THE EFFECT OF FOREIGN EXCHANGE RATE VOLATILITY ON THE FINANCIAL PERFORMANCE OF COMMERCIAL BANKS IN KENYA

BY

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DECLARATION

This research project is my original work and has not been presented for examination in any other university.

Signed…… Date……...

FAITH GATWIRI MUTWIRI **REG: D61/72769/2009**

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

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DEDICATION

This project is dedicated to my dear family; my husband Edwin Tito Wekulo Okiah, my son Alpha Baraka Tito and my Niece Purity Heiz Kageni.

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ABSTRACT

Realized volatility is a measure of actual price volatility, based on past prices over a given time period. It is sometimes called historical volatility or historical deviation. Realized volatility stands in contrast to implied volatility, which is based on expectations of future price movement. Realized volatility can be calculated and expressed in different ways, such as in terms of indexes Kenya like many other developing countries has adopted a floating rate regime which means that the price of the Kenya Shilling (Kshs.) with respect to other currencies is set by market forces of demand and supply. As per commercial banks' foreign exchange trading activities audit by Central Bank of Kenya (CBK) in 2011, the main drivers responsible for the increase in the level of activities during this period were identified as "reverse carry" deals, shortening of the tenor of currency swaps, the preference by Kenyans to hold their wealth in foreign currency and the use of Electronic Brokerage System (EBS) for foreign exchange trading.

The research method that was adopted in this research is the quantitative method since the main concern was the relationships between the variables and analysis of the causal using numerical data and statistics. The quantitative method focuses on the measurement and analysis of causal and effect relationship between variables. Exchange rate volatility was looked at by establishing the daily ratio of the day's exchange rate to the previous day.

The study findings showed that there was high volatility in foreign exchange rate within the first quarter of 2008 (January and March). The volatility reduced, almost evened out between the second and third quarter of the year before increasing in the beginning of the third quarter. Moreover the study used tolerance and Variance Inflation Factor (VIF) values for the predictors as a check for multicollinearity. Tolerance indicates the percent of variance in the independent variable that cannot be accounted for by the other independent variable while VIF is the inverse of tolerance. Finally, the study showed that tolerance values ranged between 0.221 and 0.633 while VIF values ranged between 1.579 and 4.526. Since tolerance values were above 0.1 and VIF below 10, then were was no multicollinearity in the model.

The study recommends that since there are several economic implications of these results for both business policy and public policy. Firstly, when the market is inefficient in processing information, it implies that there are significant lags between dissemination of information and market participant's reaction to news. These information lags could arise from market segmentation and/or poor utilization of information communication technologies in the market. Therefore, to improve the information efficiency in the foreign exchange market, the government should consider using information technology infrastructure to provide information on exchange rates to the wider public. This is already happening with respect to the stock market. For individuals and businesses, this implies that they can profitably utilize their sophisticated IT infrastructure to gather information and exploit it to earn profits

in the foreign exchange market. Secondly, persistence and nonlinearity in volatility also suggest inefficient information processing in the market. This could be attributed to irrationality or heterogeneous expectations or risk aversion in the market that causes participants to herd together. Therefore, the CBK needs to intervene in the market to reduce information asymmetry and speculation, which could be contributing to nonlinearity and persistence in volatility.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

ATM	Automatic Teller Machines
ATR	Average Time Range
CAR	Capital Adequacy Ratio
CBK	Central Bank of Kenya
CRB	Credit Reference Bureau
DTMs	Deposit Taking Microfinance
EBS	Electronic Brokerage Systems
FX	Foreign Exchange Rate/ Forex Rate
GDP	Gross Domestic Product
IAS	International Accounting Standards
KBA	Kenya Bankers Association
KSHS	Kenya Shillings
MFC	Mortgage Finance Company
MPC	Monetary Policy Committee
NBFI	Non-Banking Financial Institution
NPA	Non-Performing Assets
RER	Real Exchange Rate
SPSS	Statistical Package for Social Sciences
US	United States of America
USD	Unites States of America Dollar
VIF	Variance Inflation Rate

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Kenya like many other developing countries has adopted a floating rate regime which means that the price of the Kenya Shilling (Kshs.) with respect to other currencies is set by market forces of demand and supply. As per commercial banks' foreign exchange trading activities audit by Central Bank of Kenya (CBK) in 2011, the main drivers responsible for the increase in the level of activities during this period were identified as "reverse carry" deals, shortening of the tenor of currency swaps, the preference by Kenyans to hold their wealth in foreign currency and the use of Electronic Brokerage System (EBS) for foreign exchange trading (CBK, 2012).

Reverse carry transactions allowed an off-shore financial institution with counter-party agreements with banks in Kenya to borrow Kenya shillings and buy and hold US dollars. Secondly, there was increased use of swap derivatives by banks to fund their short or long US Dollar or Kenya Shilling positions as a means of hedging their customers' requirements. Prior to the period of Kenya Shilling instability, the currency swap tenor was 60 to 90 days. However, given the volatility in the foreign exchange market, investors preferred shorter tenor swaps creating even more volatility. In addition, due to the weakening of currencies in other markets, most Kenyan exporters preferred holding their wealth in US dollars.

The audits also revealed that original foreign exchange platforms being used by the Kenyan Banks were "voice driven" which required foreign exchange brokers to

transact over the phone. However, the new EBS allowed for the matching of orders on an electronic screen and had the advantage of speed and cost reduction and hence became more prominent. It was observed that the system exposed the market to a range of external players and allowed for a much higher level of activity in the market and was therefore contributing to the rapid activity in foreign exchange trading and volatility of the exchange rate (CBK, 2012). Due to the main role commercial banks played in creating foreign exchange rate volatility during this period, this research study is borne in order to find out the effect of foreign exchange volatility on their financial performance.

1.1.1 Foreign Exchange Rate Volatility

The definition of volatility in forex trading is how much a price fluctuates over a period of time. A market with a high and erratic price range is said to have high volatility and vice versa (Forex Trading Charts.com, 2013). Realized volatility is a measure of actual price volatility, based on past prices over a given time period. It is sometimes called historical volatility or historical deviation. Realized volatility stands in contrast to implied volatility, which is based on expectations of future price movement. Realized volatility can be calculated and expressed in different ways, such as in terms of indexes (CME Group, 2013).

The measurement of the volatility depends on the particular situation. For example, one could calculate the realized volatility for the forex market in May of 2013 by taking the standard deviation of the daily exchange rates within that month. One could look at the realized volatility between 10:00AM and 11:00AM on June 23, 2013 by calculating the standard deviation of one minute exchange rates (CME Group, 2013).

Historical volatility is a measure of a security's stability over a given period of time. While there are various ways to calculate it, the most common way is to compute the average deviation from the average price over the period of time one wishes to measure. The historical volatility is often compared to the implied volatility to determine if a security is overvalued or undervalued. Generally, securities with a higher historical volatility carry more risk. It is also called realized volatility or the standard deviation (Farlex Financial Dictionary, 2012).Nominal and real measures of exchange rates are used in two specifications of volatility: absolute percentage changes and standard deviations. Short-term exchange rate volatility can be estimated using time series econometric techniques, and it can be calculated from market-determined option prices. Both approaches to measuring short-term volatility have their merits. Time series estimates of the conditional variance of exchange rates provide an ex-post measure of daily or weekly volatility. Studies by Westerfield (1977) and Hsieh (1988) find evidence of unconditional leptokurtosis in daily exchange rate changes. This suggests that there exists temporal clustering in the variance of exchange rate changes: large changes are followed by large changes and small changes by small changes.

Developed by Wilder (1978), the Average True Range (ATR) is an indicator that measures volatility. As with most of his indicators, Wilder designed ATR with commodities and daily prices in mind. Commodities are frequently more volatile than stocks. They are often subject to gaps and limit moves, which occur when a commodity opens up or down its maximum allowed move for the session. A volatility formula based only on the high-low range would fail to capture volatility from gap or

limit moves. Wilder created Average True Range to capture this "missing" volatility. It is important to remember that ATR does not provide an indication of price direction, just volatility.

1.1.2 Financial Performance of Commercial Banks

Financial performance is a subjective measure of how well a firm can use assets from its primary mode of business and generate revenues (Investopedia, 2013). This term is also used as a general measure of a firms' overall financial health over a given period of time and can be used to compare similar firms across the same industry or to compare industries or sectors in aggregation (Hales, 2005). There are many different ways to measure financial performance but all measures should be taken in aggregation. Line items such as revenue from operations, operating income or cash flow from operations can be used as well as total unit sales. Furthermore, the analyst or investor may wish to look deeper into financial statements and seek out margin growth rates or any declining debt (Hales, 2005).

Sound financial health of a bank is the guarantee not only to its depositors but is equally significant for the shareholders, employees and the whole economy as well. As a sequel to this maxim, efforts have been made from time to time, to measure the financial position of each bank and manage it efficiently and effectively. The purpose of CAMELs (Capital adequacy, Asset quality, Management capability, Earnings capacity, and Liquidity) ratings is to determine a bank's overall condition and to identify its strengths and weaknesses in Financial, Operational and Managerial aspects. Despite the use of CAMEL Model by regulators to assess financial performance of banks, inefficiencies in performance have been experienced. Some

countries have shifted to other Models like EAGLES (Earning ability, Asset quality, Growth, Liquidity, Equity and Strategy).

