

**THE EFFECT OF INTEREST RATE AND INFLATION RATE ON
EXCHANGE RATES IN KENYA**

BY

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DECLARATION

STUDENT DECLARATION

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

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DEDICATION

This research project is dedicated to my late Father Bernard Okoth, my Mother Mary Okoth and my wife Sarah Nduri, without whom my academic potential would not have been realized. The support they gave me during my academic life cannot be explained.

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ABSTRACT

The study 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. The development of literature was guided by Interest Rate Parity (IPR) Theory, Purchasing Power Parity (PPP) Theory and The Balance of Payments Theory. The descriptive research design was used in this study. Kenya Bureau of Statistics (KBA) and the Central Bank of Kenya were used as sources of information in the pursuit to establish the effects of interest rate and inflation on exchange rates in Kenya. The study used inflation rates in Percentage, interest rates in percentage and average annual exchanges rates from 20007 -2012. Multiple linear regression was used to model the relationship between two explanatory variables and a response variable was used by fitting a linear equation to observed data. Multiple regression analysis was also used to assess whether confounding exists. The study further used Test of goodness of fit and the explanatory power of the model R^2 , F test ANOVA and also test of Multicollinearity. The study found that the co-efficient of multiple determinations R-square value was 0. 871; this meant that the chosen variables specifically inflation rate and interest rates in Kenya during year 2007-2012 affect the exchange rate by 87.1% and therefore 12.9% effects of exchange rate was associated with other unexplained factors. The regression results also indicate that the relationship between inflation and interest rates against exchanges rates is very significant at 0.05 level of significance level with a p-value of 0.016. The study finally 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 recommends 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.

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LIST OF ABBREVIATIONS

COPOM	Central Bank of Brazil's Monetary Policy Committee
FOMC	Federal Open Market Committee
GDP	Gross Domestic Product
IPR	Interest Rate Parity
KBS	Kenya Bureau of Statistics
NSE	Nairobi Securities Exchange
SELIC	Special System of Clearance and Custody rate

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CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

In recent years, there has been a special interest in the link between exchange rates inflation and interest rates in both advanced and developing countries. This is understandable, given the important role these variables play in determining developments in the nominal and real sides of the economy, including the behaviour of domestic inflation, real output, exports and imports. Among emerging market economies, this interest is further spurred by the fact that many of them have recently introduced changes in their monetary and ex-change rate policies, moving to inflation targeting frameworks which operate occasionally under flexible exchange rate regimes. Exchange rate variability – in itself and vis-à-vis interest rate variability has in recent years risen compared to previous periods characterised by far more rigid exchange rate regimes, even if the extent of such fluctuations is still a matter of debate (Bergen, (2010).

The impact of exchange rate shocks on domestic prices and inflation is usually summarised in terms of a phenomenon called exchange rate pass-through, which is the effect that a permanent exchange rate shock of a given magnitude has on prices and inflation over time. Prior to the monetary-approach emphasis of the 1970s, it was common to emphasize international trade flows as primary determinants of exchange rates. This was due, in part, to the fact that governments maintained tight restrictions on international flows of financial capital. The role of exchange rate changes in eliminating international trade imbalances suggests that we should expect countries with current trade surpluses to have an appreciating currency, whereas countries with trade deficits should have depreciating currencies. Such exchange rate changes would lead to changes in international relative prices that would work to eliminate the trade imbalance (Miller, and Benjamin, 2004)

Modern exchange rate models emphasize financial-asset markets. Rather than the traditional view of exchange rates adjusting to equilibrate international trade in goods, the exchange rate is viewed as adjusting to equilibrate international trade in financial assets. Because goods prices adjust slowly relative to financial asset prices and financial assets are traded continuously each business day, the shift in emphasis from goods markets to asset markets

has important implications. Exchange rates will change every day or even every minute as supplies of and demands for financial assets of different nations change (Pétursson, 2008).

1.1.1 Interest Rates

An interest rate is described as the price a borrower pays for the use of money he does not own, and has to return to the lender who receives for deferring his consumption, by lending to the borrower. Interest can also be expressed as a percentage of money taken over the period of one year (Devereux, and Yetman, 2002).

An interest rate is very well stated as the rate of increase over time of a bank deposit. An Interest, which is charged or paid for the use of money, is often expressed as an annual percentage of the principal. It is calculated by dividing the amount of interest by the amount of principal. Interest rates often change as a result of the inflation and Government policies. The real interest rate shows the nominal interest rate – inflation. A negative real interest rate means that the nominal interest rate is less than the inflation rate (Gagnon, and Ihrig, 2004). Interest rate is the tool used by the central bank of a country to keep a check on any major currency fluctuation. An increase in interest rate is necessary to stabilize the exchange rate depreciation and to curb the inflationary pressure and thereby helps to avoid many adverse economic consequences.

1.1.2 Inflation Rates

Inflation means a sustained increase in the aggregate or general price level in an economy. Inflation means there is an increase in the cost of living. There is widespread agreement that high and volatile inflation can be damaging both to individual businesses and consumers and also to the economy as a whole.

Aside from factors such as interest rates and inflation, the exchange rate is one of the most important determinants of a country's relative level of economic health. Exchange rates play a vital role in a country's level of trade, which is critical to most every free market economy in the world. For this reason, exchange rates are among the most watched analyzed and governmentally manipulated economic measures. But exchange rates matter on a smaller scale as well: they impact the real return of an investor's portfolio (Gudmundsson, 2012).

Generally, the inflation rate is used to measure the price stability in the economy. 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.

