EFFECTS OF EXCHANGE RATE VOLATILITY ON STOCK RETURNS OF FIRMS LISTED AT THE NAIROBI SECURITIES EXCHANGE

BY

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A RESEARCH PROJECT PRESENTED IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE AWARD OF THE DEGREE OF MASTER OF SCIENCE IN FINANCE OF THE UNIVERSITY OF NAIROBI

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DECLARATION

I declare that this project is my original work and has never been submitted for a degree in any other university or college for examination/academic purposes.

Signature: …… Date:……

LEVIS NYABWARI NYANGWETAH

D63/78986/2015

Thisresearchprojecthasbeensubmittedforexaminationwithmyapprovalasthe University Supervisor.

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DEDICATION

This research project is dedicated to my parent for her support while undertaking my studies. Thank you and God bless.

ABSTRACT

From the accounting point of view, an increase in the volatility exchange brings about exchange rate increase and its risk which in turn leads to increase in transaction costs of companies. Higher transaction costs lower the expected earnings of companies which, subsequently, impacts negatively on reported profits. Hence, greater volatility of exchange rate reduces the level of international transactions because companies cannot be competitive on international trade due to high transaction and operating risks. When a company's profits decline the stock returns will similarly decline and as a result the investors' wealth is reduced. During the moments of the financial hardship, the high rate of volatility in the market of stocks leads to generation of the action in the speculation by both investors as well as the flight of capital. This therefore leads to high level of instability in the foreign market. In such circumstances, investors are likely to relocate resources out of such countries by selling their holdings or ownership in respective companies and investing in countries that have stable exchange rates. Fluctuations in stock returns of companies sometimes may lead to a multiple of consequences. First, people holding such kind of shares will emerge into wealth loss and if this particular kind of fall is big, the investors may shy off from investing in stocks thereby leading to a loss of confidence in the market of stocks. Second, mostly the movement of shares is a reflection of the current occurrences in the economic world. Bad headlines of falling share prices can create panic among investors which may affect the stock market operations. Thirdly, the price share fall can hinder the ability of the firm to raise cash in the market of stocks. Ordinarily, the companies are rapidly expanding hence they borrow by issuing their shares to the public world. The main goal of the research is to determine the impact of exchange rate volatility on prices of the stock of the firms that are fully listed in NSE. This was a descriptive study that utilized quantitative data in both data collection and data analysis. Descriptive research design usually entails procedural data collection methodology, data tabulation, depiction and describing the collection of data. The objective populace for this study included all of the listed companies in Nairobi Securities Exchange. Furthermore, the study utilized aggregate stock returns and stock market values for all the listed companies in the NSE. As at October 2016, there were sixty two listed companies categorized into ten broad economic sectors. From the findings, the exchange of the securities has the power to predict to enhance investment and produce quality returns from the stocks that have the variable that is forward looking that consolidates assumptions about money streams in the future and discount rates. Securities exchange returns serves as an index to investors or governments to in settling on their investment. The following conclusions are drawn; the main findings revealed that exchange rate volatility influences stock returns movement but the opposite is not applicable in Kenya. It was also established that exchange rate volatility is more important than actual changes in exchange rate as determinant of stock returns movement. This shows that the market of stocks is sensitive to the risks in the foreign exchange market than the actual movement in exchange rates themselves.

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ABBREVIATIONS

BRICS Brazil, Russia, India, China and South Africa (BRICS) countries

CBK: Central Bank of Kenya

GDP: Gross Domestic Product

NSE: Nairobi Securities Exchange

OECD: Organization for Economic Co-operation and Development

PP: Phillips-Perron

TGARCH - Threshold Generalized Autoregressive Conditional Heteroscedasticity

UK: United Kingdom

USA: United States of America

CHAPTER ONE

INTRODUCTION

1.1 Background Study

Kenya has experienced four different currencies for the last two centuries. Its first currency can be traced to the period 1800 -1850 when Indian, Greek and European merchants introduced silver coins called Maria Theresa Thalers along its Coast. The second currency was Indian rupee which was introduced in 1896 by Indian workers who were hired to build the Kenya - Uganda railway line. The Indian rupee became official currency of Kenya and Uganda in the year 1905. The rupee remained in circulation until 1920 when it was abolished. The third currency is the East Africa shilling which was introduced in 1922. The East Africa shilling was immovably settled as the official recognized currency denomination in Kenya, Uganda and Tanganyika by June 1923.

