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**EVALUATION OF THE RESPONSIVENESS OF THE FOREIGN
EXCHANGE RATE TOWARDS INTERVENTIONS BY THE CENTRAL
BANK OF KENYA.**

By

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STRATHMORE UNIVERSITY

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[APRIL, 2016]

DECLARATION

This thesis is my original work and has not been presented for a degree in any other University.

SIGNED _____ DATE _____

[Student Name]



This thesis proposal has been submitted for examination with my approval as the University Supervisor.

SIGNED _____ DATE _____

[Supervisor's Name]

ABSTRACT

The foreign exchange market was liberalized in Kenya so as to increase market efficiency, so that it would reflect all available information. However, with the high and persistent volatility in the market, the cost of doing business increased and thus it became necessary for the Central Bank of Kenya (CBK) to intervene in the foreign exchange market. Attempts by the CBK to intervene are either too little or too late with the monetary policy maintaining a “watch and see attitude” as it allows the market to distribute liquidity amongst itself and allow the rates to control its levels. This study sought to measure the level of volatility over the years and determine if the foreign exchange market volatility was responsive to the CBK intervention. The study used Primary data from guided interviews from 35 respondents from 4 of the tier one banks in the country and secondary data from the CBK weekly bulletins over a period of five years from January 2010 to December 2014. The research applied a GARCH model to measure the level of volatility of the foreign exchange market and a multiple regression model to measure the responsiveness of foreign exchange rate volatility to CBK intervention.

The results revealed that the GARCH (1,1) value was negative over the years, showing the volatility fluctuations in the foreign exchange rate. Responsiveness of forex volatility and CBK intervention had a beta value of -1.003 for indirect intervention and -1.041 for direct intervention. This implied that the rates were more responsive to direct than indirect intervention.

The study recommends that CBK should explore avenues to enhance capacities within the commercial banks for managing foreign currency risk exposure and assist the major stakeholders to understand what really causes the central bank of Kenya to intervene and the level of responsiveness so as to avoid speculation since it increases market volatility.

LIST OF ABBREVIATIONS

CBK - Central Bank of Kenya

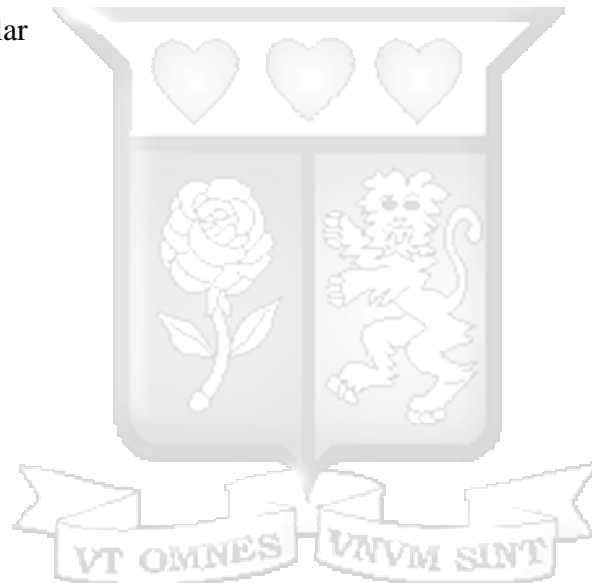
OMO - Open Market Operations

ANOVA - Analysis of Variance

GARCH - Generalised Autoregressive conditional heteroskedasticity

MPC - Monetary Policy Committee

USD - United States Dollar



ACKNOWLEDGMENT

I want to thank almighty God for giving me the opportunity to pursue this course, for His provision, strength and endurance to remain focused. I especially thank my daughter, Favour A. Wangari, for always encouraging me through her own special words and my supervisor Dr. Waweru for not giving up on me.



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INTRODUCTION

1.1 Background of the study

The foreign exchange market is a global decentralized market for trading currencies. The main participants in this market are large international banks while financial centers function as anchors of trading between buyers and sellers around the clock. An exchange rate, on the other hand, is defined as a price of one country's currency in terms of another country's currency. An exchange rate is also referred to as the nominal exchange rate when inflation effects are embodied in the rate (Copeland, 1989; Lothian and Taylor, 1997) and the real exchange rate is exclusive of the inflation effects.

There are two types of foreign exchange regimes, fixed and floating. In a floating foreign exchange market, the rates reflect the value of a currency pair and the extent to which a particular currency fluctuates against another, which is called volatility. (Kathryn, 2002) found that the fixed-rate foreign exchange regime, does not allow fluctuations of the currency as opposed to the floating exchange rate which tends to allow the currency to fluctuate over time causing volatility. Exchange rate volatility is often attributed to three factors: volatility in market fundamentals, changes in expectations due to new information and speculation.

The foreign exchange market was liberalized by the adoption of the floating exchange rate system in 1993 which was expected to have several advantages for Kenya. First, it would allow a more continuous adjustment of the exchange rate to shifts in the demand and supply by changing the nominal exchange rate, rather than the level of reserves. Second, it would allow

Kenya the freedom to pursue its own monetary policy without having to be concerned about balance of payments effects allowing the country to have an independent monetary policy that was consistent with the exchange rate management. Third under the floating system external imbalances would be reflected in exchange rate movements instead of reserve movements. IFS report (2008) stated that following liberalization, there was virtually no intervention by CBK in the foreign exchange market, as a result, Kenya was categorized a free floater among developed countries. The stated CBK exchange rate policy was to pursue a market-determined exchange rate, intervening only to smooth out erratic movement, service external obligations and achieve targeted level of foreign exchange reserves. Nonetheless, there were instances where intense lobbying from non-traditional exporters for a depreciated exchange rate putting pressure on the CBK to influence the foreign exchange rate in the short run. There were also instances where depreciation pressures emanating from speculative tendencies occasioned by fragile donor relations and large food importation to mitigate adverse effects of drought could have led CBK to intervene in the foreign exchange market so as to reduce pressures on domestic inflation. Excess volatility increases the cost of doing business and the prices of essential goods and services to consumers which reduces allocation efficiency of economic resources and consequently affects economic growth and development in Kenya. Thus it becomes necessary for the CBK to intervene in the foreign exchange market (Rotich and Maana 2007).

The foreign exchange market intervention involves trying to reduce the exchange rate misalignment in view of the fact that if the exchange rate is high it reduces the country's competitiveness and the rate being too low can lead to an unsustainable growth spurt and inflation. Therefore, Central Bank steps into the foreign exchange market if they see that the current exchange rate appears to be either overvalued or undervalued (BIS working papers

2015). Intervention is a very crucial policy tool that central banks use to correct any short term exchange rate misalignments and to dampen excessive short-term volatility in the exchange rate. Intervention can take two different forms: adjustment of domestic interest rate levels which influences the attractiveness of foreign investments and direct purchases or sale of foreign currency reserves in the foreign exchange market.

Lucio (2001) identified that intervention can either be official (Direct) or non official (Indirect). Official Exchange rate intervention in the foreign exchange market occurs when the authorities buy or sell foreign exchange, normally against their own currency in order to affect the exchange rate. When the authority simultaneously or with a very short time lag takes the necessary steps to offset the effects of the change in official foreign asset holdings on the domestic monetary base, it is called sterilized intervention. Intervention needs to be carried out in the spot market however, it may be carried out in the forward market where by the Central Bank buys and sells foreign exchange for delivery at a future date; it has an advantage in that they do not require immediate cash outlay. If the Central Bank expects that the need will be reversed, then the forward market intervention will be conducted secretly and hence will not have any effect on the foreign exchange reserves. Nelly, (2001) stated that the central bank intervenes mostly in the spot market so as to let the market players, mostly the commercial banks to identify the liquidity gap and fill the demand immediately. The extent of the responsiveness is therefore felt either immediately or after duration of time depending on the strength of the intervention that is dependent on the volume of reserves traded and the U.S Dollar demand in the Foreign exchange market.

The Kenya Shilling is governed by the Central Bank of Kenya whose primary responsibility is formulating and implementing monetary policy to achieve stability in the

general price level of the Kenya Shilling against other currencies. The CBK participates in the foreign exchange market mainly to service official debt, finance Government imports, build its foreign exchange reserves and in times of volatility they buy or sell foreign exchange to stabilize the market. The CBK also provides the policy environment on the exchange rate and cannot target a particular level or direction of the exchange rate, (Njuguna 2006). The CBK intervenes whenever the shilling shows sudden swings or if the market is very liquid or tight. There is always anticipation from the market markers on CBK intervention though there is usually no official word on when the monetary committee will do so as it maintains its secrecy. In the past CBK has never been keen on holding the shilling at a particular level since they always indicate that they would want the market to distribute liquidity and control the pace of its rise and fall (Njuguna 2011). Many central banks practice “managed floating,” whereby they intervene in the foreign exchange market by “leaning against the wind.” To do so, a central bank sells foreign exchange when the exchange rate is going up, thereby dampening its rise, and buys when it is going down. The motive is to reduce the variability in the exchange rate (Kamal, 2013). The stated exchange rate policy of the CBK has been and continues to be to pursue a market determined exchange rate, intervening only to smooth out erratic movement, service external obligations and achieve targeted level of foreign exchange reserves (CBK, 2013).

The Central Bank usually advises government on fiscal and trade policies and is responsible for the conduct of monetary and foreign exchange policies. Most central banks operating in floating regimes intervene in the foreign exchange market. However, there has been growing pessimism about the effectiveness of intervention, especially in developed economies (Schwartz 2000). The responsiveness of the foreign exchange market is the area of study since though the foreign exchange market responds to an intervention, CBK is always perceived to be

too late or the impact is too little because even though the market responds positively or negatively more volatility is seen during the period of intervention as speculators take positions awaiting CBK's move. The interventions are also seen to occur but little effect is felt to imply the extent of intervention could be little compared to the need in the market. The research sought to clarify the volatility clusters and identify at what cluster would the intervention be most significant and is the foreign exchange rate volatility responsive to the CBK intervention.

