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

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DECLARATION

This research project is my original work and has not been submitted for a degree in any University.

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

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DEDICATION

This research project is dedicated to my family and all those who supported me in completion of this project. Thank you and May God bless you abundantly.
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<tr>
<td>ANOVA</td>
<td>Analysis of Variance</td>
</tr>
<tr>
<td>APPP</td>
<td>Absolute Purchasing Power Parity</td>
</tr>
<tr>
<td>AUD</td>
<td>Australian Dollar</td>
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<tr>
<td>BOP</td>
<td>Balance of Payment</td>
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<td>CBK</td>
<td>Central Bank of Kenya</td>
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<td>CIRP</td>
<td>Covered Interest Rate Parity</td>
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<td>CPI</td>
<td>Consumer Price Index</td>
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<tr>
<td>ER</td>
<td>Exchange Rate</td>
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<tr>
<td>GDP</td>
<td>Gross Domestic Product</td>
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<td>IFE</td>
<td>International Fisher Effect</td>
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<td>IMF</td>
<td>International Monetary Fund</td>
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<td>INFRIFF</td>
<td>Inflation Rate Differential</td>
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<td>INTRDIFF</td>
<td>Interest Rate Differential</td>
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<td>KSH</td>
<td>Kenya Shilling</td>
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<tr>
<td>OECD</td>
<td>Organisation for Economic Co-operation and Development</td>
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<tr>
<td>PPP</td>
<td>Purchasing Power Parity</td>
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<td>RPPP</td>
<td>Relative Purchasing Power Parity</td>
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<td>SPSS</td>
<td>Statistical Package for Social Sciences</td>
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<td>UCIRP</td>
<td>Un-Covered Interest Rate Parity</td>
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<td>United States Dollar</td>
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ABSTRACT

The study sought to determine the effect of the macroeconomic variables on exchange rates in Kenya. The macroeconomic variables considered were interest rate differential, inflation rate differential, Balance of payment and terms of trade. The KSH/USD exchange rate was used as the dependent variable. The development of literature was guided by interest rate parity theory, purchasing power parity and the balance of payment theory. The descriptive research design was used in this study. Secondary data was used to analyze the effect of the macroeconomic variables on exchange rates and was obtained from the Central Bank of Kenya, Kenya National Bureau of Statistics, World Bank, International Monetary Fund and the USA Federal Reserve for a period of twenty years ranging from 1995 to 2014. Data was analyzed using SPSS and multiple linear regression was used to model the relationship between the explanatory variables and the response variable by fitting a linear equation to the observed data. The study findings were that interest rate differential, balance of payment and terms of trade had a negative effect on exchange rate while inflation rate differential had a positive effect on exchange rates in Kenya. The study concludes that higher interest rates in Kenya in relation to the trading partner lead to the appreciation of exchange rate, higher levels of inflation result in the depreciation of exchange rate, improvement in the balance of payment appreciates the exchange rate while increases in terms of trade appreciates the exchange rate. The study recommends inflation rate in Kenya should be contained and the Treasury bill rate should be set high enough to attract foreign investment in the country. The study also recommends that the production of goods and services should be encouraged 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.
CHAPTER ONE
INTRODUCTION

1.1 Background of the Study
Exchange rates play a significant role in international trade as it fixes prices of goods and services (Ramasamy, 2015). Without exchange rates it will be difficult to compare prices of goods and services of foreign countries. Therefore, exchange rate fluctuation becomes a major concern as it determines the quantum and direction of foreign trade and commerce (Allen, 2004). A country’s overall economic performance is reflected by exchange rates (Arize, 2000). The Kenya shilling has in the recent past been highly volatile against the major world currencies. This has created an increasing interest by the general public, exporters, importers and multinational companies as it directly or indirectly affects their income. The volatility has also posed a challenge for the policy makers while using the fiscal and monetary policies to affect the exchange rates. This implies that exchange rates ought to be studied through an empirical investigation to gain an understanding of the effect of the macro-economic variables on exchange rates.

The Kenyan government through the Central bank of Kenya (CBK) maintains a floating exchange rate regime and a liberalized capital account. The primary responsibility of the CBK is to formulate and implement monetary policy to achieve stability in the general price level, this includes the exchange rate which is the price of the Kenya shilling expressed in other currencies. The CBK participates in the foreign market mainly to acquire foreign exchange to service official debt, finance government imports, build its foreign exchange reserves, and in times of volatility, buy or sell foreign exchange to stabilize the market. The CBK therefore aims to stem excessive volatility in the
movement of the exchange rate. Once a country opts for a floating exchange rate with an open capital account, it cedes the power to defend a specific level or direction of the exchange rate (CBK, 2015).

Currency appreciation occurs when there is an increase in value of one currency with respect to another currency (Papell, 1998). For instance, when the Kenyan Shilling appreciates, it means that the shilling has become more valuable. There is a downward movement whenever there is an appreciation, that is, if the Kenyan Shilling moves downward from Kshs. 99 to Kshs. 90 per US dollar then the Kenyan Shilling is said to have appreciated. Currency depreciation is the opposite of currency appreciation. The depreciation of a country’s Currency refers to a decrease in value of that country’s currency. It occurs when there is loss of value of one currency with respect to another currency (Papell, 1998). For instance, if the Kenyan Shilling depreciates relative to the dollar, then it will require more Kenyan Shillings to purchase one dollar.

1.1.1 Selected Macro-Economic Variables
Macro-economic variables refer to factors that are pertinent to the broad economy at the regional or national level and affect a large population rather than a few selected individuals and include gross domestic product (GDP), inflation rates, interest rates balance of payment, unemployment rate, and income levels. Bergen (2010) points out that inflation rate differential, interest rate differential, current account deficits, public debt, terms of trade, political stability and economic performance all are potential determinants of exchange rates. since exchange rates are relative prices of two currencies then the macro economic variables that affect them ought to be related to the two
countries and these explains the choice of the macro economic variables of interest rate differential, inflation rate differential, balance of payment and terms of trade. These variables are also consistent with the economic theory in particular the purchasing power parity theory, interest rate parity theory and balance of payment theory.

Interest rate differential is a differential measuring the gap in interest rates between two similar interest-bearing assets. Traders in the foreign exchange market use interest rate differentials when pricing forward exchange rates. Based on the interest rate parity, a trader can create an expectation of the future exchange rate between two currencies and set the premium (or discount) on the current market exchange rate futures contracts.

Inflation means a sustained increase in the aggregate or general price level in an 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.

The balance of payments (BOP) is a net indicator of outflow and inflow of foreign currencies. Outflows and inflows are caused by international trade and services (Makin, 2004). The BOP comprises current account, capital account and the financial account. The current account includes merchandise, services, income and transfers. The inflows are
credited and outflows are debited to this current account and finally the resulting net balance indicates the surplus or deficit generated in a year. The capital account records capital transfers and acquisition or disposal on non-produced, non-financial assets. The financial account records the foreign direct investments and the portfolio investments’ inflows and outflows. Both these accounts collectively determine the foreign exchange reserves available in a country (Tenreyro, 2007). The Current account deficit/surplus is used as a proxy for balance of payment in this research. Terms of trade which is related to the current account and the balance of payment is defined as the ratio of export prices to import prices.