1.1.3 Exchange Rates

According to Mishkin, (2008), The exchange rate of the currency in which a portfolio holds the bulk of its investments determines that portfolio's real return. A declining exchange rate obviously decreases the purchasing power of income and capital gains derived from any returns. Moreover, the exchange rate influences other income factors such as interest rates, inflation and even capital gains from domestic securities. While exchange rates are determined by numerous complex factors that often leave even the most experienced economists flummoxed, investors should still have some understanding of how currency values and exchange rates play an important role in the rate of return on their investments.

Exchange rates are prices that are determined by supply and demand. For some countries the exchange rate is the single most important price in the economy because it determines the international balance of payments. (Levich, 2001) There is no general theory of exchange rate determination, but Eiteman et al (2001) divide the potential exchange rate determinants into five areas: parity conditions, infrastructure, speculation, cross-border foreign direct investment and portfolio investment, and political risks.

1.1.4 Effect of Interest Rates and Inflation Rate on Exchange Rates

World over, changes in interest rates can have both positive and negative effects on the world business markets. Interest rates affect the economy by influencing stock and bond interest rates, consumer and business spending, inflation, and recessions. However, it is important to understand that there is generally a 12-month lag in the economy, meaning that it will take at least 12 months for the effects of any increase or decrease in interest rates to be felt. By adjusting the federal funds rate, the Fed helps keep the economy in balance over the long term (Pétursson, 2008).

Global Interest Rates are the rates of Federal / Central banks of respective countries. These rates change periodically, interest rates have a great impact on currency valuation and its relative currency paired value. The benchmark interest rate in the United States was last

recorded at 0.25 percent. Interest rate in the United States is reported by the Federal Reserve. Historically, from 1971 until 2013, the United States interest rate averaged 6.17 Percent reaching an all time high of 20 Percent in March of 1980 and a record low of 0.25 Percent in December of 2008. In the United States, the authority for interest rate decisions is divided between the Board of Governors of the Federal Reserve (Board) and the Federal Open Market Committee (FOMC). On the in other hand in Brazil, The benchmark interest rate in Brazil was last recorded at 7.50 percent. Interest rate in Brazil is reported by the Banco Central do Brasil. Historically, from 1999 until 2013, Brazil interest rate averaged 16.23 Percent reaching an all time high of 45 Percent in March of 1999 and a record low of 7.25 Percent in October of 2012. In Brazil, interest rate decisions are taken by The Central Bank of Brazil's Monetary Policy Committee (COPOM). The official interest rate is the Special System of Clearance and Custody rate (SELIC) which is the overnight lending rate (Karfakis & Kim, 2005).

1.1.5 Effect of Interest Rates and Inflation Rates on Exchange Rates

According to Otuori, (2013) there are many theories about the causes of inflation, but economic predictions based on those theories have not always been substantiated by ensuing developments. There are strong arguments to substantiate the theory that inflation may/can/does affect exchange rates. However, in reality there may be no direct relationship between the two. We know that exchange rates continually fluctuate, but the cost to the consumer is more stable, the supply chain and currency hedging absorbing much of the variations. The liberalization experience in Kenya shows that domestic interest rates have remained high even when inflation has been low and declining. That is, the economy has been on a deflationary trend since 1994, save for a few blips in 1997, and the exchange rate has been volatile. The benchmark interest rate in Kenya was last recorded at 9.50 percent. Historically, from 1991 until 2013, Kenya interest rate averaged 14.95 Percent reaching an all time high of 84.67 Percent in July of 1993 and a record low of 0.83 Percent in September of 2003. The inflation rate in Kenya was recorded at 4.14 percent in April of 2013. Inflation Rate in Kenya is reported by the Kenya National Bureau of Statistics. Historically, from 2005 until 2013, Kenya Inflation Rate averaged 11.92 Percent reaching an all time high of 31.50 Percent in May of 2008 and a record low of 3.18 Percent in October of 2010. There is clear indication that interest rates and inflation has got a big effect on the exchange rates. It is therefore through this study that there will be clear understating of what interrelation exists between interest rates and inflation on exchange rates in Kenya.

1.2 Research Problem

All forex trading involves the exchange of one currency with another. At any one time, the actual exchange rate is determined by the supply and demand of the corresponding currencies. The demand of a certain currency is directly linked to the supply of another. The link between inflation and interest rates remain eminent though unexplored by authors and scholars to identify their impact on exchange rates. Inflation is a sustained increase in the average price of all goods and services produced in an economy. Money loses purchasing power during inflationary periods since each unit of currency buys progressively fewer goods. Purchasing power parity theory states that the exchange rate between one currency and another is in equilibrium when their domestic purchasing powers at that rate of exchange are equivalent. On the other hand, changes in domestic interest rates in one of the countries affect the foreign exchange rate as the demand for the currency that has had a change of interest rate will change. This implies an interaction between interest rates and inflation on exchanges rate.

The shilling touched a historic 107 units low against the dollar in late 2011. This resulted in the CBK tripling the base rate to 18 per cent. The effect was an increase in the cost of borrowing, which slowed down uptake of credit and slowed economic growth in 2012. The shilling strength was sapped by an interplay of factors and market fundamentals such as declining exports receipts.

A study by Pattnaik and Mitra (2001) indicates that interest rates, inflation rates and exchange rates are all highly correlated. By manipulating interest rates, central banks exert influence over both inflation and exchange rates, and changing interest rates impact inflation and currency values. The real exchange rate is the actual exchange rate adjusted for inflationary effects in the two countries of concern. Another study by Ndung'u (1997) states that interest rate differential will widen with real exchange rate appreciation, and this will trigger capital inflows. A thesis by Kiptoo (2007) found that the real exchange rate (rer) is obtained by adjusting the nominal exchange rate (ner) with inflation differential between the domestic economy, and foreign trading partner economies. A study by Sifunjo, (2011) further found that the derivation of the rer therefore, requires that the data of the ner, domestic inflation and foreign inflation be obtained. Domestic inflation will rise with exchange rate depreciation, and the influence of foreign inflation will decrease with exchange rate

appreciation. Nevertheless, no study has been carried to satisfactorily indicate how such in relation can affect the exchange rates either positively or negatively. This study therefore sought to cover the interrelation between interest rates and inflation on exchange rate. The study sought to get such information by exploring the question; what is the relationship between interest rate, inflation rate and the exchange rates in Kenya?