Githinji (2010) did a study on the relationship between financial performance and CAMEL rating of commercial banks in Kenya. It focused on banks registered by the Central Bank of Kenya. From the findings of the study it was concluded that although CAMEL Model is used to measure financial performance of banks by regulators, no one factor in CAMEL Model is able to capture the wholistic efficiency of a bank. He also argued that no one CAMEL rating factor taken separately from the others could influence the financial performance of a bank. Therefore the CAMEL Model rating factors were to be considered together as a combination and are inter-related.

1.1.3 Effect of Foreign Exchange Rates Volatility on Financial Performance of Commercial Banks

For the exchange rate sensitivity, earlier empirical studies generally assumed that firms' equity returns only depend on contemporaneous changes in exchange rates. However, empirical evidence by Amihud (1994) and Bartov & Bodnar (1994) suggest that there is a lagged relation between changes in exchange rates and firm values due to mispricing. Bartov & Bodnar (1994) formulate this lagged response hypothesis and conjecture that investors may have difficulties to characterize the relation between changes in exchange rates and firm performances, and thus equity values, if time series data are limited.

Foreign exchange rate volatility has a positive and negative impact on commercial banks financial performance. It impacts negatively to commercial banks when it leads to losses which therefore affect the profitability of banks and positively when it leads

to foreign exchange gain which leads to profits that increase the profitability of banks. Foreign exchange rate volatility could be an important source of risk for commercial banks. In the worst case, large foreign exchange losses due to foreign exchange rate volatility could lead to bank failures. Even for a mild scenario, foreign exchange losses could cause huge burdens on banks' profitability. Due to their serious implications for risk management and banking sector stability, measuring banks' foreign exchange exposure has long been a core interest of risk management professionals, academics, and central banks.

According to International Accounting Standards 21 (IAS 21), the effects of changes in foreign exchange rates, provides a detailed description of the accounting techniques put in place to guide most organizations in recognition of foreign transactions. According to the Bank of Jamaica's standards of sound business practices on foreign exchange risk management, foreign exchange risk is the exposure of an institution to the potential impact of movements in foreign exchange rates. The risk is that adverse volatility in exchange rates may result in a loss to an institution. Li (2003) describes financial risk as a risk that emanates from the uncertainty of such factors as interest rates, exchange rates and stock price volatility and volatility in commodity prices.

1.1.4 Commercial Banks in Kenya

According to Brown & Zehnder (2006) the role of commercial banks remains central in financing economic activity and its effectiveness exert positive impact on overall economy. Commercial banks in Kenya play a major role in Kenya. They contribute to economic growth of the country by making funds available for investors to borrow as

well as financial deepening in the country. Commercial banks therefore play a key role in the financial sector and to the whole economy

The Banking industry in Kenya is governed by the Companies Act, the Banking Act, the Central Bank of Kenya Act and the various prudential guidelines issued by the Central Bank of Kenya (CBK) from time to time. The banking sector was liberalized in 1995 and exchange controls lifted. The CBK, which falls under the Ministry of Finance docket, is responsible for formulating and implementing monetary and fiscal policies and fostering the liquidity, solvency and proper functioning of the financial system. The banks have come together under the Kenya Bankers Association (KBA), which serves as a lobby for the banking sector's interest's .The KBA serves a forum to address issues affecting members.

Kenyan Banks have realized tremendous growth in the last five years and have expanded to the East African region. The banking industry in Kenya has also involved itself in automation, moving from the traditional banking to better meet the growing complex needs of their customer and globalization challenges. There has been increased competition from local banks as well as international banks, some of which are new players in the country. This has served the Kenyan economy well as the customers and shareholder are the ones who have benefited the most.

The major issues facing the banking industry include: New regulations especially with the passing of the new constitution. CBK requires financial institutions to build up their minimum core capital requirement to Kenya shillings 1 Billion by December 2012. The Terrorist attacks on the twin towers in United States of America

emphasized and led to the mandating Acts like Anti-money laundering. Nations are working closing to ensure that proceeds of crime do not get into the financial systems of the world. The Global crisis experienced affected banking industry in Kenya and more so the mobilization of deposits and trade reduction. The interest margins declines have also affected the banking industry in Kenya (CBK, 2012).

As at 31st December 2012, there were 43 commercial banks in Kenya and 1Mortgage Finance Company -MFC), 5 representative offices of foreign banks, 8 Deposit-Taking Microfinance Institutions (DTMs), 2 Credit Reference Bureaus (CRBs) and 112 Forex Bureaus. Out of the 44 banking institutions, 31 locally owned banks comprise 3 with public shareholding and 28 privately owned while 13 are foreign owned. The 8 DTMs, 2 CRBs and 112 Forex Bureaus are privately owned. The foreign owned financial institutions comprise of 9 locally incorporated foreign banks and 4 branches of foreign incorporated banks. Only 10 commercial banks are listed at NSE.

The banking sector total net assets stood at Kshs. 2.3 trillion as at 31st December 2012 and the 27 locally owned commercial banks 11 accounted for 62.4 percent. The 13 foreign owned commercial banks accounted for 33.4 percent of the sector's net assets. During the year 2012, banks increased their branch network by 111, which translated to a total of 1,272 branches. The increase is an indication of increased provision of banking services. Nairobi County accounted for the highest number of new branches in 2012 as it recorded a growth of 53 branches followed by Mombasa County with 10 branches and Kiambu County 9 branches (CBK, 2012)

Kenyan commercial banks are classified into three peer groups using a weighted composite index that comprises assets, deposits, capital size, number of deposit accounts and loan accounts. A bank with a weighted composite index of 5 percent and above is classified as a large bank, a medium bank has a weighted composite index of between 1 percent and 5 percent while a small bank has a weighted composite index of less than 1 percent. For the period ended 31st December 2012, there were 6 large banks which accounted for 53.7 percent of the market share, 15 medium banks with a market share of 36.8 percent and 22 small banks. A similar classification was recorded in 2011, although banks changed positions within their respective peer groups. Barclays Bank of Kenya moved to position 5 from position 3 in 2011 while the Cooperative Bank which was ranked in position 4 in 2011 moved to 3. The movements were mainly occasioned by levels of customer deposits as banks deployed various strategies for deposits mobilization (CBK, 2012).

Banks continued to embrace technology as a way of offering their services through cost effective channels. This was evidenced by the increase in the number of ATMs from 2,205 in December 2011 to 2,381 in December 2012 representing an increase of 176 ATMs or 8.0 percent (CBK 2012).

1.2 Research Problem

Exchange rate plays an increasingly significant role in any economy as it directly affects domestic price level, profitability of traded goods and services, allocation of resources and investment decision. The stability of the exchange rate is today a formidable bedrock of all economic activities. The fluctuation or volatility in the

exchange rate has attracted public attention especially from exporters who have argued that the strengthening shilling is eroding their competitiveness. Kenya exchange rate policy has undergone various regime shifts over the year which has led to introduction of various techniques with the view of finding the most appropriate method for achieving acceptable exchange rate for the Kenya Shilling. The frequency with which these measures were introduced and changed is informed by the determined efforts of the monetary authorities to unrelentlessly combat the unabating depreciation and instability of the Kenya Shilling exchange rate. In a continued effort to stabilize the exchange rate, numerous variants of market determined rates have been adopted since then. Ndung'u (2000) explains that the shifts were driven by economic events especially the; balance of payment crisis in the 70's. In the 1960's and the early 1970's, a fixed exchange rate was maintained. This was changed in 1974 when the Kenyan Shilling was pegged to the US dollar and after a number of discrete devaluations the peg was changed from the US dollar to the Special Drawing Right (SDR).

In general the rate depreciated by 14 percent and depreciated even further in the year 1981 and 1982. The exchange rate regime was changed to a crawling peg in real terms at the end of 1982. This regime prevailed until 1990. In 1990 a dual exchange rate system was then adopted that lasted until October 1993, when due to further devaluations the official exchange rate was matched with the interbank rate and the shilling was allowed to float. This was preceded with the abolition of all controls in imports and foreign exchange transactions. The Liberalization stimulated foreign demand and brought about an increase in foreign exchange proceeds from exports

(Ndung'u, 2000). Though the liberalization has brought about positive effects on Kenyan trade, it has left the country vulnerable to the effects of exchange rate volatility on import, producer and consumer prices.

Despite these policies, the exchange rate of the Kenya Shilling has remained unstable since the deregulation period. The need to investigate the effect of this volatility of exchange rate on the performance of commercial banks in Kenya is important for the economy. For a country that is import dependent, the stability of its exchange rate is important for credit allocation (Adebiyi, 2006). It is therefore important to examine how the level of volatility of exchange rate affects the performance of commercial banks in Kenya.This study therefore seeks to answer the question: how does foreign exchange rate volatility affect financial performance of commercial banks in Kenya?

1.3 Research Objective

To establish the effect of foreign exchange rate volatility on the financial performance of Commercial Banks in Kenya

1.4 Value of the Study

Firstly, this study is beneficial to commercial banks management and banks forex dealers as it will help them better understand the effects of foreign exchange rate volatility on their bank's performance and thus can mitigate the bank against its adverse effects. That is to manage foreign exchange losses and profits brought about by foreign exchange rate volatility.

Secondly, information from this study is useful to investors who want to invest in commercial banks in Kenya as they will better understand the banking industry.