1.1.2 Exchange Rates

An exchange rate between two currencies is the rate at which one currency will be exchanged for another. It is also regarded as the value of one country’s currency in terms of another currency (O'Sullivan & Sheffrin, 2004). Buckley (2000) defines a foreign exchange rate as the price of one currency in terms of another and can either be a direct quote or an indirect quote. In a direct quotation the exchange rate is defined as the number of units of domestic currency required to buy one unit of foreign currency while in an indirect quote it is defined as the number of units of foreign currency required to buy one unit of domestic currency. An exchange rate is referred to as nominal exchange rate when inflation effects are embodied in the rate and as the real exchange rate when inflation influences have not been factored in the rate (Pugel, 2007).
A country’s exchange rate is an important determinant of the growth of its cross-border trading and export earnings and it serves as a measure of its international competitiveness (Bah and Amusa, 2003). For some countries the exchange rate is the single most important price in the economy because it determines the international balance of payments. Levich (2001) notes that there is no general theory of exchange rate determination, but Eiteman et al., (2001) divide the potential exchange rate determinants into five areas: parity conditions, infrastructure, speculation, cross-border foreign direct investment and portfolio investment, and political risks.

1.1.3. The Effect of Selected Macro-economic Variables on Exchange Rates

Changes in relative interest rates affect investment in foreign securities, which influences the demand for and supply of currencies and therefore influences exchange rates. Mansson (2010) notes that there exist a negative relationship between the spot exchange rate (domestic currency price of foreign currency) and the nominal interest rate differential (the domestic interest rate minus the foreign interest rate) at the shortest time scales where the prices are sticky, while a positive relationship is shown at the longest time scales where prices are flexible. The international Fisher effect states that an expected change in the current exchange rate between any two currencies is approximately equivalent to the difference between the two countries' nominal interest rates for that time. The rational for the IFE is that a country with a higher interest rate will also tend to have a higher inflation rate. This increased amount of inflation should
cause the currency in the country with the high interest rate to depreciate against a country with lower interest rates.

A country with a consistently lower inflation rate exhibits a rising currency value, as its purchasing power increases relative to other currencies while those countries with higher inflation typically see depreciation in their currency in relation to the currencies of their trading partners. This is usually accompanied by higher interest rates (Bergen, 2010). It is also widely held that exchange rates move in the direction required to compensate for relative inflation rates (Elbadawi, 2005). This means that if a currency is overvalued i.e. stronger than warranted by relative inflation rates, then depreciation can be expected to correct that position.

A negative balance of payment or a deficit in the current account shows that the country is importing or spending more on foreign trade than it is exporting or earning from abroad. This means that the country requires more on foreign currency than it receives from its exports. This excess demand for the foreign currency lowers the country’s exchange rate (Taylor, 2001). This implies that a negative balance of payment depreciates the local currency.

If the price of a country's exports rises by a greater rate than that of its imports, its terms of trade have favorably improved. Increasing terms of trade shows greater demand for the country's exports. This, in turn, results in rising revenues from exports, which provides increased demand for the country's currency (and an increase in the currency's value). If the price of exports rises by a smaller rate than that of its imports, the currency's value
will decrease in relation to its trading partners (Bergen, 2010). Edwards (1988) notes that terms of trade deterioration leads to exchange rate depreciation.

1.1.4. Exchange Rates in Kenya.

Exchange rate policy in Kenya has undergone various regime changes in the past. Up to 1974, the exchange rate was pegged to the dollar, after discrete devaluations the peg was changed to the International Monetary Fund’s Special Drawing Rights. Between 1974 and 1981, the movement in the nominal exchange rate in relation to the US dollar was quite erratic but in general the nominal exchange rate depreciated by about 14 per cent and this depreciation accelerated in 1981/82 with further discrete devaluations. Between 1980 and 1982, the Kenya shilling was devalued by about 20 per cent in real terms measured against the Special Drawing Rights. After these devaluations, the exchange rate regime was changed to a crawling peg in real terms by the end of 1982. This regime lasted until 1990 when a dual exchange rate system was adopted and lasted until October 1993 when, after a series of devaluations, the official exchange rate was abolished, that is, the official exchange rate was merged with the market rate and the shilling was put into a complete float (Ndung’u, 2000).

Since the introduction of a freely floating exchange rate regime the Kenyan shilling and US Dollar exchange rate has been highly volatile.
From the graph above it is evident that the Kenyan shilling has depreciated against the US Dollar since the implementation of the free floating exchange rate regime with a gradual decline in value from the year 1995 to 1998 followed by a sharp decline in the year 1999 and 2000. A period of stability followed in the year 2001 to 2005. The rise in the value of the Kenyan shilling against the US dollar was recorded in the period 2006 to 2008 before a sharp decline followed in the year 2009 with a historic high being recorded in the year 2011 of Ksh 88.81. The Kenyan shilling appreciated in the year 2012 which was followed by depreciation in the year 2013 and 2014.
1.2 Research Problem

Modeling of exchange rate behavior is one of the unsolved issues of research to be dealt with as there is no general theory of exchange rate determination (Levich, 2001). Due to the enormous significance of the exchange rate in an economy, no one can deny the need to understand the behavior of foreign exchange rates. There is a need to study exchange rates and behavior of foreign exchange markets in detail. Estimation and prediction of foreign exchange rate poses substantial theoretical and practical challenge. Changes in exchange rate have pervasive effects, with consequences for prices, wages, interest rates, production levels, and employment opportunities. Fluctuations in the value of currencies of different economies have increased after the collapse of Bretton Woods System. Especially short term variability has dramatically increased following the shift from fixed to flexible exchange rate in early 1970’s and thereafter. High volatility and sudden changes in exchange rate is one of the hurdles for the success of macroeconomic policy (Saeed et al., 2012). A model with theoretical and empirical validity needs to be developed. Forecasting nominal exchange rates is a difficult task especially in a flexible exchange rate arrangement (Rogoff, 2009).

The Kenyan shilling has in the recent past been fluctuating against the US Dollar. The annual exchange rate for the year 2014 being Ksh 87.92 to the US Dollar. Since January 2015 the Kenyan shilling has been depreciating from the rate of Ksh 90.70 to the rate of Ksh 105 in September 2015. This comes after the successful issuance of the sovereign bond in June 2014 and at a time when there has been increased flow of diaspora remittances. In addition, the decline in international oil prices which has occasioned a
lower import bill all of which were expected to exert a downward pressure on the exchange rate however the converse has been experienced (CBK, 2015).