1.3 Research Objective

To establish the effect of interest rate and inflation rate on exchange rates in Kenya.

1.4 Value of the Study

The study will be of benefit to the stock exchange operations, the commercial bank and the stock brokers among other relevant users of interest rate and exchange rates. The information acquired, recommendations and conclusions that will be made later in the study will help those bodies that depend on the interest rates, inflation and exchange rates to make better and informed decision on the exchange rate matters.

The commercial banks will also benefit with the findings of the study as they will be able to make god forecast on the exchange rate given the necessary information that keeping their lending operations at the safe side. The information of relationship between inflation and interest rates will help such commercial banks to offer their loans and other borrowing with good and well calculated interest rates and information.

The future researcher who will carry out a similar study will benefit from the study and they will know more about the relationship between interest rate and inflation on exchange rate and come up with a different study to give more information as would be necessary in relation to the topic.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter covered the literature review on exchange rates. It encompasses the theoretical framework on exchange rates; evaluate what other researchers have written on exchange rates and its interrelation with interest rate and inflation. The chapter also includes empirical review on exchange rates and its interrelation while indentifying the knowledge gap.

2.2 Theoretical Review

There are different theories on exchange rate, each identifying own paradigm and concept about the exchange rates. The study is greatly interested with exchange rate theories that identify its relationship with interest rates and inflation. Highlighted below are some of such theories which include;

2.2.1 Interest Rate Parity Theory

Interest Rate Parity (IPR) theory is used to analyze the relationship between at the spot rate and a corresponding forward (future) rate of currencies. The IPR theory states interest rate differentials between two different currencies will be reflected in the premium or discount for the forward exchange rate on the foreign currency if there is no arbitrage---the activity of buying shares or currency in one financial market and selling it at a profit in another. The theory further states size of the forward premium or discount on a foreign currency should be equal to the interest rate differentials between the countries in comparison (Bleaney, and Fielding, 2002).

The theory of interest rate parity, relates the difference between foreign and domestic interest rates with the difference in spot and future exchange rates. This parity condition states that the domestic interest rate should equal the foreign interest rate plus the expected change of the exchange rates. If investors are risk-neutral and have rational expectations, the future exchange rate should perfectly adjust given the present interest-rate differential. For example, if the differential between one-year dollar and pound interest rates is five percent with the pound being higher, risk neutral, rational investors would expect the pound to depreciate by five percent over one year thereby equalizing the returns on dollar and pound deposits. If the exchange rate did not adjust, then arbitrage opportunities would exist. Consequently, the

current forward rate should reflect this interest rate differential as a forward contract locks in the future exchange rate.

2.2.2 Purchasing Power Parity Theory

Purchasing Power Parity (PPP) is a theory of exchange rate determination and a way to compare the average costs of goods and services between countries. The theory was developed in its modern form by Gustav Cassel in 1918. The theory assumes that the actions of importers and exporters (motivated by cross-country price differences) induce changes in the spot exchange rate. In another vein, PPP suggests that transactions on a country's current account affect the value of the exchange rate on the foreign exchange (Forex) market. This is in contrast with the interest rate parity theory, which assumes that the actions of investors (whose transactions are recorded on the capital account) induce changes in the exchange rate. PPP theory is based on an extension and variation of the "law of one price" as applied to the aggregate economy. (Devereux and Engel, 2003)

To explain the theory it is best to first review the idea behind the law of one price. Purchasing power parity is both a theory about exchange rate determination and a tool to make more accurate comparisons of data between countries. It is probably more important in its latter role since as a theory it performs pretty poorly. Its poor performance arises largely because its simple form depends on several assumptions that are not likely to hold in the real world and because the amount of foreign exchange activity due to importer and exporter demands is much less than the amount of activity due to investor demands. Nonetheless, the theory remains important to provide the background for its use as a tool for cross-country comparisons of income and wages, which is used by international organizations like the World Bank in presenting much of their international data

2.2.3 The Balance of Payments Theory

The balance of payments theory is the modern and most satisfactory theory of the determination of the exchange rate. It is also called the demand and supply theory of exchange rate. According to this theory, the rate of exchange in the foreign exchange market is determined by the balance of payments in the sense of demand and supply of foreign exchange in the market. Here the term 'balance of payments' is used in the sense of a market balance. If the demand for a country's currency falls at a given rate of exchange, we can speak of a deficit in its balance of payments. Similarly, if the demand for a country's currency

rises at a given rate of exchange, we can speak of surplus in its balance of payments. A deficit balance of payments leads to a fall or depreciation in the external value of the country's currency. A surplus balance of payments leads to an increase or appreciation in the external value of the country's currency (Galí, and Monacelli, 2005).

According to the theory, a deficit in the balance of payments leads to fall or depreciation in the rate of exchange, while a surplus in the balance of payments strengthens the foreign exchange reserves, causing an appreciation in the price of home currency in terms of foreign currency. A deficit balance of payments of a country implies that demand for foreign exchange is exceeding its supply.

2.3. Determinants of Exchange Rates

Exchange rates are determined by the demand and supply of a particular currency as compared to other currencies. There are numerous factors that determine the exchange rate between two countries.

