MACROECONOMIC FACTORS AND EXCHANGE RATES IN KENYA

BY

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UNITED STATES INTERNATIONAL UNIVERSITY – AFRICA

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A Research Project Report Submitted to the Chandaria School of Business in partial fulfillment of the Requirements for the Degree of Master of Business Administration (MBA)

UNITED STATES INTERNATIONAL UNIVERSITY – AFRICA

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STUDENT’S DECLARATION

I, the undersigned, declare that this is my original work and has not been submitted to any institution or university other than the United States International University-Africa in Nairobi for academic credit.

Signed: ____________________________ Date: ____________________________

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This research project has been presented for examination with my approval as the appointed supervisor.

Signed: ____________________________ Date: ____________________________

Francis Mambo Gatumo

Signed: ____________________________ Date: ____________________________

Dean, Chandaria School of Business.
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ABSTRACT

The general objective of this study was to establish the effect of macro-economic variables on exchange rates in Kenya. The study sought to determine effect of interest rates, inflation rates and GDP on exchange rates in Kenya. An explanatory research design was utilized in this study. The explanatory design was used to bring out the causal relationship of the variables and this was via a correlation of variables. The population consisted of the entire macroeconomic performance data for the period of 2000 to 2016. In particular, the population consisted of the actual foreign exchange rate to Interest Rates, inflation rates, and GDP for the period of study. Thus a total of 17 observations were made for each of the four variables. Secondary data was tested for violation of assumptions of Classical Linear Regression Model (CLRM) using the diagnostic test. The period covered for the study from 2000 and 2016 was where the sample size of all variables was drawn from. A multiple regression method was used to estimate the relationship between macroeconomic variables (interest rate, inflation rate, GDP and exchange rate in Kenya. The findings were presented in tables and graphs.

On the effect of interest rate, the Pearson correlation results showed a positive relationship between interest rate and exchange rate (r=0.231, p=0.372). This implies that foreign exchange rate and interest rate are positively related however there is no significant correlation between the variables. A regression analysis done between interest rate and exchange rate. The adjusted R square value was 0.054 this implies that 5.4% of the variation in exchange rate was caused by variations in interest rate.

On the effect of inflation rate, the Pearson correlation results showed a negative relationship between the variables (r=-0.421, p= 0.093). This implies that foreign exchange rate and inflation rate are negatively related. It shows that foreign exchange rate decreases with every increase in inflation rate and a unit change in inflation would lead to 0.470 reduction in exchange rate. A regression analysis done to between inflation rate and exchange rate. The adjusted R square value was 0.177 this implies that 17.7% of the variation in inflation rate was caused by variations inflation rate.

On the effect of GDP, the Pearson correlation results showed a significant positive correlation between the variables (r=0.637, p<0.05). This implies that foreign exchange rate and GDP are positively correlated. A regression analysis done to between GDP and
exchange rate. The adjusted R square value was 0.406 this implies that 40.6 % of the variation in exchange rate was caused by variations GDP.

The study concluded that GDP positively influences exchange rates significantly on its own and correlation studies also support these findings. Developing countries should eradicate barriers which limit trade and support favorable movement of goods and services between different countries to increase GDP and therefore have a positive impact on exchange rate. It was also concluded that inflation has a negative influence on exchange rate. If inflation increases, the level of exchange rate increases. Monetary stability should be enforced to reduce and moderate the rate of inflation in the country. This will reduce the level of exchange rate volatility and increase economic growth in the economy Results in the study established that exchange rates was a positively affected by interest rates. Particularly high interests rate in lending increases the level of exchange rates. The government needs to support lending activities rather than borrowing in developing countries like Kenya in order to improve the levels of exchange rate.

The study recommends that there should also be a review of debtor credibility and ensure that funds that borrowed are used in efficiently in investments to mitigate depreciation of exchange rate. There was a positive correlation between GDP and exchange rate; the regression also showed that the relationship had a significant effect. The government should expand its exports put in place conducive environment and this will help balance the current account and provide revenue without incurring further debt. Inflation has a negative effect on exchange rate which means that high inflation reduces the level of exchange rate. There is a need for regulation to ensure on money supply to lower the inflation rates through tight fiscal and economic policies.

Further research should be done to capture any additional macroeconomic variables within the study period.
ACKNOWLEDGEMENT

I acknowledge God for bringing me this far. I also acknowledge my parents for the support given to me throughout my university journey. I thank my lecturer for guiding me and helping me throughout this research proposal.
DEDICATION

Dedicated to my friends and family who have offered me unconditional support throughout this project.
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ABBREVIATIONS AND ACRONYMS

ARDL: Autoregressive Distributed Lag

DCC: Dynamic currency conversion

ERPT: Exchange Rate Pass-Through

FDI: Foreign Direct Investment

GARCH: Generalized AutoRegressive Conditional Heteroskedasticity

GBP: Great British Pound

GDP: Gross Domestic Product

IMF: International Monetary Fund

MFIs: Micro Finance Institutions

OECD: Organisation for Economic Co-operation and Development

RER: Real Exchange Rate

U.S.: United States

USD: United States Dollars

VAR: Vector Auto Regression
CHAPTER ONE

1.0 INTRODUCTION

1.1 Background of the Study

Abdoh, Yusuf, Zulkifli, Bulot and Ibrahim (2016) noted that exchange rate is outlined as amount of units of domestic currency required to purchase one unit of foreign currency. In alternative words, the rate at which a currency in one country are often changed for alternative currencies. The rate is extremely necessary, because it permits for the conversion of national currency into another, to facilitate international trade and also the transfer of funds between countries. This allows for the comparison of costs of products in different countries. In general, the value distinction between similar merchandise determines the international trade. The demand and supply of foreign currency may stir volatility and this depends on the economic scenario in the foreign exchange market.

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, and 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, 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.

Roubini (2000) expressed that the economic development may well be influenced by the fluctuations in macroeconomic variables. Changes in economic development also will cause the movement in rate of exchange at domestic level. The macroeconomic variable such as interest rate can cause the fluctuation in exchange rate movement. Moreover, the positive modification in nominal interest at domestic level can cause the currency to be appreciated and vice versa. Meanwhile, Kashif (2000) in his study established that inflation and exchange rate incorporates a negative correlation and insignificant between
U.S. dollar and Rupees from Pakistani. The result for coefficient between rate of inflation and exchange rate was also found to be negative. This imply that when the changes in exchange rate showed an increase, the rate of inflation witnessed a decrease, the volatility between this two variable do not show the same trend.

Achsani (2010) study on the other hand established that the rate of inflation in various countries differ, this he says conjointly provides the correct association between the inflation rate and exchange rate which is often negative in nature. Levin (1997) states that the changes within the exchange rate at the local currency can fluctuate as a result of the depreciation of the currency and therefore the unchanged worth in domestic currency price. Actually, the growth in export is caused by the depreciation in the home currency.

US dollar is the most accepted and commonly used currency in international trade and was considered as the dollar standard for a long period of time (Bracke & Bunda, 2011). According to the Bank for International Settlements, 86% of all foreign exchange transactions that took place in the month of April 2007 were against the U.S. dollar. Besides, the U.S. dollar is still the world’s reserve currency even though it is no longer backed by gold. Additionally, US dollar could be considered as the worldwide instrument to report currency and monetary by international banks and countries (Ehrmann, Fratzscher, & Rigobon, 2011). Virtually all interbank transactions, by market participants domestic and abroad, involve a purchase or sale of dollars for a foreign currency (Conerly, 2013). Ehrmann, Fratzscher and Rigobon (2011) further underlined “the dominance of US markets as the main driver of global financial markets: US financial markets explain, on average, more than 25% of movements in euro area financial markets, whereas euro area markets account only for about 8% of US asset price changes.”

US dollar is that the most accepted and ordinarily used currency in international trade and as a result has been used as an international exchange currency for a long time (Bracke & Bunda, 2011). According to the Bank for International Settlements, eighty six percent of all interchange transactions that took place in 2007 were against the U.S. dollar. Besides, the U.S. dollar remains the world’s reserve currency. Statistics also show that the U.S. dollar may well be thought of as a worldwide instrument to report currency and financial by most international banks and countries. Ehrmann, Fratzscher, and Rigobon (2011) also acknowledge that nearly all interbank transactions, by market participants domestic and
abroad, involve a buying deal or sale of dollars for a distant currency (Conerly, 2013). Ehrmann, Fratzscher and Rigobon (2011) further state the dominance American markets as the main driver of world money markets. This is because the U.S. money markets account for on average, over twenty five percent of movements in Euro market, whereas the Euro market only account for regarding 8% of American Price fluctuations.

However, from 2005 to 2015 the American dollar has witnessed several challenges attributable to heated international events like the worldwide crisis in 2008, the debt crisis of the EU Zone in 2010s, the worldwide oil crisis, the Ukraine and Libya wars and therefore the issues surrounding the Association of Southeast Asian Nations zone and particularly the strong rising of Asian and latin American economies and currencies in China, India, Mexico and Brazil. It is speculated that in the next decade, the U.S. dollar may well be replaced from being the world’s reserve currency (Halligan, 2014). When the European financial institution begun operations in 1999 and therefore the single currency issued in 2002, vital shifts were expected within the reserve portfolios of central banks. It had been believed that the appearance of Euros would produce an integrated financial and monetary zone larger than the United States (Cohen, 2012).

One of the key challenges to policy management around the globe and notably in rising and developing economies has been the impact of changes in exchange rates on inflation and economic activities. It’s believed that exchange rate movements would produce domestic economic distortions and have an effect on a country’s economic competition. The negative impact of exchange rate placement is well documented in literature and there’s usually reluctance on the facet of policy makers to regulate exchange rates thanks to perceived negative impact on the economy, principally owing to pass-through effects.

Auboin and Ruta (2013) study used empirical literature related to a wide body of economic literature on the relationship between exchange rates and trade. The main focus was on the impact of exchange rate volatility and currency misalignments on international trade flows. On average, the findings revealed that exchange rate volatility negatively impacted trade. The extent of this effect relied on a number of factors which included the existence of hedging instruments, the structure of production, and the rate of economic integration across countries. The second issue involves exchange rate misalignments, which are predicted to have short-run effects in models with price rigidities. However, the exact impact depends on a number of features, such as the pricing strategy of firms.
engaging in international trade and the importance of global production networks. Trade effects of currency misalignments are predicted to disappear in the long-run, unless an economy is characterized by other relevant distortions. Empirical results broadly confirm these theoretical predictions.