In spite of the abundant literature on the effects of various macro-economic variables on exchange rates, studies that specifically focus on the Kenyan context have been scanty. The few that have been conducted on the subject of exchange rates include; Ndung’u (1997) investigated the relationships between domestic and foreign price levels and the exchange rate and other macro-variables. The results showed that exchange rate and the rate of inflation drive each other; foreign exchange reserves, domestic credit and the exchange rate drive each other; and domestic credit drives the rate of inflation with no reverse effects. Ndung’u (2001) studied the liberalization of the foreign exchange market in Kenya and the short-term capital flows problem. The study by Kiptoo (2007) focused on the real exchange rate, volatility and misalignment, and its impact on the Kenya’s international trade and investment. Amdany (2007) in his study focused on the structural and short-run factors determining variation of real exchange rate and nominal exchange rates in Kenya. Kiptoo (2003) estimated the equilibrium real exchange rate for Kenya. Kiptui and Kipyegon (2008) studied the effect of external shocks on the real exchange rate in Kenya. A study by Sifunjo (2011) focused on chaos and non-linear dynamical approaches to predicting exchange rates in Kenya. Jattani (2013) studied the relationship between exchange rates and selected macro-economic variables in Kenya. All these studies did not deal with the effect of macro-economic variables have on exchange rates in Kenya. This study explored how interest rate differential, inflation rate differential balance of payment and terms of trade affect exchange rate.
The study investigated whether there was a clear relationship in the data in order to answer the question; what are the effects of the selected macro-economic variables on exchange rates in Kenya?

1.3 Research Objectives

The general objective of this study was to establish the effect of selected macro-economic variables on exchange rates in Kenya.

The Specific Objectives were:

(i) To investigate the effect of interest rate differential on exchange rates in Kenya

(ii) To investigate the effect of inflation rate differential on exchange rates in Kenya

(iii) To investigate the effect of balance of payment on exchange rates in Kenya.

(iv) To investigate the effect of terms of trade on exchange rates in Kenya.

1.4. Value of the study

The study benefits policy makers while using interest rates, inflation rates, balance of payments and terms of trade to affect the exchange rates and by large extent the economy by making better and informed decisions. The exporters and importers also benefit with the findings of the study as they will be able to make good forecast on the exchange rates and be able to take appropriate action on the mitigation of exchange rate risks which affects their profitability. The study adds value to theory as it establishes the effect of macro-economic variables on exchange rates in Kenya. The study also acts as a basis for future researchers while conducting similar or related studies on the subject of exchange rates.
CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter examines and outlines the theoretical and empirical literature review. The chapter begins with identification of relevant theories. Secondly, the determinants of exchange rates are discussed followed by a summary of previous studies conducted by different scholars both internationally and locally. Finally, the chapter concludes with summary of literature review.

2.2 Theoretical Review

There are various theories on exchange rate with each presenting different concepts. There are three exchange rate theories presented in this research proposal; the Purchasing Power Parity theory, the interest rate parity theory and the balance of payment theory.

2.2.1 Interest Rate Parity Theory

Interest rate parity condition was developed by Keynes (1923), as what we currently call interest rate parity. This is a theory in which the interest rate differential between two countries is equal to the differential between the forward exchange rate and the spot exchange rate. Interest rate parity connects interest rates, spot exchange rates and forward exchange rates. The theory states that differential in interest rate in different markets can cause a flow of funds from markets with low interest rates to markets with high interest rates.
The theory is in two forms; covered interest rate parity (CIRP) and Un-covered Interest Rate Parity (UCIRP). CIRP describes the relationship of spot market and forward market exchange rates with interest rates on bonds in two economies. This is a condition where the relationship between interest rates and the spot and forward currency values of two countries are in equilibrium. As a result, there are no interest rate arbitrage opportunities between those two countries. Investors will be indifferent among the available interest rates in two countries because the forward exchange rate sustains equilibrium such that the dollar return on dollar deposits is equal to the dollar return on foreign deposit, thereby eliminating the potential for covered interest arbitrage profits. UCIRP describes the relationship of the spot and expected exchange rate with nominal interest rates on bonds in two economies. UCIRP implies nominal interest rate differential between two countries must be equivalent to the future change in the spot exchange rate. Thus UCIRP argues that economies with high interest rates should have depreciating currencies.

Engel (1996) provided a general survey of earlier literature and indicated that the most of the studies have developed a strong consensus that UCIRP works poorly. Furthermore, against to UCIRP, the majority of the papers found adverse relation between the spot exchange rate movement and interest rate differential, which are called “Forward premium bias” (Alper et al., 2009). The work of Mylonidis and Semertzidou (2010) and Aslan and Korap (2010) differently tested the UCIRP hypothesis using generalized Method of moments (GMM) procedure considering four bilateral exchange rates vis a vis the US Dollar for UK Pound, Canadian Dollar, Australian Dollar and Japanese Yen. Both studies uniformly verify the failure of the UCIRP
Horne (1998) showed support for the CIRP among the United States of America, Japan, and most European countries in that there was generally an offsetting relationship between interest rates and the forward exchange rate relative to the spot rate, and that the cost of hedging offsets any yield advantage. Studies done by Rhee and Chang (1992) and Abeysekera and Turtle (1995) found out that major global markets are efficient in the sense that profit opportunities from traditional covered interest arbitrage were rarely available in the 1980s and early 1990s. Most studies also show that IRP is stronger for short-term rates and weakens with longer maturities (Abeysekera, 1995).

### 2.2.2 Purchasing Power Parity Theory

This is also called the inflation theory of exchange rates. A Swedish economist Cassel (1918) was the first to name the theory of Purchasing power parity (PPP) and argued that without it, there would be no meaningful way to discuss over or under valuation of currency. The PPP maintains the equality between domestic and foreign prices measured in domestic term via commodity arbitrage.

The law of one price states that if markets are efficient, that is markets reflect all relevant information, all identical goods must have only one price. This law has several implications for international transactions. For instance, two identical tradable goods, with no obstacles to international trade and no transaction costs, should have the same price in the same currency in two countries. This implies that the price of good \( X \) in one country must equal its price in the foreign country multiplied by the exchange rate i.e.

\[
Pt^* = StPt^{**}
\]
Where

Pt refers to the domestic price of good X
St refers to the exchange rate
Pt* refers to the foreign price of good X

The law of one price makes sense. If Pt is greater than StPt*, an investor will buy good X in the foreign country, transport it to the domestic country and sell it for a profit. But with time these two prices will converge, until it is not possible to take advantage of this arbitrage opportunity.

In practice, due to the existence of trade barriers and transportation costs that drive a wedge between prices in different countries, the law cannot hold exactly (Rogoff, 1996). Rogoff (1996) writes that the wedge depends on the tradability of the goods. For goods which are highly traded, such as gold, the law holds quite well, whereas for non-traded goods such as Big Macs, factors such as not traded inputs, Value – added taxes and profit margins militate against the law. Absolute Purchasing power parity (APPP) is a generalization of the law of one price. It postulates that given the same currency, a basket of goods will cost the same in any country. Mathematically we have;

\[ P = SP^* \]
\[ \Rightarrow S = P/P^* \]

Where P and P* are the prices of the identical basket of goods in the domestic and foreign countries respectively, and S is the exchange rate, or the domestic currency price of foreign currency. APPP is unlikely to hold exactly for the same reasons that the law of one price fails to hold. The Relative Purchasing power parity (RPPP) states that the rate
of growth in the exchange rate offsets the differential between the rate of growth in home and foreign price indices. Mathematically we have;

\[ \Delta P = \Delta S \Delta P^* \]

If the increase in domestic prices is faster relative to that of the foreign country, then the exchange rate will depreciate.