The East Africa shilling remained in circulation until Kenya attained her political independence. However, Kenya started printing and minting her own denominations - the Kenya shilling, in 1966 under the Central Bank of Kenya (CBK) Act (Cap 491). The Kenya shilling which is poses as the accepted legal tender of Kenya is divided into 100 smaller units called cents (CBK, 2013).

Caporale, Gil-Alana and Mudida (2012) express that the International Monetary Fund (IMF) groups Kenya as working an autonomous float from the years 1992 and 1997 and managing float since the year 1998. Initially, the Kenyan shilling had initially maintained its currency value at a fixed exchange rate to the British pound, and at that point to also the US dollar, finally to the SDRs ahead of a creeping peg in view of an exchange weighted crate was presented. However, as per Ndung'u, Karingi, Geda and Were (2001) the Kenya shilling was pegged to the US dollar from its beginning.

1.1.1 Exchange Rate Volatility

This is the propensity for depreciation or deterioration of the value of foreign money, therefore influencing the profit of the foreign exchange trades realized. Volatility is the estimation of the aggregate that these rates become changed and also the recurrence of those progressions. Numerous conditions exist when exchange rate volatility becomes possibly the most important factor, including dealings held between business parties in two different nations and global ventures. In spite the fact that this sort of vitality is hard to evade in instances such as these, exchange rates are locked in with currency futures to initiate the results of changes in prices. It can be seen that volatility can take place in any security whose value ascents or depreciates. The term is regularly utilized together with the stock market, however, it can be unpredictable in foreign currencies are sometimes. At the point which rate of exchange become floating currencies, instead of being maintained at a fixed conversion rate, their values are expected to go vary downwards and upwards and this is dependent on the economies involved and their strengths. Therefore, unpredictability is something that influences any business undertaking including two distinct nations. A floating exchange rate is therefore volatile or may not be and this is dependent on how much it changes over time. According to Suranovic (2010), volatile exchange rates make investment decisions and international trade more difficult since they increase operational risk by firms.

Kiptoo (2007), states that there is no accessible proof that achievement has ever been accomplished since in understanding the goal for which liberalization occurred in the foreign exchange market. In Kenya, the monetary markets has been defined by volatilities in nominal exchange rates that are huge, since 1993 when the shilling was permitted to

float. Maana (2011) in his study also contends that in Kenya, the trade rates have been unstable since liberalization in 1993 October. Volatility speaks to how much a variable changes over time. Along these lines, volatility in exchange rates may allude to the propensity of appreciation or depreciation of foreign currencies in value with respect to time. Thefaster it changes over time, the more unstable it is. In this way, the exchange rate floatation could become unpredictable hence changing over the period of time. As indicated by Suranovic (2010), exchange rates which are volatile make investment decisions and international trade more burdensome since they increase operational risk by firms.

1.1.2 Stock Returns

Returns in a security exchange are the yield a speculator gets over a predefined period of time. It is now and then viewed as synonymous to stock costs. A solid market is actually one which consolidates new data on stock cost, therefore influencing stock costs for the firm's accurately valued and stable (Mwangi and Mwiti, 2015). Securities exchange returns have predictive investment power and yield as the reate of exchange of stock are variables that are forward looking hence consolidates assumptions about money streams in the future and rate of discount. Securities exchange returns serves as investor index to in settling on their investment.

According to Agrawal, Srivastav and Srivastava (2010), regardless of contributing factors, whenever economies experience exchange rate volatility the pressure is exerted on prices of stock thereby impacting on the portfolios and balance sheets of various businesses and in particular the investors' wealth. Stock price (share price) is the value of the firm divided by the total outstanding number of shares. The stock price change as

well as the continuous change has been of the great interest in the secondary market as a result of the stability in the market as well as adopted strategies (Wang, 2010).

1.1.3 Exchange Rate Volatility and Stock Returns

Trade rates, similar to some other product, have a basis on supply and demand for specific currencies. Changes take place in local currency supply because of a nation's financial and money related policies. Currency demand may be impacted by a wide variety of elements, such as inflation, imports and exports, rate of interest, and perspectives on looming government control. Several external related elements exist that possibly can influence the company's stock returns. The proceedings with increases on international capital as well as trade developments makes rate of exchange to be essential determining business productivity factor and value costs Kim (2003). Changes in exchange rate particularly affect how firms are internationally competitive, given their great impact on both input and output (Joseph (2002).

The volatility in currency has impacts on stock returns. Exactly when the value in money increases in value, in a circumstance where the nation is export-oriented, it's ordinary for a diminishment in the intensity of her exports to be expected, thusly, negatively affect the local securities exchange. This is in light of the fact that companies that are export-oriented cited on the stock exchange market would not have profitthus making to become less interested in it (Muthike&Sakwa, 2012).