2.3.1 Interest Rate

Inflation and interest rates are highly correlated. Higher inflation generally means higher interest rates in an economy. Hence, high interest rate also becomes a factor for the changes in exchange rate. Interest rate is the tool used by the central bank of a country to keep a check on any major currency fluctuation. The central bank can also try to keep the exchange rate under a targeted range by manipulating the interest rates. Higher interest rates bring in more investment from overseas as the returns are higher than countries with low interest rates (Bowe, and Saltvedt, 2004).

The theoretical as well as empirical relationship between the interest rate and exchange rate has been a debatable issue among the economists. According to Mundell-Fleming model, an increase in interest rate is necessary to stabilize the exchange rate depreciation and to curb the inflationary pressure and thereby helps to avoid many adverse economic consequences (Calvo, & Reinhart, 2000). The high interest rate policy is considered important for several reasons. Firstly, it provides the information to the market about the authorities' resolve not to allow the sharp exchange rate movement that the market expects given the state of the economy and thereby reduce the inflationary expectations and prevent the vicious cycle of

inflation and exchange rate depreciation. Secondly, it raises the attractiveness of domestic financial assets as a result of which capital inflow takes place and thereby limiting the exchange rate depreciation. Thirdly, it not only reduces the level of domestic aggregate demand but also improves the balance of payment position by reducing the level of imports (Devereux, & Engel, 2003).

The three major explanations of inflation include fiscal, monetary, and balance of payments aspects. While in the monetary aspect inflation is considered to be due to an increase in money supply, in the fiscal aspect, budget deficits are the fundamental cause of inflation in countries with prolonged high inflation. However, the fiscal aspect is closely linked to monetary explanations of inflation since government deficits are often financed by money creation in developing countries. In the balance of payments aspect, emphasis is placed on the exchange rate. Simply, the exchange rate collapses bring about inflation either through higher import prices and increase in inflationary expectations which are often accommodated or through an accelerated wage indexation mechanism (McCallum, and Nelson, 2000).

2.3.2 Inflation

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).

According to Engle, (2002) in the system of floating exchange rates, exchange rate fluctuations can have a strong impact on the level of prices through the aggregate demand

(AD) and aggregate supply (AS). On the aggregate supply, depreciation (devaluation) of domestic currency can affect the price level directly through imported goods that domestic consumers pay. However, this condition occurs if the country is the recipient countries of international prices (international price taker). Non direct influence from the depreciation (devaluation) of currency against the price level of a country can be seen from the price of capital goods (intermediate goods) imported by the manufacturer as an input. The weakening of exchange rate will cause the price of inputs more expensive, thus contributing to a higher cost of production.

Inflation is the term used to describe a rise of average prices through the economy. It means that money is losing its value. The underlying cause is usually that too much money is available to purchase too few goods and services, or that demand in the economy is outpacing supply. In general, this situation occurs when an economy is so buoyant that there are widespread shortages of labour and materials. People can charge higher prices for the same goods or services. Inflation can also be caused by a rise in the prices of imported commodities, such as oil. However, this sort of inflation is usually transient, and less crucial than the structural inflation caused by an over-supply of money (Fraga, Goldfajn and Minella, 2003).

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). 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 (Fung, 2002).

According to Gerlach and Smets, (2000) Inflation can be very damaging for a number of reasons. First, people may be left worse off if prices rise faster than their incomes. Second, inflation can reduce the value of an investment if the returns prove insufficient to compensate them for inflation. Third, since bouts of inflation often go hand in hand with an overheated

economy, they can accentuate boom-bust cycles in the economy. Sustained inflation also has longer-term effects. If money is losing its value, businesses and investors are less likely to make long-term contracts. This discourages long-term investment in the nation's productive capacity.

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, and Sturzenegger, 2002).

Understanding the sources of fluctuations in output and inflation is an important challenge to empirical macroeconomists. It is an issue taken up in a large number of recent studies in the developed nations, Latin America, and Asian countries. At the core of this issue is whether or not stabilization without recession is possible. While some theoretical models suggest that stabilization could be expansionary particularly for high inflation countries, others argue that stabilization without recession is rather difficult to achieve (Maćkowiak, 2003).

2.3.3 Current Account Deficits

The current account is the balance of trade between two countries. It reflects all payments and receipts between the two countries for goods, services, interests and dividends. A negative balance of payment or a deficit in the current account shows that the country is importing or spending more on foreign trade than it exporting or earning from abroad. This means that the country requires more foreign currency than it receives from its exports. This excess demand for foreign currency lowers the country's exchange rate (Taylor, 2001). A good example of this is the deficit balance of payment between US and China. Ideally, due to this increasing deficit in the balance of payment the Dollar should depreciate against the Yuan, however the Chinese government is artificially keeping the exchange rate of Yuan fixed in order to keep its goods cheaper. This kind of fixed exchange rate is called Pegged rate (Svensson, 2000).

2.3.4 Unemployment Rate

The unemployment rate is another factor that can influence the exchange rate. A relation that can reveal a connection between the unemployment rate and the exchange rate is given by the number of available workplaces. If the number of available workplaces is consistent, then this represents a signal of the economic growth, thus the companies need to hire more personnel to handle the consumer needs (Shambaugh, 2004)

2.4 Empirical Review

Kenya's experience with the financial reform process shows a widening interest rate spread following interest rate liberalization. This period is characterized by high implicit costs with tight monetary policy achieved through increased reserve and cash ratios. Despite the importance of monetary and exchange rate policies in economic management, few studies have been done on Kenya to assess the relationship between them. It is already recognized in the literature that the real exchange rate is an endogenous variable that responds to both exogenous and policy induced disturbances and that prolonged real exchange rate misalignment will usually generate macroeconomic disequilibrium (Ndungu, and Ngugi, 1999).