1.2 Statement of the Problem

Central banks around the globe generally intervene in the foreign exchange market through direct and indirect methods. The direct methods are mostly conducted through open market operations such as the sale or purchase of repos, with the intention of stabilizing the exchange rates. The potential responsiveness of direct intervention depends upon the amount of reserves the central bank can use for this purpose. If the central bank has a low level of reserves, it may not be able to exert much pressure on the currency's value since direct intervention becomes a less effective tool with the spectacular growth in foreign exchange activity as concluded by Edison (1993).

Ramon (2005) in his research and experience suggested that the instrument of intervention is only effective if seen as signaling interest rate or other policy adjustments. The intervention is seen to be without a durable and independent impact on the nominal exchange rate and hence seen as having no lasting power to influence the real exchange rate.

The motives of central bank authorities range from calming excessively volatile markets to discouraging destabilizing speculation to maintaining the spot rate about a target level and conveying information about future monetary policy. However, in an increasingly complex and

fast paced environment of electronic trading, the ability of central banks to influence the market through intervention has been challenged, and often defeated (Anusha 2002).

African economic outlook (2012) indicated that in 2011 the Kenyan Shilling depreciated by a margin of 25.2% against the US dollar, dropping from an average of KES 81.11 per USD 1 in January 2011 to KES 101.51 in October 2011. The depreciation of the Kenyan shilling was traced back to the CBK policy adopted in 2010, the policy's indecisiveness, inaction of the CBK and speculative activities of some banks and individuals led to the formation of a parliamentary committee in February 2012 to discuss the depreciation of the shilling since it was a concern to the whole country.(10th parliamentary Report 2012) This research sought to identify if foreign exchange volatility was responsive to the intervention by the monetary policy.

1.3 OBJECTIVES

1.3.1 Main Objective

To examine the responsiveness of the foreign exchange rate to CBK intervention

1.3.2 Specific Objectives.

1. To measure the volatility of the foreign exchange market in Kenya.
2. To examine the responsiveness of the foreign exchange rate volatility to the CBK intervention.

1.3.3 Research Questions.

1. What are the volatility of the exchange rate over the period of study?
2. What is the relationship between CBK intervention and foreign exchange volatility?

1.4 Significance of the Study.

The basic microstructure of foreign exchange markets consists of a number of core elements, namely, the major players (dealers, central banks, corporations, and speculators), the

mechanisms for trading and the regulatory and management systems. The conduct of monetary policy besides other functions plays an important role in macroeconomic stability. Exchange rate and price stability are among the most desirable macroeconomic goals that the monetary policy helps to achieve.

1.4.1 Commercial bankers

Commercial banks account for the largest proportion of all trading of both a commercial and speculative nature and operate within an interbank market. This is essentially a market composed solely of commercial and investment banks which buy and sell currencies from each other. Strict trading relationships exist between the member banks and lines of credit are established between these banks before they are permitted to trade (Anusha 2002). Whenever the Central Bank buys foreign exchange, it is in effect, injecting liquidity into the market. When it sells foreign currency, it effectively mops up the local currency with the objective of achieving predetermined liquidity targets. Whether buying or selling foreign currency, the foreign exchange market activity in the bank should be understood in terms of its broader policy goals of enhancing confidence and predictability of the value of the currency while providing ample liquidity to the banking system.

1.4.2 Speculators

A possible channel through which sterilized purchases and sales of foreign currencies by the monetary authorities may influence market expectations and the exchange rate has been considered by Mussa (1981). When speculators believe that a currency will be devalued in the future, they hedge against the currency by going long or short which could result in either a

profit or a loss. According to his 'signaling hypothesis' operations in the foreign exchange market by the central bank may be used to signal future changes in the monetary policy. Sales (purchases) of foreign exchange should signal a forthcoming monetary contraction (expansion) more effectively than a simple announcement, because the Central Bank stakes its own capital in support of the future policy and hence 'buys credibility'.

1.4.3 Investors

Foreign exchange markets are essential to the functioning of the international economy. However, they sometimes appear to be excessively volatile and occasionally their movements have been disruptive. Exchange rates that are overly volatile and out of line with economic fundamentals impose real costs on the economy, through their effects on international trade and investment. Moreover, at times, pressures from exchange markets have complicated the setting of monetary policy. When the market is very volatile and we have no clear indication of stability then those who are importing on trade credit during this time are usually uncertain as to what price they would have to pay for foreign exchange when their letters of credit are due.

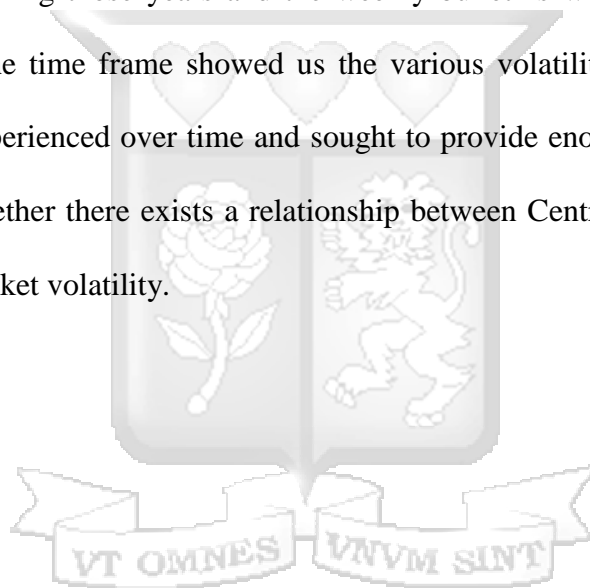
1.4.4 Traders

There are other major traders in the foreign exchange market. They include the importers, exporters, oil marketers and aviation service providers. Excess volatility could be the result of traders over-reacting to new information or incorporating into prices information that is not relevant. Empirical evidence on what type of information affects markets is still relatively scarce and not yet conclusive. Some studies distinguish between public information, such as the publication of new statistics, and private information not shared by others, such as knowledge that a particularly large amount of currency had to be converted. Indeed it appears that a sizeable part of volatility is associated with private information, but this does not necessarily imply that

such information is not related to fundamental developments. The volatility correction would imply more trading and price movements, further strengthening the correlation between trading and volatility.

1.5 Scope of Study

The study analyzed data from 2010 to 2014 provided by the central bank on an average weekly basis during the released weekly bulletins; this is because the foreign exchange market has shown most volatility during those years and the weekly bulletins were made available to the public as from 2010. The time frame showed us the various volatility trends that the foreign exchange market has experienced over time and sought to provide enough evidence to come up with a conclusion of whether there exists a relationship between Central Bank intervention and the foreign exchange market volatility.



LITERATURE REVIEW

2.1 INTRODUCTION

This chapter presents an overview of the foreign exchange market in the country and the role of intervention in the market. The research studied the theories behind the exchange rate formation, the possible mechanics of intervention and the models and hypothesis behind the intervention. The chapter also identifies the theoretical framework supporting the study and empirical literature review on studies done by various researchers from developed and developing countries on the responsiveness of the foreign exchange volatility to the intervention by Central Bank of Kenya. Finally the conceptual framework sought to identify the relationship between the dependent and independent variables through various models that could test the objectives.

2.2 THEORETICAL FRAMEWORK

Theoretically the exchange rate can be formulated using a number of theories while interventions in the foreign exchange rate volatility can be applied through a variety of channels that are not mutually exclusive. The mechanics of the Central Bank intervention will help us identify the ways that the intervention occurs.

2.2.1 Exchange rate theories

Many theories have been written in respect to the main determinant of future exchange rates but there are four main theories regarding the determinants of the exchange rates. They include Purchasing power parity, International fisher effect, Interest rate parity and Balance of payment theory. Although the majority of these theories give adequate reasons in order to explain what actually determines the rates between the currencies, there are many factors that may cause a

currency fluctuation. The research studied the Balance of payment Theory since Kenya is a big importer and exporter and it is seen to be the main cause of exchange rate movements.

2.2.1.1 Balance of Payments (BOP)

The balance of payments (BOP) is an accounting of a country's international transactions for a particular time period. Any transaction that causes money to flow into a country is a credit to its BOP account, and any transaction that causes money to flow out is a debit. There are two segments involved with a country's BOP, which is a listing of all transactions between one country and others during a particular period of time. This is a measure of influx and outgo of a nation's capital and goods. Normally, the BOP Theory looks at a country's current account rather than the capital accounts used to determine the direction that a currency is heading based on the trading of tangible goods. When a country's import outweighs their exports, this is considered a deficit and it normally devalues the currency. Conversely when exports exceed imports, a surplus exists and the currency will normally ascend in value. In Kenya the balance of payment theory mostly determines the price of the Kenya shilling against the US dollar since we are a major importing country than exporting as per the balance of payment statement by CBK. Kenya's imports have outweighed the exports causing an unfavorable effect on the country's competitiveness in the foreign exchange market (MPC October 2012).

2.3 The Mechanics of Central bank Intervention

Intervention can either be sterilized or non sterilized. Official intervention is said to be sterilized when the authorities simultaneously take action to offset official foreign asset holdings on the domestic monetary base. Sterilized intervention is thus change in the relative stocks of domestic and foreign assets held by the public but not related to any change in the monetary base. It is

found to have little systematic influence on the near-term nominal exchange rate expectations in the direction intended by the central banks (Miyajima 2013).

On the other hand, non sterilized intervention is a way of conducting monetary policy and occurs when the authorities buy or sell foreign currency, normally against their own currency without such offsetting actions. It affects the domestic money supply and therefore its effect on the exchange rate is contentious only in so far as the effects of changes in the money supply on the exchange rate are contentious (Taylor 1995). It can affect the exchange rate through central bank purchases and sales of domestic securities. This changes the stock of base money and thus changing the broader monetary aggregates, interest rates, real demand for goods, assets and market expectation (Vitale, 2002).