When currency loses value at the same time when exports increase their competitiveness, the inverse happens. The unsteadiness seen in the Kenyan shilling influence the stock costs depending upon whether it increases or deteriorates. As of the 16th of May 2013 the conversion of the Kenya shilling standard retained its stability against critical widespread

world monetary standards. The Kenya shilling solidified against the US Dollar to trade at an ordinary rate of Ksh 83.81 (Republic of Kenya, 2013). When return rates are modified in a case as this, it may cause a direction on stock benefits in Nairobi Stock Exchange, contingent on the conduct of cash, paying little respect to s whether it acknowledges or something else.

1.1.4 Firms Listed at the Nairobi Securities Exchange

The Stock Market isone that handles exchange of shares of openly cited government, companies, and, municipal bonds among different instruments. In Kenya, dealing in stocks and shares began in the 1920s. Trading by then occurred on a gentleman's agreement since there was no formal market. It was not until 1954 when the Nairobi Stock Exchange became framed a voluntary organization for stockbrokers (NSE, 2013). The main objective of establishing stock exchange in Kenya was to facilitate resource mobilization for long term financing investments' capital.

The stock exchange market thusly gives investors an efficient mechanism to make investment decisions in securities and also liquidate (Monther&Kaothar, 2010). Hence, unstable market creates high investors uncertainty due to eroding assurance in the market. Literature that has been reviewed exhibits two major types of theoretical models analyzing the relationship existing between the exchange of stock and the prices. Approach number one being the traditional approach, included in 'flow oriented' economic models which were first developed by Dornbusch and Fisher (1980). This theory asserts that rate of exchange fluctuations lead to movements in stock price, hence exchange rate are led by stock prices with complementary relations. Other approaches include the 'stock-oriented' and also the 'portfolio balance approaches' (Branson, 1983,

Frankel, 1983). These models postulate that stock price changes may influence exchange rates movements, hence stock prices a negative correlation leads exchange rate. The stock oriented models embrace the 'monetary theory approach' which was developed by Gavin (1989). This theory postulates that there is no linkage between currency market and capital market.

1.2 Research Problem

From the accounting point of view, an increase in exchange rate volatility brings about increase in exchange rate risk which in turn leads to increase in transaction costs of companies. Higher transaction costs lower the expected earnings of companies which, subsequently, impacts negatively on reported profits. Hence, greater volatility of exchange rate reduces the level of international transactions because the company cannot be competitive on international trade due to high transaction and operating risks. When a company's profits decline the stock prices will similarly decline and as a result the investors' wealth is reduced. In such circumstances, investors are likely to relocate resources out of such countries by selling their holdings or ownership in respective companies and investing in countries that have stable exchange rates.

Fluctuations in stock prices of companies sometimes may lead to a multiple of consequences. First, people beholding shares will experience a drop in their riches and in case this drop in wealth is significant the investors may shy off from investing in stocks thereby leading to a loss of confidence in the stock market. Second, most of the time share price movements reflect what's going on in the economy. Bad headlines of falling prices in shares can create panic among investors which may affect the stock market operations. Thirdly, a fall in share prices may reduce firms' ability to increase finance on

the market exchange system. Customarily, firms which are extending their boundaries and wish to borrow regularly and they do as such by issuing more shares to the general population. Companies wishing to invest in long term projects usually prefer such sources of funds since they are cheaper than bank loans. However, with falling share prices and low returns it becomes much more difficult to borrow from the stock market. For example, in the year 2008 the public listing of the Cooperative Bank of Kenya managed only 81 percent subscription even after scaling down the target from Ksh.10 billion to Ksh.6.7 billion. According to Mwega (2010) this was the first under-subscription on the Nairobi Securities Exchange in recent times. From this explanation one might be tempted to believe that there is linkage between exchange rate and stock markets. Therefore, decoupling occurs. However, there is scanty empirical evidence to explain this phenomenon between the two markets in Kenya.

Some studies on the linkage between foreign exchange and stock markets in Kenyan such as (Kirui, Wawire&Onono 2014, Ouma&Muriu 2014, Kisaka&Mwasaru 2012, and Aroni 2011) have either focused on macroeconomic variables and returns in the stock market, causal interaction between rate of exchange and stock prices and or factors influencing stock prices. As such very few studies have been done on the current topic and particularly, during the period between the year 2007 and 2015. Currently, studies aim to address the association relationship between stock and returns in rate of exchange and their volatilities broadly by analyzing monthly data for firms that are listed in NSE for the period 2007-2016. Therefore this study seeks to provide better understanding of effects of the volatility in exchange rate on listed companies in Kenya for the period under review.