Thirdly, this study is to guide policy makers in the banking sector especially the Central Bank of Kenya and the Treasury in coming up with policies which will manage exchange rates volatility and spur growth and profitability in this sector. Lastly, this study is a useful guide for carrying out further studies in the area and future development of theories by researchers and academicians in the field of finance, economics and banking.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter deals with various concepts in regard to foreign exchange rate volatility, and financial performance of commercial banks. In addition, the researcher discusses various theoretical reviews of foreign exchange, empirical studies done in the same field, and summary and conclusion of the literature review.

2.2 Theoretical Review

The international parity conditions link two important factors to exchange rate namely; inflation rate and interest rate. These three can be linked together to explain some classical finance theories namely:

2.2.1 Purchasing Power Parity (PPP) Theorem

The purchasing power parity (PPP) theory is based on law of one price. That is prices in two countries of goods of similar quality under the assumptions of absence of or low transportation costs and absence of trade barriers, should be identical when expressed in terms of the same currency, is an elegant proposition in economics. The PPP theory states that exchange rates between any two countries will adjust over time to reflect changes in their respective price levels (Mishkin, 2012). PPP has three forms.

2.2.1.1 Absolute PPP

It holds equilibrium exchange rate between two countries is determined entirely by the ratio of the national price levels. It's assumes they are no barriers in the market hence law of one price will operate PERFECTLY. However in reality, the following will prevent: transportation costs; tariffs and quota. Thus the discrepancy of not having one law price for common good in all market will remain. Absolute PPP is generally viewed as a condition of goods market equilibrium. Under absolute PPP, both the home and foreign market are integrated into a single market. Since it does not deal with money markets and the balance of international payments, we consider it to be only a partial equilibrium theory, not the general one. Perhaps because absolute PPP require many strong impractical preconditions, it fails in explaining practical phenomenon, and signs of large persistent deviations from Absolute PPP have been documented (Kanamori, Toshiki, & Zhao, 2006).

2.2.1.2 Relative PPP

This version acknowledges existence of market imperfections and assumes that prices of the same goods may have different prices when measured on the same common currency. It does state that, the rate of change in the prices of the baskets should be somewhat similar when measured in a common currency as long as the transportation costs and trade barriers are unchanged. It holds percentage change in actual spot rate between two countries is determined entirely by differences between actual currencies inflation rates (Mishkin, 2012).

%age actual change in spot rate = actual inflation rate counter currency – actual inflation rate base currency

2.2.1.3 Ex Ante PPP

It holds the percentage change in spot rate is determined by expected difference in national inflation rates. Countries that are expected to run persistently high inflation rates should expect their currency to depreciate over time (Mishkin, 2012)

%age expected change in spot rate = expected inflation rate counter currency – expected inflation rate base currency

2.2.2 Interest Rate Parity (IPP) Theorem

It was developed by Keynes in 1930 and applies the law of one price. To PPP, the law of one price applies in the market of goods and services. In IPP, the law of one price applies in securities markets – it holds when quoted in a common currency, identical securities in different countries should have the same price. This is irrespective of interest rate prevailing in the different countries. Under IPP, the forward markets adjust the exchange rate such that any arbitrage gains made in investing in higher interest rate countries are wiped out depreciation of local currency. Covered interest rate parity (CIRP), holds a riskless arbitrage relationship exists where an investment in a foreign money market instrument is completely hedged against exchange rate risks and should yield identical return to domestic money market investment. For this to happen, a forward contract is executed to transact foreign currency to home currency.

Empirically, using weekly observations from January 1962 to November 1967, Frenkel & Levich (1975) confirmed that CIRP held. Later in (1977) they extended their studies into three periods: 1962–67, known as the “tranquil peg”; 1968–69, the

"turbulent peg"; and 1973–1975, the managed float, and strengthened the findings of their previous study that CIRP still holds during these periods even when the effect of transaction costs is taken into account. They indicated that deviations from CIRP might occur due to four major reasons: transaction costs, political risk, potential tax advantages, and liquidity preference.

Uncovered interest rate parity (UCIRP); holds expected return on unhedged foreign currency investment should equal the return on a comparable domestic currency investment. It states the change in spot rate over an investment horizon should on average equal to the differential interest rates between two countries %age change in spot rate = interest rate differential in two countries

FX carry trade; based on uncovered interest rate, currency with high interest rates are expected to depreciate the currency to achieve same rate of return as other currency with low interest rate. However, this does apply in practice that is, currency with high interest rate are appreciate or do not depreciate to the expected rate hence an opportunity to make gain exist. FX carry trade is a trading strategy that exploits this anomaly by taking long position in high yielding currency and short position on low yielding currency. To create an arbitrage free profit, currency with low interest rates are used as funding currency

However, investors face uncertainty over future events. In a rational expectation framework, the forward exchange rate may be strongly influenced by the market expectations about the future exchange rate if new information is taken into consideration. In an uncertain environment, an un-hedged interest rate parity

condition may hold. Very few empirical studies support UCIRP. For example, using a K-step-ahead forecasting equation and overlapping techniques on weekly data of seven major currencies, (Hansen & Hodrick, 1980) reject the market efficiency hypothesis for exchange.

2.2.3 International Fisher Effect

Hypothesized by American economist Irving Fisher, the Fisher effect states that nominal interest rates (N) are a function of the real interest rate (R) and a premium (I) for inflation expectations (Mishkin, 2012).

This is explained as $(1+N) = (1+ R) (1 + I)$ and approximated as $N = R + I$

If all investors require the same real return, differentials in interest rates may be due to differentials in expected inflation. With no government interference nominal rates vary by inflation differential based on addictive or multiplicative model.

2.3 Determinants of Foreign Exchange Volatility

According to Otuori (2013) the determinants of exchange rate fluctuations on commercial banks are: interest rates, inflation rates, external debt and exports and imports.

2.3.1 Interest Rates

Interest rates, inflation 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. Higher interest rates offer lenders in an economy a higher return relative to other countries. Therefore,

higher interest rates attract foreign capital and cause the exchange rate to rise. The impact of higher interest rates is mitigated, however, if inflation in the country is much higher than in others, or if additional factors serve to drive the currency down. The opposite relationship exists for decreasing interest rates - that is, lower interest rates tend to decrease exchange rates (Bergen, 2010).

Karfakis & Kim (1995) using Australian exchange rate data found that unexpected current account deficit is associated with exchange rate depreciation, and a rise in interest rates. Evidence is found that current account deficits diminishes domestic wealth, and may lead to overshooting of exchange rates. A fall in the real value of currency was also reported by (Engel & Flood, 1985), (Obstfeld & Rogoff, 1995) and (Dornbusch & Fisher, 2003).

There has also been a surge and collapse in international capital flows into developing countries in the recent decades. Sudden outflow of capital is another major concern when it can drastically affect exchange rates as were witnessed during several financial crises of Brazil, East Asia, and Mexico. These capital outflows affect domestic output, real exchange rates, capital and current account balances for years after the crises.

2.3.2 Inflation Rates

As a general rule, a country with a consistently lower inflation rate exhibits a rising currency value, as its purchasing power increases relative to other currencies. During the last half of the twentieth century, the countries with low inflation included Japan, Germany and Switzerland, while the U.S. and Canada achieved low inflation only

later. Those countries with higher inflation typically see depreciation in their currency in relation to the currencies of their trading partners. This is also usually accompanied by higher interest rates (Bergen, 2010).

2.3.3 External Debt

According to Bergen (2010) countries will engage in large-scale deficit financing to pay for public sector projects and governmental funding. While such activity stimulates the domestic economy, nations with large public deficits and debts are less attractive to foreign investors. This is because a large debt encourages inflation, and if inflation is high, the debt was serviced and ultimately paid off with cheaper real dollars in the future.

2.3.4 Exports and Imports

According to Solnik (2000) the balance of payments approach was the first approach for economic modeling of the exchange rate. The balance of payments approach tracks all of the financial flows across a country's borders during a given period. All financial transactions are treated as a credit and the final balance must be zero. Types of international transactions include: international trade, payment for service, income received, foreign direct investment, portfolio investments, short- and long-term capital flows, and the sale of currency reserves by the central bank.

A ratio comparing export prices to import prices, the terms of trade is related to current accounts and the balance of payments. If the price of a country's exports rises by a greater rate than that of its imports, its terms of trade have favorably improved. Increasing terms of trade, shows greater demand for the country's exports. This, in

turn, results in rising revenues from exports, which provides increased demand for the country's currency (and an increase in the currency's value). If the price of exports rises by a smaller rate than that of its imports, the currency's value will decrease in relation to its trading partners (Solnik, 2000).

2.4 Foreign Exchange Trading Income

Efficiency is key concept in companies and its measurement is one aspect of a company's indicator of profitability or loss. Efficiency can be measured with respect to maximization of output, minimization of cost or maximization of profits. In general efficiency is important to companies themselves as it has direct relationship with profitability (present and future), competitiveness, and solvency. Also regulatory authorities demand the same from companies in provision of cost effective services and products. The numerous stake holders' interests in a firm must be satisfied. Stakeholder theory suggests that the purpose of a business is to create as much value as possible for stakeholders. In order to succeed and be sustainable over time, executives must keep the interests of customers, suppliers, employees, communities and shareholders aligned and going in the same direction. Stakeholder management can be linked to conventional concepts of organizational success through analytical argument.