When a monetary authority buys or sells foreign exchange, its own monetary base increases/decreases by the amount of the purchase/sale. By itself, this type of transaction would influence exchange rates in the same way as domestic open market purchases/sales of domestic securities; however, many central banks routinely sterilize foreign exchange operations by reversing the effect of the foreign exchange operation on the domestic monetary base through buying and selling of domestic bonds (Edison, 1993).

2.4 CHANNELS OF INTERVENTION

Theoretically interventions in the foreign exchange market can affect the exchange rate through a variety of channels that are not mutually exclusive.

The channels include: signaling, portfolio balance and microstructure channels. They all depend on the exchange rate determination.

2.4.1 Signaling channel

The channel works by signaling to market participants the future stance of the monetary policy. The exchange rate in this case is treated as the asset price and is determined by the money supply. The intervention of the central bank only works if there exists policy credibility and by moving market participant's expectations of what future monetary conditions are likely to be closer to central banks' expectations (Seerattan, 2005).

Mussa (1981) concluded in his research that operations in the foreign exchange market by the Central Bank may be used to signal a forthcoming monetary policy this is because the Central Bank stakes its own capital in support of the future policy and may possess some private information on the fundamental value of a foreign currency that they can explain to influence market expectations and consequently alter the exchange rates. In developing countries where central banks credibility may be weak, the signaling channel may not be as effective as in developed economies. This means that the magnitude of intervention in these jurisdictions may have to be relatively larger to have a favorable impact.

Kathryn (2002) stated that signaling does not require that assets be considered imperfect substitutes and is operative only if at least some market participants observe the intervention operation and believe it conveys price relevant information. In the short run information content of intervention signals may not be common knowledge and so intervention operations may add to the rational confusion of the market.

2.4.2. Portfolio balance channel

In the portfolio balance channel, domestic and foreign assets are assumed imperfect substitutes. Investors allocate their portfolios to balance exchange rate risk against expected rate of return so intervention could lead to a change in the value of the exchange rate.

A recent study by Evans and Lyons (2001) focuses on the portfolio balance channel by assuming that private transactions can serve as a proxy for secret interventions. The interventions studied here are explicitly non-secret, in that the timing information for the operations is taken from contemporaneous Reuters' newswire12 reports, so that both channels of influence may be operative.

Kathryn (2002) stated that traders perceive domestic and foreign exchange assets as imperfect substitutes and hence an intervention would change the domestic to foreign assets held in the market. This in return changes the relative value of domestic currency since it becomes expensive to hold to the rebalance portfolio. The channel is mostly affected by non-official and non-informative intervention.

The portfolio balance model holds that sterilized purchases of the Kenya Shilling raises the dollar price because investors must be compensated with a higher expected return to hold the relatively more numerous U.S. bonds. To produce a higher expected return, the Kenya shilling price of the U.S. bonds must fall immediately. That is, the dollar price of Kenya shilling must rise (Nelly 2000).

2.4.2 Market micro structure

The structure was developed by Baccetta (2003) and provides a way to think why traders heterogeneity might lead to short run price and volatility effects in reaction to information revelation. The channel also provides a framework for understanding the process by which central bank interventions are observed and interpreted by traders.

Paolo (1999) has used the market micro structure model of the foreign exchange market to show that even secret operations can alter exchange rates. The market maker modifies the exchange rates in response to the order flow and the central bank on the other hand will influence

by altering the dealers expectation. The Central Bank in most cases posse's private information on the fundamental value that the dealers and customers are not aware of and later influences the dealer's expectations and alters the exchange rate. This means that the Central Bank should keep its intervention operations concealed if its objective is not equal to the fundamental value of the foreign currency.

The research seeks to identify whether the Central Bank intervention signals the market on a certain trend or expected level of the foreign exchange market. The Central Bank is also seen to balance the market portfolio by increasing or decreasing the reserves and through mopping or injecting liquidity into the market. The study will rely on both the signaling and portfolio balancing channel.

2.5 Empirical Framework

Central Bank interventions towards exchange rate volatility are not associated with an adjustment of the near-term exchange rate forecasts in the direction of depreciation. This suggests intervention may not change the near term exchange rate expectations but may have had unintended effects in the sense that it can lead to undesired volatility in the exchange rate.

Central banks choose to intervene for different reasons. The Foreign Currency Directive of the Federal Reserve System, for example, directs intervention to “counter disorderly market conditions,” which has been interpreted differently at different times. Often, excessive exchange rate volatility or deviations from long-run equilibrium exchange rates have prompted intervention. Multiple central banks often coordinate intervention, intervening in the same direction on the same day. The response rule of central bank intervention to economic conditions is known as the central bank's intervention reaction function. (Neely 2002)

Dominguez (1990) studies the relationship between weekly data on money surprises and intervention, and concludes that intervention anticipates monetary policy. Dominguez (1993) observed that exchange rates display a high degree of time conditional volatility in the UK and argued that the central bank had relied heavily on intervention policy to influence the level of exchange rates. Klein and Rosegren (1991) found the impact of intervention declines with time, while Kaminsky and Lewis (1992) used a regime switching model and found inconclusive evidence as to whether intervention correctly signaled changes in monetary policy. Piers (1997) examined the interaction between informed and uninformed traders gave rise to short term price leadership during periods of central bank intervention.

Karen (1996) investigated whether U.S. foreign exchange interventions during the late 1980s signaled a change in monetary policy. To address this question, she developed a methodology allowing intervention to signal shifts in monetary policy regimes. They tested and rejected the hypothesis that intervention provides no signal of future monetary policy. Thus intervention was informative about future monetary policy over the period. The research concluded that the estimates indicate that interventions signaled future monetary policy in the opposite direction from the signaling hypothesis for much of the period. When traders view intervention as signaling monetary policy changes in the opposite direction, these interventions were useful for predicting the future. Paolo (1998) in his research used the market micro structure model of the foreign exchange market to show that even secret operations can alter exchange rates concealed if its objective is not equal to the fundamental value of the foreign currency. The monetary authorities intervene in the foreign exchange market in order to target the value of a foreign currency. The foreign exchange market is more efficient when this objective is secret than when it is common knowledge. According to Paolo, sterilized

intervention has no impact on exchange rates though it's evident that the intervention is a useful instrument to alter exchange rates. The research seeks to address the issue on secrecy. Implying that central bank should conceal their operations in the market for foreign exchange. This is mostly applicable when the central bank intends to target the value of the exchange rate.

Kathryn (2002) later researched on how the U.S government intervened in the Dollar exchange market, but the USD either moved in the expected direction or didn't move at all. The markets' reaction to interventions differed over time and across different central banks. Interventions are expected to influence the exchange rate in two channels, the Portfolio balance channel and Signaling channel. The market micro structure approach is also a model that was found to analyze short term currency movements and economic theory. This was a structure used to understand the process by which central bank interventions are observed and interpreted by traders and how the process might result in exchange rate changes. The information content may not be common knowledge and so operations may add to the rational confusion in the market. Kathryn stated that traders perceive domestic and foreign exchange assets as imperfect substitutes and hence an intervention would change the domestic to foreign assets held in the market. This in turn changes the relative value of domestic currency since it becomes expensive to hold to the rebalance portfolio. A recent study by Evans and Lyons (2003) focuses on the portfolio balance channel by assuming that private transactions can serve as a proxy for secret interventions. The interventions studied here are explicitly non-secret, in that the timing information for the operations is taken from contemporaneous Reuters' newswire reports, so that both channels of influence may be operative. The channel is mostly affected by non-official and non-informative intervention. Anusha (2002) then tested the hypothesis that bid and ask spread volatility is the reaction to an intervention and it depends on the exchange rate target by

speculators in the foreign exchange market. Anusha identified the different models that different banks employ to interpret public information signals.

Nelly (2000) in his survey of monetary authorities' intervention practices reveals that a number of monetary authorities do intervene with some frequency in foreign exchange (mostly spot) markets. The desire is to check short-run trends or correct longer-term misalignments. There is a unanimous agreement that intervention does influence exchange rates. There is much disagreement about the horizon over which the full effect of this influence is felt, with estimates ranging from a few minutes to more than a few days. Dave (2006) established that the effectiveness of central bank intervention is determined by the impact and level of stability of the exchange rate. He also added that markets react differently and over different periods depending on the level of development of the economy. He concluded that intervention through sales of foreign exchange is not a useful policy tool to dampen volatility in the market either in terms of rate or liquidity

Edison (1993) looks at the conceptual issue of how we could be able to measure the effectiveness of central bank intervention by studying the profit derived from it. He looks at a previous study done by Friedman (1953) who was the first to study the use of profitability to measure the success of intervention. Friedman suggested that if the Government is to intervene they should measure the success by the profitability in that if it stabilizes the exchange market and makes a profit then it is successful and if suffers a loss then it is unsuccessful. He based his argument in the principle that central bank intervention should promote economic efficiency rather than slow exchange rate fluctuations. He concluded that intervention does not offer monetary authorities an independent policy tool for influencing the foreign exchange market and the only effect is felt through the signaling approach. In the same year Karen Lewis investigated

if intervention can be viewed as signaling changes in monetary future policy variables and whether changes in the monetary policy could stabilize the exchange rate movements. She concluded that monetary policy variables affect intervention and vice versa, this means there is a relationship between the two. She observed that central bank intervention does not alter the relative money supply of countries and hence should not have an effect upon the exchange rate. The signaling hypothesis shows that intervention induce traders in the market to alter their expectations of future monetary policy to imply intervention is related to monetary policy variables in a systematic way. The paper concluded that there is a relationship between the monetary variables, exchange rates, foreign exchange intervention.