1.3 Research Objectives

The goals of the research is to investigate the effects of exchange rate volatility on return of stock of companies listed in the NSE. This will be done by establishing the relationship and influence that volatility of exchange rate has on stock returns.

1.4 Value of the study

A firm can witness three sorts of dangers in the market which can be named: Credit Risk, Market Risk and Operational Risk (Pulley blank, 2003). Market hazard alludes to the hazard to a firm coming about because of developments in showcase costs, especially changes in loan costs, remote trade rates, and stock costs. For organizations presented to advertise hazard, the unchecked unpredictability can rapidly wipe out its productivity. To beat the danger of instability, different strategies have been attempted and tried with progress.

Therefore, this study will facilitate firms in making the following decisions: (i) hedging decisions –not only are these tools are cheaper in comparison with other alternatives, but are also among the most effective instruments in handling volatilities of prices. This study will be of aid to managers for the purpose of understanding the importance of derivative markets as a means to mitigating exchange rate volatility. (ii) Target market decision – managers of firms aim at global markets to buy crude material and furthermore to sell completed merchandise at competitive costs. Therefore, crude materials will be bought from countries whose currencies are anticipated to reduce in value over time against the home currency and exports made where currencies are anticipated to increase in value over time against home currency. This enables organizations change to more

affordable crude materials when costs appreciate or move production to various geographic areas which have cost advantages. Organizations may likewise store a stock of crude materials when costs are low and go back to them when costs spike. Even when there are costs related with keeping up high stock volumes, they might be legitimized by the advantages when crude materials costs are exceedingly unpredictable. This study will empower organizations to value the conduct of trade rates and how to profit by outside swapping scale instability by taking proper vital choices as needs be.

This study will also assist investors in concluding if they can use the exchange rate parameter to have an objective opinion in knowing the countries stock market returns. Based upon performance of the performance of the currency, an investor can also decide whether it is safe to diversify share portfolio in an economy's stock market whose currency is either appreciating or depreciating. This study will also enable investors when to hedge the securities invested. The Capital market Authority will also decide on whether it is necessary to place regulations relating to exchange rate. These regulations will be mainly to protect the investors from information asymmetry that may arise in relation to exchange rate.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction of the Study

The review of literature analyzes investigations that have been embraced as well as hypothetical introduction on impacts of trade rates on stock costs. A number of researches already conducted will be discussed in the empirical review. This aided in distinguishing the research gap and in building up the conceptual framework for the present examination.

2.2 Theoretical Review

The interaction between the international stock exchange and stock market has drawn much interest for academic debate and empirical analysis since the system of Bretton Woods was abandoned in 1973 as well as widespread adoption of more flexible exchange rates by both developed and developing countries.

2.2.1. Flow-oriented Theories of Rates of Exchange

This model was well explained by Dornbusch and Fisher (1980) for the first time. Customary monetary hypothesis guesses that stock expenses and rates of exchange may collaborate. The principal approach is incorporated in 'stream arranged' models which suggest that change scale developments cause stock esteem improvements. In Granger-Sim’s dialect of causality, this is referred to as 'unidirectional' causality running from rates of exchange to stock expenses. Stream arranged models were first talked about by Dornbusch and Fisher (1980). This approach is founded on the view of the macro economy which examines stock costs on the understanding that stock costs speak to the

marked down present estimation of a company's conventional future streams of money. Henceforth, any wonder that sways an organization’s earnings will be mirrored in the company's stock cost, considering the market is well equipped according to the Efficient Market Hypothesis (EMH). In this manner, developments in the swapping scale are one such marvel that decides the stock cost. This implies share costs of organizations are affected by conversion scale developments. Proponents of flow-oriented theory argue that most empirical studies have used flow oriented model in explaining the linkage between the two markets. Kang and Young (2012) concluded that many empirical studies have supported the flow-oriented analysis approach in the exchange rates andstock markets returns relationship.

2.2.2 Stock - oriented Theories of Exchange Rates

Stock oriented models on the other hand underline with respect to the capital in the determination rates of exchange. They may be perceived on portfolio adjust models and money related models. Portfolio Balance demonstrates was put by (Branson and Halttunen 1979, Branson 1983, and Frankel 1983). In the event that interest rate parity theory holds at that point portfolio adjust hypothesis lessens to what we call fiscal model of conversion standard.