The main focus of this effort in the recent literature builds on established concepts of principal-agent relations (Jensen & Meckling, 1976) and the firm as a nexus of contracts (Williamson & Winter, 1991). Agency theory and firm-as-contract theory, although arising from different sources, are closely related and share a common

emphasis: efficiency. Measuring efficiency of listed companies serve two important purposes. It helps benchmark the relative efficiency of an individual company against the "best practice" firms within the industry and across industries. Efficiency addressed in literature is in term of scale and scope or in terms of efficiency or both. According to Limam (2010), Scale efficiency addresses question whether a firm is operating at the minimum of its long-run average cost curve. Scope efficiency is measured by difference between the cost of joint production and the sum of producing the different output individually. Nyahan (1998) defines technical efficiency measures as a way of using minimum inputs to produce a given level output (output orientation). Technical efficiency could be deterministic or Stochastic and gives the maximum output that can be attained for a given level of input, or minimum cost for a given level of output and input prices. (Limama,2001).

Interest in "frontier" analysis of economic efficiency has grown rapidly over the past two decades; and numerous books and hundreds of papers have been written on efficiency methodologies and applications. Two primary methodologies have been developed for measuring efficiency the econometric approach and the mathematical programming approach. Both methodologies involve the estimation of "best practice" frontiers, with the efficiency of specific decision making units (DMUs) measured relative to the frontiers. The econometric approach specifies a functional form for the cost, profit, or production frontier. The methodology is stochastic; firms can be off the frontier because they are inefficient or because of random shocks or measurement errors that have nothing to do with inefficiency. Thus, the cost function error term is hypothesized to consist of an inefficiency component and a purely random

component. Efficiency is measured by separating the efficiency component from the overall error term. Some variants of the econometric approach require that specific distributional assumptions be imposed on the components of the error terms, while others do not require distributional assumptions. By contrast, the mathematical programming approach places less structure on the frontier and is non-stochastic, i.e., any departure from the frontier is measured as inefficiency.

Some prior research on the performance and efficiency of companies had used simple financial statement ratios (e.g., asset turnover) as proxies for efficiency to examine the relation between efficiency and performance; these studies show that changes in asset turnover improve forecasts of changes in future profitability (Fairfield and Yohn 2001; Soliman 2008). Later many studies used various measures of performance which include financial index (Wu et. al., 2006), a non-parametric approach -Data Envelopment Analysis (DEA)(Wu, 2005) and parametric approach-Stochastic Production Approach (SPA) (Radamet. al., 2008). DEA is frequently used to measure efficiency of a company. DEA is a non-parametric multiple input-output efficiency technique that measures the relative efficiency of decision making units or DMUs using a linear programming model. It is non-parametric because it requires no assumption on the shape or parameters of the underlying production function. This technique has been applied for measuring the relative efficiency of DMUs in various sectors such as hospitals, financial institutions, textile industry, IT companies and transportation companies. DEA is popularly used because of its advantages. The main advantage is that it can readily incorporate multiple inputs and outputs to calculate technical efficiency.

2.5 Empirical Literature

The adverse consequences of exchange rate volatilities on various parts of the domestic economy have now been well documented in numerous research works. In particular, a rise in exchange-rate volatilities has been found to have negative consequences on the trade sector (i.e. exports and imports) of the local economy (McKenzie, 1998), (Chou, 2000), (Rahmatsyah, Rajaguru, & Siregar, 2002). A similar message was conveyed in a recent paper by Calvo & Reinhart (2002) and Siregar & Rajan (2004) who show that the monetary authority needs to intervene and manage the volatility of the local currency in order to achieve its desired level of inflation target.

Mouyad (2009) conducted a research to describe and investigate the factors which determine the equilibrium real exchange rate (ERER) and its volatility effect in the Syrian economy over the period 1980-2008, using two estimation techniques, the Vector Error Correction Mode (VECM) and ARCH Model. Three main results are derived from the analysis: first, the actual Syrian (RER) has been volatile around its equilibrium level; in contrast, the speed of adjustment is relatively slow.

Results from ARCH model estimation shows that the real shocks volatility will persist, so that shocks will die out rather slowly, and lasting misalignment seems to have occurred; second, the expected decline in Syrian oil production would require a significant depreciation of (RER), since its impact is relatively important; third, to address the challenges of the Syrian economy and to allow (RER) to converge easily to its equilibrium level, a more flexible exchange rate system was needed. Therefore, the Central Bank of Syria (CBS) should move regularly towards greater flexibility in

the exchange rate regime, which would also facilitate a gradual increase in central bank independence and promote indirect monetary policy instruments.

Diffu (2011) did a case study that sought to establish the relationship between foreign exchange risk and financial performance of Kenya Airways for the period 2007 to 2010. The study found statistically significant coefficients for all the variables used in the model. From the results of the findings there was a negative relationship between foreign exchange risk and financial performance of Kenya Airways.

Onyancha (2011) did a study on the impact of exchange rate movements on the financial performance of International Non-Governmental Organizations (INGOs) based on three variables namely asset holding, investment capacity and liability management. Based on the data collected and after analysis, it was determined that out of the financial performance indicators tested, there was a significant indication that financial performance could be affected by foreign exchange gains and losses and other factors most importantly management support of INGOs.

Ngerebo (2012) did a study on the impact of foreign exchange fluctuation on the intermediation of banks in Nigeria (1970 – 2004). The study empirically examined the impact of foreign exchange fluctuation on the intermediation of banks in Nigeria with a view to enabling the banking system work efficiently and effectively towards the proper valuation of the Naira. The study used data sourced mainly from Central Bank of Nigeria publications. In conducting this relationship study, sample sizes of 34 years (1970 – 2004) were collected and analyzed. The analysis empirically examined the relationship between exchange rate fluctuation and commercial banks intermediation

index using annual average exchange rate as independent variables while Commercial Banks Intermediation Index (CBII) represented the dependent variable.

Using SPSS to conduct the regression and correlation analysis, the study found that there is a positive relationship between foreign exchange fluctuation and CBII, that only about 28% of the changes in CBII is accounted for by variations in foreign exchange(that is, after adjusting for sample size), since the adjusted R2 = 0.278. It also revealed that at 5% significance level, the critical T-value of 2.042 is less than the computed T-value of 3.754, hence, the rejection of Ho. The result led to the conclusion that exchange rate fluctuation has significant impact on banks' intermediation. It was therefore, recommended that government should ensure a stable naira exchange rate through a right mix of policies and de-emphasis on cash-economy.

Otuori (2013) conducted a study that sought to investigate the determinant factors of exchange rates and their effects on the performance of commercial banks in Kenya. The results showed that interest rate and external debt had positive and significant effects on performance while inflation rate and external debt had negative and significant effects on performance. The study concluded that higher levels of interest rate lead to higher profitability in commercial banks in Kenya. The study further concluded that higher levels of inflation rate result in lower bank profitability in Kenya. The study also concluded that higher levels of external debt result in lower bank profitability in Kenya. Lastly, the study concluded that higher levels of exports and imports lead to higher profitability in commercial banks.

2.6 Summary of Literature Review

This chapter attempted to reveal the various theories relevant to the study, such as the purchasing power parity and international fisher effect.

The second last part of this chapter explored relevant general literature about the determinants of exchange rate fluctuations such as interest rates, inflation rates, and others. The chapter also made an attempt at determining the financial performance method (CAMEL) that was tested to identify the impact of foreign exchange rate volatility on performance of commercial banks in Kenya.

Empirical literature on this research project has been carefully analyzed in the last part of the chapter which observed that there are various contributions of several authors as far as this research is concerned. Thus it suffices to conclude here that no study exists on the effect of foreign exchange rates volatility on the performance of commercial banks Kenya. This is the gap the present study seeks to bridge.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter describes the methods that were used to collect and analyze data in order to accomplish the study objective. These methods include research design, data collection instruments, data collection procedures and data analysis procedures.

3.2 Research Design

According to Mugenda & Mugenda (1999) research design is the outline plan or scheme that is used to generate answers to the research problems. It is basically the structure and plan of investigation.

The research method that was adopted in this research is the quantitative method since the paper is more concerned with the relationships between the variables and analysis of the causal using numerical data and statistics. The quantitative method focuses on the measurement and analysis of causal and effect relationship between variables. It is more concerned with the issues of design and measurement (Bryman & Bell, 2007).

3.3 Population

The target population refers to the entire group of individuals or objects from which the study seeks to generalize its findings (Cooper & Schindler, 2008). The target population was drawn from the 43 licensed commercial banks in Kenya according to Central Bank of Kenya (CBK, 2012). This was the population of interest as they are all exposed to foreign exchange rate volatility. Appendix 1 shows the commercial banks classified in terms of peer group.

3.4 Data Collection

Secondary data used in this study was collected from various Central Bank of Kenya (CBK) reports between 2008 and 2012. The time frame for the historical data was 5 years (2008 to 2012) which was considered sufficient for the study as was the most current period and a reflection of the current situation in the Kenyan banking industry; could be used to predict future trends too. To be able to answer the research question, foreign exchange trading income or loss was used to reflect the financial performance of the 43 commercial banks in Kenya.

3.5 Data Analysis

A model was estimated in this study using the following variables: Dependent variable; foreign exchange trading income or loss; independent variable; exchange rate volatility between the local currency (Kenya Shillings) and the US dollars and controllable variables; total external debt; inflation rate; interest rate defined as the average lending interest rate; export and imports which was measured as the ratio of exports to import prices.

The uncertainty referred to in the study is assumed to be as a result of exchange rate volatility which makes foreign exchange trading income for commercial banks uncertain. The formula below was used to calculate the exchange rate volatility.