Doroodian and Caporale (2001) provide additional empirical evidence on the topic of effectiveness of the Federal Reserve intervention on the United States exchange rate. Using a daily measure of exchange rate intervention in the yen/dollar for the period 1985–97, they found a statistically significant effect of intervention on spot rates. A generalized autoregressive conditional heteroscedasticity exchange rate equation is used to measure the impact of intervention on exchange rate uncertainty. The study finds that intervention is associated with a significant increase in the inter-day conditional variance (uncertainty) of both bilateral spot exchange rates. This supports the view of Friedman and Schwartz that exchange rate intervention serves to destabilize the foreign exchange market by introducing additional levels of exchange rate uncertainty.

A common way to study the effect of intervention on volatility is with a GARCH (1,1) model. Simatele (2004) investigated the effect of central bank intervention on the Zambian Kwacha. She uses a GARCH (1,1) model simultaneously estimating the effect of intervention on the mean and variance. She finds that central bank intervention in the foreign exchange market

increases the mean but reduces the volatility of the Zambian Kwacha. The explanation supports the ‘speculative bandwagon’ and a ‘leaning against the wind’ strategy. Although there is no attempt to distinguish through which channel intervention works, she argues that this is more likely to be a signaling effect rather than a portfolio balance. Later Adebisi (2007) investigated the impact of foreign exchange intervention in the Nigerian foreign exchange market using an Autoregressive Distributed Lag (ARDL) modeling approach. The overall finding is that foreign exchange intervention in Nigeria is sterilized because the cumulative aid, which constitutes part of the foreign exchange inflows, and net foreign assets variables, which are proxies for intervention, are not significant. The paper concludes by recommending that the use of stock of external reserves to support the exchange rate through increased funding of foreign exchange market should be encouraged.

Researchers have considered various success criteria. The most commonly used are the direction criterion and the smoothing criterion (Humpage 2000). The direction criterion defines intervention as successful if the purchased currency appreciates after an intervention. That is, a USD purchase would be successful if the dollar appreciated in the post-event window. But, mindful that most intervention is “against the wind”—that is, the authorities are buying the currency that is depreciating—one might also consider an official purchase to be successful if the purchased currency depreciates less in the post-event window than in the pre-event window. The standard that the intervention should moderate the pre-event trend in the exchange rate is known as the smoothing criterion. Once the success criterion is defined, one needs some method to evaluate whether it has been achieved. In strictly narrative studies, the researcher might simply graph the data or compute simple summary statistics, such as the percentage of successes or mean change in the exchange rate, to informally judge whether intervention has been successful.

Humpage (2000), for example, examines whether one can reject that the observed number of exchange rate changes of a given type (e.g, depreciations) come from a null distribution. In other words, for example, does the Japanese yen (JPY) depreciate more often than one would expect when the Fed sells JPY for USD? The number of successes under the null of no effect is distributed as a hyper geometric random variable. Humpage goes on further to test whether successful interventions are related to factors such as amount, coordination, and secrecy by regressing success indicators on those factors in a probability framework. Fatum and Hutchison (2003) similarly test whether the number of “successful” interventions is greater than one would expect if intervention were ineffective. And they use a “matched sample” t-test to ask whether the mean post-intervention exchange rate change is statistically significantly different from the mean pre-intervention change.

2.5.1 Limitations and Gaps

Vitale (1999) assumes that the central bank aims at minimizing a loss function that depends on the distance between the exchange rate, the target level and the cost of intervention. The Central Bank should behave as a stabilizing speculator and should accept the intervention cost so as to target the exchange rate. The research gap hence is if sterilized and open market operations are not coordinated, the former might affect the latter. Suggesting that a researcher can investigate how sterilized intervention affects the monetary policy and how this two policy instruments interrelate.

In Kathryn’s (2002) research there is a gap in that we can’t clearly indicate the number of days that one would use so as to clearly establish the effect of the intervention on an intraday basis. The research will seek to study the pre and post window even study so as to find out how long the market takes to react to an intervention.

Karen (1993) identifies the empirical relationship between intervention and money supply but the reason for the relationship is not yet apparent. The research sought to identify the theoretical evidence for this relationship.

The event study methodology does not control the effect of changes in other variables e.g. arrival of news regarding changes in policies. This issue is addressed by conducting a robustness test on a sub-sample of events during which central bank intervention does not coincide with interest rate changes by either the central bank. Second, the issue of endogeneity arises in our study since the central bank usually takes its cue to intervene on the basis of observed exchange rate movements. We define intervention events as a ‘cluster’ of related days of intervention activity, the final date of which is essentially the manifestation of when the central bank chooses to stop intervening. This ‘endogeneity’ may make intervention appear more effective. However, we argue that the appropriate measure of successful intervention is not the daily instantaneous impact on the exchange rate while the intervention activity is ongoing, but the cumulative effect after its completion (Hutchinson 2003).

An important goal in studying intervention and exchange rate behavior is to ascertain the effect of intervention on exchange rates. An event study, by definition, looks at the behavior of an asset price (e.g. exchange rates) around periods of intervention. This does not necessarily mean, however, that intervention causes the exchange rate behavior. To determine the effect of intervention on exchange rates, one must consider how all the variables that influence exchange rates and intervention interact (Neely 2002).

2.6 RELATIONSHIP BETWEEN THE CBK INTERVENTION AND THE FOREIGN EXCHANGE RATES

The Independent variable will be the CBK intervention through the direct and indirect methods while the dependent variable will be the foreign exchange rates volatility. Direct intervention is through sale of foreign currency into the spot market while the indirect intervention is through the purchase of repos and treasury bills. The foreign exchange volatility is determined by the calculating the variation in price within a certain period.

Independent Variable

Dependent Variable



The responsiveness of the intervention will be measured through studying the relationship between the foreign exchange rate volatility and the central bank intervention.

The research applied the GARCH Model, to measure volatility in the foreign exchange market

$$\delta^2_n = \gamma VL + \alpha u^2_{n-1} + \beta \delta^2_{n-1}$$

A multiple regression model was applied to study the relationship between the foreign exchange volatility and the central bank intervention. $Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + e$

An analysis of variance table will also tabulate the relationship between the Foreign exchange volatility and the CBK intervention.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

The chapter describes the design that was applied in the research, the target population and sample that assisted in data collection. The research later described the data collection and analysis techniques that was applied for the research.

3.2 Research design

The study adopted a descriptive research design. This is because the research used secondary data that would describe events in the market and was tabulated in form of tables and graphs after the data collection. The secondary data is also made available through the weekly CBK market update bulletins and the MPC bi-monthly bulletins.

The descriptive statistics also showed that the variables display many features of financial time series such as fat tails, skewness and volatility clustering.

3.3 Population and Sampling

The population was the forty three banks that are governed by the Central Bank while the sample was four of the Tier One banks that have offshore presence. This is because the main participants in this market are the larger international banks and the volumes required by their offshore banks would cause demand in the local market hence increase volatility in the market (African Economic outlook 2012). The four banks namely; CFC Stanbic Bank, Standard Chartered Bank, Barclays Bank and Citibank were reported to have had increased foreign exchange trading activity.

3.4. Data collection Methods

The research used secondary data from the Central Bank and primary data from guided interviews that were answered by the various market participants from the various target banks. The primary data was intended to help the research get first hand information on what happens in the foreign exchange market and the level of responsiveness to the intervention. It targeted the Tier One banks with offshore presence since they have greater influence in the market as compared to the other banks that have just local presence. In the secondary data, the research used a weekly data series from the CBK weekly bulletin and that are readily available on the

CBK website and the foreign exchange variables analyzed would be the exchange rate, foreign exchange reserves and the overnight rates.

The daily average trading levels of each day will be collected from the Central Bank of Kenya. The changes in the trading levels showed the market trends that the currency and interest rates have experienced over the period

The monetary policy committee meetings and the CBK weekly bulletins from the Central Bank provided the news that was in the market over the period and with the changes in rates and the other monetary variables the research was able to analyze the relationship.

The research adopted primary data in form of questionnaires so as to acquire the views of the main stakeholders, the market behavior over the period and the responsiveness in terms of duration of the foreign exchange rates.

3.5 Data Analysis Methods

The research used panel data through an event study analysis since it covers a period of 5 years. The event study analysis design was important since it assisted to analyze the prior and after reaction of the Central Bank intervention on the foreign exchange market. The event study methods defined an event window to include one or more intervention episodes together with non intervention days so as to ensure a balanced sample in the event window. Exchange rate changes that occurred in this event window are compared to the pre event window (Seerttan 2006).

Dominguez (1999) utilized an event study approach with intra daily data to capture micro structure elements in a model of central bank intervention in the foreign exchange market. Attempts by Dominguez have been made to study the effect of intervention on the level and volatility of the exchange rate in a unified framework using GARCH techniques.

The research sought to analyze data using the average weekly closing spot rate and get to see how the market reacted to an intervention. The research took account of the market conditions prior to the time of intervention and if the Kenya Shilling was appreciating or depreciating prior to intervention activity by measuring the volatility in the market. This helped to analyze whether the intervention was aimed at breaking an exchange rate movement. The new spot price was identified and thus the margin calculated and through the profit or loss, the research got to find out if the intervention was successful or not.

The research adopted the GARCH and the multiple regression models. We compared results from the GARCH model with those from the equilibrium exchange rate criterion. The first-order (p=q=1) GARCH model, suggested by Taylor (1986), has since become the most popular ARCH model in practice. The GARCH (p, q) model on which the study is based takes the form:

$$\sigma^2_n = \gamma v_L + \alpha u^2_{n-1} + \beta \sigma^2_{n-1}$$

Where:

σ^2_n = Garch Value

γ = Gamma

v_L = Changes in natural logarithms for exchange rates

α = Alpha

u^2_{n-1} = Return on exchange rates

β = beta

σ^2_{n-1} = Variance

The GARCH (p, q) model successfully captures several characteristics of financial time series such as volatility.