Klitgaard (1999) examined the impact of fluctuations in the dollar/yen exchange rate and established that the US import price of Japanese goods went up by less than the exchange rate in the early 90s, this was attributed to the fact that Japanese firms accepted a lesser export prices in terms of the yen values. In a similar note, McCarthy (2000) established that exchange rate pass-through to buyer prices was modest in a huge number of industrialized economies. The study also established that the rate of pass-through was positively associated to trade openness and inversely associated to exchange rate volatility. Gagnon and Ihrig (2001) on the other hand failed to establish a systematic relationship between exchange rate pass-through (ERPT) and the financial behavior in the developed countries. Kang and Wang (2003) also evaluated the impact of exchange rate fluctuations on import and consumer prices in four Asian countries: Japan, Singapore, Korea and Thailand. The authors noted that the transmission of exchange rate variations to import and consumer prices were high during the post-crisis period (1998–2001) compared to the pre-crisis period (1991–1996).

Campa and Goldberg (2005) offered evidence to of partial pass-through in selected OECD countries in the short run. The study also established that import prices in local currencies echoed about 46 per cent of exchange rate variations in the short run, and almost 65 per cent in the long run. Even though individual pass-through elasticity’s were noted to be closer to 1 in some of the case countries, although complete pass-through was rejected for many of them. The authors also concluded that macroeconomic variables play a significant role in explaining cross-country differences in pass-through elasticities though with very minimal effects, as the pass-through into import prices was lesser for nations that had low average inflation and exchange rate variability.

Shintani et al (2009) confirmed that declines in the ERPT in the US in the 80s and 90s were attributed to the low inflation rates. Similarly, Sahaa and Zhanga (2011) set to investigate whether ERPT to import prices was complete and estimated the pass-through to consumer pricing index. Their findings, revealed structural exchange rates had less impact on the increasing domestic prices in China and India. Jiang and Kim (2013)
utilized the structural vector auto regression (VAR) approach to scrutinize the impact of exchange rate changes on production and retail prices in China. The findings revealed that ERPT to producer and retail prices were incomplete, however the pass-through to producer prices was upper compared to the retail prices.

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. 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. This means that if a currency is overvalued for instance stronger than warranted by relative inflation rates, then depreciation can be expected to correct that position.

The relationship between GDP growth rate and exchange rate has mixed results. It could be positive, negative or no relation at all as seen from above. For instance, according to Rodrik (2008) in his work “the real exchange rate and economic growth: theory and evidence”, undervaluation (high exchange rate) stimulates the growth of an economy. That is, there is positive relationship between exchange rates and the GDP growth rates and that this is true particularly for developing countries, suggesting that tradable goods suffer disproportionality from the distortions that keep poor countries from converging. The countries used in his work as evidence were China, India, South Korea, Taiwan, Uganda and Tanzania.

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. Since the introduction of a freely floating exchange rate regime the Kenyan shilling and US Dollar exchange rate has been highly volatile. 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 (Ghura & Grennes, 2013). 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 Problem Statement

Changes in exchange rates have pervasive effects on prices, wages, production levels, and employment opportunities. Fluctuations in the value of currencies of different economies have increased after the collapse of the economy (Saeed, Uwan, Sial & Sher, 2012). Due to the enormous significance of the exchange rates in an economy, in-depth understanding on the behavior of foreign exchange rates is required. Previous studies looked at the fluctuation in exchange rates for instance Mayaka (2015) examined the effect of the macroeconomic variables on exchange rates in Kenya. The study covered the period 1995-2014 and the main macroeconomic variables considered were interest rate, inflation rate, Balance of payment and terms of trade. The study was however not exhaustive of the macroeconomic variables affecting exchange rates in Kenya but recommended further studies be conducted incorporating other variables like Public debt, unemployment rate, income levels, GDP.

The literature presented above indicate that there is a relationship between interest rate, inflation rate, Balance of payment and terms of trade, stock market indices, foreign direct investment and stock return. Despite recent studies like Mayaka (2015) who examined the effect of the macroeconomic variables on exchange rates in Kenya using interest rate, inflation rate, Balance of payment and terms of trade. This study seeks to look at how substitution of balance of payment with GDP in the equation affects exchange rate in Kenya.
1.3 Purpose of the Study
The general objective of this study is to establish the effect of macro-economic variables on exchange rates in Kenya.

1.4 Research Questions
1.4.1 What is the effect of interest rates on exchange rates in Kenya?
1.4.2 What is the impact of inflation rates on exchange rates in Kenya?
1.4.3 What is the influence of GDP on exchange rates in Kenya?

1.5 Significance of the Study
The object of the research presented in this study is to look at the effect of macroeconomic factors on foreign exchange rates.

1.5.1 Financial Firms
This research study would further allow firms to understand better the nature of foreign exchange markets and the factors that affect it and might lead to losses when affected negatively, and when to take advantage of situations to gain profit and positively utilize their funds to maximize their profits. It would serve as a guideline for the financial firms in Kenya to understand the importance of foreign exchange.

1.5.2 Policy Makers
The enhanced management of funds and finances is important for Kenya as a nation. The findings will assist in identifying gaps and areas that require assistance. The government and other key stakeholders in policymaking can use this study to be able to come up with ways of working together in this industry to improve profitability through international financial management.

1.5.3 Scholars and Researchers
This study would further help scholars and researchers by providing the data necessary for undertaking further studies in the area of international financial management.

1.6 Scope of the Study
The study of exchange rate is important to an economy's growth perspective. Substantial variables are responsible for the determination which causes impact on exchange rates.
The scope of this research is to show the impact of selected variables on foreign exchange rates and whether they affect it positively or negatively. Moreover, it shows the interrelations between these variables and how they also affect each other. The secondary data will cover the period 2000-2016, this period is considered sufficient enough to be able to analyze and record fluctuations in the macro economic factors and better analyze the relationship.

1.7 Definition of Terms

1.7.1 Foreign exchange rates

It is defined as the price of a nation’s currency in terms of another currency. An exchange rate thus has two components, the domestic currency and a foreign currency, and can be quoted either directly or indirectly.

1.7.2 Interest rates

The liquidity theory looks at the interest rates as the token paid for abstinence and inconveniences experienced for having to part with an asset whose liquidity is very high. It is a price that equilibrates the desire to hold wealth in the form of cash with the available quantity of cash, and not a reward of savings.

1.7.3 Inflation rates

The inflation rates refer to the change in the general level of prices in the economy over a given period of time. The change in the inflation rates would have a significant effect in the purchasing power of money and the cost of production in the manufacturing sector.

1.7.4 Gross Domestic Product Percentage (GDP)

The gross domestic product (GDP) is the monetary value of all the finished goods and services produced within a country’s borders in a specific time period. Though GDP is usually calculated on an annual basis, it can be calculated on a quarterly basis.
1.8 Chapter Summary
This chapter introduces the background of the study and outlines the problem statement and justifies the claim for the study. The purpose and specific research questions are also presented followed by the significance and the scope of the study according to the research questions. The next chapter presents the literature review to the study topic.
CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Introduction
This chapter presents an in-depth analysis of selected macro-economic variables and exchange rates in Kenya. This will be based on the specific research objectives and different articles from the literature review that is organized according to the research questions.

2.2 Effect of Interest Rate on Exchange Rates

2.2.1 Effect of Interest Rate
Patra (2004) studied the log-run relationship between real exchange rate and real interest rate differentials using the co-integration approach between India and US for the period 1993 – 2003. It employed both Engle-Granger and Johansen tests for presence of co-integration. The model studied in this paper, as one would expect, suggests that there is good reason to believe that there should be a systematic relationship between the two variables. However, similar to some other researchers, he could not find a good empirical representation that is supported by the data and hence empirical support in favour of the above relationship. The result is robust for different measures of real interest rate differentials.

Bautista (2005) examined the relationship between exchange rate and interest rate differential in six East Asia countries by tracking the correlation of the real exchange rate and the real interest differential from 1986 to 2004 and noting the shifts in the nominal exchange rate regime. The analysis makes use of the dynamic conditional correlation multivariate GARCH model (DCC model henceforth) developed by Engle (2002). For each country, a DCC model is estimated to determine the correlation of the two variables over time. These countries are Indonesia, Korea, Malaysia, Philippines, Singapore and Thailand. Positive time-varying correlations characterized the relation during pegged regimes. Correlations are negative during freely falling regimes.

Bjornland and Hungnes (2006) examined the forecasting performance of a structural exchange rate model that combines the purchasing power parity condition with the interest rate differential in the long run, with some alternative exchange rate models. The analysis is applied to the Norwegian exchange rate using the Johansen Model (1988). The long-run equilibrium relationship is embedded in a parsimonious representation for the
exchange rate. The structural exchange rate representation is stable over the sample and outperforms a random walk in and out of-sample forecasting exercise at one to four horizons. Ignoring the interest rate differential in the long run, however, the structural model no longer outperforms a random walk thus need for undertaking this study in order to draw conclusions.

Hnatkovska and Lahiri (2007) investigated the non-monotonic relationship between interest rates and exchange rates. They found that empirical literature in this area, however, has been unable to detect a clear systematic relationship between interest rates and exchange rates. They used an optimizing model of a small open economy to rationalize the mixed empirical findings. The model had three key margins. First, higher domestic interest rates raise the deposit rate. This increases the demand for deposits and hence raises the money base. Secondly, firms need bank loans to finance the wage bill, which reduces output when domestic interest rates increase. Lastly, higher interest rates raise the government’s fiscal burden. This negative fiscal effect raises the expected inflation. They found that increases in the interest rate up to 35% both appreciate the currency and induce a fall in the rate of currency depreciation. However, more aggressive increases in the domestic interest rate both depreciate the currency as well as increase the rate of currency depreciation. The results provided an explanation for the inability of nonstructural empirical models to find a systematic relationship. This study therefore seeks to establish if indeed such a relationship exist here in Kenya.

Park (2011) extended the studies of Meese and Rogoff (1998) and others to find a stable longrun relationship between real exchange rates and real interest rates differentials using Korean Won/US Dollar data for the period of 1991~2011 containing the East Asian financial crisis. Applying error correction model to two sub-periods before and after the crisis, he identified a reliable relationship between the two variables with the addition of foreign exchange reserves for the post-crisis period but not for the pre-crisis period. The estimate of the coefficient on the real interest rates differential is significant but positive unlike the prediction of conventional interest rate parity theory. However, the sign is negative and significant on the lagged real interest differential. Korean foreign exchange reserve is estimated to have a negative significant effect on the Won/USD real exchange rate. This study will therefore intend to establish if such a relationship exist in the Kenyan market.
Lungu and Sheefani (2013) investigated the relationship between the exchange rate and the interest rate for Namibia using time series techniques such as unit root tests, co-integration test, and impulse response and variance decomposition. The study used quarterly data for the period 1993. The results for co-integration show that there is no co-integration among the variables. The empirical results of this study were unable to detect a clear systematic relationship between interest rates and exchange rates. However, the variance decomposition further revealed that the errors in the forecast of both the exchange rate and interest rate are dominated by itself and an insignificant percentage is also attributed to other variables. This study will therefore intend to establish if such a relationship exist in the Kenyan market and draw conclusion on the same.