### 2.2.3 Balance of Payment Theory

The balance of payment theory was developed by Hurne (1711-1776) who argued that when a country with a gold standard had a positive balance of trade, gold would flow into the country in the amount that the value of exports exceeds the value of imports and vice versa. Hurne further argued that in countries where the quantity of money increases, inflation would set in and the prices of goods and services would tend to rise while in countries where the money supply decreases, deflation would occur as the prices of goods and services fell.

According to this theory, the rate of exchange in the foreign exchange market is determined by the balance of payments in the sense of demand and supply of foreign exchange in the market. If the demand for foreign exchange is higher than its supply, the price of foreign currency will go up. In case, the demand of foreign exchange is lesser than its supply, the price of foreign exchange will decline (Kanamori & Zhao, 2006). This implies that a negative balance of payment causes depreciation of the value of the country's currency while the surplus leads to the appreciation of currency.
When the exchange rate of a country falls below the equilibrium exchange rate, it is a case of adverse balance of payments. The exports increase and eventually the adverse balance of payments is eliminated and the equilibrium rate is restored. When the balance of payment of a country is favorable, the exchange rate rises above the equilibrium exchange rate resulting in the decline of exports (Kanamori & Zhao, 2006).

2.3 Determinants of Exchange Rates

Exchange rates are determined by the demand and supply of a particular currency as compared to other currencies. There are several factors that can affect the exchange rate between currencies.

2.3.1 Interest Rate Differential

It has been argued that an increase in the real interest rate of the home country will lead to a positive real interest rate differential that attracts capital inflow, which would in turn impose an upward pressure on the home economy’s real exchange rate. However given the contagious movement of the real interest rate across economies, and when the real interest rate of other economies have caught up to eliminate the real interest rate differential, capital inflow might not take place and remove the upward pressure on the real exchange rate. Thus the real interest rate differential and the real exchange rate relationship may behave differently under different situations.

Both the sticky–price and flexible price approaches have been used to explain the relationship between real interest rate differential and real exchange rate. The sticky-price approach predicted a negative relationship between exchange rate and nominal interest rate differential (Dornbusch, 1976). It argued that the higher interest rate in the home
country relative to the foreign country will attract capital inflow, and hence the home currency will appreciate instantly. On the contrary, the flexible price approach argued for positive relationship between nominal interest rate differential and exchange rate, and that a change in nominal interest rate reflected a change in the expected inflation rate. Given that the interest rate equals to the sum of the real interest rate and the expected inflation rate, an increase in the nominal interest rate in the home country relative to the foreign nominal interest rate will result in a depreciation of the home currency as expected inflation rises. The demand for the domestic currency will therefore fall and the exchange rate will then depreciate (Frankel, 1976).

2.3.2 Inflation Rate Differential

A country with a consistently lower inflation rate exhibits a rising currency value, as its purchasing power increases relative to other currencies. During the last half of the twentieth century, the countries with low inflation included Japan, Germany and Switzerland, while the U.S. and Canada achieved low inflation only later. Those countries with higher inflation see depreciation in their currency in relation to the currencies of their trading partners (Bergen, 2010). Changes in relative inflation rates can affect international trade activity, which influences the demand for and supply of currencies and therefore influences exchange rates (Madura, 2010).

2.3.3 Balance of Payment

The balance of payments (BOP) is a net indicator of outflow and inflow of foreign currencies. Outflows and inflows are caused by international trade and services (Makin, 2004). The exchange rate being a relative price of foreign and domestic money, then it should be determined by the relative supply and demand for these moneys (Frankel and
Rose, 1994). This simply suggests, if people demand more money than is being supplied by the central bank then the excess demand for money would be met by inflow of money from abroad, hence the trade balance will improve. On the contrary, if the central bank supplies more money than is demanded, the excess supply of money is eliminated by outflow of money to the other countries and this will worsen the trade balance. It is inherent therefore that, any excess demand for goods, services and assets, resulting in a deficit of the balance of payments, reflects an excess supply or demand of the stock of money.

The central point of the monetary approach to the balance of payment is that balance of payment deficits or surpluses reflect stock disequilibrium between demand and supply in the market for money (Johnson, 1977). With monetary approach therefore, it is important to emphasize the role of demand and supply of money in determining the exchange rates. Thus, similar to any merchandise which is for sale, the foreign exchange value is subjected to the law of supply and demand (Sharan, 2010). This is the reason why the exchange rate will be explained using the same geometric artifices which are used to explain the formation of prices in general. Therefore, according to this approach, the exchange rate between two currencies is the ratio of their values determined on the basis of money supply and money demand positions of the two countries (Frankel, 1976).

2.3.4 Terms of Trade

In international economics, terms of trade is defined as the relative price of a country's export to import or the ratio of export prices to import prices. It measures a nation's trading position, which improves when export prices rise faster or fall slower than import
prices. Thus an improvement in a country’s terms of trade is good for that country in the sense that it has to pay less for the imports. Most of theoretical models emphasize the significance of terms of trade disturbances as a potential source of real exchange rate misalignment. The effect of terms of trade has two contrary effects (Elbadawi, 1994). First, an improvement in terms of trade that causes a positive income effect which represents an increase in both the domestic purchasing power and domestic demand for non-traded goods, thus the real exchange rate will be appreciated. Second, a negative substitution effect makes the consumption of imported goods relatively more expensive. The total effect of terms of trade deterioration on real exchange rate depends on the strength of the income and substitution effects. Therefore, terms of trade improvements are expected to be associated with real appreciation in the long-run.

2.3.5 Relative Income Levels

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

2.3.6 Government Controls

Governments can influence equilibrium exchange rates in many ways. This include; Direct intervening through buying and selling of currencies in the foreign exchange markets, imposing foreign exchange barriers, imposing foreign trade barriers and lastly by affecting the macro variables such as inflation, interest rates and income levels (Madura, 2010).
2.3.7 Public Debt

Countries will engage in large-scale deficit financing to pay for public sector projects and governmental funding. While such activity stimulates the domestic economy, nations with large public deficits and debts are less attractive to foreign investors. A large debt encourages inflation, and if inflation is high, the debt will be serviced and ultimately paid off with cheaper real dollars in the future. In the worst case scenario, a government may print money to pay part of a large debt, but increasing the money supply inevitably causes inflation. Moreover, if a government is not able to service its deficit through domestic means by selling domestic bonds, then it must increase the supply of securities for sale to foreigners thereby lowering their prices. A large debt may also prove worrisome to foreigners if they believe the country risks defaulting on its obligations. Foreigners will be less willing to own securities denominated in that currency if the risk of default is great (Bergen, 2010).