The study also adopted a multiple regression model which was applied to study the relationship between the foreign exchange volatility and the Central Bank intervention and regress each independent variable against the dependent variables. If they are positively correlated then the intervention was concluded to be responsive and vice versa.

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + e$$

Where Y = CBK intervention

X_1 = Direct Intervention

X_2 = Indirect Intervention

e = Random error term

β_0 = Regression constant

An analysis of variance table was used to tabulate the relationship between the foreign exchange volatility and the CBK intervention.

CHAPTER FOUR: RESEARCH FINDINGS

4.0 Introduction

This chapter presents the results and findings of the study on the research questions with regards to the data collected from the respondents. The chapter first presents the descriptive statistics on the background information of the respondents from the primary data so as to identify the duration of responsiveness and the market behavior before and after an intervention. This was followed by the trend analysis of the exchange rates fluctuations between the year 2010 and 2014 to identify the responsiveness of the foreign exchange monetary variable. The chapter finally presents the findings on the forex volatility in the market using the GARCH analysis and the relationship between CBK intervention and exchange rates volatility through the multi regression model. The research will also measure the time taken for the market to react to an intervention using an event study.

4.1 Background Information

This section offers the background information with regards to the market behavior over the years. This was put into consideration because of the meaningful contribution it offers to the study as the variables help to analyze the reasons for intervention and analyze the market players feel of the impact of the CBK intervention on the foreign exchange market.

4.1.1 Responsiveness of the foreign exchange rates

Respondents were also asked to state whether the offshore banks played an impact in causing volatility in the market. Majority of the respondents opined that the demand from the offshore banks is too huge to be serviced by just the local banks, so the local banks have to seek the currency from the other commercial banks and it often results in causing a shortage of supply in

the market, the lack of balance in the foreign exchange market causes volatility. Interventions are done at a regular basis depending on the kind of intervention whether direct or indirect, but intervention to the foreign exchange market only occurs when the currency moves out of hand i.e. out of the control of the market makers either out of excess demand or inadequate liquidity. Additionally the respondents expressed that the Central Bank intervenes to control the volatility in the market and not to move the local currency in a certain direction this is in support of the smoothing criterion. (Humpage,2000) who stated that intervention should moderate the pre-event trend in the exchange rate. The level of secrecy to an intervention is very high and also it was reported that it takes at most one week to observe the full effect of intervention on exchange rates. Finally the respondents reported that the intervention was a response to economic conditions as reflected in the monetary variables such as USD Reserves, Foreign exchange rates and Overnight interest rates.

4.2 Volatility of the Forex Exchange Market in Kenya

The first objective of the study was to establish the volatility of the foreign exchange market. The study made use of the GARCH (1,1) Analysis to measure the volatility of the foreign exchange market. The model was based on the assumption that forecasts of variance changing in time depend on the lagged variance of the foreign exchange market. An unexpected increase or fall in the returns of an asset at time t would generate an increase in the variability expected in the period to come.

Table 4.2: GARCH (1,1)

Year	2010	2011	2012	2013
Gamma	33%	33%	33%	33%
Alpha	33%	33%	33%	33%
Beta	33%	33%	33%	33%
Garch (1,1)	0.09%	0.20%	0.58%	0.41%

The table 4.2 shows a variance in GARCH (1,1),for all the four years. To mean that there was volatility in the Kenya forex market, with the most volatility being in 2012 with a value of 0.58% and the least volatility in 2010 with a value of 0.09%. These findings agree with Fatum and Hutchison (1999) who investigated whether daily intervention operations in the United States are related to changes in expectation over the stance of future monetary policy using a GARCH model for the period 1989-93. They concluded that the interventions of the Federal Reserve appear to have significantly increased the conditional variance of Federal funds futures rate as the conditional variance is positively and significantly related to the magnitude of intervention operations implying the higher the variance, the higher the volatility.

4.3 Responsiveness of the Foreign exchange rate volatility to the CBK intervention

The second objective of the study was to measure the responsiveness of the Foreign exchange rate volatility to the CBK intervention. First the study sought to analyze the CBK intervention in the foreign exchange market.

4.3.1 CBK Intervention in the Foreign exchange Market

Table 4.4 presents a summary of findings with regards to the number of interventions as well as the type of interventions made throughout the study period.

Table 4.3: Interventions Made by CBK

Year	No of interventions	Type	Change in rates
2010 Q1	12	Direct-omo	0.17%
Q2	8	Direct-omo	0.34%
Q3	3	Direct-omo	-0.74%
Q4	5	Direct-omo	0.53%
2011 Q1	7	Indirect-Auctions	0.43%
Q2	6	Direct-omo	1.15%
Q3	2	Indirect-Auctions	2.38%
Q4	4	Indirect-Auctions	-1.09%
2012 Q1	11	Indirect-Auctions	-0.33%
Q2	6	Indirect-Auctions	0.17%
Q3	16	Indirect-Auctions	0.05%
Q4	13	Indirect-Auctions	0.08%
2013 Q1	5	Direct-omo	-0.03%
Q2	5	Direct-omo	-0.01%
Q3	11	Direct-omo	0.16%
Q4	5	Direct-omo	-0.16%
2014 Q1	4	Indirect-Auctions	0.05%
Q2	10	Direct-omo	0.11%
Q3	6	Direct-omo	0.11%
Q4	9	Direct-omo	0.13%

*OMO - Open Market Operations

As seen in the table 4.4, the year 2010 saw 28 interventions made over one year, 2011 had 31 interventions, 2012 had 17 interventions, and 2013 had 48 interventions while 2014 had 37 interventions. 60% of the intervention was direct while the other 40% was indirect that occurred when CBK was out of the foreign exchange market. The main type of intervention was the direct intervention in the foreign exchange market and through the open market operations. The foreign exchange rates over the year are reducing in rates over the period to mean that the intervention was responsive over the year with the shown percentage change. The changes in foreign exchange rates were either positive or negative, depending on the type of intervention and the market liquidity. The positive change meant that even though there was intervention the rates didn't move down, hence market was not responsive but the negative sign shows that the market responded well by having the Foreign exchange rates become better than before. Edison, 2007 in his study concluded that when a monetary authority buys/sells foreign exchange, its own monetary base increases/decreases by the amount of the purchase/sale. By itself, this type of transaction would influence exchange rates in the same way as domestic open market purchases/sales of domestic securities; however, many central banks routinely sterilize foreign exchange operations; that is, they reverse the effect of the foreign exchange operation on the domestic monetary base by buying and selling domestic bonds.

4.3.2 Responsiveness of the foreign exchange Rate to CBK intervention

This section evaluates the secondary data from the weekly bulletins, by use of graphs on a yearly basis so as to compare the changes in rates to the other monetary variable especially USD reserves that play a huge role in the foreign exchange market liquidity. This supports Edison (1993) who concluded the potential responsiveness of direct intervention depends upon the

amount of reserves the central bank can use for the purpose. This is further explained by the GARCH model to elaborate the evaluation of the models.

The section shows the responsiveness of the market over the period 2010 to 2014. This was measured by regression of the foreign exchange volatility compared to the CBK intervention. The research also compared the data presented in the weekly bulletins and compared over the period. The following subsection shows that the CBK intervenes in the foreign exchange market primarily to ease liquidity tightness in money markets. This is because a liberalized foreign exchange market environment implies that the CBK cannot dictate the value of the Kenyan shilling and cannot target a certain level of the Kenya Shilling depreciation so as to intervene. However, the CBK can only influence the value of the Kenyan shilling by buying foreign exchange when there is an excess in the market and selling when there is a shortage. This means therefore that in theory, the CBK can maintain a stable exchange rate by intervening in the foreign exchange market. In practice however, the CBK has to consider the monetary implications as well as the implications of such interventions on the position of official foreign reserves.

It therefore means inadequate capacity for the CBK to support the market effectively, thereby affecting the surplus/demand balance in the market. Overall, the CBK has to do a lot of portfolio balancing in managing the exchange rate so as to ensure the achievement of a stable exchange rate, and which does not come at the expense of inflation and the depletion of foreign exchange reserves.