Mbaya (2013) conducted a research in Kenya and sought to establish the effect of interest rate in stabilizing exchange rates. Longitudinal correlation design was adopted and regression analysis was run on multivariate equations to establish the relationship between the variables in determining the exchange rate of USD, GBP and Euro. The findings of the study reveal that not only interest rates have a positive relationship with exchange rate but also money supply has a strong significant effect on exchange rates. Nduri (2013) sought to understand the effects of interest rate and inflation rate on exchange rates in Kenya.

There are many factors that affect the exchange rate in Kenya and elsewhere in the world, but the study keenly was interested in understanding the relationship between interest rates and inflation rates on exchange rate in Kenya. Using a multiple linear regression to identify the relationship between two explanatory variables the study concluded that increase in interest rate is necessary to stabilize the exchange rate depreciation and to curb the inflationary pressure and thereby helps to avoid much adverse economic consequence. The study recommended that regulators should come up with means to evaluate exchange rate volatility. It was further recommended that given specific context of developing countries like Kenya, of significant shocks from the exchange rate to inflation and the limitations related to monetary policy, controlling exchange rate volatility is very important in the fight against inflation (Mbaya, 2013).

2.2.2 Challenges facing use of Interest Rates in Stabilizing Exchange Rates

Furman and Stiglitz (1998) discuss the contemporaneous relationship between interest rate and exchange rate, and identify 13 episodes in nine emerging markets, characterized
by “temporarily high” interest rates. They conducted a simple regression analysis and found that both the magnitude and duration of such interest rate rises are coincided with exchange rate depreciation. With some precautionary reservations, they interpret this result that it at least makes questionable the usefulness of raising interest rates to defend the exchange rate. On the other hand, Goldfajn and Baig (1998) analyzed the relationship between nominal interest rates and nominal exchange rates in the aftermath of currency crises, with a special emphasis on the Asian crisis, found no evidence for the weakening impact of higher interest rates on exchange rates. Using a large panel data set, Kraay (1999) examined the usefulness of higher interest rates across speculative attacks. He failed to find very strong positive or negative association between raising interest rates and the outcome of the speculative attack.

Cho and West (2003) empirically tested the said relationship for the exchange rate crises in Korea, the Philippines and Thailand during the 1997–98, by proposing a model that identifies a monetary policy rule and found that an exogenous increase in interest rates caused exchange rate appreciation in Korea and the Philippines, depreciation in Thailand, however, they obtained mixed results. For same countries, using simple linear expectation model Kim and Ratti (2006) provided evidence that sharp increase in the interest rate result in business failures that further deepen exchange rate crisis. More technically, one standard deviation shocks in the interest rate is associated with statistically significant response (depreciation) in the exchange rate in Thailand, Korea and the Philippines.

According to Tauline (2008) there are numerous hurdles in the use of interest rates in stabilizing exchange rates, these hurdles often emanate from the unpredictable trend of interest rates which may jeopardize a country’s favorability for investment and capital inflow. Tauline (2008), faults the consideration used by commercial banks in raising interest rates. He singles out the absence of strict guidelines to prevent commercial banks from raising interest rates on their own. Though central banks offer the umbrella guidelines on the establishment of interest rates, most commercial banks have their own mechanisms for establishing interest rates. Therefore, using interest rates to stabilize exchange rates could be ineffective since the establishment of interest rates is not a uniform process.

As opined by Sylla and Homer (2011) a number of studies have been conducted to determine the role of interest rates in stabilizing exchange rates. Majority of these studies
have focused on the comparison of two or more countries regarding how the interest rate regime plays a pivotal role in the stabilization of the exchange rate and the economy at large. One of the most significant studies involved the exchange rate regime in Kenya, Uganda and the rest of East Africa regarding the IMF model of exchange rate. Not just there were worries on the correctness of the IMF-type plans in the holder of the East African states. Geithner (2011) states that there are also several economists who disputed to the raise in the concern pace that is directed in array to calm the trade charge can really have vicious things, for instance, by rising the ambiguity and the likelihood of evasion due to liquidation, a raise in the interest rate can truly create an extra decrease of the trade rate.

### 2.2.3 Factors Influencing Interest Rates

Rosenberg (2009) analyzed the internal factors. His study found four main components reflected in the microfinance interest rates: operating expenses, cost of funds, loan loss expenses, and profit. He also found that institutions with a longer history are able to control operating costs more effectively and therefore are able to charge lower interest rates. Any change in interest rates will have a bigger effect on low-income borrowers than on those with higher incomes. In addition, borrowers are more sensitive to a change in the length of the loan rather than a change in the interest rate (Karlan & Zinman, 2008). Similarly, a client's portfolio does not have an impact on the cost of the loan. Regression analyses do not confirm that a MFI with a higher number of borrowers would be better off spreading the fixed operational costs over their clients in comparison with a MFI managing a small portfolio of borrowers. Therefore the latter mentioned MFIs can provide a lower interest rate. This is primarily due to the operating cost structure, where fixed costs are usually very low but variable costs may fluctuate considerably.

In comparison with commercial banks, MFIs tend to be less leveraged, even though they often seek alternative sources of funding (securitizations, bond issues, etc.) for the improvement of their financial services and more rapid development (Jayadev & Rudra, 2012). However, this direction is very difficult and depends on many determinants such as the size of institution, business place and type of institution or risk rating. Moreover, Campion (2010) shows that many determinants on the cost of funds are outside the control of MFIs, at least in the short run. Many of these institutions are primarily price takers and have no opportunity to negotiate better terms on the market.
Another strand of literature claims that a higher rate of profitability and the resulting increase in interest from investors applies upward pressure on interest rates. Investors try to influence the management to maximize their capital expenditures (Cull, Demirgüç-Kunt & Morduch, 2009). Governments try to correct such behavior by introducing interest rate ceilings. The main objective is to set an interest rate that cannot exceed a certain level. It may seem that such an approach is effective, however, economic studies have found that such ceilings lead to the rejection of those clients with higher potential risk (Helms and Reille, 2004).

2.3 What is the Impact of Inflation Rates on Exchange Rates

2.3.1 Effect of inflation rates

Inflation is one of the major factors that affect the exchange rate. Theoretically a low inflation rate scenario will exhibit a rising currency rate, as the purchasing power of the currency will increase as compared to other currencies (Duarte, & Stockman, 2002). Generally, the inflation rate is used to measure the price stability in the economy. Conceptually, the inflation can be divided into two sides, namely: demand side inflation (demand pull inflation) and supply side inflation (cost push inflation). For open-economy countries, inflation comes from domestic factors (internal pressure) and also overseas factors (external pressure) (Edwards, 2002). The sources of external factors are the increase in the world commodity prices or exchange rate fluctuation. The influence of exchange rate towards inflation itself depends on the choice of exchange rate regime in the country. Exchange rate system has an important role in reducing or minimizing the risk of fluctuations in exchange rates, which will have an impact on the economy. Any changes in exchange rates will have a great impact on the economy (Eichengreen, 2004).

Kitatia, Zablon and Maithya (2015) study sought to establish evidence supporting the existence of influence of the selected macro-economic variables of: foreign exchange rate of hard currencies, interest rate and inflation rate on share prices fluctuations based on the weighted average monthly data from January 2008 to December 2012 for the companies listed on the Nairobi Securities Exchange in Kenya. The study covered a 5-years period from 2008 to 2012 and recommended that future studies should be done over a longer period of 10 to 15-years so as to investigate the influence of macro-economic variables on stock market prices in the short run as well as the long run for the case of the securities exchanges in East Africa.
Margaret and Patrick (2016) on the other hand undertook a research to establish the impact of Selected Macro economic variables on foreign direct investment in Kenya. The study examined data for a 10 years period starting 2005 and primary data was collected from 271 respondents. Linear regression analysis revealed that Exchange rate, GDP and Inflation rate had a negative and insignificant effect on FDI.

Generally, the inflation rate is used to measure the price stability in the economy. Conceptually, the inflation can be divided into two sides, namely: demand side inflation (demand pull inflation) and supply side inflation (cost push inflation). For open-economy countries, inflation come from domestic factors (internal pressure) and also overseas factors (external pressure). Olweny and Omondi (2012) notes that the sources of external factors are the increase in the world commodity prices or exchange rate fluctuation. The influence of exchange rate towards inflation itself depends on the choice of exchange rate regime in the country. Levy, Yeyati & Sturzenegger (2002) notes that exchange rate system has an important role in reducing or minimizing the risk of fluctuations in exchange rates, which will have an impact on the economy. Any changes in exchange rates will have a great impact on the economy (Fung, 2002).

In another study by Edwards, and Yeyati (2005) tried to establish the relationship between exchange rates and inflation in Latin America. The research established that generally, the inflation rate is used to measure the price stability in the economy. The study by Kiptoo (2007), focused on Real Exchange Rate (RER) volatility and misalignment on international trade and investment. The study found out that RER volatility has a negative and significance impact on trade and investment during the study period 1993 to 2003. Finally, the study by Sifunjo (2011) examined chaos and nonlinear dynamical approaches to predicting exchange rates in Kenya.

2.3.2 Factors Influencing Inflation

Alomar (2007) examined the main determinants of inflation in Kuwait during the period 1972 to 2004. The researcher used three independent variables namely money supply, real gross domestic product and imported inflation. The study was estimated by using Granger causality test which indicated that domestic inflation is influenced mainly by the development of domestic liquidity which overwhelmed the theoretically expected effect of imported inflation. According to the researcher, these results might be caused by two
main factors; the first is the economic and political developments during the period of study, and the second is the difference in constructing each measure of inflation. These factors might be responsible for distorting the expected relationship between domestic and imported inflation.

Barnichon and Peiris (2007) explored the relationship between inflation, the output gap, and real money gap for a sample covering countries of Sub-Saharan namely Botswana, Niger, Cameroon, Nigeria, Cote d’Ivoire, Rwanda, Ethiopia, Senegal, Ghana, Sierra Leone, Kenya, Swaziland, Madagascar, Uganda, Malawi, Zambia, Mali, Zimbabwe and Mozambique. To estimate the structural gaps, the researchers used annual data on these countries covering a maximum time span of 1960 to 2003 by employing panel co integration estimation techniques. The results of this study showed that the estimated output gap and money gaps are both economically and statistically significant in accounting for inflation in SSA. In addition, the structural output and real money gaps have a significant predictive power on inflation.