Defenders of this hypothesis fight that remote cash and in addition outside securities, aren’t potential alternatives of neighborhood cash or nearby securities eventually, hence, trade rates are mostly dictated by cash supply distinction and incompletely by different resources. This hypothesis likewise puts into consideration the effect of trade rate on the wealth of agents.

2.2.3 Monetary Theory

Monetary theory is grouped under the stock-situated models. Fiscal hypothesis was first created by Gavin (1989). As showed by this approach a rate of exchange is the price of one unit of international currency against local currency. Consequently the actual rate of exchange must be dictated by the expected exchange in the future comparably like costs rate of distinctive assets. The principle factors impacting the real conversion scale are factors that impact the future estimation of the swapping scale.

Because upgrades of stock costs and trade rates might be caused by various elements the benefit showcase approach accentuates no association between stock expenses and rates of exchange. That is, this hypothesis proposes that there's no connection between rates of trade and stock returns with the exception that the two factors are affected by some normal elements.

2.3 Determinants of Stock Returns of Listed firms

2.3.1 Central Bank Interest Rate

Central banks are responsible for monetary policies, controlling the amount of money in an economy. Managing the level of inflation is their main concern. Generally, cutting interest rates stimulates economic activity and should increase inflation, whereas raising interest rates has the reverse effect. Low interest rates encourage banks to lend, and firms and households to borrow – supporting economic activity and staving off deflation, or falling prices. The interest rate cutting by use of quantitative easing method to enhance the flooding of the financial market by use of newly printed money has been able to boost the price of the asset. This includes the equities, use of properties, use of cash, application

of bonds, use of currencies as well as the properties. In the process of hunting for the assets that are new, riskier assets should be considered first.

2.3.2 Inflation Rate

According to Rapach et al (2005) & Chen et all (1986), inflation as a variable has little positive correlation to the company's return of stocks in the NSE. This research work illustrates the NSE case, the practice that is actual is very opposite to the very expectation concerning the negative correlation. In the ideal situation, the increase in the anticipated price leads to the reduction of the cash flows emanating from the investment level. The investors who have the asset ownership have very high exposure to the potential real value as a result of the inflation. This kind of tendencies makes many investors to shy from countries that are experiencing series of the inflation surge

2.3.3 Commercial Bank Interest Rate

Rate of interest on commercial Banks have very big impact on the return of stock. When the country experience the rise in the rate of interest, the saving rate increases leading to channeling of the flow of money to the banks. This leads to depletion of stock demand hence reduction of the prices on the stock. High rates of interest lead to the reduction of the value of the future stocks. This leads to low attraction of the options of investment resulting from low returns Dubravka and Petra (2010)

2.3.4 Macroeconomic Variables

In accordance to Cheng et el (2011) investigation of ventures of electronics in Taiwan observed that the factors of mechanical generation, and cash supply (M2) and conversion

scale had a direct impact on the stock performance. In a relative investigation, however, they had an observation that external occasions had even much power of prediction than the internal elements. Rapach et al (2005) utilized a few elements from twelf nations that are highly industrialized to look at the imact of the macroeconomic factors on the flow of the stocks. Investigations inferred that the greater part of the chose factors had the capacity to foresee stock costs. Dubravka and Petra (2010) in their examination attempted in Croatia capital markets researched very strong connectivity between the return on the stock and the macroeconomic factors utilizing swelling, mechanical generation, loan fees.

Wang (2010) exact examination of elements that influence the adjustment in stock value demonstrates that the adjustment in stock cost is mostly influenced by the conversion scale, loan cost, macroeconomic thriving list, shopper's certainty list and corporate products value list.

2.4 Empirical Studies

Inci and Lee (2014) researched various relations between alterations in the rate of exchange and stock returns based on seven advanced economies of the UK France, Japan, Switzerland, , the US, Canada, and Germany using annual data from the years 1984 to the year 2009. Caporale, Hunter and Ali (2013) researched the association between stock prices and exchange rates on six advanced economies. They include: Japan, the UK, Canada, the Europe, the US, and Switzerland using Bivariate GARCH-BEKK models. They reported varied causalities ranging from country to country. This implies that in the US and the UK, stock prices are led by rate of exchange, hence embracing the flow-oriented theory of exchange rates. These specific findings disagree with earlier studies by

Alagidede, Panagiotidi and Zhang (2011) who established that in the UK, exchange rates lead stock prices and hence embrace flow-oriented model. However, both (Inci& Lee, 2014 and Caporale*et al.* 2013) are in agreement that the Canadian economy embrace flow oriented model that is, exchange rates lead stock prices. Similarly both studies are in agreement as far as Euro zone is concerned. Both found out that there is bidirectional spillover in the Euro area implying that both the traditional approach and the portfolio approach can be observed at times concurrently in the Euro area. This may also suggest that there is a flow in information (transmission) between both markets and both these markets are integrated with each other.