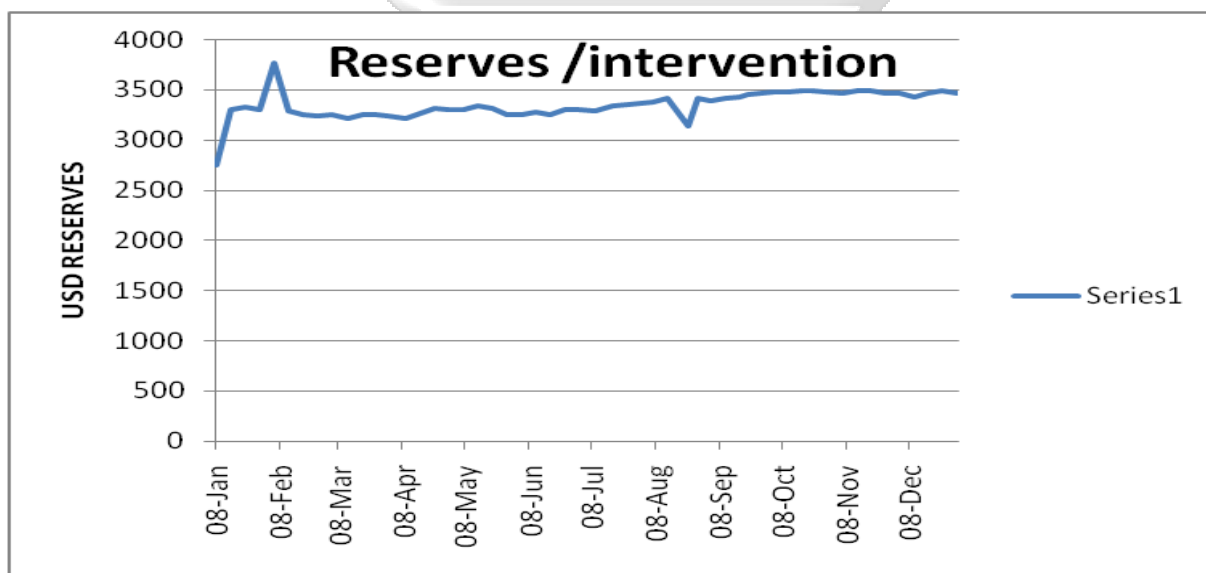
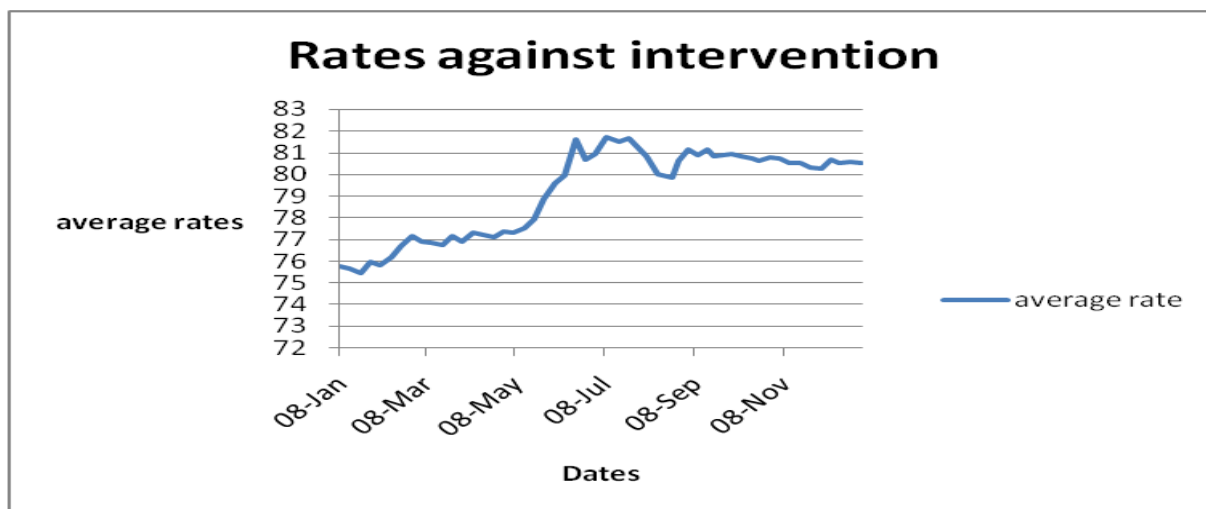


Figure 4.1: CBK Intervention 2010

As seen in figure 4.1, interventions made by the CBK in the year 2010 through the, purchases or sales of foreign currency resulted to changes in the average exchange rates. In the month of March and April an increase in the average foreign exchange rates resulted in CBK intervention through the sale of forex reserves.

Figure 4.2 further presents CBK interventions in the year 2011.

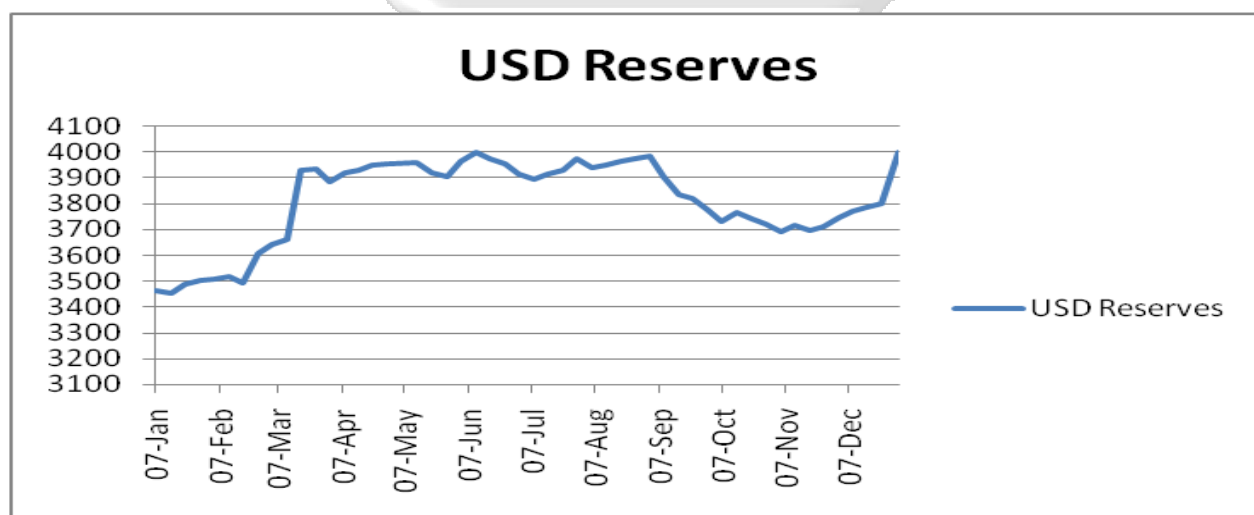
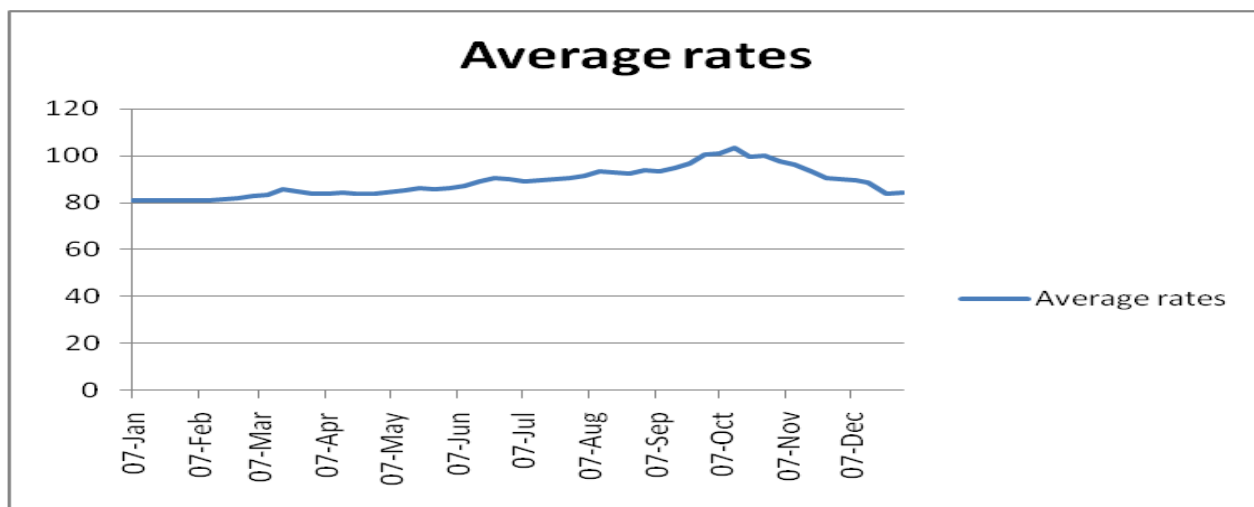


Figure 4.2: CBK Intervention 2011

As seen in figure 4.2, interventions made by the CBK in the year 2011 through the, purchases or sales of foreign currency resulted to changes in the average exchange rates. In the month of September there were soaring foreign exchange rates that triggered the CBK to sale of forex reserves so as to reduce the foreign exchange rates. This indeed resulted in a drop in the foreign exchange rates in the period.

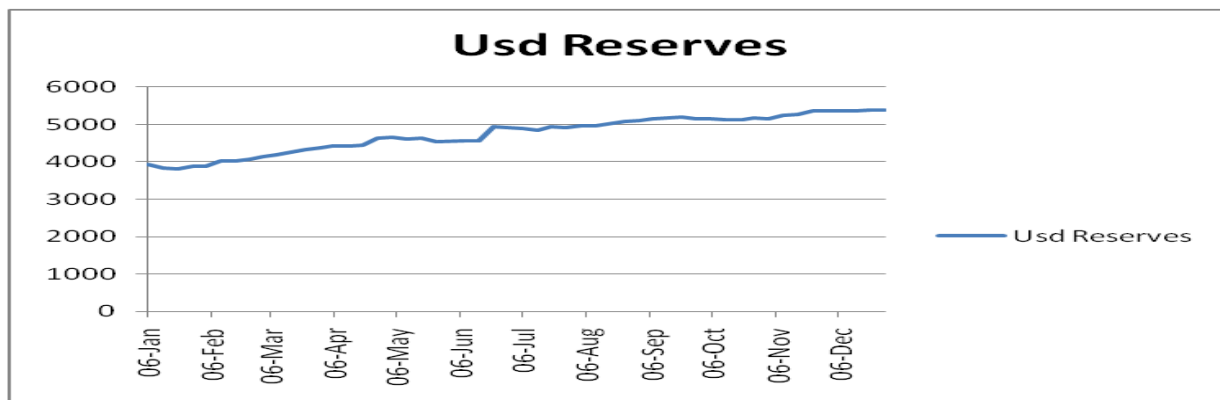
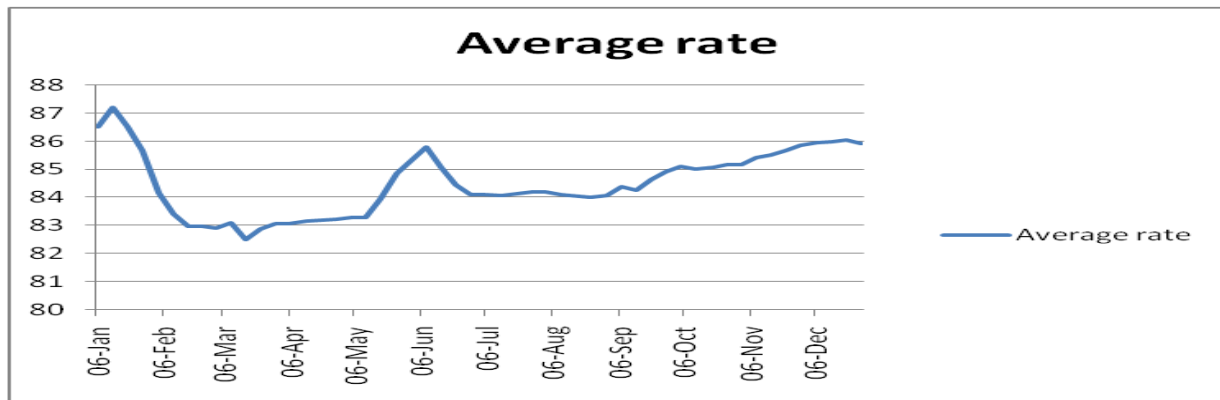