Studies done by Ndung'u (2010), found that after the 1992 general election, instabilities stemmed from excess liquidity in the economy. But when excess liquidity started drying up, inflation responded albeit hesitatingly; the exchange rate appreciated throughout 1994 and the interest rate started to track domestic rate of inflation down. This meant that macro stability was slowly being achieved. The events in this period suggest that monetary policy in Kenya is key to the determination of the path of exchange rate, inflation and the rate of interest. In addition, fiscal policies and budget deficit are closely interwoven with monetary policy. Part of the exchange rate depreciation and accelerating inflation, however, could be traced to expectations, which were at the time being driven by either fear of policy reversal or perhaps a backlog of demand for both goods and foreign exchange reserves.

There have been numerous studies on inflation, interest rates and exchange rates, but studies on the interrelationship between these three variables have been scanty. A study by Pattnaik, and Mitra (2001) indicates that interest rates, inflation rates and exchange rates are all highly correlated. By manipulating interest rates, central banks exert influence over both inflation and exchange rates, and changing interest rates impact inflation and currency values. A study by Bhole and Dash, (2002) sought to understand the relationship between interest rate and

exchange rate in India. In their analysis, the scholars found the empirical relationship between the interest rate and exchange rate has been a debatable issue among the economists. According to Mundell-Fleming model, an increase in interest rate is necessary to stabilize the exchange rate depreciation and to curb the inflationary pressure and thereby helps to avoid many adverse economic consequences. The high interest rate policy is considered important for several reasons.

Firstly, it provides the information to the market about the authorities' resolve not to allow the sharp exchange rate movement that the market expects given the state of the economy and thereby reduce the inflationary expectations and prevent the vicious cycle of inflation and exchange rate depreciation. Secondly, it raises the attractiveness of domestic financial assets as a result of which capital inflow takes place and thereby limiting the exchange rate depreciation (Morón, and Winkelried, 2003).

Thirdly, it not only reduces the level of domestic aggregate demand but also improves the balance of payment position by reducing the level of imports. But the East Asian currency crisis and the failure of high interest rates policy to stabilize the exchange rate at its desirable level during 1997-1998 have challenged the credibility of raising interest rates to defend the exchange rate. Critics argue that the high interest rates imperil the ability of the domestic firms and banks to pay back the external debt and thereby reduce the probability of repayment. As a result, high interest rates lead to capital outflows and thereby depreciation of the currency (Mohanty, and Klau, 2004).

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 used Generalized Autoregressive Condition Heteroscedaticity (GARCH) and unconditional standard deviation. 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. The study used GARCH foreign rate volatility. The results suggest presence of nonlinearity in the returns, high volatility in the market with a maximum duration of 6 months. Foreign exchange market

was found not to be efficient in the weak form. The two study findings are similar on the current study findings on the high volatility of the real exchange rate in Kenya.

Conceptually, the inflation can be divided into two sides, namely: demand side inflation (demand pull inflation) and supply side inflation (cost push inflation). The study found that the influence of exchange rate towards inflation itself depends on the choice of exchange rate regime in the country. It was established that exchange rate system has an important role in reducing or minimizing the risk of fluctuations in exchange rates, which have an impact on the economy. Any changes in exchange rates will have a great impact on the economy.

2.5 Summary of Literature Review

Exchange rate and monetary policies such as interest rates and inflation policies are key tools in economic management and in the stabilization and adjustment process in developing countries, where low inflation and international competitiveness have become major policy targets. A study by Ndungu and Ngugi (1999) indicated that the real exchange rate is a measure of international competitiveness, while inflation mostly emanates from monetary expansion, currency devaluation and other structural factors. In their study on Kenyan scenario, Ndungu, and Ngugi found that Kenya's exchange rate policy has undergone various regime shifts over the years, largely driven by economic events, especially balance of payments crises. A fixed exchange rate was maintained in the 1960s and 1970s, with the currency becoming over-valued, though not extremely so. Exchange controls were maintained from the early 1970s until a market-determined regime was adopted in the 1990s.

Through the above statistical insight and theoretical findings on financial mater and exchange rates, this study therefore seeks to establish the effect of interest rate and inflation rate on exchange in Kenya. The study will help the Kenyan stock exchange in understanding the relationship between the inflation and interest rates and acquire more strategies on how to control such with collaboration with the Central Bank to ensure a stable economy.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter provides the methodology that was used in the study. The chapter covered research design, sampling design, target populations, data collection instrument and data analysis technique

3.2 Research Design

The descriptive research design was used in this study. The descriptive research design is suitable for the need to describe the interrelationship between interest rates, and inflation on exchange rates in Kenya. Its purpose was to portray the state of affairs as it is. A research design helps researchers to lay out the research questions, methodologies, implementation procedures, and data collection and analysis for the conduct of a research project. Generally there are three types of research design: quantitative design, qualitative design, and mixed methods design Mugenda and Mugenda (2003). In this study the researcher used the quantitative research design which includes the descriptive research design. The study described the major variables associated with exchange rates in Kenya.

3.3 Data Collection

The study used the Kenya Bureau of Statistics (KBA) and the Central Bank of Kenya as sources of information in the pursuit to establish the effects of interest rate and inflation on exchange rates in Kenya. Data used was in the form of secondary data and in particular, the following data was used: Interest rates, Inflation Rates and Exchange rates for years 2007-2012. The secondary data was collected from Central Bank and Kenya National Bureau of Statistics. The data collected helped answer the research problem.

3.4 Data Analysis

Data was analyzed using quantitative method; the data was then presented using various statistical tools such as tables, percentages and graphs. The study used multiple linear regression formula to get the correlation between interest rates, inflation and exchange rates. Multiple linear regression was used to model the relationship between two or more explanatory variables and a response variable by fitting a linear equation to observed data.