Tsagkanos and Siriopoulos (2013) investigated "A long-run relationship between stock prices and exchange rate in European Union and USA using both daily and monthly observations." They applied structural nonparametric co-integrating regression model. The outcomes indicate a causal relationship from stock prices to rates of exchange that is eventual in European Union and short-run in the USA. Findings support the stock oriented model suggesting that exchange rates are led by stock prices and that they are related negatively. Their results are in agreement with the findings in the same year by Caporale*et al.* (2013). This implies that both EU and USA economies embrace the stock-oriented model. That is, changes in rates of exchange are led by changes in stock prices.

Chkili and Nguyen (2014) applied a regime-switching model approach to find out the relationships between the rates of exchange and returns in stock market for Brazil, Russia, India, China and South Africa (BRICS) countries. The un ilabiate analysis shows that stock returns of the BRICS countries change depending on two separate

systems: a low volatility regimen and a high volatility regimen. However, when they applied Markov switching VAR models they found that stock markets have more persuasion on rates of exchange during calm and turbulent times, thereby embracing stock-oriented theory. Hegerty (2014) examined "Exchange market pressure and stock-price spillovers in emerging markets." The author applied Vector Autoregressive (VAR) models that captured regional and global effects. The results show that asset-market shocks often spill over to exchange market pressure. Further, the findings indicate that causality often runs the opposite direction as well. These findings are in agreement with those done in the same year by Chkili and Nguyen.

By applying Threshold Genaralized Autoregressive Conditional Heteroscedasticity (TGARCH) model Kirui, Wawire and Onono (2014) examined "Macroeconomic variables, volatility and stock market returns in Kenya." They applied Engle-Granger two-step methods to find out the co-integrating association between the macroeconomic variables and stock returns. The empirical outcomes uncover that exchange rate, Gross Domestic Product and Treasury bill rate the effect of news was a not symmetrical and there was presence of effects of leverage as well. Further, the outcomes demonstrate the lack of volatility persistence within all the macroeconomic factors. Ouma and Muriu (2014) researched the "Impact of macroeconomic variables on stock market returns." They found that money supply, rates of exchange and inflation rate influence the stock market returns in Kenya. They additionally settled that money supply and inflation are critical determinants of the profits at NSE. Further, they found that exchange rates have negative effect on stock returns, while interest rate is not vital in deciding eventual profits in Nairobi Securities Exchange.

By applying error correction model Otieno (2013) investigated the "Factors influencing real exchange rate and export sector performance in Kenya." The study found that, international aid inflow lead to real exchange rate rising in value in Kenya. Further, international aid inflows also had a positive effect on export volumes. Kisaka and Mwasaru (2012) analyzed the causal connection between exchange rates and stock prices in Kenya. The empirical results obtained from the years 1993 November to 1999 May demonstrated that stock prices in Kenya are caused the exchange rates granger. Likewise, the study discovered a unidirectional causality from exchange rates to stock prices. Along these lines, the developments in return rates exert a huge effect on determination of stock price in Kenya.

2.5 Conceptual Framework

The conceptual framework incorporates both the independent and dependent variables that have been mentioned in the theoretical framework and which were identified in the review of literature and how these variables inter-relate to each other. However, the conceptual framework is based on the flow-oriented theory developed by Dornbusch and Fisher (1980). This theory assumes that a causal relationship runs from the rate of exchange to the stock returns. This assumes that Stock returns prices of companies are influenced by exchange rate movements.

The conceptual framework shows the independent variable on the left, the intervening variables on the left and the dependent variable on the right. The independent variable (exchange rate volatility) is the input or cause that affects the dependent variable (stock returns) of companies listed in NSE. In statistics, what occurs between the independent

and the dependent variables is known as an intervening variable. This is a hypothetical variable and is used to explain a causal links between other variables. It causes the dependent variable and is caused by the independent variable. In this study, the exchange rate volatility which represents independent variable was measured using: (i) Changes that occur daily changes in mean exchange rate of Ksh/USD, (ii) Changes that occur monthly in mean exchange rate of Ksh/USD, and (iii) Monthly standard deviation. On the other hand, the stock prices which represent dependent variable were measured using: (i) Daily mean price per share, (ii) monthly mean price per share, and (ii) monthly value of shares traded.