Figure 4.3: CBK Intervention 2012

As seen in figure 4.3, interventions made by the CBK in the year 2012 through the, purchases or sales of foreign currency resulted to changes in the average exchange rates. In the month of June there were soaring foreign exchange rates that triggered the CBK to sale of forex reserves so as to reduce the forex rates. This indeed resulted in a drop in the foreign exchange rates in the period between July and September 2012.

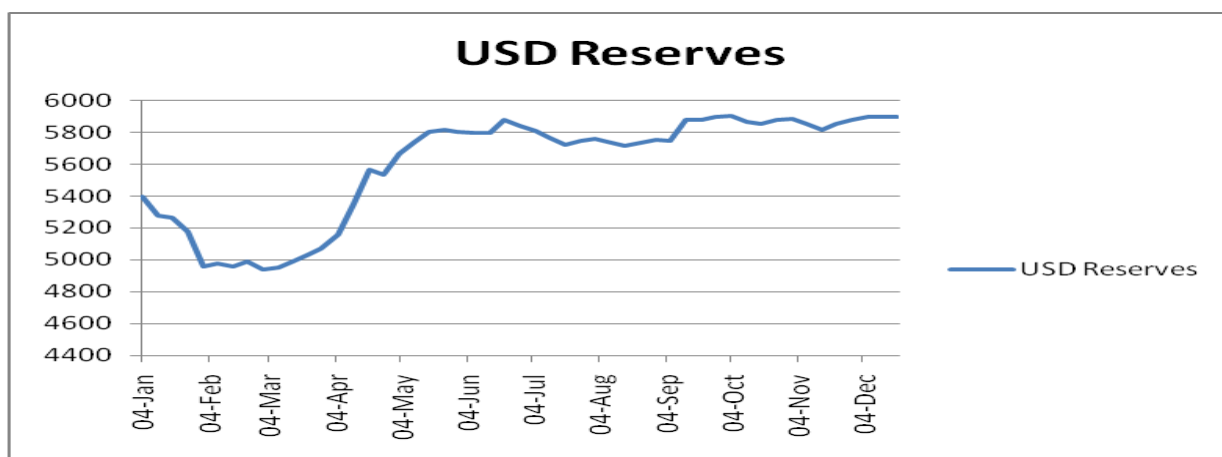
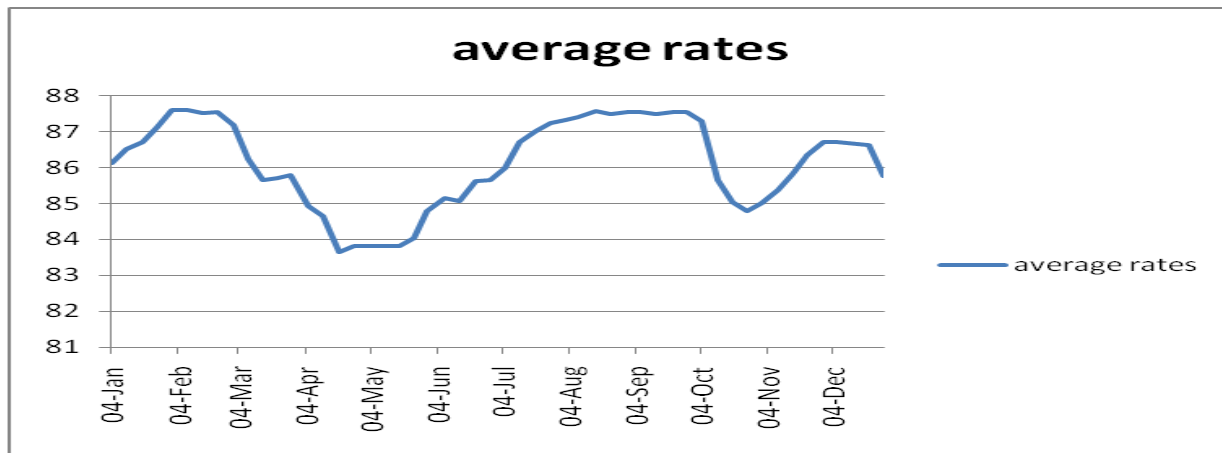


Figure 4.4: CBK Intervention 2013

As seen in figure 4.4, interventions made by the CBK in the year 2013 through the purchases or sales of foreign currency resulted to changes in the average exchange rates. In the month of June there were soaring foreign exchange rates that triggered the CBK to sale of forex reserves so as to reduce the foreign exchange rates. This indeed resulted in a drop in the foreign exchange rates in the period between August and November 2013. The study findings were based on the assumption that assets denominated in different currencies are imperfect substitutes and as such purchases of foreign currency would change the relative supply of domestic to foreign assets which would eventually lead to a change in the relative value of the domestic currency as traders

would require a higher risk premium to hold the re-balanced portfolio. The findings agreed with Vitale (1999) who said that we assume that the monetary authorities intervened in the foreign exchange market in order to target the value of a foreign currency. The foreign exchange market was more efficient when this objective is secret rather than when it is common knowledge. According to Paolo, sterilized intervention has no impact on exchange rates though it's evident that the intervention is a useful instrument to alter exchange rates. The research seeks to address the issue on secrecy, implying that central banks should conceal their operations in the foreign exchange market. This is mostly applicable when the central bank intends to target the value of the exchange rate.

4.3.3 Regression results

Regression analysis was used to measure the responsiveness of the foreign exchange rate volatility to the CBK intervention.

The following regression model was used.

$$Y = 81.55 - 1.041 X_1 - 1.033 X_2 + e$$

As per table 4.5

Where Y = CBK intervention

X_1 = Direct Intervention = 81.55

X_2 = Indirect Intervention = (1.041)

e = Random error term = (1.033)

β_0 = Regression constant

The model summary on the relationship between CBK intervention and the foreign exchange rate volatility is presented in table 4.4. the model used both direct and indirect interventions.

Table 4.4: Responsiveness of Forex Volatility to CBK Intervention

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.794 ^a	.621	.501	3.2500

a. Predictors: (Constant), CBK Intervention

The adjusted R squared value in Table 4.4 was 0.501 implying that only 50.1% of foreign exchange volatility is stabilized by CBK intervention, the remaining 49.9 % is explained by other market factors. The standard error term is 3.2500, which is a measure of variability in the sampling distribution of the statistic. A low standard error means there is relatively less spread in the sampling distribution.

The ANOVA results on the relationship between responsiveness of foreign exchange market volatility and CBK intervention is presented in table 4.6.

Table 4.5: Analysis of variance Table

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	64.124	1	64.124	5.952	.084 ^b
	Residual	32.318	3	10.773		
	Total	96.443	4			

a. Dependent Variable: foreign exchange volatility

b. Predictors: (Constant), (Direct/Indirect) Intervention

The study findings as seen in table 4.5 reveal that the model was insignificant. This is because the F value was not significant at 5.952; the level of significance was at 0.084 which was above the 0.05 to show even though there is a relationship, but is insignificant. The mean square value was also at 64.124.

The coefficient results on the relationship between responsiveness of the foreign exchange volatility and CBK intervention is presented in table 4.7.

Table 4.6: Coefficients of intervention

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
Constant	81.5553	32.0481		2.045	.077
Direct Intervention	-1.041	0.3451	-.598	-3.001	0.67
Indirect Intervention	-1.003	0.4301	-.674	-2.110	.077

a. Dependent Variable: Responsiveness of foreign exchange

As depicted in Table 4.6, it was revealed that there exists a negative relationship between responsiveness of forex volatility and CBK intervention with a beta value of -1.003 for indirect intervention and -1.041 for direct intervention and a t value of -2.110 during indirect intervention and -3.001 during direct intervention and p value of 0.77 for indirect intervention and 0.67 for indirect intervention, implying that the relationship was insignificant. In terms of the significance of the predictor variables, the individual variables whose t-values are significant ($p < 0.05$) then we reject the null hypothesis and accept the alternative hypothesis.

4.4 Chapter Summary

This chapter presented the results and findings of the study on the research questions with regards to the data collected from the respondents. The chapter presented descriptive statistics on the background information of the respondents. This was followed by the trend analysis of the exchange rate fluctuations between the year 2010 and 2014. The chapter also presented the findings on the relationship between CBK intervention and forex rates using the secondary data; the GARCH analysis was offered to present the findings on the volatility in the market and a multiple regression analysis to compare the relationship between the foreign exchange volatility and the CBK intervention so as to respond to the study on the responsiveness. The study revealed that interventions made by the CBK in the year 2010 to 2014 through the purchases or sales of foreign currency resulted to changes in the average exchange rates. This is because an increase in the average forex rates resulted in CBK intervention through the sale of forex reserves.

