of negative 0.395. The Level of aggregation of trade flows had a correlation coefficient of 0.829 to the exchange rate. The findings are presented in table 2 below:

**Table 4.2 Correlations**

		Exchange Rates	Inflation Rates	Interest Rate	Trade flows
Exchange Rates	Pearson Correlation	1	-.395**	.446**	.829**
	Sig. (2-tailed)		.000	.000	.000
	N	120	120	120	120
Inflation Rates	Pearson Correlation	-.395**	1	.187*	.294**
	Sig. (2-tailed)	.000		.041	.001
	N	120	120	120	120
Interest Rate	Pearson Correlation	.446**	.187*	1	-.411**
	Sig. (2-tailed)	.000	.041		.000
	N	120	120	120	120
Trade flows	Pearson Correlation	.829**	.294**	.411**	1
	Sig. (2-tailed)	.000	.001	.000	
	N	120	120	120	120

\*\* . Correlation is significant at the 0.01 level (2-tailed).

\* . Correlation is significant at the 0.05 level (2-tailed).

#### **4.4 Regression Analysis and Hypothesis Testing**

The exchange rate was regressed against three predictor variables; average monthly inflation rate, average monthly interest rate and Level of aggregation of trade flows. The

regression analysis was undertaken at 5% significance level. The critical value obtained from the F – table was compared with the one obtained from the regression analysis.

The study obtained the model summary statistics as shown in table 4.3 below.

**Table 4.3 Model Summary**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.863 <sup>a</sup>	.745	.739	5.060697

a. Predictors: (Constant), Trade flows, Inflation Rates, Interest Rate

**Source: Research Findings**

R squared, being the coefficient of determination indicates the deviations in the response variable that is as a result of changes in the predictor variables. From the outcome in table 4.3 above, the value of R square was 0.745, a discovery that 74.5 percent of the deviations in exchange rates in Kenya occurred due to changes in interest rate, inflation rate and trade flows at 95 percent confidence level. Other variables not included in the model justify for 25.5 percent of the variations in exchange rates in Kenya. Also, the results revealed that there exist a strong relationship among the selected macro-economic variables and the exchange rate as shown by the correlation coefficient (R) equal to 0.863.



**Table 4.4: Analysis of Variance**

**ANOVA<sup>a</sup>**

Model	Sum of Squares	Df	Mean Square	F	Sig.
1 Regression	8697.834	3	2899.278	113.206	.000 <sup>b</sup>
Residual	2970.836	116	25.611		
Total	11668.670	119			

a. Dependent Variable: Exchange Rates

b. Predictors: (Constant), Trade flows, Inflation Rates, Interest Rate

**Source: Research Findings**

The significance value is 0.00 which is less than  $p=0.05$ . This implies that the model was statistically significant in predicting how the macro economic variables of interest rate, inflation rate and trade flows affect exchange rates in Kenya.

The results of the analysis obtained the model coefficients and corresponding statistics as outlined in table 5 below;

**Table 4.5: Model Coefficients****Coefficients<sup>a</sup>**

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	62.916	1.709		36.813	.000
Inflation Rates	-.342	.075	-.239	-4.553	.000
Interest Rate	.602	.154	.215	3.920	.000
Trade flows	30.372	2.559	.670	11.870	.000

a. Dependent Variable: Exchange Rates

**Source: Research Findings**

The regression analysis results indicate that the relationship between the selected macro-economic variables and exchange rates can be expressed using the following regression equation:  $Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \epsilon$

**Where:**

Y is Exchange Rate as measured by average monthly exchange rates (KSH/USD)

$\beta_0$  is the regression constant (parameter of the function)

$\beta_1$ ,  $\beta_2$  and  $\beta_3$  are the coefficients of independent variables,

$X_1$  is average monthly inflation rates as measured by CPI

$X_2$  is average monthly interest rates as measured by bank rates

$X_3$  is Level of aggregation of trade flows as measured by balance of payment divided by gross domestic product

$\epsilon$  is the error term

Becomes;  $Y = 62.916 - 0.342X_1 + 0.602X_2 + 30.372X_3 + \epsilon$

From the regression equation above, it was determined that having the interest rate, inflation rate and trade flows as a constant zero, the KSH/USD exchange rate would stand at 62.916

#### **4.5 Discussion of Research Findings**

The study found that the exchange rates are high in Kenya and that they are on an increase. The change rate in the exchange rates as a result of changes in the selected macro-economic variables was 74.5% which was significant. This shows that the link between rates of exchange and the predictor variables which included monthly interest rate, monthly inflation rates and level of aggregate trade flows was significant. This is consistent with Razin and Collins (2007) who point out that valuation of exchange rate as any other price varies depending on the purchasing power of currencies under the influence of currency's demand and supply. The correlation of such supply and demand is dependent on several factors whereby, multiple factor exchange rates reflect its relationship with other economic categories such as inflation, interest rates, balance of payments among many other macro-economic variables.