Adigozalov (2009) examines determinant of inflation in Azerbaijan during 2000-2009 by applying co integration modeling. The concept of the model targeted to capture external and internal factors of inflation such as broad money (M3), oil GDP and non-oil GDP, nominal effective exchange rate, credit and deposit rates. The empirical results show an appreciation of domestic currency has multiple effects on inflation. In addition, the elasticity of non-oil GDP is higher than the GDP of oil. Being an exporter of oil, Azerbaijan extract a boom in foreign asset inflow to the economy that affects to the exchange rate while domestic liquidity expansion reinforcing inflation process. The spillover effect of external factor, expressed as higher prices in trading partners and exchange rate depreciation, the lack of independent monetary policy with a combination of pegged exchange rate, contribute to inflation process in the long run. The short term inflation shock that exacerbated by supply side bottleneck manifested as production of long term determinants of inflation in Azerbaijan.

Pahlavani and Rahimi (2009) conducted a study to find the determinants of inflation in Iran by applying ARDL model. Their empirical model is based on the special economic peculiarity which includes variables as GDP, expected inflation, liquidity, imported inflation and the dummy variable presenting the effect of Iran/Iraq war on Iran’s economy. The time series data has used for a period of 1971 to 2006. Their results explain
that the liquidity, exchange rate, expected inflation rate and the rate of imported inflation
granger cause inflation in the Iranian economy. Similarly, the war with Iraq continuing
eight years had an effect on the inflation rate in Iran. Maliszewski (2003) notes that the
expected inflation has the most significant impact on inflation being an endogenous to the
system. It stipulates structural challenges, transaction cost, and a lack of exchange market.
Johansen and Juselius (2017) indicated that the second endogenous factor impacted on
price level is excessive liquidity which invoked budget deficits. Moreover, another
determinant of inflation is the instability of exchange rate, which appeared through
unification policy.

Dizaji (2011) examined determinants of inflation in Iran by using annual data covering
the period from 1973 until 2008. He used some econometrics techniques such as unit root
test, co-integration test. The results of this study indicated that foreign prices, gross
domestic product (GDP), exchange rate and the two dummy variables DT80 and DT88
(for capturing the structural break which have been caused respectively by the war with
Iraq and the subsequent reconstructions after war) have significantly affected the
domestic prices in Iran. Agayev (2011) explored the determinants of inflation in relatively
low inflation period of 1996-2008 in 10 Commonwealth Independent States transition
economies. Exchange rate growth, wage increases, money supply growth and inflation
inertia were analyzed as determiners of inflation in this study (Johansen & Juselius,
2017).

Kinda (2011) investigated the sources of inflation in Chad using quarterly data from
1983:Q1 to 2009:Q3. The analysis of this study was based on a single-equation model.
The results showed that the main determinants of inflation in Chad are rainfall, foreign
prices, exchange rate movements, and public spending (Habib, Mileva & Stracca, 2017).
The effects of rainfall shocks and changes in foreign prices on inflation persist during six
quarters. Changes in public spending and the nominal exchange rate affect inflation
during three and four quarters, respectively. In a comparative study of inflation in
Bangladesh and India over a period of 1979-2010, Paul and Zaman (2013) used ‘auto
regressive distributed lag’ (ARDL) approach and found the dominance of monetary
effects after counter adjustments of supply shocks. In addition to it, their study reveals
that the inflation rate was rapidly rose whenever the money supply grew in Bangladesh
than in India, implying the scenario of an inconsistent pattern of money supply from the
central banks of both countries.
2.3.3 Curbing Inflation Rates

One of the most applied methods to curbing inflation for a country involves the pegging the value of its currency to those of large, low-inflation ones. In some cases, this strategy pertains the persistent pegging of the exchange rate to a fixed value of the other country so that its inflation rate can gravitate to that of the other nation (Roll, 2014). However, in other cases it pertains a crawling target whereby the currency of the other nation can depreciate steadily for its inflation rate to be higher than that of the other country (Habib, Mileva & Stracca, 2017).

According to Chen (2017), a key merit of an exchange-rate peg is that it offers a nominal benchmark which can deter the time-inconsistency issue which arises when the policymaker have an incentive to pursue expansionary policy to increase the rate of economic output and generate jobs in the short run. Horton et al, (2016) also noted that if policy has a rule that deter policy-makers from applying such a policy, then the time-inconsistency can be resolved. In addition, with a strong commitment, the exchange-rate peg generates an automatic monetary-policy rule that demands a strict monetary policy when the domestic currency to depreciate, or a flexible one when the domestic currency appreciates (Johansen & Juselius, 2017).

Another important merit of the exchange-rate peg has been its simple nature, which makes it very comprehensible to the public just like the Banque de France that has regularly made appeals to the ‘franc fort’ to validate the tight monetary policy (Chen, 2017). In addition, an exchange-rate peg can set up price inflation for internationally traded products and, if the pegging is credible, it helps the pegging nation undertake a low-inflation country’s monetary policy, thus help tone down inflation in line with that of the low-inflation country (Airaudo, Buffie & Zanna, 2016).

However, Johansen and Juselius (2017) explains that despite these benefits there exists challenges in the implementation and among the key disadvantages experienced comes from the loss of an independent monetary policy for the pegging state. Chen (2017) narrates that as long as a state has open capital markets, interest rates in a country pegging its exchange rate are closely linked to those of the anchor country therefore its money creation is inhibited by money growth in the anchor country thus loss of monetary policy capability (Horton et al, 2016). Another choice for a monetary-policy strategy that has gained popularity in recent years has been inflation targeting, which pertains the public
2.4 What Is the Influence of GDP on Exchange Rates

2.4.1 Effect of GDP

In Aizenman and Lee (2010), Benigno et al. (2015) there are learning by doing effects external to the individual firm in the traded goods sector, therefore a weak real exchange rate is needed to support the production of tradable. In these models, an exchange rate undervaluation acts like a subsidy to the tradable sector. In Rodrik (2008), a weak real exchange rate compensates for institutional weaknesses and market failures (e.g. knowledge spillovers, credit market imperfections, etc.) which lead to underinvestment in the traded goods sector in developing countries. In Di Nino at al. (2011), nominal depreciation has persistent real effects on output growth in a model with Bertrand competition and increasing returns to scale. A different channel is proposed by Glizmann et al. (2012) where a weak exchange rate leads to higher saving and investment through lower labour costs and income re-distribution. By shifting resources from consumers to financially-constrained firms, real devaluation boosts savings and investment. Most empirical work tends to confirm a positive relation between weak real exchange rates and growth.

Dollar (1992) shows that overvaluation harms growth, whereas Razin and Collins (1997) and Aguirre and Calderon (2005) find that large over- and undervaluation hurt growth, while modest undervaluation enhances growth. Similarly, Hausmann et al. (2005) demonstrate that rapid growth accelerations are often correlated with real exchange rate depreciations. Rodrik (2008) finds that the growth acceleration takes place, on average, after ten years of steady increase in undervaluation in developing countries. Di Nino et al. (2011) also conclude that there is a positive relationship between undervaluation and economic growth for a panel dataset covering the period 1861-2011. In addition, the authors show that undervaluation supported growth by increasing exports, especially from high-productivity sectors, in Italy in 1861-2011.

Kappler et al. (2011) identify 25 episodes of large nominal and real appreciations in a sample of 128 countries of developing and advanced economies between 1960 and 2008. They find that the effects on output are limited. The negative effect on the level of output is only 1 percent after six years, and results are statistically insignificant. More at a business cycle frequency, Farrant and Peersman (2006) show that pure real exchange rate shocks (i.e. separated from the effect of monetary policy) have a substantial
contemporaneous impact on output (exchange rate shocks are identified through sign restrictions in a VAR setting). Finally, Glözmann et al. (2012) find that undervaluation does not affect the tradable sector, but does lead to greater domestic savings and investment, as well as employment, in developing countries. On the other hand, Nouira and Sekkat (2012) established no evidence that undervaluation promotes growth for developing countries, after excluding overvaluation episodes.

2.4.2 Factors Affecting GDP

Despite years of research, the existing literature has not yet reached a consensus about a typical set of variables that may affect economic growth. Following previous papers which have reviewed the existing literature (Bleaney & Nishiyama, 2002). The most fundamental determinant of economic growth identified by both neoclassical and endogenous growth models is investment hence a lot of empirical work focus on it. For instance, Fowowe (2008) however, findings are not conclusive. Another major factor hypothesized as affecting economic growth is government expenditure (or government burden), whose effect can be negative or positive. Many see such government burden as representing the drain that government may present to private activity. Although government can play a beneficial role for the economy, it can be a heavy burden if it imposes high taxes, uses this revenue to maintain ineffective public programs and a bloated bureaucracy, distorts market incentives, and interferes negatively in the economy by assuming roles most appropriate for the private sector (Loayza and Soto, 2002).

The burden of government is usually captured through a proxy, namely, the ratio of government consumption to GDP. Barro (1996), using a panel of about 100 countries from 1960 to 1990, finds that economic growth is enhanced by lower government consumption, the starting level of real per capita GDP, higher initial schooling and life expectancy, lower fertility, better maintenance of the rule of law, lower inflation, and improvements in the terms of trade. In addition, growth is negatively related to the initial level of real per capita GDP while at low levels of political rights, an expansion of these rights stimulates economic growth but once a moderate amount of democracy has been attained, a further expansion reduces growth.

Based on the ‘catching-up effect’ theory, poorer economies typically grow faster per capita and tend thereby to catch up to the richer economies. The level of initial per capita GDP is usually used as a proxy for convergence. Thus, Barro (2003) find that initial GDP
has a persistently and significantly negative impact on growth, implying that poorer countries are catching up richer countries in terms of economic growth. These are consistent with those of Ayadi et al (2013). Recently, Anyanwu (2011) surveyed the aid growth literature in an empirical study of the effects of foreign aid on Africa’s economic growth based on time series data from 1958 to 2001 and constructed in 5-year averages of end periods, covering 53 African countries. He finds that aid has a positive impact on growth, and that the impact does not depend on the policy environment. On the other hand, Fayissa and Nsiah (2010) find that ODA has a negative but insignificant effect on growth in SSA countries. It is also posited that foreign direct investment (FDI) is a primary source of technology transfer and economic growth. Some recent studies affirming FDIs positive effect on growth include Lensink and Morrissey (2006).

Despite the above, Fayissa and Nsiah (2010) show that FDI has no significant effect on SSA countries. It has been posited theoretically that openness to trade affects economic growth through several channels, including the exploitation of comparative advantage, technology transfer and diffusion of knowledge, increasing scale economies and competition. However, results have been mixed. A large part of the literature has found that economies that are more open grew faster (Uwatt, 2003; Arezki and Gylfason, 2011) but several scholars criticize the robustness of these findings especially on methodological and measurement grounds. Thus, Fowowe (2008) finds no significant effect of openness on SSA growth. Baliamoune (2009) find that openness to trade seems to have positive effects in African countries with higher income and negative effects in lower income ones. Also, Arezki and Gylfason (2011) use a dataset of 158 countries during the period 1970–2007 and find that trade openness has a positive and statistically significant impact on non-resource GDP growth.