The study also revealed that the GARCH (1,1), value varied over the years, with most volatility experienced in 2012 with a value of 0.58%. The GARCH value is an implication of the variance in the foreign exchange rates over the year.

The study revealed that only 62.1% of responsiveness of forex rate volatility is explained by CBK intervention. The remaining 37.9 % is explained by other factors. The standard error term is 3.2500, which is a measure of variability in the sampling distribution of the statistic. A low standard error means there is relatively less spread in the sampling distribution. It was also revealed that the model was insignificant. This is because the F value was not significant at 5.952.

The multiple regression model concluded that there exists a negative relationship between responsiveness of forex volatility and CBK intervention with a beta value of -1.003 for indirect intervention and -1.041 for direct intervention and a t value of -2.110 during indirect intervention and -3.001 during direct intervention and p value of 0.77 for indirect intervention and 0.67 for indirect intervention. Finally it was shown that the foreign exchange market takes at most one week to fully respond to an intervention and that the central bank intervenes with an aim of controlling the volatility and not changing the exchange rates to a certain level. The market is still left to distribute the liquidity amongst itself.



SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.0 Introduction

This chapter consists of four sections, namely summary, discussion, conclusions, and recommendations following that order. The first section provides a summary of the important elements of the study which includes the study objectives, methodology and the findings. The second section discusses the major findings of the study with regards to the specific objectives. The third section discusses the conclusions based on the specific objectives, while using the findings and results which are obtained in the fourth chapter.

5.1 Summary

The main objective of the study was to examine the responsiveness of the foreign exchange market to CBK intervention. The study was guided by the following objectives: to establish the forex volatility in the market, to examine the responsiveness of the foreign exchange rate to the CBK intervention and to establish how long the market takes to react to an intervention. The population was the forty three commercial banks that are governed by the Central Bank while the sample was the four Tier One banks that have offshore presence. The research adopted an event study analysis design so as to analyze the prior and after reaction of the Central Bank intervention on the foreign exchange market. The event study methods defined an event window to include one or more intervention episodes together with non intervention days so as to ensure a balanced sample in the event window. Exchange rate changes that occur in this event window are compared to the pre event window.

The study revealed the year 2010 saw 28 interventions made over one year, 2011 had 31 interventions, 2012 had 17 interventions, and 2013 had 48 interventions while 2014 had 37 interventions. 60% of the intervention was direct while the other 40% was indirect.

It was also revealed that interventions made by the CBK in the year 2010 to 2014 through the purchases or sales of foreign currency resulted to changes in the average exchange rates. This is because an increase in the average forex rates resulted in CBK intervention through the sale of forex reserves. Thus we can conclude that every intervention causes a change in exchange rate volatility either in a positive or negative direction depending on the impact of the intervention to the need in the market. Dave Seerattan (2006) in his study established that the effectiveness of central bank intervention is determined by the impact and level of stability of the exchange rate. He also added that markets react differently and over different periods depending on the level of development of the economy.

The study also revealed that the GARCH (1,1), value varied for all the four years. The increase in the GARCH value is an implication that the variance in exchange rates also change over the years. The responsiveness of forex volatility to the CBK intervention had a beta value of -1.003 for indirect intervention and -1.041 for direct intervention, implying that there was a better relationship between direct interventions than indirect intervention. The results suggest that the CBK intervenes in the market to stabilize the volatility in the market and not necessarily cause a reduction in the rate of depreciation of the Kenya Shilling in the market. The explanation supports the 'speculative bandwagon' and a 'leaning against the wind' strategy by Simatele (2004) who argued that this it is more likely to be a signaling effect rather than a portfolio balance.

Finally the study revealed that only 62.1% of responsiveness of forex rate volatility is explained by CBK intervention. The remaining 37.9 % is explained by other factors. It was also revealed that the model was insignificant, because the F value was not significant at 5.952; the level of significance was at 0.084 which was above the 0.05 to show even though there is a relationship, it is insignificant. The mean square value was also at 64.124. Finally it was shown that there exists a negative relationship between responsiveness of forex volatility and CBK intervention with a beta value of -1.003 and a t value of -2.110 and p value of 0.77. In terms of the significance of the predictor variables, the individual variables whose t-values are significant ($p < 0.05$), then we reject the null hypothesis and accept the alternative hypothesis. Christopher Nelly (2000) in his survey of monetary authorities' intervention practices revealed that a number of monetary authorities do intervene with some frequency in foreign exchange markets. The desire is to check short-run trends or correct longer-term misalignments. There is unanimous agreement that intervention does influence exchange rates.

5.2 Conclusions

The study concludes that interventions made by the CBK in the year 2010 to 2014 through the purchases or sales of foreign currency resulted to changes in the average exchange rates. This is because an increase in the average forex rates resulted in CBK intervention through the sale of forex reserves.

The study also concludes that there exists a negative relationship between responsiveness of forex volatility and CBK intervention. This is because only 62.1% of responsiveness of forex volatility is explained by CBK intervention. The remaining 37.9 % is explained by other factors. It was also revealed that the model was insignificant, this is because the F value was not significant at 5.952. Finally it was shown that there exists a negative relationship between

responsiveness of forex volatility and CBK intervention with a beta value of -1.003 and a t value of -2.110 and p value of 0.77. In terms of the significance of the predictor variables, the individual variables whose t-values are significant ($p < 0.05$), then we reject the null hypothesis and accept the alternative hypothesis.

5.3 Recommendations

From the findings of this research, the study recommends that CBK should explore avenues to enhance capacities within the retail banks for managing foreign currency risk exposure. They should explore the route of continued education for those in workplaces through short term training that should be very practically oriented. This could involve professional organizations for finance specialists, bankers, accountants and consultants. This would assist the major stakeholders to understand what really causes an intervention and the level of responsiveness and avoid speculation and if the speculators want to trade in the market, to understand the dynamics of the exchange rate movements and CBK intervention. Such training should ideally be out of site because of the need to meet participants from diverse businesses and orientations for training and assessment to avoid internal interruptions. These trainings should not only cover foreign currency risk alone but rather could be preceded by introductory contents on the import-export trade and the practical market challenges facing the industries and all market makers and takers. As found out in this study, the exchange fluctuations faced by banks, forms a significant component of their risk profile. It is therefore imperative that the CBK intervenes so as to effectively manage forex fluctuation.

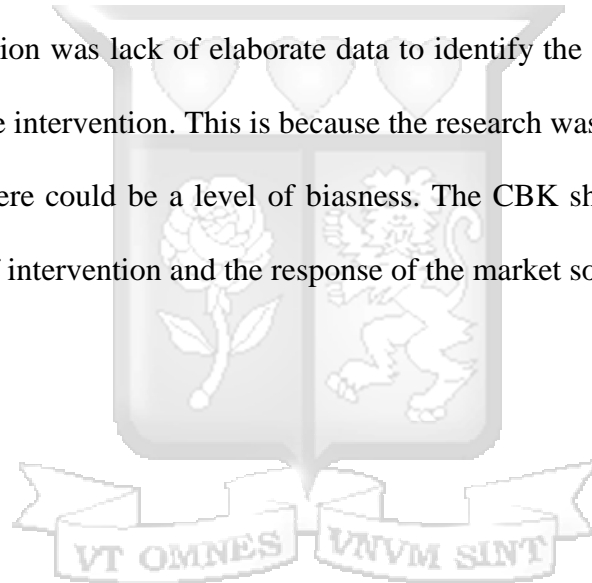
The research identified the need for information. Given that the markets thrive on information, the authorities should strengthen the information dissemination process and

sensitize the market players on the meaning of key macroeconomic aggregates and their implication on the market.

The CBK should focus on reducing speculation in the foreign exchange market since it increases volatility even more with the increased expectation of intervention in the market, hence the CBK should intervene faster to avoid the currency depreciating even further and control volatility early enough.

5.4 Limitations

The major limitation was lack of elaborate data to identify the levels of intervention and the level of secrecy of the intervention. This is because the research was dependent on the market players' response and there could be a level of biasness. The CBK should make it clear in the bulletins on the causes of intervention and the response of the market so as to be more informed.



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APPENDICES

Appendix I: Introductory Letter

P.O. BOX

NAIROBI.

DATE:

Dear Respondent,

I am pleased to inform you that I am a graduate student at Strathmore University pursuing a Master's of Commerce degree. As partial fulfillment of the course, I am conducting a research assessment on **“EVALUATION OF THE RESPONSIVENESS OF THE FOREIGN EXCHANGE RATE TOWARDS INTERVENTION BY THE CENTRAL BANK OF KENYA”**.

This study focuses on commercial banks in Kenya from which you have been selected as one of the respondents. The result of this study will provide the necessary information on the research.

This is an academic research and confidentiality is strictly emphasized. Your name will not appear anywhere in the report. Kindly spare a few minutes to complete the questionnaire attached.

Thank you in advance,

Yours Faithfully,

Ellaine Wanjiru

Questionnaire

1. Does the foreign exchange volatility contribute significantly to CBK intervention?

Yes ()

No ()

(b) Does central bank intervene into the foreign exchange market in time?

Just in time ()

Late ()

Not sure ()

2. How responsive is the CBK intervention as per the below main goals.

(a) In stabilising exchange rate at desired level(Direction Criterion)

Responsive most of the time () Sometimes responsive () Never or rarely responsive ()

(b) In calming disorderly markets (smoothing criterion)

Responsive most of the time () Sometimes responsive () Never or rarely responsive ()

3. (a) what is the size of intervention by central bank of Kenya in the foreign exchange market?

In millions of Dollars () as a percentage of average FX market turnover () as a percentage of average FX54 reserves ()

(b) What is the perception of the size of intervention with respect to the market expectation?

Small ()

Adequate ()

More than enough ()

(c) What are the main channels of intervention by CBK that affect the value of the exchange rate?

Signalling ()

Portfolio Balancing ()

Market microstructure ()