Interest rates among major currencies have been an important factor for exchange rate movements in recent years. The coefficient of monthly interest rate was 0.602 which was not significant, indicating existence of a positive but insignificant relationship between changes in rates of exchange and monthly interest rates. This is similar to what Razin and Collins (2007) previously posited that lenders will be offered a higher return relative to other countries in an economy with higher interest rates. Therefore, the exchange rate will rise as a result of higher interest rates that attract foreign capital. The effect of higher interest rates can be resolved if inflation in that country's economy is much higher than in other country's economy, or if additional factors do drive the currency down. Youngblood (2004) noted that there exist a positive relationship between the spot rate of exchange and the nominal rate of interest differential at the longest time scales where prices are flexible.

It is widely referred that rates of exchange tend to move in the direction required to cover for relative inflation rates (Elbadawi & Sato, 2005). For example, if a currency is already overvalued, meaning it is stronger compared to the relative inflation rates, then a depreciation or loss of value enough to correct that position can be expected and vice versa. Consistent with these earlier studies, the coefficient of monthly inflation rates for this study was -0.342 which was significant; the findings show that exchange rates in Kenya were significantly and directly sensitive to the rates of inflation. Higher rates of inflation resulted into greater the changes in the rates of exchange.

The coefficient of level of aggregation of trade flows as measured by balance of payment divided by gross domestic product was 30.372 which was significant. This indicated that there was a significant relationship between changes in exchange rates and level of aggregation of trade flows as measured by balance of payment divided by gross domestic product. This concurs with Kempa (2005) who observed that the home currency can be strengthened by a net inflow of foreign currency vis-à-vis other currencies because of the excess demand over the supply of the foreign currency. A deficit in the current account which means a negative balance of payment indicates that the country is importing or has high expenditure on foreign trade than it is exporting or receiving revenues from abroad. This therefore shows that the country is more in need of foreign currency than what it receives from its exports. As a result of the excess demand for the foreign currency, the country's exchange rate will reduce (Taylor, 2001). This implies that a negative balance of payment depreciates the local currency.

## **CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATIONS**

### **5.1 Introduction**

This chapter summarizes the findings of the previous chapter, conclusion, limitations encountered during the study. This chapter also elucidates the policy recommendations that policy makers can implement to achieve the expected exchange rates in Kenya. Lastly the chapter presents suggestions for further research which can be useful to future researchers.

### **5.2 Summary of Findings**

The study sought to investigate the effect of selected macroeconomic variables on exchange rates in Kenya. The macroeconomic variables selected were interest rate, inflation rate and Level of aggregation of trade flows as measured by balance of payment divided by gross domestic product. The study adopted a descriptive cross-sectional research design. Secondary data was obtained from the Central bank of Kenya and Kenya National Bureau of Statistics and was analyzed using SPSS software version 21. The study used monthly data covering a period of ten years from January 2006 to December 2015.

From the results of correlation analysis, interest rate was found to have a positive correlation coefficient of 0.446 with exchange rate in Kenya. Inflation rate and exchange rate exhibited a negative correlation as shown by a correlation coefficient of -0.395. The

Level of aggregation of trade flows as measured by balance of payments divided by gross domestic product had a correlation coefficient of positive 0.829 to the exchange rate.

The co-efficient of determination R-square value was 0.745 which means that about 74.5 percent of the variation of the KSH/USD exchange rate can be explained by the three selected macroeconomic variables while 25.5 percent in the variation of exchange rate was associated with other factors not covered in this research. The study also found that the independent variables had a high correlation with exchange rate ( $R=0.863$ ). ANOVA results show that the F statistic was significant at 5% level with a  $p=0.000$ . Therefore the model was fit to explain the relationship between the selected variables.

The regression results show that when all the macroeconomic variables selected for the study have zero value the exchange rate will be 62.916. It is also noted that a unit increase in the rate of interest increases the rate of exchange by 0.602, a unit increase in inflation rate decreases the exchange rate by 0.342 while a unit increase in trade flows increases the exchange rate by 30.372. The findings are consistent with the findings of Bergen (2010) who concluded that those countries with higher inflation typically see depreciation in their currency in relation to the currencies of their trading partners. Higher interest rates attract foreign capital and cause the domestic currency to appreciate. The three independent variables selected for the study were found to be statistically significant at 5% significance level as they all had a significance value of 0.000.