2RealVol Formula:

$$\text{Vol} = 100 \bullet \sqrt{\frac{252}{n} \sum_{t=1}^{n} R_t^2}$$

Where:

Vol = Realized volatility

252 = a constant representing the approximate number of trading days in a year

t = a counter representing each trading day

n = number of trading days in the measurement time frame

Rt = continuously compounded daily returns as calculated by the formula:

$$R_t = Ln\frac{P_t}{P_{t-1}}$$

Where:

Ln = natural logarithm

Pt = Underlying Reference Price ("closing price") at day t

Pt–1 = Underlying Reference Price at day immediately preceding day t

In determining the relationship between dependent (commercial banks financial performance) and independent (foreign exchange volatility), the study's multiple regression analysis:

$$\text{Ln(Foreign Exchange Gain/Loss)} = \beta_0 + \beta_1 * \text{Foreign Exchange Volatility} + \varepsilon$$

Where β_0 is regression constant for the y-intercept, β_1 is regression coefficient and ε is error term. In fully determining this relationship, the regression model was moderated by incorporating intervening variables - lending interest rate, ratio of exports to imports, inflation rate and total external debt. The regression equation becomes:

$$\text{Ln(Forex)} = \beta_0 + \beta_1 * \text{Vol} + \beta_2 * \text{Ln(ExtDt)} + \beta_3 \text{Inf} + \beta_4 \text{LndRt} + \beta_5 \text{ExIm} + \varepsilon$$

Whereby β_0 is the model constant, β_1 and β_5 are coefficients of the independent variables and ε is the error term, Forex is financial performance of commercial banks

measured by the foreign exchange gains or losses and standardized by establishing its natural logarithm, Vol is foreign exchange volatility, ExtDt is the value of external debt standardized by its natural logarithm, Inf is average annual inflation rate, Lndrt is average lending rate of the commercial banks for the year, ExIm is the ratio of exports to imports.

In order to determine the goodness of fit of the regression equation, the study used correlation coefficient between the overall independent variables and financial performance. Coefficient of determination established the strength of the relationship between the two variables. Multicollinearity diagnostics was used to determine whether the independent variables had relationships among themselves; that is, if two or more predictor (independent) variables in the multiple regression model are highly correlated.

The study used tolerance and variance inflation factor (VIF) values for the predictors as a check for multicollinearity. Tolerance indicates the percent of variance in the independent variable that cannot be accounted for by the other independent variable while VIF is the inverse of tolerance.

CHAPTER FOUR

DATA ANALYSIS, RESULTS AND DISCUSSION

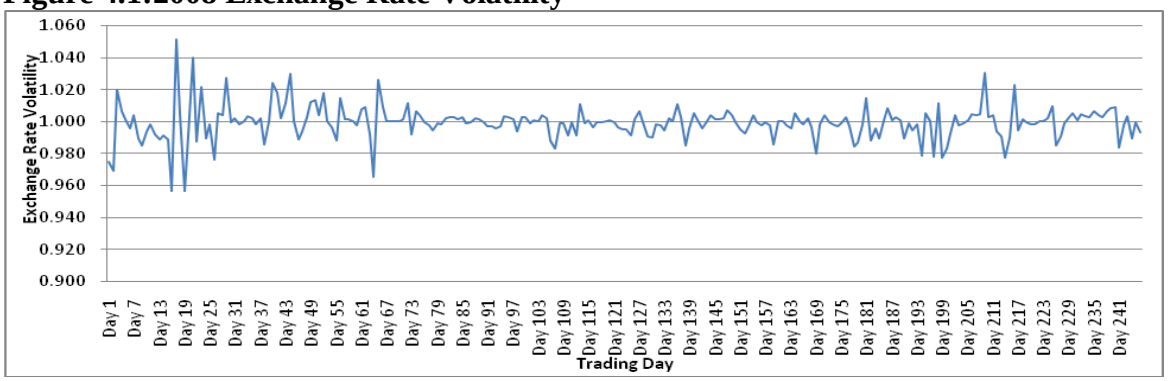
4.1 Introduction

This chapter presents the data findings on effect of foreign exchange rate volatility on the financial performance of commercial banks by analyzing how volatility impacts on foreign exchange gains or losses vis a vis other bank variables and macroeconomic aggregates. The data was collected from the CBK reports between 2008 and 2012 and analyzed using Excel and SPSS (version 17). Analysis involved evaluation of returns in Us dollar to Kenya shilling exchange, its volatility and volatility.

4.2 Exchange Rate Volatility

Exchange rate volatility was looked at by establishing the daily ratio of the day's exchange rate to the previous days.

Figure 4.1:2008 Exchange Rate Volatility

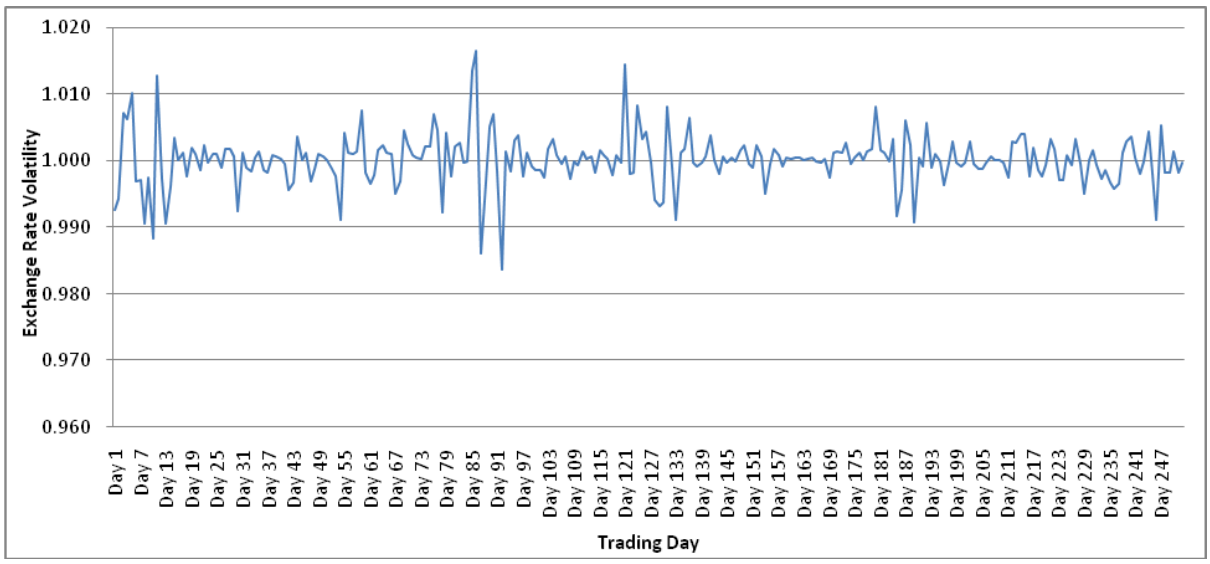


Source: Research Findings

Figure 4.1 shows that there was high volatility in foreign exchange rate within the first quarter of 2008 (January and March). The volatility reduced, almost evened out

between the second and third quarter of the year before increasing in the beginning of the third quarter

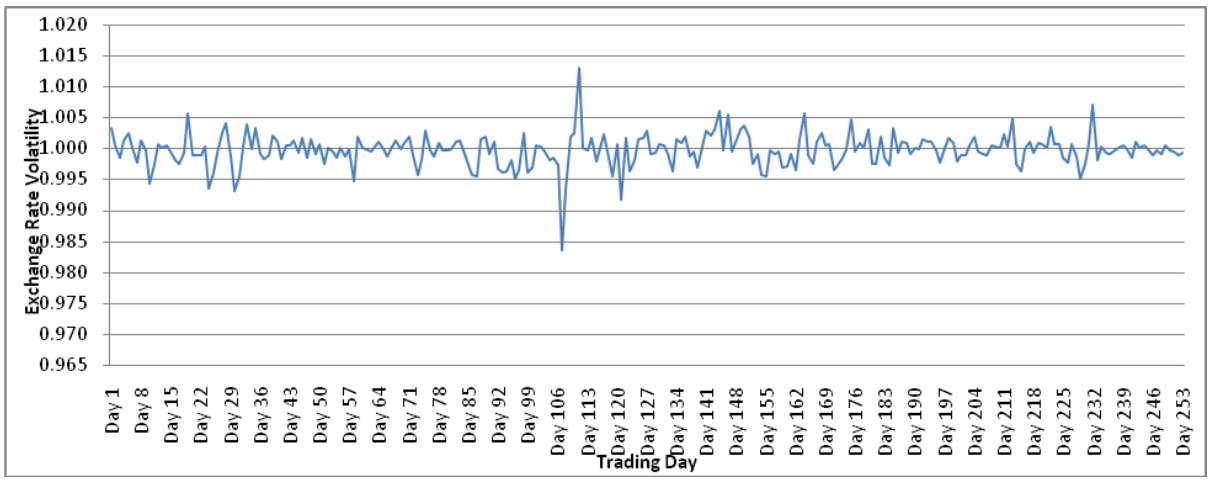
Figure 4.2: 2009 Exchange Rate Volatility



Source: Research Findings

Figure 4.2 shows that there was a high volatility in the first weeks of the year. The volatility reduced before increasing in mid-year of 2009. The volatility decreased in third and fourth quarter of 2009.