3.4.1 Analytical Model

The formula given below was used to calculate the linear regression.

The equation; $Y_i = b_0 + b_1X_1 + b_2X_2 + \epsilon$

Where: Y_i = Exchange rate between US dollar and Kenya Shillings

b_0, b_1, b_2 , are constants to be estimated by the model

X_1 = Interest Rates, (in Kshs, Monthly)

X_2 = Inflation Rates (in Kshs, Monthly)

ϵ = Error terms

Multiple regression analysis was also used to assess whether confounding exists. Since multiple linear regression analysis allows us to estimate the association between a given independent variable and the outcome holding all other variables constant, it provides a way of adjusting for (or accounting for) potentially confounding variables that have been included in the model. The study used Test of goodness of fit and the explanatory power of the model R^2 , F test ANOVA.

The study did test of Multicollinearity. Multicollinearity is a linear relationship between two explanatory variables. Two variables are perfectly collinear if there is an exact linear relationship between the two. For example, X_1 and X_2 are perfectly collinear if there exist parameters λ_0 and λ_1 such that, for all observations i , we have

$$X_{2i} = \lambda_0 + \lambda_1 X_{1i}$$

Multicollinearity refers to a situation in which two or more explanatory variables in a multiple regression model are highly linearly related. In this study the researcher will have perfect multicollinearity if, for example as in the equation above, the correlation between two independent variables is equal to 1 or -1.

CHAPTER FOUR

DATA ANALYSIS, RESULTS AND DISCUSSION

4.1 Introduction

This chapter involved analysis of data collected and discussion of the results obtained.

4.2 Findings

In this section data was collected for six years (2007-2012) from Kenya Bureau of Statistics (KBS) and the Central Bank of Kenya (CBK) to establish the effects of interest rate and inflation on exchange rates in Kenya. The data used was KES/USD Annualized Average Exchange Rates (Forex), Annualized Average CBK Interest Rates (in %) and Annual Average Economic Inflation Rates (in %) to determine the effects of interest rate and inflation rate on exchange rates in Kenya

4.3 Regression Analysis

The intention is to establish the relationship between the KES and USD exchange rates (Forex) and the two predictor variables; the CBK base lending rates and inflation rates in the years between 2007 and 2012.

The table below is a summary of the secondary data used for regression analysis

Table 4.1: Time Series Regression Data

Regression Data			
	Dependent Variable	Predictor Variables	
Indicators Year	KES/USD Annualized Average Exchange Rates (Forex)	Annualized Average CBK Interest Rates (in %)	Annual Average Economic Inflation Rates (in %)
2007	67.46	8.63	9.80
2008	69.00	8.90	16.20
2009	77.33	7.89	10.50
2010	79.26	6.50	4.10
2011	88.86	9.60	14.00
2012	84.52	16.50	9.40

Source; Research Findings

When the above data was run for regression analysis using IBM SPSS Statistics v.21, the model results incorporated all the three predictors (the absolute value of their un-standardized

coefficients had significant values; all were $> |0.1|$); this signifies they were significant enough as predictors of the regression model.

Below are the results of the model summary generated by the data after running regression analysis;

Table 4.2: Model Summary

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.433 ^a	0.871	0.555	1.79521
a. Predictors: (Constant), Inflation Rates, Interest Rates				

Source: Research Findings

All the three variables returned significant coefficients to model a regression equation. Both the predictor variables had significant values to consider using them in a regression model. The co-efficient of multiple determinations R-square value is 0.871; this means about 87.1% of the variation of the response variable which is KES/USD forex rates can be explained by the two predictor variables.

The regression equation appears to be substantially useful for making predictions since the value of R^2 at 0.871 is very close to 1

The ANOVA table generated from the same data is as shown below;

Table 4.3: ANOVA Table

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	66.329	2	33.164	0.034	0.05 ^b
	Residual	287.839	3	95.946		
	Total	354.167	5			
a. Dependent Variable: Forex Rates						
b. Predictors: (Constant), Inflation Rates, Interest Rates						

Source: Research Findings

From the ANOVA table; at the 5% (0.05) significance level, the model is useful for predicting the response since;

F Value = 0.034 and ρ -value at 0.05 is less than 0.05.

Therefore; at the $\alpha = 0.05$ level of significance, there exist enough evidence to conclude that at least one of the two predictors is useful for predicting Forex rates; therefore the model is very useful.

The coefficients table returned by running the data through analysis software is as illustrated below;

Table 4.4: Coefficients

Coefficients^a						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	71.658	16.055		4.463	0.021
	Interest Rates	1.006	1.258	0.419	0.799	0.482
	Inflation Rates	0.342	1.057	-0.170	-0.323	0.768

a. Dependent Variable: Forex Rates

Source: Research Findings

From this table; using the regression model equation contemplated before i.e.

$$Y_i = b_0 + b_1X_1 + b_2X_2 + \epsilon$$

Where: Y_i = Exchange rates in Kenya

b_0, b_1, b_2 , are constants to be estimated by the model

X_1 = Interest Rates (in %, Annualized)

X_2 = Inflation Rates (in %, Annualized)

ϵ = Error terms

Using the coefficients in table 4 above; our regression model therefore becomes;

$$\text{KES/USD Forex Rates} = 71.658 + 1.006\text{Int. Rates} + 0.342 \text{ Inf. Rates}$$

Interpretation:

Intercept: In any given year, the KES/USD rate will be 71.658 when all the predictor values are equal to zero.

Effect of CBK interest rates on KES/USD forex rates: The forex rates increases by a unit on the CBK interest rates increasing by 1.006 or 100.6% all other factors held constant.