2.4.3 Challenges of GDP calculation

Of particular concern is that GDP measurement encourages the depletion of natural resources faster than they can renew themselves. Another concern is that current economic activity is degrading ecosystems, thereby reducing the services that, until now, have been provided to humans virtually for free. For example, in 1997 it was estimated that the world’s ecosystems provided benefits valued at an average of US$33 trillion per year. This was significantly larger than the total global GDP at the time (Costanza, d’Arge et al. 1997). GDP encourages depletion because clear-cutting a forest for lumber is valued more in GDP terms than the ecosystem services that forest provides if left uncut.
These services including biodiversity habitat, reducing flooding from severe storms, filtration to improve water quality in rivers and lakes, and the sequestration of carbon dioxide and manufacture of oxygen are not part of the market economy and as a result are not counted in GDP. As Herman Daly, formerly the senior economist at the World Bank, once commented, “the current national accounting system treats the earth as a business in liquidation” (Halstead et al. 1995).

The GDP is nowadays faced with many critiques, limitations in its application and shortcomings in the broader sense. Shortly after its creation, its usage and interpretation in the context of measure of development and prosperity, as well as its exclusive focus aimed at producing, was criticized by many famous economists such as Nobel Prize winners Kenneth Arrow, Simon Kuznets, Daniel Kahneman, Robert Solow, Joseph Stiglitz, Amartya Sen and Muhammad Yunus (Wesselink et al., 2007). Even Simon Kuznets, one of the main pioneers of the GDP, was aware of how the welfare of the country can hardly be judged based on the measures of national income: one should pay attention to the difference between quantitative and qualitative growth, between costs and income, and between a short and long period of time; aims for more growth should specify more growth of what and for whom (Kuznets, 1962).

Recent empirical research and studies (Scheplemann et al., 2010) show that the monetary measures should not be the ultimate in measuring progress due to the weakness and limitation of access and methodology, calculation and monitoring, because they are too simplistic and do not cover all aspects of human life. In other words, it cannot be assumed that the monetary transactions increase well-being, i.e. those things are generally improving and progressing only because more money is being spent.

Arezki and Gylfason (2011) somewhat provocatively calls for a rethinking of the concept of progress that is necessary because of economic ideas and behaviour in the last few decades. The author points out that in the last few hundred years business and economics have not faced real progress at all, because progress is expressed exclusively through objective indicators (and their material nature, for example, shopping and consumption) on the basis of which progress cannot be fully quantified. In modern times society is characterized by growth obsession that is often seen in the context of exclusive increasing of economic wealth. Namely, economic growth and the overall output of the economy are usually quantified by monetary measures (of which the most widely used and publicly
mentioned is the GDP). Media and everyday practice in the public show that time, the GDP, progress and even well-being become synonyms in time. The GDP is also frequently used in comparative analyses of welfare and as an indicator of living standards. In this paper, by giving the historical perspective and definition and by analysing the GDP methodology, it is shown why such practice is not valid. Moreover, the GDP as a measure of economic growth is analysed by using the SWOT framework with the focus on its limitations.

The GDP is nowadays faced with many critiques, limitations in its application and shortcomings in the broader sense. Shortly after its creation, its usage and interpretation in the context of measure of development and prosperity, as well as its exclusive focus aimed at producing, was criticized by many famous economists such as Nobel Prize winners Kenneth Arrow, Simon Kuznets, Daniel Kahneman, Robert Solow, Joseph Stiglitz, Amartya Sen and Muhammad Yunus (Fayissa & Nsiah, 2010).

**2.5 Chapter Summary**

This chapter reviewed the literature on the effect of selected macro-economic variables on exchange Rates in Kenya. This was based on the specific research questions and different articles from various authors was critically reviewed and comparisons made. Past studies on specific research questions were exhausted. The next chapter presented the research methodology that was applied in this study.
CHAPTER THREE

3.0 RESEARCH METHODOLOGY

3.1 Introduction

This chapter describes the research methodology adopted in this study. The chapter highlights the research philosophy used, design applied, and the population studied, the sampling design, and the data collection method used, research procedures undertaken and then data analysis methods used.

3.2 Research Design

This research’s philosophy is positivism, as a philosophy, positivism adheres to the view that only “factual” knowledge gained through observation (the senses), including measurement, is trustworthy. In positivism studies the role of the researcher is limited to data collection and interpretation through objective approach and the research findings are usually observable and quantifiable. A research design is a blue print for collection, measurement and analysis of data. It outlines how the research was carried out. (Sreevidya, 2011). The quality of any research project is enhanced by a having a good comprehension of the research design as this aids in informing one’s thinking and lays the foundation for the design of the project (Kothari, 2004). An explanatory research design was utilised in this study. The explanatory design was adopted to bring out the causal relationship of the variables and this was via a correlation of variables (correlation study). This has focused on understanding, explaining, predicting and controlling relationships between variables (Saunders et al, 2012).

In this study the macroeconomic variables (Interest rates, inflation rates, and Gross Domestic Product) are the independent variables while exchange rate is the dependent variable.

3.3 Population and Sampling Design

3.3.1 Population

A population is a collection of people, items, or events about which you want to make inferences or apply your results. (Cooper, 2008) Holloway and Wheeler (2010) noted that the target population is that accessible population having the experience and knowledge of the phenomenon under study which the researcher can draw a study population from.
The study was based on the implications of macroeconomic factors in the country. Therefore, the population consisted of the entire macroeconomic performance data for the period of 2000 to 2016. In particular, the population consisted of the actual foreign exchange rate to Interest Rates, inflation rates, and GDP for the period of study. This population is too large given the constant changes in the variables above. The studies then narrows down to a period of 2000 to 2016, thus a total of 17 observations were made for each of the four variables.

3.3.2 Sampling design

3.3.2.1 Sampling frame
The sampling frame is a complete list of all the cases in the population, from which a probability sample is drawn (Saunders, Lewis, & Thornhill, 2016). According to Blumberg, Cooper, & Schindler, (2014) the sampling frame is a list of elements from which the sample will be collected and we find it closely associated to the population. Sampling frame consists of a list of objects, subjects, elements to be studied. In this case the 17 year data.

3.3.2.2 Sampling technique
The study used the census technique which involves studying the whole population as explained by Mugenda and Mugenda (2003). The whole population is studied and the findings are universally represented.

3.3.2.3 Sample size
Sample size is defined as a smaller set of the larger population (Dawson 2002). Even though large samples give more reliable results than small samples. It is not necessary to sample the entire target population. The period covered for the study from 2000 and 2016 was where the sample size of all variables was drawn from. This period is selected because it is long enough to give a good indication as to the effect of macroeconomic factors on the foreign exchange rate. The data collected with regards to the variable was retrieved from World Bank Database; while the other variables that were used required data from the Kenya National Bureau of Statistics (KNBS), various issues and reports of the Government Finance Statistics Yearbook, International Monetary Fund; Monthly reports by the Central Bank of Kenya (CBK).
3.4 Data Collection Method

The study relied on secondary data collection methods. Secondary data can be defined as collection of data that was collected by someone else for another primary purpose. The utilization of this existing data provides a viable option for researchers who may have limited time and resources (Johnston, 2014). The secondary data concerning the macroeconomic variable was collected from the Kenya National Bureau of Statistics, the National Treasury and the Central Bank of Kenya for the period of 17 years period between 2000 and 2016. The reason behind collecting the data in that specified period was to cover all the political regimes in the last two decades. Political environment normally affects the economic situation in a country and that affects its foreign exchange market, I will extend the study up to the year 2016 to have enough data for the study and that will also give us insight about the effect of the interest rate capping in Kenya although it was introduced late 2016. The main purpose of collecting this data was to investigate the specific objectives of this study. That is: the effect of interest rate on exchange rates in Kenya, the impact of inflation rate on exchange rates in Kenya, and the influence of GDP on exchange rates in Kenya?

3.5 Research Procedures

Data was sources from the KNBS, CBK and National Treasury which ranged between 2000 and 2016 period. A data collection tool attached as appendix I was used to collect in a table or schedule, the data collected was intend to collect information regarding the effect of macro-economic factors on the exchange rate.

3.6 Data Analysis Method

The most appropriate method to determine the relationship of these variables under study is regression analysis. Regression analysis is a statistical tool for the investigation of relationships between variables. It’s a tool that helps in discovering the causal effect of one variable on the other. The process involves collecting data on the variables under the study and using regression to determine the causal effect of one variable on the other. Once the dependent and independent variables have been identified they are presented in the following formula.
Y = β0 + β1x1 + β2x2 + β3x3

Where;
Y = exchange rates
X1 = interest rates %
X2 = Inflation %
X3 = GDP %

β0, β1, β2, β3 = Coefficients representing to exchange rates, interest rates Inflation, and GDP.

3.7 Chapter Summary

This chapter presents the research design, population and sample of the study. The data collection tool as well as the data analysis methods were also presented. The next chapter presents the results and findings.
CHAPTER FOUR

4.0 RESULTS AND FINDINGS

4.1 Introduction

This chapter presents the research findings on interest rates, inflation and GDP on exchange rates in Kenya.

4.2 General Information

4.2.1 Trends of Interest Rate in Kenya 2000-2016

Interest Rate in Kenya has not been stable and the rates have witnessed an average of 16.11 from 2000 until 2016. The highest rate was 22.34 in 2000 and a record low of 12.53 in 2004 as indicated in figure 4.1.

![Interest Rate Trends 2000-2016](image)

Figure 4.1: Trends of Interest Rate in Kenya 2000-2016

Source: Central Bank of Kenya (2017)

4.2.2 Trend of Inflation Rates in Kenya 2000-2016

From the secondary data, Inflation is measured by the consumer price index that reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that is fixed yearly. It is clear that the country inflation has increased over the years, with the highest average value of 26.24 percent in 2008, the lowest value was however in 2002 at 1.96 (figure 4.2).
4.2.3 Trends of Gross Domestic Product (GDP) in Kenya 2000-2016

From the secondary data, GDP in the country had increased over the years, with the highest average value of 70.53 percent in 2016 and a low of 10.19 in 2000. Despite this there was an abrupt shift between the years 2000-2003, 2007-2010, and 2010-2013 (figure 4.3).
4.2.4 Trends of Exchange Rates in Kenya 2000-2016

Exchange rates have been on the rise in the country over the years, with the highest average value of 101.12 in 2016 and the least value of 67.32 in 2007 figure 4.4

![Exchange Rate Trends 2000-2016](image)

Figure 4.4: Trends of Exchange Rates in Kenya 2000-2016

Source: Central Bank of Kenya (2017)

4.2.5 Descriptive Statistics

Descriptive statistics show the bottom and most excessive estimations of the elements that assist in getting a photograph about the greatest and least values a variable can accomplish. It offers graphical and numerical method to encapsulate a compilation of records in a coherent and understandable manner the investigation of facts that portrays, seem or condense records definitively with the cease aim that, for instance, examples can also upward thrust up out of the records. It demonstrates the imply and middle of the numerous factors of enthusiasm for the have a look at. This study sought to investigate the descriptive statistics of exchange rate, Interest rates, inflation and GDP.