2.3.8 Political Stability and Economic Performance

Foreign investors inevitably seek out stable countries with strong economic performance in which to invest their capital. A country with such positive attributes will draw investment funds away from other countries perceived to have more political and economic risk. Political turmoil, for example, can cause a loss of confidence in a currency and a movement of capital to the currencies of more stable countries (Bergen, 2010).
2.4 Review of Empirical Studies

Empirical foundation gives meanings of phenomenon through findings based on the verification via experiments, experiences and observations. This section provides the empirical evidence on the concepts of the study topic and covers both the international and local evidence.

2.4.1 International Evidence

Mkenda (2001) analyzed the main determinants of the real exchange rate in Zambia and estimated the degree of misalignment in the real exchange rate. Johansen co-integration analysis was conducted on time series data from 1971 to 1993. The study findings were that terms of trade and government consumption depreciated the real exchange rate while investment share, growth of real GDP, central bank reserves and trade taxes were appreciating real exchange rate.

Chortareas and Driver's (2001) investigated the relationship between the real exchange rate and the interest rate differential for 18 OECD countries. The test was split between the G7 economies on one hand and eleven small open economies on the other and used non-stationarity techniques. They found little support for purchasing power parity (PPP) to hold; in other words, there was no equilibrium long-run exchange rate. However, regarding the eleven small open economies, there was a positive relationship between the exchange rate and the interest rate differential. This cointegration was not found with a panel existing of purely the G7 economies. The authors further observed that developed countries usually have low interest rates in their economies, making it difficult to attract capital flows from another developed country. Moreover, most of their currencies of the
G7 economies are used when making international trade transactions, making it difficult to have a positive relationship between exchange rate and interest differentials.

MacDonald (2008) presented a reduced form model of the real exchange rate to re-examine the determinants of real exchange rates in a long run setting. His model featured productivity differentials, terms of trade effects, fiscal balances, net foreign assets and real interest rate differentials as key fundamental determinants of the real exchange rate. Using multivariate cointegration methods, the model was implemented for the real effective exchange rates of the U.S. dollar, Yen and the Deutschmark, over the period 2004 to 2007. He found evidence of a significant and sensible long run relationship for his model, indicating that the fundamentals mentioned above have an important and significant bearing on the determination of both long and short run real exchange rates. All the variables were found to have a positive relationship with the real exchange rate; an increase in any of them leads to an appreciation of the real exchange rate.

Hoffmann and Macdonald (2009) used the bivariate VAR method to model the relationship of real interest rate differential and the real exchange rate using bilateral United States of America vis-à-vis the G7 countries; Canada, France, Germany, Italy, United Kingdom and Japan using real exchange rate data spanning the period 1978 to 2007. The empirical results showed evidence that the real exchange rate-real interest rate link was economically significant and that the real interest rate differential was a reasonable approximation of the expected rate of depreciation over longer horizons.

Kia (2013) in his study on the determinants of real exchange rate in Canada developed a monetary model of the real exchange rate and used Augmented Dickey–Fuller and non
parametric Philips-Perron tests. The findings of the study were that in the long run real money supply, domestic and foreign interest rate, real GDP, real government expenditure, deficit per GDP, domestic and foreign outstanding debt per GDP, domestic and foreign externally financed debt per GDP and commodity price were factors affecting real exchange rate. All the variables except real money supply, domestic and foreign interest rate and domestic externally financed debt had statistically significant impact on the real exchange rate. The change in interest rate, the growth of money supply, the commodity price and the US debt per GDP had negative impact on the growth of the real exchange rate over the short run.

Ramasamy and Abar (2015) studied the influence of macroeconomic variables on exchange rates by considering three countries i.e United States of America, Germany and Australia and their exchange rates AUD/USD, Euro/USD and AUD/Euro. The macroeconomic variables studied were relative interest rates, relative inflation rates, relative balance of payments, relative employment rate, relative corruption index, relative GDP, relative deficit/surplus rate, relative tax rate and relative borrowing rate. Bootstrapping technique was used to increase the sample size to run regression to study the effect. The results showed that all macroeconomic variables significantly influenced the exchange rates except employment and budget deficit. Most of the Macro-economic variables showed opposite sign contrary to the expectations and the researcher concluded that the psychological factors like investor confidence dominate over economic variables in deciding exchange rate fluctuation.
2.4.2 Local Evidence.

There are few studies that have been conducted on the effect of macro-economic variables on exchange rates in Kenya. However, key contributions have been made by the following scholars:

Krichene (1998) used PPP to study exchange rate and price interdependence in five East African countries, namely Burundi, Kenya, Rwanda, Tanzania, and Uganda. The study employed monthly data of bilateral real exchange rates for the period covering 1979-1996. The findings of the study were that bilateral real exchange rates revert to long-run equilibrium. Other findings of the study were that the tests for unit roots in bilateral real exchange rates rejected the null hypothesis of unit root, hence supporting absolute PPP in the cases of Burundi and Kenya, Burundi and Rwanda, Kenya and Rwanda. Using the results of the study, Krichene (1998) concluded that nominal exchange rates in the five countries had adjusted to inflation differentials, and that intra-regional trade had played a key role in re-establishing competitiveness in the region.

Ndung’u (2001) studied the relationship between real exchange rate movements and real interest rate differential on the one hand, and the impact of short-term (speculative) private capital flows and domestic and external shocks on the real exchange rate on the other. The nominal exchange rate was analysed as deviating from the perceived long-run equilibrium level determined by the purchasing power parity relationship, the deviations governed by the interest rate differential. The results showed that an error correction formulation was an adequate representation of this relationship. The model was also re-
estimated in a time-varying parameters technique (the Kalman filter). The results concluded that the interest rate differential widens with real exchange rate appreciation and this triggers capital to flow in. Second, domestic inflation will rise with real exchange rate depreciation and the influence of foreign inflation will decrease with exchange rate appreciation. In the second stage of the analysis, a vector autoregressive (VAR) model was estimated with private short-term capital flows entering the model in levels and in their volatility form. The results confirmed that domestic as well external shocks influence the movements of real exchange rate and real interest rate differential, thereby directly affecting or triggering capital flows.

Kiptoo (2003) estimated the equilibrium real exchange rate for Kenya using the Johansen cointegration estimation procedure and data spanning from 1970 to 2002. The explanatory variables included in their model include real interest rate differential, real GDP per capita relative to trading partners (productivity), real commodity prices, openness, the ratio of fiscal balance to GDP and the ratio of net foreign assets of the banking system to GDP. The study findings were that an increase in the real interest rate differential, productivity, terms of trade, fiscal balance and net foreign assets appreciate the real exchange rate in Kenya, while an increase in openness depreciates it. Further findings were that if the real exchange rate deviates from its equilibrium level owing to temporary factors, it can be expected to revert to equilibrium fairly quickly, in the absence of further shocks.
Kiptoo (2007) conducted a study on real exchange rate volatility and misalignment in Kenya on the country’s international trade and investment for the period 1993 to 2003. Cointegration analysis was used and the study findings were that in the long run, Kenya’s equilibrium real exchange rate was only affected by real variables which may be either categorized as external or internal fundamentals. The former fundamentals were terms of trade and net capital flows while the latter fundamentals were productivity growth and trade policy proxied by the degree of openness.