### **5.3 Conclusion**

From the study findings, the study further concludes that exchange rates in Kenya are significantly affected by monthly inflation rates, monthly interest rates and trade flows. The study found that interest rate had a positive effect on exchange rate. The study therefore concludes that higher interest rate in Kenya in relation to the trading partners lead to appreciation of the domestic currency. The study found that inflation rate had a negative effect on exchange rate and therefore it is concluded that higher levels of inflation result in depreciation of the domestic currency. The study found that trade flows had a positive effect on exchange rate and therefore it can be concluded that an increase in aggregation of trade flows leads to appreciation of the domestic currency.

This study concludes that independent variables selected for this study inflation rate, interest rates and aggregation of trade flows influence to a large extent exchange rate in Kenya. It is therefore sufficient to conclude that these variables significantly influence the value of the Kenyan currency. The fact that the three independent variables explain 74.5% of changes in exchange rates implies that the variables not included in the model only explain 25.5% of changes in exchange rates.

This finding concurs with Kempa (2005) who observed that the home currency can be strengthened by a net inflow of foreign currency vis-à-vis other currencies because of the excess demand over the supply of the foreign currency. The findings of this study are also similar to what Razin and Collins (2007) previously posited that lenders will be offered a higher return relative to other countries in an economy with higher interest rates.



Therefore, the exchange rate will rise as a result of higher interest rates that attract foreign capital. The findings of Elbadawi and Sato (2005) that exchange rates tends to move in the direction required to cover for relative inflation rates are also confirmed by this study.

#### **5.4 Recommendations**

The Kenyan shilling has been depreciating in value over the years implying a weakening of its purchasing power in the international markets. This study therefore recommends that the policy makers should come up with policies that will contribute to lowering the exchange rates in Kenya and contribute to reversing this trend. The study recommends that policy makers should enact policies that will lower inflation rates in Kenya as found out in the study that inflation rates are high and that they contribute towards increasing the exchange rates in Kenya.

The study also recommends that central bank of Kenya should set the treasury bill rate that can help attract foreign investment in the country as it was found that high interest rate leads to an appreciation of foreign currency. The study further recommends that the government should enact policies that encourage production of goods and services with the aim of increasing the exports and decreasing the imports which in turn improves the balance of payment and the terms of trade which further strengthens the Kenyan currency against foreign currency.

## **5.5 Limitations of the Study**

The scope of this research was for ten years 2006-2015. It has not been determined if the results would hold for a longer study period. Furthermore it is uncertain whether similar findings would result beyond 2015. A longer study period is more reliable as it will take into account major economic conditions such as booms and recessions.

One of the limitations of the study is the quality of the data. It is difficult to conclude from this research whether the findings present the true facts about the situation. The data that has been used is only assumed to be accurate. The measures used may keep on varying from one year to another subject to prevailing condition. The study utilized secondary data, which had already been obtained and was in the public domain, unlike the primary data which is first-hand information. The study also considered selected macroeconomic variables and not all the macroeconomic variables affecting the exchange rate mainly due to limitation of data availability.

For data analysis purposes, the researcher applied multiple linear regression model. Due to the shortcomings involved when using regression models such as erroneous and misleading results when the variable values change, the researcher cannot be able to generalize the findings with certainty. If more and more data is added to the functional regression model, the hypothesized relationship between two or more variables may not hold.

## **5.6 Suggestions for Further Research**

The study was not exhaustive of the selected macroeconomic variables affecting exchange rates in Kenya and this study recommends that further studies be conducted to incorporate other variables like Public debt, unemployment rate, income levels, political stability and economic performance. Exchange rates are a function of many macroeconomic variables. Establishing the effect of each macroeconomic variable on foreign exchange rates will enable policy makers know what tool to use when controlling the foreign exchange rate levels.

The study concentrated on the last ten years since it was the most recent data available. Future studies may use a range of many years e.g. from 1970 to date and this can be helpful to confirm or disapprove the findings of this study. The study limited itself by focusing on the US Dollar as the foreign currency. The recommendations of this study are that further studies be conducted on other currencies traded in the Kenyan foreign exchange market. The study also recommends that daily data be used in future studies so as to obtain more precise results. Finally, due to the shortcomings of regression models, other models such as the Vector Error Correction Model (VECM) can be used to explain the various relationships between the variables.