Table 4.1: Descriptive Statistic

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean Ksh</th>
<th>Std. Deviation/Ksh</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exchange Rate</td>
<td>17</td>
<td>67.32</td>
<td>101.12</td>
<td>80.94%</td>
<td>9.23</td>
</tr>
<tr>
<td>Interest Rate</td>
<td>17</td>
<td>12.53</td>
<td>22.34</td>
<td>16.11%</td>
<td>2.73</td>
</tr>
<tr>
<td>Inflation Rate</td>
<td>17</td>
<td>1.96</td>
<td>26.24</td>
<td>9.53%</td>
<td>5.43</td>
</tr>
<tr>
<td>GDP %</td>
<td>17</td>
<td>10.19</td>
<td>70.53</td>
<td>36.47%</td>
<td>20.32</td>
</tr>
<tr>
<td>Valid N (listwise)</td>
<td>17</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
As shown in table 4.1 the exchange rate was evenly distributed with a mean of 80.94 and a standard deviation of 9.23 with a minimum value of 67.32 and maximum value of 101.12. Interest rate was evenly distributed with a mean of 16.11 and a standard deviation 2.73 with a minimum value of 12.53 and a maximum of 22.34. On the other hand, the variable inflation was evenly distributed with a mean of 9.53 and a standard deviation of 5.43 with a minimum value of 1.96 and a maximum of 26.24. The variable GDP was evenly distributed with a mean of 36.47 and a standard deviation of 20.32 with a minimum value of 10.19 and a maximum of 70.53.

4.2.6 Normality Test
Tests were done to establish the normality of Interest rate, Inflation, GDP, Exchange rate. Using Shapiro-Wilk (SW) values were established as shown in table 4.2

Table 4.2: Tests of Normality

<table>
<thead>
<tr>
<th></th>
<th>Statistic</th>
<th>df</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interest rate</td>
<td>.943</td>
<td>17</td>
<td>.354</td>
</tr>
<tr>
<td>Inflation</td>
<td>.846</td>
<td>17</td>
<td>.009</td>
</tr>
<tr>
<td>GDP</td>
<td>.919</td>
<td>17</td>
<td>.143</td>
</tr>
</tbody>
</table>


Table 4.2 presents the analysis of the Shapiro-Wilk indicated that the value for interest rate (0.934), inflation (0.846), GDP (0.919). All variables had a p value above 0.05, except inflation which was significant. This imply that interest rate and GDP data was normally distributed.

4.3 Effect of Interest Rates on Exchange Rates in Kenya
Analysis of the Interest rate was evenly distributed with a mean of 16.11% and a standard deviation 2.73% with a minimum value of 12.53% and a maximum of 22.34%. Figure 4.6 indicate the trend exhibited between interest rate and exchange rate. The secondary data analyzed indicate that interest rates have been fluctuating over the 17 years period.

Analysis of the interest rates on exchange rates in Kenya revealed that when the interest rates are highest, exchange rate is lowest as was exhibited in 2001 and 2012. In some instances when interest rates are low, exchange rates are also low as seen in 2008-2009.
There is also an inverse association where periods of high exchange rate recorded low interest rates 2003-2007, 2013-2016 as shown in figure 4.6

![Exchange Rate vs Interest Rate Graph](graph.png)

**Figure 4.5: Interest Rates on Exchange Rates in Kenya**

### 4.3.1 Correlation of Interest Rates and Exchange Rates

On the effect of interest rate, the Pearson correlation results showed a positive relationship between interest rate and exchange rate ($r=0.231$, $p=0.372$). This implies that foreign exchange rate and interest rate are positively related however there is no significant correlation between the variables as shown in table 4.3

<table>
<thead>
<tr>
<th>Variable</th>
<th>Exchange rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interest rate</td>
<td></td>
</tr>
<tr>
<td>Pearson Correlation</td>
<td>0.231</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>0.372</td>
</tr>
<tr>
<td>N</td>
<td>17</td>
</tr>
</tbody>
</table>

**Table 4.3: Correlation of Interest Rates and Exchange Rates**

### 4.3.2 Regression of Interest Rates and Exchange Rates

A regression analysis done to between interest rate and exchange rate. The adjusted R square value was 0.054 this implies that 5.4% of the variation in exchange rate was caused by variations in interest rate as indicated in table 4.4. The significance had a p value of 0.372 > 0.05 therefore no explanation by the model.
Table 4.4: Model Summary of Interest Rates and Exchange Rates

<table>
<thead>
<tr>
<th>Model</th>
<th>$R^2$</th>
<th>Adjusted $R^2$</th>
<th>Std. Error of the Estimate</th>
<th>Change Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>.231a</td>
<td>-.010</td>
<td>9.2682</td>
<td>$\text{R Square Change}$</td>
</tr>
<tr>
<td>1</td>
<td>.054</td>
<td></td>
<td></td>
<td>.054</td>
</tr>
</tbody>
</table>

a. Predictors: (Constant), Interest rate

An ANOVA analysis was done between Interest Rates and Exchange Rates at 95% confidence level, the $F$ critical was 0.848 and the $P$ value was (0.372) therefore not significant the results are illustrated below in table 4.5

Table 4.5: Anova of Interest Rates and Exchange Rates

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>$F$</th>
<th>$\text{Sig.}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>72.835</td>
<td>1</td>
<td>72.835</td>
<td>.848</td>
<td>.372b</td>
</tr>
<tr>
<td></td>
<td>Residual</td>
<td>15</td>
<td>85.900</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>1361.341</td>
<td>16</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. Dependent Variable: Exchange rate

b. Predictors: (Constant), Interest rate

As per Table 4.5, the equation $(Y= \beta_0 + \beta_1 X_1)$ becomes:

$Y = 68.378 + 0.70X_1$

Where $Y$ is the dependent variable (Exchange Rates)

$X_1$ – Interest rates

The regression equation illustrated in Table 4.6 has established that taking interest rates into constant exchange rate increases by 68.378 and an increase in interest rate result into 0.78 increase in exchange rate. However, only the constant was significant ($p=0.000$) the interest rate was not significant ($p=0.372$).
Table 4.6: Coefficient of Interest Rates and Exchange Rates

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>(Constant)</td>
<td>68.378</td>
<td>13.827</td>
<td>4.945</td>
</tr>
<tr>
<td></td>
<td>Interest rate</td>
<td>.780</td>
<td>.847</td>
<td>.231</td>
</tr>
</tbody>
</table>

4.4 Impact of Inflation Rates on Exchange Rates in Kenya

The variable inflation was evenly distributed with a mean of 9.53% and a standard deviation of 5.43% with a minimum value of 1.96 and a maximum of 26.24.

Analysis of the inflation rates on exchange rates in Kenya revealed that when the inflation rate are high, exchange rate are lowest as was exhibited in 2007-2008. In some instances when inflation rates are low, exchange rates are high as exhibited in 2009-2016. This implies an inverse association between inflation and exchange rate as shown in figure 4.7

Figure 4.6: Inflation Rates on Exchange Rates in Kenya

4.4.1 Correlation of Inflation and Exchange Rates

On the effect of inflation rate, the Pearson correlation results showed a positive relationship between interest rate and exchange rate ($r=-0.421$, $p=0.093$). This implies that
inflation rate and interest rate are negatively related; however there is no significant correlation between the variables.

Table 4.7: Correlation of Inflation and Exchange Rates

<table>
<thead>
<tr>
<th>Inflation</th>
<th>Exchange rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Correlation</td>
<td>-.421</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.093</td>
</tr>
<tr>
<td>N</td>
<td>17</td>
</tr>
</tbody>
</table>

4.4.2 Regression of Inflation Rates and Exchange Rates

A regression analysis done to between inflation rate and exchange rate. The adjusted R square value was 0.177 this implies that 17.7% of the variation in exchange rate was caused by variations on inflation rate as indicated in table 4.8

Table 4.8: Model Summary of Inflation and Exchange Rates

<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>
<th>Change Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>R Square Change</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>F Change</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>df1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>df2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Sig. F Change</td>
</tr>
<tr>
<td>1</td>
<td>.421 a</td>
<td>.177</td>
<td>.122</td>
<td>8.6433</td>
<td>.177</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3.223</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>15</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.093 a</td>
</tr>
</tbody>
</table>

a. Predictors: (Constant), Inflation

An ANOVA analysis was done between inflation rates and exchange rates at 95% confidence level, the F critical was 3.223 and the P value was (0.093) therefore not significant the results are illustrated below in table 4.9

Table 4.9: Anova of Inflation and Exchange Rates

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>240.750</td>
<td>1</td>
<td>240.750</td>
<td>3.223</td>
<td>.093 a</td>
</tr>
<tr>
<td>1 Residual</td>
<td>1120.591</td>
<td>15</td>
<td>74.706</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>1361.341</td>
<td>16</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. Dependent Variable: Exchange rate
b. Predictors: (Constant), Inflation

As per Table 4.10, the equation \( Y = \beta_0 + \beta_2 X_2 \) becomes:

\[
Y = 87.761 - 0.716X_2
\]
Where Y is the dependent variable (Exchange Rates)

\[ X_3 – \text{inflation rates} \]

The regression equation illustrated in Table 4.10 has established that taking inflation rates into constant exchange rate increases by 87.761. However, the p value was not significant (p>0.05).

**Table 4.10: Coefficients of Inflation and Exchange Rates**

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>(Constant)</td>
<td>87.761</td>
<td>4.339</td>
<td>20.227</td>
</tr>
<tr>
<td></td>
<td>Inflation</td>
<td>-.716</td>
<td>-.399</td>
<td>-.421</td>
</tr>
</tbody>
</table>

**4.5 Influence of GDP on Exchange Rates in Kenya**

The variable GDP was evenly distributed with a mean of 36.47 and a standard deviation of 20.32 with a minimum value of 10.19 and a maximum of 70.53 and the figure is on the upward trend.

Analysis of the GDP and exchange rates in Kenya revealed that when the GDP is high, exchange rate also high as exhibited in 2009-2016. In some instances when GDP are low, exchange rates are high as exhibited in 2000-2008. This implies an inverse association between GDP and exchange rate as shown in figure 4.7

![Figure 4.7: GDP on Exchange Rates in Kenya](image-url)
4.5.1 Correlation of GDP and Exchange Rates

On the effect of GDP, the Pearson correlation results showed a positive relationship between GDP and exchange rate \((r=0.637, \ p=0.006)\). This implies that GDP and interest rate are positively related; there is a significant correlation between the variables.