2.6 Summary of literature review and identification of research gap

The empirical literature has revealed that the association between foreign exchange markets and stock markets is yet not standardized; therefore, there isn't a general consensus on whether or not the stock market affects the exchange rates positively or negatively. Few researches have been done conducted which investigated the impact of rate of exchange volatility on stock prices of companies. One motivation for undertaking this research is so as to fill the knowledge gap in the area of effects of exchange rate volatility in developing countries generally and particularly Kenya. Analysis of the findings indicates that the results of the studies are mixed. This might have been caused by different factors and different economic circumstances that each country was exposed to at the time respective studies were being carried out. It can be concluded that the association between the foreign exchange and stock markets have caused a lot of interest in academic research and that empirical researchers are not close to reaching an

agreement as to the model that commands the two markets. Hence, the main contributors to research gap could be the models used, the macroeconomic factors being analyzed, the timeframe, and the specific study objectives.

Results of reviewed studies portray mixed findings. Some studies such as those by (Chkili& Nguyen 2014, Hegerty 2014, Tsagkanos&Siriopoulos 2013, Caporale*et al.* 2013, Bonga&Hoveni 2011, and Agrawal 2011) support the stock oriented model. Other studies such as those by (Ouma 2014, Umoru&Asekome 2013, Olugbenga 2012, Kisaka&Mwasaru 2012, Alagidede, Panagiotidi& Zhang 2011, and Sekmen 2011) support the flow oriented model. However, other studies such as (Diamandis&Drakos 2011, and Kenani*et al.,* 2012) indicate there is no causal relationship between the stock markets and exchange rates.