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## APPENDICES

### Appendix I: Exchange Rates (KSH/USD)

month/year	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
<b>JAN</b>	72.21	69.89	68.08	78.95	75.79	81.03	86.34	86.90	86.21	91.36
<b>FEB</b>	71.80	69.62	70.62	79.53	76.73	81.47	83.18	87.45	86.28	91.49
<b>MAR</b>	72.28	69.29	64.92	80.26	76.95	84.21	82.90	85.82	86.49	91.73
<b>APR</b>	71.30	68.58	62.26	79.63	77.25	83.89	83.19	84.19	86.72	93.44
<b>MAY</b>	71.76	67.19	61.90	77.86	78.54	85.43	84.38	84.15	87.41	96.39
<b>JUN</b>	73.41	66.58	63.78	77.85	81.02	89.05	84.79	85.49	87.61	97.71
<b>JUL</b>	73.66	67.07	66.70	76.75	81.43	89.90	84.14	86.86	87.77	101.20
<b>AUG</b>	72.87	66.95	67.68	76.37	80.44	92.79	84.08	87.49	88.11	102.43
<b>SEP</b>	72.87	67.02	71.41	75.61	80.91	96.36	84.61	87.41	88.84	105.28
<b>OCT</b>	72.29	66.85	76.66	75.24	80.71	101.27	85.11	85.31	89.23	102.78
<b>NOV</b>	71.13	65.49	78.18	74.74	80.46	93.68	85.63	86.10	89.96	102.17
<b>DEC</b>	69.63	63.30	78.04	75.43	80.57	86.66	85.99	86.31	90.44	102.20

Source: Central Bank of Kenya

## Appendix II: Kenyan Inflation Rates

<b>M/Y</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>
<b>JAN</b>	15.4	9.7	18.2	21.9	4.7	5.4	18.3	3.67	7.21	5.53
<b>FEB</b>	18.9	6.8	19.1	14.6	5.2	6.5	16.7	4.40	6.86	5.61
<b>MAR</b>	19.1	5.9	21.8	14.6	4.0	9.2	15.6	4.10	6.27	6.31
<b>APR</b>	14.9	5.7	26.6	12.4	3.7	12.1	13.1	4.12	6.41	7.08
<b>MAY</b>	13.1	6.3	31.5	9.6	3.9	13.0	12.2	4.05	7.3	6.87
<b>JUN</b>	10.9	11.1	29.3	8.6	3.5	14.5	10.1	4.91	7.39	7.03
<b>JUL</b>	10.2	13.6	26.5	8.4	3.6	15.5	7.7	6.02	7.67	6.62
<b>AUG</b>	11.5	12.4	27.6	7.4	3.2	16.7	6.1	6.67	8.36	5.84
<b>SEP</b>	13.9	11.7	28.2	6.7	3.2	17.3	5.4	8.29	6.6	5.97
<b>OCT</b>	15.7	10.6	28.4	6.6	3.2	18.9	4.1	7.76	6.43	6.72
<b>NOV</b>	14.6	11.8	29.4	5.0	3.8	19.7	3.3	7.36	6.09	7.32
<b>DEC</b>	15.6	12.0	27.7	5.3	4.5	14.0	3.20	7.15	6.02	8.01

Source: Kenya National Bureau of Statistics

### Appendix III: Kenyan Interest Rates

<b>M/Y</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>
<b>JAN</b>	8.23	6	6.95	8.46	6.56	2.46	20.56	8.08	9.26	8.59
<b>FEB</b>	8.02	6.22	7.28	7.55	6.21	2.59	19.7	8.38	9.16	8.59
<b>MAR</b>	7.6	6.32	6.9	7.31	5.98	2.77	17.8	9.88	8.98	8.49
<b>APR</b>	7.02	6.65	7.35	7.34	5.17	3.26	16.01	10.38	8.8	8.42
<b>MAY</b>	7.01	6.77	7.76	7.45	4.21	5.35	11.18	9.46	8.82	8.26
<b>JUN</b>	6.6	6.53	7.73	7.33	2.98	8.95	10.09	6.21	9.81	8.26
<b>JUL</b>	5.89	6.52	8.03	7.24	1.6	8.99	11.95	5.92	9.78	10.57
<b>AUG</b>	5.96	7.3	8.02	7.25	1.83	9.23	10.93	10.03	8.29	11.54
<b>SEP</b>	6.45	7.35	7.69	7.29	2.04	11.93	7.77	9.58	8.38	14.61
<b>OCT</b>	6.83	7.55	7.75	7.26	2.12	14.8	8.98	9.72	8.67	21.65
<b>NOV</b>	6.41	7.52	8.39	7.22	2.21	16.14	9.8	9.94	8.64	12.34
<b>DEC</b>	5.73	6.87	8.59	6.82	2.28	18.3	8.3	9.52	8.58	9.81

Source: Central Bank of Kenya