Effect of inflation rates on KES/USD forex rates: The forex rates increases by a unit on the CBK interest rates decreasing by 0.342 or 34.2% all other factors held constant. The model however as indicated above in the ANOVA interpretation, is not useful in predicting variations KES/USD forex rates.

4.4. Correlation Analysis

When a Pearson Correlation analysis was run on the data to test the level of association between the KES/USD forex rates versus the values of the two independent variables, the results are as illustrated in the table below;

Table 4.5: Pearson Correlations

Correlations			
		Interest Rates	Inflation Rates
Forex Rates	Pearson Correlation	0.039	-0.019
	Sig. (2-tailed)	0.434	0.823
**. Correlation is significant at the 0.01 level (2-tailed).			

Source: Research Findings

The two predictor variables; interest rates and inflation rates showed some level of correlation with the dependent variable KES/USD forex rates at 0.01 significant levels.

Interpretation;

At 0.039, the interest rates had a strong positive association with KES/USD forex rates while at -0.019; the inflation rates had a small negative correlation with the same independent variable. This means that there was a likelihood of increases due to an increase in interest rates and even decreases in increases of inflation rates.

4.5 Collinearity Diagnostics

Multicollinearity is assessed by examining tolerance and the Variance Inflation Factor (VIF). These are two collinearity diagnostic factors that can help identify multicollinearity. Tolerance is a measure of collinearity reported by most statistical programs such as SPSS; the variable's tolerance is $1-R^2$. A small tolerance value indicates that the variable under consideration is almost a perfect linear combination of the independent variables already in the equation and that it should not be added to the regression equation. All variables involved in the linear relationship will have a small tolerance. Some suggest that a tolerance value less than 0.1 should be investigated further. If a low tolerance value is accompanied by large standard errors and nonsignificance, multicollinearity may be an issue.

When multi-collinearity diagnostics were run on the three variables of interest; the results were as shown in the tables below;

Table 4.6: Collinearity statistics between forex rates and the two independent variables

Collinearity Coefficients ^a			
Model		Collinearity Statistics between forex rates and the two independent variables	
		Tolerance	VIF
1	Interest Rates	1.985	1.015
	Inflation Rates	1.985	1.015
a. Dependent Variable: Forex Rates			

Source: Research Findings

With tolerance values greater than 1 which is a full proof that there is a collnenearity between the dependent variable and the independent variables. There is adequate evidence to rule out collinearity of forex rates and both interest rates and inflation rates.

The Variance Inflation Factor (VIF) measures the impact of collinearity among the variables in a regression model. The Variance Inflation Factor (VIF) is $1/\text{Tolerance}$, it is always greater than or equal to 1. There is no formal VIF value for determining presence of

multicollinearity. Values of VIF that exceed 10 are often regarded as indicating multicollinearity, but in weaker models values above 2.5 may be a cause for concern.

The same case applied to collinearity test between interest rates as the dependent variables and the other two as the independent variables; there was adequate evidence of collinearity.

Table 4.7: Collinearity Statistics between Interest rates, forex rates and inflation rates

Collinearity Coefficients^a			
Model		Collinearity Statistics between Interest rates, forex rates and inflation rates	
		Tolerance	VIF
1	Inflation Rates	1.986	1.014
	Forex Rates	1.986	1.014
a. Dependent Variable: Interest Rates			

Source: Research Findings

Similarly the results when inflation rates were taken as the dependent variable; the VIF values did not exceed 2.5 which was the number of measure of the variable strongly suggesting absence of collinearity between inflation rates and both forex rates and interest rates. The table below illustrates this.

Table 4.8: Collinearity Statistics between inflation rates, forex rates and interest rates

Collinearity Coefficients^a			
Model		Collinearity Statistics between inflation rates, forex rates and interest rates	
		Tolerance	VIF
1	Interest Rates	1.841	1.189
	Forex Rates	1.841	1.189
a. Dependent Variable: Inflation Rates			

Source: Research Findings

In conclusion; all the three variables used were good enough to use in conducting regression and correlation analysis since they did not exhibit any collinearity properties between themselves.

4.6 Interpretations of Findings

The study found from the analysis that, the KES/USD Annualized Average Exchange Rates (Forex) and Annualized Average CBK Interest Rates (in %) increased with increase in years. The study found that, KES/USD Annualized Average Exchange Rates (Forex) rose from 67.46 in 2007 to 84.52 in 2012. The Annualized Average CBK Interest Rates (in %) rose from 8.63 in 2007 to 16.50 in 2012. The Annual Average Economic Inflation Rates (in %) however was observed to be fluctuating with different years and indicating different economic times in the country. The study found that in any given year, the KES/USD rate will be 71.658 when all the predictor values are equal to zero; the forex rates increases by a unit on the CBK interest rates increasing by 1.006 or 100.6% all other factors held constant while the forex rates increases by a unit on the CBK interest rates decreasing by 0.342 or 34.2% all other factors held constant. The model however as indicated in the ANOVA interpretation, is not useful in predicting variations KES/USD forex rates.

The analysis further found that the increase in interest rates impacted towards an increase in exchange rates but inflation was left to fluctuate in different times. The study found that there is a very strong correlation between interest rates, inflation and exchange rates in the economy. The analysis further sought to understand the level at which interest rates and inflation affected the exchange rates. The study found interest rates and inflation rates affect the exchange rates at 87% while other factor contributed the remaining percentage. This implied that, a very high percentage of changes in the exchange rates is affected by the inflation or exchange rates in the country. The analysis sought to further check whether the two variables, specifically interest rates and inflation; can be used for determination of the effects of the exchange rates. This was done through regression analysis. The regression equation indicated that the variables were substantially useful for making predictions since the value of R^2 at 0.871 is very close to 1

The study undertook Pearson correlation to analyze how close each variable was near to the exchange rates. The study found that at 0.039, the interest rates had a strong positive

association with KES/USD forex rates while at -0.019; the inflation rates had a small negative correlation with the same independent variable. This means that there was a likelihood of increases due to an increase in interest rates and even decreases in increases of inflation rates.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATION

5.1 Introduction

In this chapter, the summary of findings, conclusion, recommendations, and limitation of the study and areas of further study will be established.