Amdany (2007) in his study examined both structural and short-run factors determining variations of real exchange rates and nominal exchange rates in Kenya. The structural factors examined were terms of trade, net capital flows, balance of trade and trade policy while short-run factors are fiscal and monetary policies. Results from analysis showed that balance of trade in most cases was insignificant while terms of trade, net capital flows, nominal exchange rate policy and monetary policy were very significant in determining variations in real exchange rates. Monetary and expansionary fiscal policies tend to reinforce depreciating effects on nominal exchange rate and terms of trade on real exchange rate. The inflationary effects of these policies also tend to undermine international competitiveness that the real exchange rate depreciation was supposed to enhance. Therefore, a real exchange rate policy which strikes a balance between the need for a real exchange rate at a sustainable long-run level and the need to prevent destabilizing effects on the domestic price level is desirable.
Kiptui and Kipyegon (2008) conducted a study and investigated the effect of external shocks on the real exchange rate in Kenya. Cointegration and error correction model was used and the findings were that oil prices and openness have significant effects on the real exchange rate. Oil price increases, being a proxy for terms of trade deterioration, cause a depreciation of the real exchange rate in the short and long-run. Openness, which tends to dampen prices of traded goods causes an appreciation of the real exchange rate in the short and long-run. Capital inflows have appreciating effects on the real exchange rate in short and long-run periods but was not highly significant in the short-run. It was found that though external shocks have major effects on the real exchange rate, domestic shocks also play a role. The results showed that the interest rate differential had significant negative (appreciating) effects in the short and long-run.

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

2.5 Summary of Literature Review

Several studies have been conducted internationally on the determinants of exchange rates and have yielded conflicting results as there is no single model for exchange rate determination. Locally the few that have been conducted have largely considered the variables in isolation for instance Ndung’u (2001) only considered the interest rate
differential. Jattani (2013) included in her model the inflation and interest rates for the domestic country without considering the effects of the same variables for the foreign country of which ought to be factored as exchange rates are relative prices of domestic and foreign currencies. There was no study found that has considered interest rate differential, inflation rate differential, balance of payment and terms of trade in a single model. All these variables are closely linked and ought to be used in the same model to clearly see the effect they have on exchange rates.

The absence of a clear empirical relationship between these variables and the exchange rate is problematic from the perspective of policy makers as they will not be able to make policies that meet the desired results. This study sought to investigate the effect of inflation rate differential, interest rate differential, balance of payment and terms of trade on exchange rates in Kenya.
CHAPTER THREE
RESEARCH METHODOLOGY

3.1 Introduction
This chapter describes the procedure used to conduct the empirical research. This includes research design, data collection, data analysis techniques, introduce the analytical model and conclude with the tests of significance.

3.2 Research Design
The descriptive research design was used in this study. Descriptive research is the process of collecting data in order to answer questions concerning the current status of the subjects in the study. Saunders et al., (2003) states that descriptive research portrays an accurate profile of persons, events or situations. This research design offers the researcher a profile or describes relevant aspects of the phenomena of interest from an individual, organizational, industry oriented or other perspectives. It also helps present data in a meaningful form and thus helps the researcher to understand the characteristics of different groupings in a given situation. Since this research was numerical and quantitative in nature then descriptive research design was suitable for the need to describe the interrelationship between interest rate differential, inflation rate differential, balance of payments and terms of trade on exchange rates in Kenya.

3.3 Data Collection
The data used in this research was secondary data. Data on exchange rates and the average interest rate was obtained from the Central Bank of Kenya (CBK). Data on average annual inflation rates, exports and imports was obtained from the Kenya National
Bureau of statistics (KNBS), balance of payment, Gross Domestic Product (GDP) was obtained from the International Monetary Fund database, the data for the United States of America inflation rates was obtained from the World Bank database while data on interest rates was obtained from the Federal Reserve. The interest rate and inflation rate differentials were then computed as well as the terms of trade.

The data covered a period of twenty years ranging from 1995-2014 this was the period for the floating exchange rates. Though, the foreign exchange rate was liberalized in 1993, the first two years were excluded to obtain data that reflected the truly floating exchange rate regime. The choice of the currency i.e the KSH/USD was influenced by the fact that the US Dollar was the major trading currency in Kenya and across the world and was commonly used in asset valuation.

3.4 Data Analysis

Data was analyzed using statistical package for Social sciences (SPSS); the data was also presented using various statistical tools such as tables and percentages. Multiple linear regression was used to model the relationship between the explanatory variables and a response variable by fitting a linear equation to observed data.

3.4.1 Analytical Model

Under the theoretical and empirical literature, exchange rate was hypothesized as a function of interest rate differential, inflation rate differential, balance of payments and terms of trade.
The analytical model that was used is as follows:

\[ Y(ER) = \alpha + \beta_1(INRDIFF) + \beta_2(INFDIFF) + \beta_3(BOP) + \beta_4(TOT) + \varepsilon \]

Where \( Y(ER) \) is the exchange rate between the Kenya Shilling and US Dollar

\( \alpha \) is the constant term

\( \beta_1, \beta_2, \beta_3, \beta_4 \) are model coefficients

INRDIFF is the interest rate differential between Kenyan interest rates and the USA interest rates as measured by the 91 day Treasury bill rates.

INFDIFF is the inflation rate differential between Kenyan inflation rates and the USA inflation rates. The inflation as measured by the Consumer price index which reflects the percentage change in the cost to the average consumer of acquiring a basket of goods and services.

BOP is the balance of payment expressed as a percentage of GDP as measured by the current account deficit/Surplus.

TOT is the terms of trade which was measured as a percentage of total export prices to total import prices.

\( \varepsilon \) = Error term

### 3.4.2 Test of Significance

The study used tests of significance tools mainly Analysis of variance (ANOVA), Coefficient of determination \( (R^2) \), Correlation coefficient (R) and the F statistic to better understand the different relationships between the variables in the study. ANOVA provided a statistical test of whether or not the means of the groups under study were equal. The goodness of fit statistic \( R^2 \) was used in measuring how well the regression
model fitted the data in the study and how close the data fitted in the regression line. The R test was used to measure the strength and the direction of the linear relationship between variables. R is defined as the covariance of the variables divided by the product of their standard deviations. The significance of the regression results was tested using the F test statistic which is a ratio that compares the explained sum of squares and the unexplained sum of squares.
CHAPTER FOUR
DATA ANALYSIS, FINDINGS AND INTERPRETATION

4.1 Introduction

This chapter presents findings from analyzed secondary data. Descriptive statistics and model results are presented. This chapter also includes the interpretation of the findings.