Table 4.11: Correlation of GDP and Exchange Rates

<table>
<thead>
<tr>
<th>GDP</th>
<th>Exchange rate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pearson Correlation</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
</tr>
<tr>
<td></td>
<td>N</td>
</tr>
</tbody>
</table>

A regression analysis done to between GDP and exchange rate. The adjusted R square value was 0.406 this implies that 40.6% of the variation in exchange rate was caused by variations GDP as indicated in table 4.12

Table 4.12: Model Summary of GDP and Exchange Rates

<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>
<th>Change Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Change Statistics</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>R Square Change</td>
</tr>
</tbody>
</table>

a. Predictors: (Constant), GDP

An ANOVA analysis was done between GDP and exchange rates at 95% confidence level, the F critical was 10.256 and the P value was (0.06) therefore significant the results are illustrated below in table 4.13

Table 4.13: ANOVA of GDP and Exchange Rates

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Regression</td>
<td>552.823</td>
<td>1</td>
<td>552.823</td>
<td>10.256</td>
</tr>
<tr>
<td>1</td>
<td>Residual</td>
<td>808.518</td>
<td>15</td>
<td>53.901</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>1361.341</td>
<td>16</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. Dependent Variable: Exchange rate
b. Predictors: (Constant), GDP

As per Table 4.14 the equation \((Y= \beta_0+ \beta_3X_3)\) becomes:
\[Y= 70.387+ .289 X_3\]
Where Y is the dependent variable (Exchange Rates)

\[ X_3 = \text{GDP} \]

The regression equation illustrated in Table 4.14 has established that taking GDP rates constant, exchange rate increases by 70.387 and the p value was significant \((p<0.05)\).

**Table 4.14: Coefficient of GDP and Exchange Rates**

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>(Constant)</td>
<td>70.387</td>
<td>3.746</td>
<td>18.790</td>
</tr>
<tr>
<td></td>
<td>GDP</td>
<td>.289</td>
<td>.090</td>
<td>.637</td>
</tr>
</tbody>
</table>

**4.6 Multicorrelation analysis**

**Table 4.15: Multi linear collinearity**

<table>
<thead>
<tr>
<th>Exchange rate($)</th>
<th>Interest rate %</th>
<th>Inflation%</th>
<th>GDP%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exchange rate ($)</td>
<td>Pearson Correlation</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interest rate %</td>
<td>Pearson Correlation</td>
<td>.231</td>
<td>1</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td></td>
<td>.372</td>
<td></td>
</tr>
<tr>
<td>Inflation%</td>
<td>Pearson Correlation</td>
<td>-.421</td>
<td>-.377</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td></td>
<td>.093</td>
<td>.135</td>
</tr>
<tr>
<td>GDP%</td>
<td>Sig. (2-tailed)</td>
<td>.006</td>
<td>.671</td>
</tr>
<tr>
<td></td>
<td></td>
<td>17</td>
<td>17</td>
</tr>
</tbody>
</table>

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

As shown in Table 4.15 to establish the effect of interest rate on exchange rate, the Pearson correlation results showed a positive relationship between interest rate and exchange rate \((r=0.231, p=0.372)\). This implies that foreign exchange rate and interest rate are positively related however there is no significant correlation between the variables.

On the effect of inflation rate on exchange rate, the Pearson correlation results showed a negative relationship between the variables \((r=-0.421, p=0.093)\). However they were not significant. This implies that foreign exchange rate and inflation rate are negatively
related. It shows that foreign exchange rate decreases with every increase in inflation rate and a unit change in inflation would lead to 0.470 decline in exchange rate. On the effect of GDP, the Pearson correlation results showed a significant positive correlation between the variables (r=0.637, p<0.05). This implies that foreign exchange rate and GDP are positively correlated.

4.7 Multi Regression analysis

A Multi regression analysis was done to between interest rates, inflation, GDP and exchange rate. The R square value was 0.648 this implies that 64.8 % of the variation in exchange rate was caused by variations in interest rates, inflation and GDP as indicated in table 4.16

Table 4.16: Model Summary

<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>
<th>Change Statistics</th>
<th>R Square</th>
<th>F Change</th>
<th>df1</th>
<th>df2</th>
<th>Sig. F Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.805&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.648</td>
<td>.567</td>
<td>6.0717</td>
<td>.648</td>
<td>7.976</td>
<td>3</td>
<td>13</td>
<td>.003</td>
<td></td>
</tr>
</tbody>
</table>

a. Predictors: (Constant), GDP, Inflation, Interest rate ($)

An ANOVA analysis was done between interest rates, inflation, GDP and exchange rates at 95% confidence level, the F critical was 7.976 and the P value was (0.03) therefore significant the results are illustrated below in table 4.17

Table 4.17: ANOVAa

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>882.094</td>
<td>3</td>
<td>294.031</td>
<td>7.976</td>
<td>.003&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>1</td>
<td>Residual</td>
<td>479.247</td>
<td>13</td>
<td>36.865</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>1361.341</td>
<td>16</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. Dependent Variable: Exchange rate
b. Predictors: (Constant), GDP%, Inflation%, Interest rate %
Table 4.18: Coefficient of Multi Regression analysis

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
<td></td>
</tr>
<tr>
<td>(Constant)</td>
<td>68.206</td>
<td>11.695</td>
<td>5.832</td>
<td>.000</td>
</tr>
<tr>
<td>Interest rate ($)</td>
<td>.505</td>
<td>.602</td>
<td>.150</td>
<td>.840</td>
</tr>
<tr>
<td>Inflation</td>
<td>-.712</td>
<td>.303</td>
<td>-.418</td>
<td>-2.350</td>
</tr>
<tr>
<td>GDP</td>
<td>.312</td>
<td>.075</td>
<td>.687</td>
<td>4.144</td>
</tr>
</tbody>
</table>

As per Table 4.18 the equation \( Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 \) becomes:

\[ Y = 68.206 + 0.505X_1 - 0.712X_2 + 0.312X_3 \]

Where \( Y \) is the dependent variable (Exchange Rates)

\( X_1 \) interest rate

\( X_2 \) Inflation

\( X_3 \) GDP

The regression equation illustrated in Table 4.18 has established that taking all factors into account (interest rates, inflation, GDP) all other factors held exchange rate increases by 68.206. The findings presented also showed that with all other variables held at zero, a unit change in interest rate would lead to a 0.505 increase in exchange rate, and a unit change in inflation would lead to 0.721 decreases in exchange rate. Moreover, the study also showed that a unit change in GDP would result in 0.312 increases in exchange rate. Only the variables interest rate was not significant \((p>0.05)\).

4.8 Chapter Summary

The chapter presented the results and findings of the study which was based on three specific questions and aimed to establish the effect of interest rates on exchange rates in Kenya, the impact of inflation rates on exchange rates in Kenya and the influence of GDP.
on exchange rates in Kenya. The descriptive and inferential statistics have been presented as per the research questions. In the next chapter discussions, conclusions, and recommendations are presented
CHAPTER FIVE
5.0 DISCUSSION, CONCLUSIONS, AND RECOMMENDATIONS

5.1 Introduction

This chapter establishes the summary of findings, a discussion of the results based on the research objectives, conclusions, and the recommendations drawn from the empirical findings on the relationship between macro-economic factors on exchange rate.

5.2. Summary of the Study

The study examined the relationships between interest rate and foreign exchange rate, inflation and foreign exchange rate, external debt and foreign exchange rate and trade flows and foreign exchange rate. The data analysis employed secondary data obtained from IMF International Financial Statistics covering the period, 2000-2016. Secondary data was tested for violation of assumptions of Classical Linear Regression Model (CLRM) using the diagnostic tests. A multiple regression method was used to estimate the relationship between macroeconomic variables (interest rate, inflation, GDP and exchange rate in Kenya. The findings were presented in tables and graphs.

On the effect of interest rate, the Pearson correlation results showed a positive relationship between interest rate and exchange rate (r=0.231, p=0.372). This implies that foreign exchange rate and interest rate are positively related however there is no significant correlation between the variables. A regression analysis done to between interest rate and exchange rate. The adjusted R square value was 0.054 this implies that 5.4% of the variation in exchange rate was caused by variations in interest rate. An ANOVA analysis was done between Interest Rates and Exchange Rates at 95% confidence level, the F critical was 0.848 and the P value was (0.372) therefore not significant.

On the effect of inflation rate, the Pearson correlation results showed a negative relationship between the variables (r=-0.421, p= 0.093). This implies that foreign exchange rate and inflation rate are negatively related. It shows that foreign exchange rate decreases with every increase in inflation rate and a unit change in inflation would lead to 0.470 declines in exchange rate. A regression analysis done between inflation rate and exchange rate. The adjusted R square value was 0.177 this implies that 17.7% of the variation in inflation rate was caused by variations inflation rate. An ANOVA analysis
was done between inflation rates and exchange rates at 95% confidence level, the F critical was 3.223 and the P value was (0.093) therefore not significant.

On the effect of GDP, the Pearson correlation results showed a significant positive correlation between the variables (r=0.637, p<0.05). This implies that foreign exchange rate and GDP are positively correlated. A regression analysis done to between GDP and exchange rate. The adjusted R square value was 0.406 this implies that 40.6% of the variation in exchange rate was caused by variations GDP. An ANOVA analysis was done between GDP and exchange rates at 95% confidence level, the F critical was 10.256 and the P value was (0.06) therefore significant.

5.3 Discussion
5.3.1 Effect of Interest Rates On Exchange Rates
On the effect of interest rate, the Pearson correlation results showed a positive relationship between interest rate and exchange rate (r=0.231, p=0.372). This implies that foreign exchange rate and interest rate are positively related however there is no significant correlation between the variables. Bjornland and Hungnes (2006) examined the forecasting performance of a structural exchange rate model that combines the purchasing power parity condition with the interest rate differential in the long run, with some alternative exchange rate models. The analysis is applied to the Norwegian exchange rate using the Johansen Model (1988). The long-run equilibrium relationship is embedded in a parsimonious representation for the exchange rate. The structural exchange rate representation is stable over the sample and outperforms a random walk in and out of-sample forecasting exercise at one to four horizons. Ignoring the interest rate differential in the long run, however, the structural model no longer outperforms a random walk thus need for undertaking this study in order to draw conclusions.

Hnatkovska and Lahiri (2007) investigated the non-monotonic relationship between interest rates and exchange rates. They found that empirical literature in this area, however, has been unable to detect a clear systematic relationship between interest rates and exchange rates. They used an optimizing model of a small open economy to rationalize the mixed empirical findings. The model had three key margins. First, higher domestic interest rates raise the deposit rate. This increases the demand for deposits and hence raises the money base. Secondly, firms need bank loans to finance the wage bill,
which reduces output when domestic interest rates increase. Lastly, higher interest rates raise the government’s fiscal burden. This negative fiscal effect raises the expected inflation. They found that increases in the interest rate up to 35% both appreciate the currency and induce a fall in the rate of currency depreciation. However, more aggressive increases in the domestic interest rate both depreciate the currency as well as increase the rate of currency depreciation. The results provided an explanation for the inability of nonstructural empirical models to find a systematic relationship.