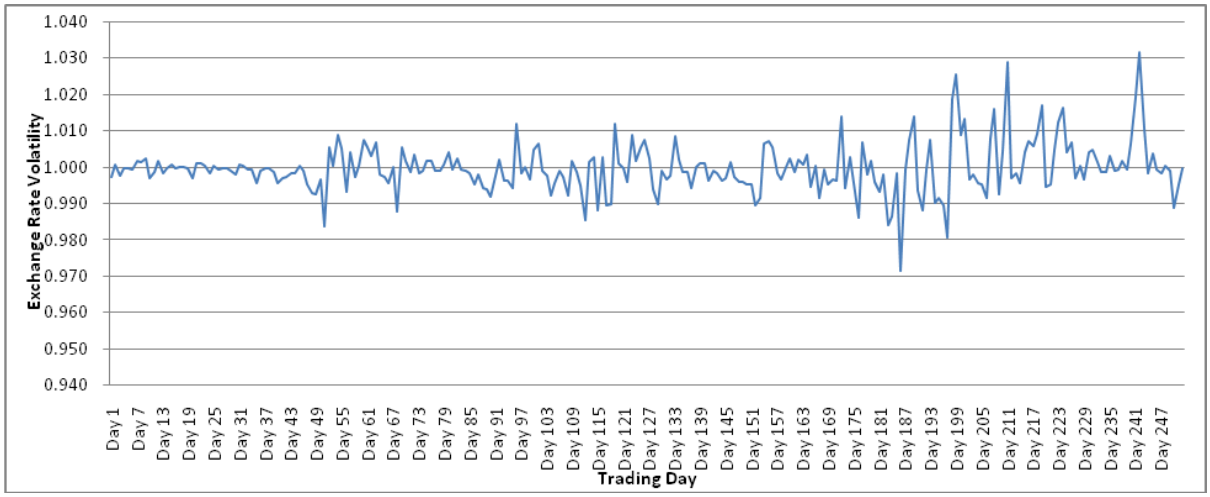
Figure 4.3: 2010 Exchange Rate Volatility



Source: Research Findings

Figure 4.3 shows that in 2010, the volatility in foreign exchange increased in mid of the year. Before decreasing for the rest of the year.

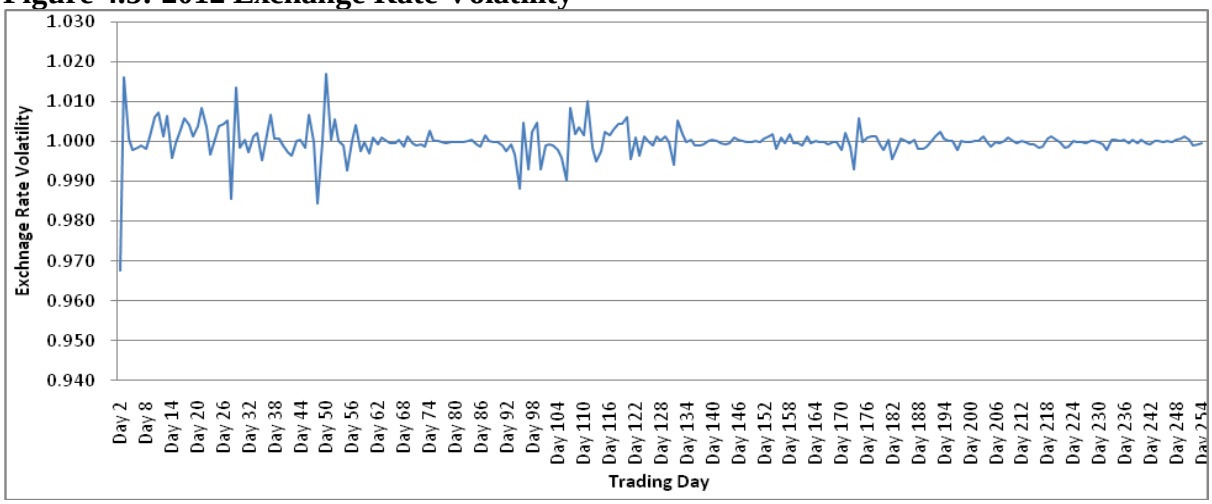
Figure 4.4: 2011 Exchange Rate Volatility



Source: Research Findings

Figure 4.4 shows that in 2011, foreign exchange volatility was low within the first quarter of the year. In the second quarter, foreign exchange volatility increased and remained high till the third quarter. In the fourth quarter (September to December), foreign exchange volatility increased erratically.

Figure 4.5: 2012 Exchange Rate Volatility



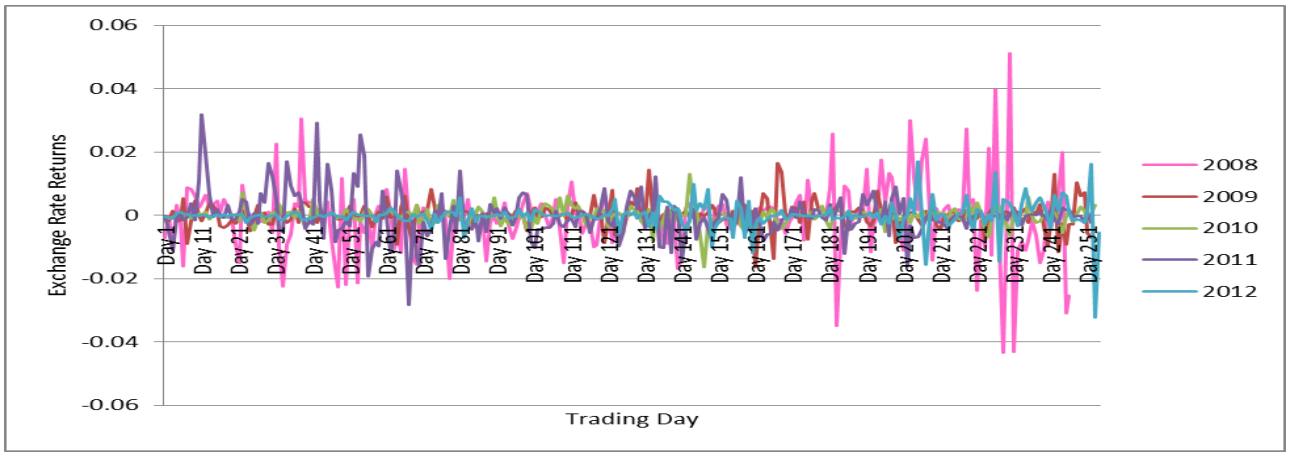
Source: Research Findings

In 2012, the foreign exchange volatility was high within the first and part of second quarter (January to May). In the third and fourth quarter, the volatility was low.

4.2.1 Foreign Exchange Rate Returns

The study sought to establish the foreign exchange rate returns by establishing the ratio of the differences in the day's exchange rate and the previous days.

Figure 4.6: Foreign Exchange Rate Returns



Source: Research Findings

Figure 4.6 shows that there were higher returns in foreign exchange rate and volatility thereof within the first quarters of the period (2008 – 2012) and towards the end of the years (2008 – 2012). There were high returns in the foreign exchange rate in 2011 and 2008. This could be due to the global events: Kenya shilling depreciation of 2011 and global economic recession of 2008.

4.3 Financial Performance and Foreign Exchange Volatility

The study used correlation and multiple linear regression analysis to establish the relationship between foreign exchange rate and financial performance of commercial

banks. Pearson Correlation analysis was used to achieve this end at 95% ($\alpha = 0.05$) and 90% ($\alpha = 0.1$) confidence levels.

Table 4.1: Correlation Matrix

Variables		Foreign Exchange Trading	Exchange Rate Volatility	Export Import Ratio	Total External Debt (Billion)	Inflation Rate
Exchange Rate Volatility	Pearson Correlation	-0.637	**1**			
	Sig. (2-tailed)	.043				
Export Import Ratio	Pearson Correlation	-0.951	0.034	**1**		
	Sig. (2-tailed)	.013	.956			
Total External Debt	Pearson Correlation	0.865	-0.530	-0.825	**1**	
	Sig. (2-tailed)	.059	.357	.086		
Inflation Rate	Pearson Correlation	0.129	0.357	-0.189	-0.374	**1**
	Sig. (2-tailed)	.036	.010	.761	.535	
Average Lending rate	Pearson Correlation	0.742	-0.349	-0.657	0.768	-0.184
	Sig. (2-tailed)	.041	0.564	.227	.128	.766

Source: Research Findings

Table 4.1 shows that at 95% confidence level: good, significant and positive correlation coefficient was established between financial performance and average lending rate ($R = 0.742$; $p = .041$); low, positive but significant relationship was established between inflation rate ($R = 0.129$; $p = .036$); and, good, negative and significant relationship was established between financial performance and exchange rate volatility ($R = 0.637$; $p = .043$). At 90% confidence level, a very good, positive and significant relationship was established between financial performance and total external debt ($R = 0.865$; $p = .059$). At 95% confidence level a very good significant negative relationship was established between financial performance and export-import ratio ($R = 0.951$; $p = .013$).