4.2. Descriptive Statistics

Descriptive statistics presents the mean, maximum and minimum values of variables used in this study together with their standard deviations.

Table 4.1 Descriptive Statistics

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>ER</td>
<td>20</td>
<td>51.43</td>
<td>88.81</td>
<td>73.734</td>
<td>10.48</td>
</tr>
<tr>
<td>INTRDIFF</td>
<td>20</td>
<td>1.59</td>
<td>18.54</td>
<td>8.4925</td>
<td>5.20525</td>
</tr>
<tr>
<td>INFRDIFF</td>
<td>20</td>
<td>-1.19</td>
<td>11.26</td>
<td>5.5770</td>
<td>3.60006</td>
</tr>
<tr>
<td>BOP</td>
<td>20</td>
<td>-9.22</td>
<td>.79</td>
<td>-3.7905</td>
<td>3.07809</td>
</tr>
<tr>
<td>TOT</td>
<td>20</td>
<td>33.20</td>
<td>70.16</td>
<td>52.0685</td>
<td>11.26190</td>
</tr>
<tr>
<td>Valid N</td>
<td>20</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Research Findings

Table 4.1 above gives the descriptive statistics for the variables used in this study. The descriptive analysis of all the variables in this study was sourced using SPSS 20 software for the period of twenty years (1995 to 2014). The exchange rate had a mean of 73.734 with a standard deviation of 10.48. The interest rate differential had a mean of 8.4925 with a standard deviation of 5.20525. The inflation rate differential had a mean of 5.5770
with a standard deviation of 3.6006. The balance of payment as proxied by the Current account as a percentage of GDP had a mean of -3.7905 and standard deviation of 3.07809 while terms of trade had a mean of 52.0685 with a standard deviation of 11.26190.

### 4.3 Inferential Statistics

Inferential statistics presents the correlation matrix, regression analysis, analysis of variance and the model coefficients.

#### 4.3.1 Correlation Analysis

Pearson correlation was used to analyze the level of association between the exchange rate and the macroeconomic variables. The results are presented in table 4.2 below;

**Table 4.2 Pearson Correlation Matrix**

<table>
<thead>
<tr>
<th>Pearson Correlation</th>
<th>ER</th>
<th>INTRDIFF</th>
<th>INFRDIFF</th>
<th>BOP</th>
<th>TOT</th>
</tr>
</thead>
<tbody>
<tr>
<td>ER</td>
<td>1.000</td>
<td>-.502</td>
<td>.278</td>
<td>-.457</td>
<td>-.679</td>
</tr>
<tr>
<td>INTRDIFF</td>
<td>-.502</td>
<td>1.000</td>
<td>-.024</td>
<td>-.185</td>
<td>.277</td>
</tr>
<tr>
<td>INFRDIFF</td>
<td>.278</td>
<td>-.024</td>
<td>1.000</td>
<td>-.186</td>
<td>-.199</td>
</tr>
<tr>
<td>BOP</td>
<td>-.457</td>
<td>-.185</td>
<td>-.186</td>
<td>1.000</td>
<td>.841</td>
</tr>
<tr>
<td>TOT</td>
<td>-.679</td>
<td>.277</td>
<td>-.199</td>
<td>.841</td>
<td>1.000</td>
</tr>
</tbody>
</table>

*Source: Research Findings*

From Table 4.2, all the independent variables are correlated to the dependent variable. From the table, the interest rate differential had a negative correlation coefficient of 0.502 with exchange rate. The correlation coefficient between inflation rate differential and exchange rate was positive 0.278. The balance of payment as proxied by the current account as a percentage of GDP had a correlation coefficient of negative 0.457 to the
exchange rate while terms of trade had a correlation coefficient of negative 0.679 to the exchange rate.

### 4.3.2 Regression Analysis

The exchange rate was regressed against four predictor variables; average annual inflation rate differential, average annual interest rate differential, Annual balance of payment as proxied by the current account deficit as a percentage of GDP and terms of trade. 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 Statistics**

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.774a</td>
<td>.599</td>
<td>.492</td>
<td>7.46664</td>
</tr>
</tbody>
</table>

a. Predictors: (Constant), TOT, INFRDIFF, INTRDIFF, BOP

b. Dependent Variable: ER

**Source: Research Findings**

R squared which is the coefficient of determination indicates the variation in the dependent variable that is due to changes in the independent variables. From the findings in table 4.3 above, the value of R square was 0.599, an Indication that 59.9% of the variations in exchange rates in Kenya were caused by changes in interest rate differential, inflation rate differential, balance of payment and terms of trade at 95% confidence level.
Other factors not stated in the model account for 40.1% of the variations in exchange rates in Kenya. Also, the results revealed that there was a strong relationship between the selected macro-economic variables and the exchange rate as shown by the correlation coefficient (R) equal to 0.774.

### 4.3.3 Analysis of Variance

The study conducted an Analysis of Variance, in order to test the significance of the model. The findings were as shown in table 4.4 below.

#### Table 4.4: Analysis of Variance

<table>
<thead>
<tr>
<th></th>
<th>ANOVA&lt;sup&gt;a&lt;/sup&gt;</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Model</td>
<td>Sum of Squares</td>
<td>df</td>
<td>Mean Square</td>
<td>F</td>
</tr>
<tr>
<td>1</td>
<td>Regression</td>
<td>1250.518</td>
<td>4</td>
<td>312.630</td>
<td>5.608</td>
</tr>
<tr>
<td></td>
<td>Residual</td>
<td>836.261</td>
<td>15</td>
<td>55.751</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>2086.779</td>
<td>19</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<sup>a</sup> Dependent Variable: ER  
<sup>b</sup> Predictors: (Constant), TOT, INFRDIFF, INTRDIFF, BOP

**Source: Research Findings**

The significance value is 0.006 which is less than p=0.05 implies that the model was statistically significant in predicting how the macro economic variables of interest rate differential, inflation rate differential, balance of payment and terms of trade affect exchange rates in Kenya. The critical value for an F distribution F(4;15, 0.05)= 3.06 which is less than the calculated value F=5.608. This implies that at 95% confidence level, the variance was not due to random chance.
4.3.4 Model Coefficients

The results of the analysis obtained the model coefficients and corresponding statistics as shown in table 4.5 below;