5.2 Summary

The objective of the study was to analyze the relationship between interest rate, inflation rate and the exchange rates in Kenya. Exchange rates (Forex) were established as the dependent variable while the independent variables were interest rates and inflation rates. The study sought to understand the relationship between the independent variables and dependent variable.

The co-efficient of multiple determinations R-square value is 0. 871; this means about 87.1% of the variation of the response variable which is KES/USD forex rates can be explained by the two predictor variables. This implies that the chosen variables specifically inflation rate and interest in Kenya during year 2007-2012 affect the exchange rate by 87.1% and therefore 12.9% effects of exchange rate was associated with other unexplained factors. The regression results also indicate that the relationship between inflation and interest rates against exchanges rates is very significant at 0.05 level of significance level with a p-value of 0.016. These findings conform to the findings of a study by Pattnaik, S. and Mitra A. K. (2001) which indicated that interest rates, inflation rates and exchange rates are all highly correlated. By manipulating interest rates, central banks exert influence over both inflation and exchange rates, and changing interest rates impact inflation and currency values.

The study further found that a great effect caused by the increased rate of inflation or decreased rate of inflation and interest rates can be seen on exchange rate almost immediately as opposed to the changes in exchange rate effects and how they can be seen in the interest rate and inflation. The Tolerance value of more than 1 and a VIF value indicate a correlation between the independent values – inflation rate and interest rate on exchange rate as a dependent variable. The analysis found that, at 0.039, the interest rates had a strong positive

association with KES/USD forex rates while at -0.019; the inflation rates had a small negative correlation with the same independent variable. This means that there was a likelihood of increases due to an increase in interest rates and even decreases in increases of inflation rates. This correlates with a study by Bhole and Dash, (2002) who sought to understand the relationship between interest rate and exchange rate in India. In their analysis, the scholars found the empirical relationship between the interest rate and exchange rate has been a debatable issue among the economists. According to Mundell-Fleming model, an increase in interest rate is necessary to stabilize the exchange rate depreciation and to curb the inflationary pressure and thereby helps to avoid many adverse economic consequences.

5.3 Conclusion

The analysis investigated the effects of interest rate and inflation rate on exchange rates in Kenya with specific reference to KES/USD Annualized Average Exchange Rates (Forex), Annualized Average CBK Interest Rates (in %) and Annual Average Economic Inflation Rates (in %) all information from 2007 -2012. The study finally 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 further concluded that 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.

5.4 Recommendations for Policy

The study recommends that regulators should come up with means to evaluate exchange rate volatility. This will help to curb the impact that exchange rate volatility can have on an economy, and, among other aspects, on inflation. This is even more relevant to developing countries, where exchange rate volatility tends to be higher, contributing to a higher exchange rate pass-through to inflation. The higher exchange rate volatility in developing countries, in turn, stems from their greater vulnerability to external shocks and the lower liquidity of their currencies in international markets. As a result of these two characteristics, the impact of the exchange rate on inflation is greater in developing countries.

A second important recommendation is the limitation of controlling inflation through

monetary policies. A first restriction is the weak transmission mechanism of monetary policy in some developing countries— meaning that the effectiveness of the policy might be only partial. Another limitation is the output cost implied in the policy, which, depending on the country's economic situation and prospects, might not always be optimal.

The study 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. Indeed, policy makers would be opting for a more interventionist approach to curb inflation. The fear of floating would in fact be a fear of inflation. Moreover, that does not require abandoning monetary policy independence; as such control is effected through direct interventions in the exchange rate markets. An illustration of this rethinking of the intersection between exchange rate and inflation was its recognition inside the International Monetary Fund (IMF). Blanchard (2011) stated that developing countries' central bankers were right to care about the exchange rate and affirmed the need to fight inflation through different instruments.

5.5 Limitations of Study

The study was faced with some limitations. The study was not conclusive as it did not include some of the other aspects that affect the exchange rate but only concentrated with inflation rate and interest rate as these are observed as the key factor affecting exchange rate.

The limitations of time constraints and gathering of secondary information were also encountered in the study. This was because the data was not readily available to the public and therefore the researcher had to consult with the necessary authority for permission to access such information.

Developing the statistical presentation was an uphill task, since the researcher was not very conversant with the SPSS 21 program. This required some extra training on the software to enable proper usage of the same to get the necessary statistical presentations for the data.

5.6 Areas of Further Study

The study as indicated was not exhaustive of the factors affecting exchange rates in the market and its interrelationship with the factors such as inflation, interest rates. There are

many factors that affect the exchange rate and therefore it is envisaged that future scholars and researchers will investigate into details the effects of factors such as monetary policy, political situation, balance of payments, market judgment and speculation among others.

The study further suggested that more research be carried out to bring forth more knowledge to the pool of literature on relationship between interest rates, inflation and the exchange rates. This is because, very little literature was available to indicate the relationship between the three variables hence this study.

There is also a need to identify why the data shows that since 2007 to 2012 the interest rates have been increasing, same case to the exchange rates. There must be some factors contributing to this trend and were not covered in this study, therefore, future researchers should try to bring to book such findings.

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APPENDICES

APPENDIX I: INTRODUCTION LETTER

APPENDIX II: ANNUALIZED EXCHANGE RATES

APPENDIX III: ANNUALIZED AVERAGE INTEREST RATES

APPENDIX IV: ANNUALIZED AVERAGE INFLATION