4.3.1 Regression Analysis

In determining the relationship between dependent (commercial banks financial performance) and independent (foreign exchange volatility), the study's multiple regression analysis:

$$\text{Ln(Foreign Exchange Gain/Loss)} = \beta_0 + \beta_1 * \text{Foreign Exchange Volatility} + \varepsilon$$

Where β_0 is regression constant for the y-intercept, β_1 is regression coefficient and ε is error term. In fully determining this relationship, the regression model was moderated by incorporating intervening variables - lending interest rate, ratio of exports to imports, inflation rate and total external debt. The regression equation becomes:

$$\text{Ln(Forex)} = \beta_0 + \beta_1 * \text{Vol} + \beta_2 * \text{Ln(ExtDt)} + \beta_3 \text{Inf} + \beta_4 \text{LndRt} + \beta_5 \text{ExIm} + \varepsilon$$

Whereby β_0 is the model constant, β_1 and β_5 are coefficients of the independent variables and ε is the error term, Forex is financial performance of commercial banks measured by the foreign exchange gains or losses and standardized by establishing its natural logarithm, Vol is foreign exchange volatility, ExtDt is the value of external debt standardized by its natural logarithm, Inf is average annual inflation rate, Lndrt is average lending rate of the commercial banks for the year, ExIm is the ratio of exports to imports.

In order to determine the goodness of fit of the regression equation, the study used correlation coefficient between the overall independent variables and financial performance. Coefficient of determination established the strength of the relationship between the two variables. Multicollinearity diagnostics was used to determine

whether the independent variables had relationships among themselves; that is, if two or more predictor (independent) variables in the multiple regression model are highly correlated.

The study used tolerance and variance inflation factor (VIF) values for the predictors as a check for multicollinearity. Tolerance indicates the percent of variance in the independent variable that cannot be accounted for by the other independent variable while VIF is the inverse of tolerance.

Table 4.2: Multicollinearity Diagnostics

Statistic	Exchange Rate Volatility	Export Import Ratio	Total External Debt	Inflation Rate	Average Lending Rate
Tolerance	0.494	0.221	0.242	0.532	0.633
VIF	2.024	4.526	4.140	1.878	1.579

Source: Research Findings

Table 4.2 shows that tolerance values ranged between 0.221 and 0.633 while VIF values ranged between 1.579 and 4.526. Since tolerance values were above 0.1 and VIF below 10, then were was no multicollinearity in the model.

Table 4.3: Goodness of Fit Statistics

DF	4.000
R^2	0.964
Adjusted R^2	0.920
MSE	0.029
RMSE	0.172
MAPE	0.443
DW	2.082

Source: Research Findings

A From the determination coefficients in Table 4.3, it can be noted that there is a very good linear relationship between dependent and independent variables since the R^2 value was 0.964 and 0.920 when adjusted. This shows that the independent variables used could account for 92% of the volatility in financial performance of the commercial banks as proxied by the foreign exchange trading loss or gains.

The study also used Durbin Watson (DW) test to check that the residuals of the models were not autocorrelated since independence of the residuals is one of the basic hypotheses of regression analysis. Being that the DW test statistic was close to the prescribed value of 2.0 (2.082) for residual independence, it can be concluded that there was no autocorrelation

Table 4.4: Analysis of Variance

Source	DF	Sum of squares	Mean squares	F	Pr > F
Model	5	3.181	0.636	21.568	0.005
Error	4	0.118	0.029		
Corrected Total	9	3.299			

Source: Research Findings

Analysis of Variance (ANOVA) was used to make simultaneous comparisons between two or more means; thus, testing whether a significant relation exists between variables (dependent and independent variables). This helps in bringing out the significance of the regression model. The ANOVA results presented in Table 4.4 shows that the regression model has a margin of error of 0.005. This indicates that the model has a probability of 0.5% of giving false prediction. This point to the significance of the regression model.

Multiple regression equation of the model was:

Foreign Exchange Gain/Loss = 21.915 + 0.132*Forex Volatility - 2.787*Export/Import Ratio + 6.607E-02*Total External Debt + 5.037E-03*Inflation Rate + 8.418E-02* Lending Rate

Table 4.5: Regression Coefficients

Source	Value	Standard error	t	Pr > |t|	Lower bound (95%)	Upper bound (95%)
Intercept	21.916	1.177	18.627	< 0.0001	18.649	25.183
exchange Rate Volatility	0.132	0.318	0.416	0.699	-0.751	1.015
Export Import Ratio	-2.787	0.968	-2.878	0.045	-5.475	-0.098
Total External Debt (Billion)	0.066	0.030	2.202	0.092	-0.017	0.149
Inflation Rate	0.005	0.019	0.263	0.805	-0.048	0.058
Lending Rate	0.084	0.033	2.539	0.064	-0.008	0.176

Source :Research Findings

From the finding in Table 4.5, the study found that when foreign exchange volatility, external debt, inflation rate, lending rate, and exports to imports ratio are zero, foreign exchange gain or loss would be 21.915. This means that the commercial banks would make profits .It was further established that a unit increase in foreign exchange volatility while holding other factors, external debt, inflation rate, lending rate and exports to imports ratio, will lead to a 0.132 increase in financial performance of commercial banks.

Holding other factors constant, a unit increase in external debt will lead to a 0.06607 increase in financial performance, a unit increase inflation rate will lead to a 0.005037 increase in financial performance, and a unit increase in the commercial banks' lending rate would lead to a 0.08418 increase in the financial performance of

commercial banks. Moreover, a unit increase in export/import ratio will lead to 2.787 decreases in financial performance of commercial banks.

4.4 Summary and Interpretation of Findings

The study objective was to investigate the effects foreign exchange rate volatility on the financial performance of Commercial Banks in Kenya. The study reviled that Exchange rate volatility was looked at by establishing the daily ratio of the day's exchange rate to the previous days. Moreover the findings showed that there was high volatility in foreign exchange rate within the first quarter of 2008 (January and March). The volatility reduced, almost evened out between the second and third quarter of the year before increasing in the beginning of the third quarter .The findings showed that there was a high volatility in the first weeks of the year. The volatility reduced before increasing in mid-year of 2009. The volatility decreased in third and fourth quarter of 2009.This study findings were in line with Williamson & Winter,(2009) who contended that although arising from different sources, are closely related and share a common emphasis and efficiency.

On seeking to establish weather volatility in foreign exchange increased, the study findings established that that in 2010, the volatility in foreign exchange increased in mid of the year. Before decreasing for the rest of the year. Moreover, the results showed that shows that in 2011, foreign exchange volatility was low within the first quarter of the year. In the second quarter, foreign exchange volatility increased and remained high till the third quarter. In the fourth quarter (September to December), foreign exchange volatility increased erratically. In 2012, the foreign exchange

volatility was high within the first and part of second quarter (January to May). In the third and fourth quarter, the volatility was low.

The study sought to establish the foreign exchange rate returns by establishing the ratio of the differences in the day's exchange rate and the previous days. The Findings also showed that there were higher returns in foreign exchange rate and volatility thereof within the first quarters of the period (2008 – 2012) and towards the end of the years (2008 – 2012). There were high returns in the foreign exchange rate in 2011 and 2008. This could be due to the global events: Kenya shilling depreciation of 2011 and global economic recession of 2008.

The study used correlation and multiple linear regression analysis to establish the relationship between foreign exchange rate and financial performance of commercial banks. Pearson Correlation analysis was used to achieve this end at 95% ($\alpha = 0.05$) and 90% ($\alpha = 0.1$) confidence levels. furthermore the findings showed that at 95% confidence level: good, significant and positive correlation coefficient was established between financial performance and average lending rate ($R = 0.742$; $p = .041$); low, positive but significant relationship was established between inflation rate ($R = 0.129$; $p = .036$); and, good, negative and significant relationship was established between financial performance and exchange rate volatility ($R = 0.637$; $p = .043$). At 90% confidence level, a very good, positive and significant relationship was established between financial performance and total external debt ($R = 0.865$; $p = .059$). At 95% confidence level a very good significant negative relationship was established between financial

performance and export-import ratio (R = 0.951; p = .013).This results agrees with Measuring efficiency of listed companies serve two important purposes.

This results concurs with Limam (2010), contention finding that benchmark, the relative efficiency of an individual company against the “best practice” firms within the industry and across industries. Efficiency addressed in literature is in term of scale and scope or in terms of efficiency or both. According to Limam (2010), Scale efficiency addresses question whether a firm is operating at the minimum of its long-run average cost curve. Scope efficiency is measured by difference between the cost of joint production and the sum of producing the different output individually.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter presents the summary of the results of the study and the main conclusions drawn from the analysis of the data in Chapter Four. The chapter is organized as follows. Section 5.2 presents the summary of the findings of the study while section 5.3 is the conclusion. Section 5.4 discusses the policy implications arising from the results of this study. Lastly, section 5.5 presents the recommendations for further research.

5.2 Summary

The general objective of this study was to analyze market efficiency, volatility, and nonlinearity and chaos in the foreign exchange market in Kenya for the period starting January 2008 to December 2012. There were two specific objectives: first, to test the volatility of the foreign exchange rate in Kenya; second, to determine how volatility of the foreign exchange affects financial performance of banks.

Firstly, the results from the data analysis strongly suggest that the foreign exchange market is not efficient in the weak form. The spot market is characterized by foreign exchange rates that are non-stationary and returns that are not normally distributed. Therefore, both the hypothesis that foreign exchange rates are stationary and the hypothesis that returns are normally distributed are rejected. The returns are positively serially correlated implying that the exchange rate has been depreciating most of the time. Returns are also mean- reverting. The results also showed the existence of a

time varying risk premium. The term structure of the risk premia contains significant information that can be used to predict the future spot exchange rate.

Secondly, there are seasonal patterns in returns and volatility in the foreign exchange market. Foreign exchange returns display seasonal patterns around holidays, in April, May, June, July and August. Volatility also revealed significant seasonal patterns in March to June, and September to December. Seasonality may reflect the economy-wide events such as reading of the government budget and the tourism season, as well as the institutional arrangements within the market.