Table 4.5 Model Coefficients

<table>
<thead>
<tr>
<th>Coefficientsa</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>Unstandardized Coefficients</td>
<td>Standardized Coefficients</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
<td></td>
</tr>
<tr>
<td>(Constant)</td>
<td>89.787</td>
<td>27.817</td>
<td></td>
<td>3.228</td>
</tr>
<tr>
<td>1 INTRDIFF</td>
<td>-.939</td>
<td>.575</td>
<td>-.467</td>
<td>-1.634</td>
</tr>
<tr>
<td>1 INFRDIFF</td>
<td>.463</td>
<td>.486</td>
<td>.159</td>
<td>.953</td>
</tr>
<tr>
<td>1 BOP</td>
<td>-.916</td>
<td>1.724</td>
<td>-.269</td>
<td>-.531</td>
</tr>
<tr>
<td>1 TOT</td>
<td>-.271</td>
<td>.483</td>
<td>-.292</td>
<td>-.562</td>
</tr>
</tbody>
</table>

a. Dependent Variable: ER

Source: Research Findings

The regression analysis results indicate that the relationship between the macro economic variables and exchange rates can be expressed using the following regression equation:

\[
ER = 89.787 - 0.939 \text{INTRDIFF} + 0.463 \text{INFRDIFF} - 0.916 \text{BOP} - 0.271 \text{TOT} + \epsilon
\]

From the regression equation above, it was established that holding the interest rate differential, inflation rate differential, balance of payment and terms of trade to a constant zero, the Ksh/Usd exchange rate would stand at 89.787
4.4 Interpretation of the Findings

From the descriptive statistics, the study reveals that the exchange rate has depreciated over the study period that is from an annual minimum of 51.43 to an annual maximum of 88.81 which represents a 73% drop in the value of the Kenya shilling against the United States dollar. The study also reveals that the interest rate differential had a mean of 8.4925 while inflation rate differential had a mean of 5.577 this implies that the Kenyan interest rates and inflation rates were on average higher than that of the United States of America. The balance of payment as proxied by the current account as a percentage of GDP had a mean of -3.7905 which indicates that the current account on average had a deficit balance. The terms of trade had an average cover ratio of 52.0685 implying that exports on average covered imports by 52.0685%.

From the results of the Pearson correlation matrix, inflation rate differential had a positive correlation coefficient of 0.278 which means that there is a likelihood of increases in exchange rates with increase in inflation rate differential. Interest rate differential, balance of payment and terms of trade had negative correlation coefficients of -0.502, -0.457 and -0.679 respectively which means that there was a likelihood of decreases in exchange rate with increases in interest rate differential, balance of payment and terms of trade.

Results from the regression coefficients reveal that a unit increase in interest rate differential decreases the exchange rate by 0.939, a unit increase in inflation rate differential increases the exchange rate by 0.463, a unit increase in balance of payment decreases the exchange rate by 0.916 while a unit increase in the terms of trade decreases the exchange rate by 0.271.
The coefficient of inflation rate differential for this study was positive 0.463 which was consistent with an earlier study by Elbadawi and Sato (2005) who also established a positive effect of inflation rate differential on exchange rate. This means that if a currency is overvalued i.e stronger than warranted by relative inflation rates, then depreciation can be expected to correct that position.

The coefficient of balance of payment for this study was -0.916 which was consistent with the findings of Taylor (2001) who observed that a negative balance of payment depreciates the local currency because of excess demand for foreign currency. This also implies that a surplus in the balance of payment appreciates the local currency due to excess demand for the local currency.

The coefficient for the interest rate differential was -0.939 which showed a negative effect on the exchange rate. This was consistent with the findings of Ndung’u (2001) who observed that interest rate differential widens with exchange rate appreciation and this triggers capital inflow.

The coefficient for the terms of trade was -0.271 which showed a negative effect on exchange rate. This was consistent with the findings of Bergen (2010) who observed that if the terms of trade deteriorate then the currency value will decrease. Edwards (1998) also observed that terms of trade deterioration leads to exchange rate depreciation.
CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter summarizes the study, makes conclusions, recommendations, the limitations of the study and suggestions for further research.

5.2 Summary

The study sought to investigate the effect of macroeconomic variables on exchange rates in Kenya. The macroeconomic variables were interest rate differential, inflation rate differential, balance of payment and terms of trade. The study adopted a descriptive research design. Secondary data was obtained from the Central bank of Kenya, Kenya national bureau of statistics, World Bank, international Monetary Fund and the United States Federal Reserve. Data was analyzed using SPSS software.

The co-efficient of determination R-square value was 0.599 which means that about 59.9% of the variation of the KSH/USD exchange rate can be explained by the four selected macroeconomic variables while 40.1% 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=0.774). ANOVA results show that the F statistic was significant at 5% level with a p=0.006. Therefore the model was fit to explain the relationships.

The regression results show that when all the macroeconomic variables have zero value the exchange rate will be 89.78. It is also established that a unit increase in interest rate differential decreases the exchange rate by 0.939, a unit increase in inflation rate
differential increases the exchange rate by 0.463, a unit increase in balance of payment decreases the exchange rate by 0.916 while a unit increase in the terms of trade decreases the exchange rate by 0.271. 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. Improvement in the balance of payment increases the supply for foreign currency hence causing an appreciation of the domestic currency while increasing terms of trade appreciates the domestic currency.

5.3 Conclusion

The study found that interest rate differential had a negative effect on exchange rate. The study therefore concludes that higher interest rate in Kenya in relation to the trading partner lead to the appreciation of the domestic currency. The study found that inflation rate differential had a positive effect on exchange rate and therefore it is concluded that higher levels of inflation result in the depreciation of the domestic currency. The study found that the balance of payment had a negative effect on exchange rate and therefore it is concluded that the balance of payment appreciates the domestic currency. The study also found that terms of trade had a negative effect on exchange rate in Kenya and therefore concludes that increases in terms of trade appreciates the domestic currency.
5.4 Recommendations for Policy and Practice

The study recommends that policy makers should enact policies that will lower inflation rates in Kenya as found out in the study that higher inflation rate differential contribute towards increasing the exchange rate. Secondly, the study 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 interest rate differential lowers the exchange rate. 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 study utilized secondary data, which had already been obtained and was in the public domain, unlike the primary data which is first-hand information. Possible errors in the process of measurement or/and recording may have been impounded into this research.

The study was based on a twenty year period from 1995 to 2014. It is not known whether the results would hold for a period after the year 2014. The annual data used was also a limitation as compared to quarterly or monthly data which could give more precise results.

The study also considered selected macroeconomic variables and not all the macroeconomic variables affecting the exchange rate mainly due to limitation of data availability.
5.6 Suggestions for Further Studies

The study was not exhaustive of the 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, GDP, political stability and economic performance.

The study focused on the US Dollar as the foreign currency. This study recommends a further study be conducted on other currencies traded in the Kenyan foreign exchange market. The study also recommends that quarterly or monthly data be used in future studies so as to obtain more precise results.
REFERENCES


APPENDICES

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Source: Central Bank of Kenya
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Source: Central Bank of Kenya
### Appendix IV: Kenyan GDP, BOP, Exports, Imports, USA Interest and Inflation Rates

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<th>BOP (US$ Billions)</th>
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<th>Exports-KSH (Millions)</th>
<th>Imports-KSH (Millions)</th>
<th>Terms of Trade (E/I) %</th>
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Source: IMF, Kenya National Bureau of Statistics, USA Federal Reserve and World Bank
### Appendix V: Interest Rate Differential and Inflation Rate Differential

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