In a regression analysis done between interest rate and exchange rate. The adjusted R square value was 0.054 this implies that 5.4% of the variation in exchange rate was caused by variations in interest rate. An ANOVA analysis was done between Interest Rates and Exchange Rates at 95% confidence level, the F critical was 0.848 and the P value was (0.372) therefore not significant. Park (2011) extended the studies of Meese and Rogoff (1998) and others to find a stable longrun relationship between real exchange rates and real interest rates differentials using Korean Won/US Dollar data for the period of 1991~2011 containing the East Asian financial crisis. Applying error correction model to two sub-periods before and after the crisis, he identified a reliable relationship between the two variables with the addition of foreign exchange reserves for the post-crisis period but not for the pre-crisis period. The estimate of the coefficient on the real interest rates differential is significant but positive unlike the prediction of conventional interest rate parity theory.

Lungu and Sheefani (2013) investigated the relationship between the exchange rate and the interest rate for Namibia using time series techniques such as unit root tests, cointegration test, and impulse response and variance decomposition. The study used quarterly data for the period 1993. The results for co integration show that there is no co-integration among the variables. The empirical results of this study were unable to detect a clear systematic relationship between interest rates and exchange rates. However, the variance decomposition further revealed that the errors in the forecast of both the exchange rate and interest rate are dominated by itself and an insignificant percentage is also attributed to other variables. This study will therefore intend to establish if such a relationship exist in the Kenyan market and draw conclusion on the same.
5.3.2 Impact of Inflation Rates on Exchange Rates

On the effect of inflation rate, the Pearson correlation results showed a negative relationship between the variables \( r = -0.421 \), \( p = 0.093 \). This implies that foreign exchange rate and inflation rate are negatively related. It shows that foreign exchange rate decreases with every increase in inflation rate and a unit change in inflation would lead to 0.470 declines in exchange rate. Kitatia, Zablon and Maithya (2015) study sought to establish evidence supporting the existence of influence of the selected macro-economic variables of: foreign exchange rate of hard currencies, interest rate and inflation rate on share prices fluctuations based on the weighted average monthly data from January 2008 to December 2012 for the companies listed on the Nairobi Securities Exchange in Kenya. The study covered a 5-years period from 2008 to 2012 and recommended that future studies should be done over a longer period of 10 to 15-years so as to investigate the influence of macro-economic variables on stock market prices in the short run as well as the long run for the case of the securities exchanges in East Africa.

Margaret and Patrick (2016) on the other hand undertook a research to establish the impact of Selected Macro economic variables on foreign direct investment in Kenya. The study examined data for a 10 years period starting 2005 and primary data was collected from 271 respondents. Linear regression analysis revealed that Exchange rate, GDP and Inflation rate had a negative and insignificant effect on FDI.

A regression analysis done to between inflation rate and exchange rate. The adjusted R square value was 0.177 this implies that 17.7% of the variation in inflation rate was caused by variations inflation rate. An ANOVA analysis was done between inflation rates and exchange rates at 95% confidence level, the F critical was 3.223 and the P value was (0.093) therefore not significant.

Olweny and Omondi (2012) study was set at determining the effect of macro-economic factors on stock return volatility in the Nairobi stock exchange, Kenya. The study focused on the effect of foreign exchange rate, interest rate and inflation rate fluctuation on stock return volatility at the Nairobi Securities Exchange. Monthly time series data was used for a ten years period between January 2001 and December 2010. The main variables of concern were effect of foreign exchange rate, interest rate and inflation rate fluctuation on stock return volatility of firms listed NSE. The results offered evidence that foreign
exchange rate, Interest rate and Inflation rate had an effect on stock return although at a very low magnitude.

The influence of exchange rate towards inflation itself depends on the choice of exchange rate regime in the country. Exchange rate system has an important role in reducing or minimizing the risk of fluctuations in exchange rates, which will have an impact on the economy. Any changes in exchange rates will have a great impact on the economy (Fung, 2002). The relationship between inflation targeting regime and exchange rate regime has led some analysts to conclude that one of the costs of inflation targeting adoption is the increase in exchange rate volatility. Yet, some studies show that the adoption of a free-floating exchange rate does not necessarily implies more effective of nominal and real exchange rate floating argue that inflation targeting would lead to higher exchange rate volatility find that the lack of credibility of monetary authority may lead to exchange rate volatility problem (Levy, Yeyati & Sturzenegger, 2002).

5.3.3 Influence Of GDP On Exchange Rates
On the effect of GDP, the Pearson correlation results showed a significant positive correlation between the variables (r=0.637, p<0.05). This implies that foreign exchange rate and GDP are positively correlated. Dollar (1992) shows that overvaluation harms growth, whereas Razin and Collins (1997) and Aguirre and Calderon (2005) find that large over- and undervaluation hurt growth, while modest undervaluation enhances growth. Similarly, Hausmann et al. (2005) demonstrate that rapid growth accelerations are often correlated with real exchange rate depreciations. Rodrik (2008) finds that the growth acceleration takes place, on average, after ten years of steady increase in undervaluation in developing countries. Di Nino et al. (2011) also conclude that there is a positive relationship between undervaluation and economic growth for a panel dataset covering the period 1861-2011. In addition, the authors show that undervaluation supported growth by increasing exports, especially from high-productivity sectors, in Italy in 1861-2011.

Kappler et al. (2011) identify 25 episodes of large nominal and real appreciations in a sample of 128 countries of developing and advanced economies between 1960 and 2008. They find that the effects on output are limited. The negative effect on the level of output is only 1 percent after six years, and results are statistically insignificant. More at a
business cycle frequency, Farrant and Peersman (2006) show that pure real exchange rate shocks (i.e. separated from the effect of monetary policy) have a substantial contemporaneous impact on output (exchange rate shocks are identified through sign restrictions in a VAR setting). Finally, Glözmann et al. (2012) find that undervaluation does not affect the tradable sector, but does lead to greater domestic savings and investment, as well as employment, in developing countries. On the other hand, Nouira and Sekkat (2012) established no evidence that undervaluation promotes growth for developing countries, after excluding overvaluation episodes.

A regression analysis done between GDP and exchange rate. The adjusted R square value was 0.406 this implies that 40.6 % of the variation in exchange rate was caused by variations GDP. An ANOVA analysis was done between GDP and exchange rates at 95% confidence level, the F critical was 10.256 and the P value was (0.06) therefore significant. Based on the ‘catching-up effect’ theory, poorer economies typically grow faster per capita and tend thereby to catch up to the richer economies. The level of initial per capita GDP is usually used as a proxy for convergence. Thus, Barro (2003) find that initial GDP has a persistently and significantly negative impact on growth, implying that poorer countries are catching up richer countries in terms of economic growth. These are consistent with those of Ayadi et al (2013).

Recently, Anyanwu (2011) surveyed the aid growth literature in an empirical study of the effects of foreign aid on Africa’s economic growth based on time series data from 1958 to 2001 and constructed in 5-year averages of end periods, covering 53 African countries. He finds that aid has a positive impact on growth, and that the impact does not depend on the policy environment. On the other hand, Fayissa and Nsiah (2010) find that ODA has a negative but insignificant effect on growth in SSA countries. It is also posited that foreign direct investment (FDI) is a primary source of technology transfer and economic growth. Some recent studies affirming FDIs positive effect on growth include Lensink and Morrissey (2006).

Despite the above, Fayissa and Nsiah (2010) show that FDI has no significant effect on SSA countries. It has been posited theoretically that openness to trade affects economic growth through several channels, including the exploitation of comparative advantage, technology transfer and diffusion of knowledge, increasing scale economies and competition. However, results have been mixed.
5.4 Conclusions

5.4.1. Interest Rates on Exchange Rate
Results in the study established that exchange rates was positively affected by interest rates. Particularly high interests rate in lending increases the level of exchange rates. The government needs to support lending activities rather than borrowing in developing countries like Kenya in order to improve the levels of exchange rate.

5.4.2. Inflation on Exchange Rate
Regression results show that inflation has a negative influence on exchange rate. If inflation increases, the level of exchange rate increases. Monetary stability should be enforced to reduce and moderate the rate of inflation in the country. This will reduce the level of exchange rate volatility and increase economic growth in the economy.

5.4.3. GDP on Exchange Rate
The study determined that GDP positively influences exchange rates significantly on its own. Correlation studies also support these findings. Developing countries should eradicate barriers which limit trade and support favourable movement of goods and services between different countries to increase GDP and therefore have a positive impact on exchange rate.

5.5 Recommendations

5.5.1. Recommendation for Improvement

5.5.1.1 Relationship between Interest Rates and Exchange Rate
There was no significant relationship between interest rate and exchange rate. The interest rate in conjunction with other macroeconomic variables influences exchange rate volatility. The study recommends there is a need to have laws that govern lending in order to reduce the level of borrowing. There should also be a review of debtor credibility and ensure that funds that borrowed are used in efficiently in investments to mitigate depreciation of exchange rate.

5.5.1.2 Relationship between Inflation and Exchange Rate
Inflation has a negative effect on exchange rate which means that high inflation reduces the level of exchange rate. The government should expand the money supply to lower the inflation rates through tight fiscal and economic policies.
5.5.1.3 Relationship between GDP and Exchange Rate
There was a positive correlation between GDP and exchange rate, the regression also showed that the relationship had a significant effect. The government should expand its exports put in place conducive environment and this will help balance the current account and provide revenue without incurring further debt.

5.5.2. Suggestion for Further Research
This study focused on the relationship between macroeconomic variables and exchange rate. The scope was limited to investigating the relationship between exchange rate and the macroeconomic variables: Interest rates, inflation and GDP. The findings can be generalized to these macroeconomic variables. In future, further studies can done to capture any additional macroeconomic variables within the study period.
REFERENCES


Halligan, L. (2014). The dollar’s 70-year dominance is coming to an end. The telegraph


Helms B. & Reille X. (2004): Interest rate ceilings and microfinance: The story so far. Occasional Paper No. 9, CGAP.


APPENDIX I: DATA COLLECTION INSTRUMENT

The Data Collection Framework below is intended to collect information regarding the effect of macro-economic factors on the exchange rate.

<table>
<thead>
<tr>
<th>Year</th>
<th>Exchange Rate</th>
<th>Interest Rate</th>
<th>Inflation</th>
<th>GDP</th>
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<td>22.34</td>
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<td>5.74</td>
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</tr>
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<td>70.53</td>
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