Thirdly, these results strongly suggest that the foreign exchange market is highly volatile. Both extremely low and extremely high volatility are clustered and are well described by the regression model. Thus, volatility in the foreign exchange market is predictable, at least in the short run. Fourthly, the evidence strongly indicates that the foreign exchange rate market is nonlinear.

Fifthly, the results show that the term structure of the risk premiums rises with the investment horizon. Thus, as the investment horizon rises from one month to twelve month, the risk premiums demanded also increase to reflect the increasing exposure to risk at longer maturities. This suggests that the yield curve is upward sloping. When short-term risk premiums are rising, longer-term risk premiums are also rising. Therefore, the yield curve typically shifts upward or downward each week or month instead of twisting or rotating about some point along the yield curve.

5.3 Conclusion

Several conclusions can be drawn from the findings of this study in section above. Firstly, the evidence strongly suggests that the foreign exchange market in Kenya is not efficient in the weak form. The foreign exchange market inefficiency is ascribed to significant serial correlation, non-normal distribution and a non-constant variance in returns. Inefficiency in the foreign exchange market is also attributable to seasonal patterns in foreign exchange returns and volatility. Both returns and volatility in the market can be predicted, at least in the short-run. This conclusion is in agreement with that of previous studies that tested for the weak form of market efficiency of the foreign exchange markets in Kenya (Ndunda, 2002; Muhoro, 2005; Kimani, 2007).

Secondly, the results indicate that the foreign exchange market is highly volatile most of the time. Volatility clusters are well described by the Poisson distribution while the cluster members follow the inverse power law distribution. Thus, the volatility clusters arise from random shocks to the market and are likely to persist in the market. This suggests that new information in the market is not instantaneously incorporated into exchange rates. Hence, the market could be populated by irrational market participants and/or market participants holding heterogeneous expectations.

Thirdly, the foreign exchange market is characterized by seasonal patterns in returns and volatility. There appears to be two significant seasonal patterns in returns and volatility across the year. The first season begins in March and ends in June while the second seasonal pattern starts in August and ends in December.

Fourthly, the term structure of the risk premium is upward sloping. The risk premiums increase with the investment horizon. The risk premiums are also pro-cyclical, rising and falling with economic booms and recessions, respectively. Premiums of various maturities move in the same direction. However, short term risk premiums are more volatile compared to long term risk premiums.

5.4 Recommendations for Policy

There are several economic implications of these results for both business policy and public policy. Firstly, when the market is inefficient in processing information, it implies that there are significant lags between dissemination of information and market participants reaction to news. These information lags could arise from market segmentation and/or poor utilization of information communication technologies in the market. Therefore, to improve the information efficiency in the foreign exchange market, the government should consider using information technology infrastructure to provide information on exchange rates to the wider public. This is already happening with respect to the stock market. For individuals and businesses, this implies that they can profitably utilize their sophisticated IT infrastructure to gather information and exploit it to earn profits in the foreign exchange market.

Secondly, persistence and nonlinearity in volatility also suggest inefficient information processing in the market. This could be attributed to irrationality or heterogeneous expectations or risk aversion in the market that causes participants to herd together. Therefore, the CBK needs to intervene in the market to reduce information asymmetry and speculation, which could be contributing to nonlinearity and persistence in volatility. The results also imply that forward contracts and other

derivative instruments for hedging against risk should be introduced in the market. This will enable participants to bear only that risk they are willing to carry in the highly volatile market. This can increase market liquidity and information efficiency.

Thirdly, the two seasons in returns and volatility in the market are characterized by extreme movements in the exchange rates, especially in January, May and December. This suggests increased speculation in the foreign exchange market around these dates. Again, this suggests that intervention by the CBK may reduce the pronounced volatility around these seasons. For dealers, forex bureaus, and portfolio managers this represents an opportune time to take positions in the market and reap profits. However, farmers expecting cash inflows from export of their products should consider hedging their expected cash flows around these months. The importers of goods and raw materials should also consider using derivatives to hedge against currency risk around these periods in the year.

Fourthly, the results in this study suggest that effective intervention in the market by the CBK should occur at most five days after gyrations begin in the exchange rates and the interest rates at different maturities. Any delay beyond five days after the market has become volatile, given risk averse and irrational market participants, could plunge the market deep into chaos.

Lastly, nonlinearity and chaos in exchange rates have important implications for portfolio insurance, stop-loss trading strategies and determination of the minimum capital requirements for dealer banks and foreign exchange bureaus. The Central Bank can use the results of this study to set the minimum capital for dealers and forex

bureaus. Portfolio managers also need to hedge their open positions in the market, since extreme exchange rate changes are more common in the market than suggested by popular normal distribution. Thus, derivative products should be introduced and popularized in the market to help participants to manage foreign exchange rate risk.

5.5 Limitations of the study

The researcher encountered various limitations that may have affected the findings of this study. For instance, the study relied on secondary data sources. Secondary data can, however, be unreliable as they were intended for other purposes. This could include convincing external stakeholders that the business performs well. To curb this, the study sought audited financial results. The sample for this study might have been small. Small samples have the drop-back of not being representative of the population reality. However, the researcher carried the study on all commercial banks engaged in agency banking hence it was fully inclusive. Further, the performance of commercial banks is influenced by other factors other than contributions. Thus, establishing the relationship between the two variables might be erroneous. The study tested the significance of the relationship established to mitigate this.

5.6 Recommendations for Further Research

There are at least four areas where this study can be extended. First, the efficiency, nonlinear and chaotic behavior of the foreign exchange market over time needs to be examined. This may shed light on the impact of specific reforms and CBK interventions in the market on efficiency and complexity. A similar study can be done for other currencies vis-à-vis the Kenya shilling. This will allow a comparison to be made between markets based on information efficiency and the degree of nonlinearity

and complexity. Secondly, there is need to study the issue of volatility forecasting in the foreign exchange market in Kenya. Specifically, it should be examined whether the models fitted to the data in the current study offer any improvement over the extant models in forecasting returns and volatility in the foreign exchange market. At the moment, the ability of available models to predict the future, even over the short-run, is poor.

Thirdly, the results presented with respect to the KSh/USD market could be gainfully replicated in other currency markets. This will provide an opportunity to compare results in this study with those of other markets and thereby enable one to make general statements concerning the efficiency and volatility clustering in all foreign exchange markets in Kenya. Fourthly, future studies could employ high frequency data to re-examine the issues raised and addressed by the current study. The motivation would be to study market activity almost in real time.

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APPENDICES

Appendix 1: List of Commercial Banks in Kenya as at 31Dec 2012 Classified Per Peer Group

COMMERCIAL BANKS	PEER GROUP
1. Barclays Bank of Kenya Ltd	Large
2. CFC Stanbic Bank Ltd	Large
3. Co-operative Bank of Kenya Ltd	Large
4. Equity Bank Ltd	Large
5. Kenya Commercial Bank Ltd	Large
6. Standard Chartered Bank Kenya Ltd	Large
7. Bank of Africa Kenya Ltd.	Medium
8. Bank of Baroda (K) Ltd.	Medium
9. Bank of India	Medium
10. Chase Bank (K) Ltd	Medium
11. Citibank N.A Kenya	Medium
12. Commercial Bank of Africa Ltd	Medium
13. Diamond Trust Bank Kenya Ltd	Medium
14. Ecobank Kenya Ltd	Medium
15. Family Bank Limited	Medium
16. Guardian Bank Ltd	Medium
17. Imperial Bank Ltd	Medium
18. I & M Bank Ltd	Medium
19. National Bank of Kenya Ltd	Medium
20. NIC Bank Ltd	Medium
21. Prime Bank Ltd	Medium

22. African Banking Corporation Ltd.	Small
23. Charterhouse Bank Ltd	Small
24. Consolidated Bank of Kenya Ltd	Small
25. Credit Bank Ltd	Small
26. Development Bank of Kenya Ltd.	Small
27. Dubai Bank Kenya Ltd.	Small
28. Equatorial Commercial Bank Ltd	Small
29. Fidelity Commercial Bank Ltd	Small
30. Fina Bank Ltd	Small
31. First community Bank Limited	Small
32. Giro Commercial Bank Ltd	Small
33. Gulf African Bank Limited	Small
34. Habib Bank A.G Zurich	Small
35. Habib Bank Ltd.	Small
36. Jamii Bora Bank Limited	Small
37. K-Rep Bank Ltd	Small
38. Middle East Bank (K) Ltd	Small
39. Oriental Commercial Bank Ltd	Small
40. Paramount Universal Bank Ltd	Small
41. Trans-National Bank Ltd	Small
42. UBA Kenya Bank Limited	Small
43. Victoria Commercial Bank Ltd	Small

Source: Central Bank of Kenya http://www.centralbank.go.ke/images/docs/Bank Supervision Reports/Commercial Banks Directrory - 13 December 2011.pdf

Appendix 2: Average Lending Rate

	Average Lending rate
2008	14.02
2009	14.80
2010	14.37
2011	15.05
2012	19.72

Source: Central Bank of Kenya

Appendix 3: Summary Statistics

Summary statistics:							
Variable	bservation	ith missin	thout miss	Minimum	Maximum	Mean	Std. deviation
Foreign Exchange	5	0	5	23.148	23.764	23.418	0.285
Exchange Rate Vo	5	0	5	0.264	1.067	0.563	0.322
Average Lending	5	0	5	14.017	19.723	15.593	2.343