Independent Variable

Dependent Variable

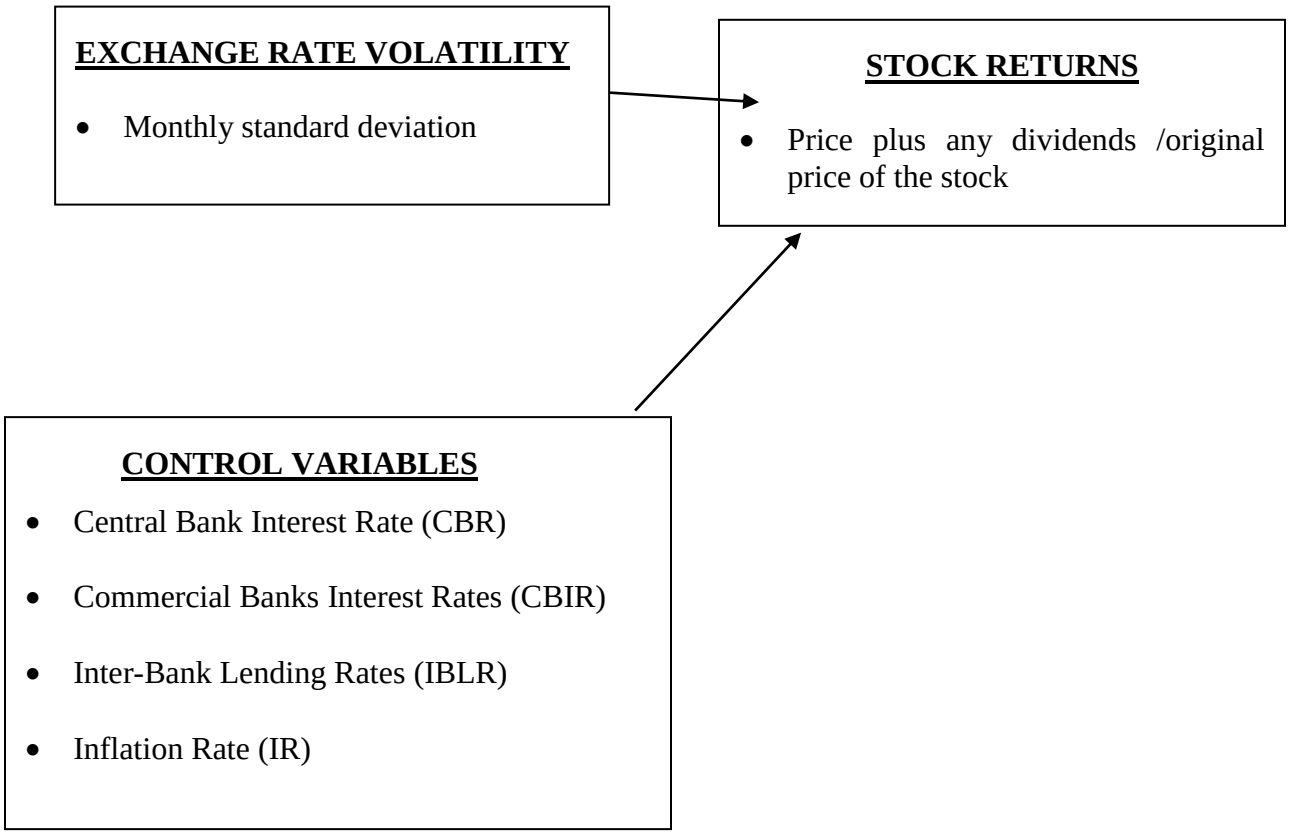

Figure above shows that this study utilized some selected macroeconomic variables which work around +-the stock prices and the exchange rate volatility. These intervening variables include: (i) the Central Bank Rate (CBR) – which is defined as the price at which money isloaned normally overnight to commercial banks by the Central Bank, (ii) Commercial Bank Interest Rates (CBIR) – characterized as costs charged to or paid for the use of money, (iii) Inter Bank Lending Rates (IBLR) – defined as the rate at which commercial banks borrow and loan money between themselves over a brief timeframe, usually overnight, and (iv) Inflation Rate (IR) – defined as the persistent increment in the level of general costs of products and services over a given timeframe.When the independent variable (exchange rate volatility) changes, it induces the intervening variables to move up and down and subsequently the stock market changes in tandem. For example, in the period between 2007 and 2016 Kenya experienced worst exchange rate volatility. This is the period when the exchange rate to the dollar hit its lowest level at over Ksh.107. The NSE 20-Share Index oscillated between a high of 5700 points to a low of 2500 points with market capitalization swinging between Ksh.834 billion and Ksh.1089 billion. Similarly, when the exchange rate was volatile, it induced some macroeconomic variables such as the Central Bank Rate (CBR) to move from a single digit to 18 percent while commercial banks' lending rates oscillated between 16 percent and 27 percent. As a result, the stock market moved downwards to its rock bottom with the NSE 20 Index being quoted at around 2500 points.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This particular research methodology is used in this section. The design of research, data collection and the various techniques for data analysis to be used in the study is described. It explains the design of the research, the study population, methods of collecting data, analysis as well as interpretation.

3.2 Research Design

This was a descriptive type of study that utilized quantitative data in both data collection and data analysis. Descriptive research design usually entails collecting data that describes events and then organization, tabulation, depiction, description of methodologies of collecting data. The application of the visual instruments like graphs and pie charts to enable the reader understands the distribution of data distribution. Descriptive studies normally use methods of analyzing relationships between variables by making use of models like the Pearson's Product Moment correlation, simple regression, or multiple regression analysis. This studyutilized different regression analysis to decide the connection between the variables.

3.3 Target Population

The objective populace for this study included all of the listed companies in Nairobi Securities Exchange. Furthermore, the study utilized aggregate stock returns and stock market values for all the listed companies in the NSE. As at October 2016, there were sixty two listed companies categorized into ten broad economic sectors (Appendix I).

3.4 Data Collection Procedures

The data required in this study relating to every company listed in the Nairobi Securities Exchange from 2007 until 2016 was extracted from secondary sources. As per Yin (1994), the utilization of documentation as a wellspring of information has a few points of interest including: (I) solidness (archives can be surveyed over and over); (ii) offers exact and quantitative data; (iii) gives expansive scope in time and occasions and; (iv) it is typically unpretentious – not made because of the request. Nonetheless, access to archives might be compelled by poor or powerless frameworks of recovery and secrecy or security reasons. Also, records may mirror a detailing predisposition made by the creators.

The data was obtained particularly from KNBS, CBK, and the NSE. Data relating to daily exchange rate and the monthly mean exchange rates of Kenya shilling to the US dollar will be gotten from the Central Bank of Kenya database which is published weekly in the weekly bulletin of CBK concerning the economic indicators on their website.

Similarly, both end period data and monthly average data on exchange rate interest in CBK bi-annual Statistical Bulletin and Monthly Economic review.

The data for monthly average stock prices (SP), monthly average Central bank rate (CBR), monthly average commercial bank interest rate (CBIR), and monthly average inflation rate (IR) were gotten from the handbooks of Kenya National Bureau of Statistics. However, the list of every company listed in the NSE was obtained from the NSE handbooks.

3.5 Data Analysis Procedures

In order to make the measurement of the stock return's impact emanating from the volatility of the interest rates in Kenya, multiple regression analysis was used in this study to determine the variable and their relationships. The independent variable will be exchange rate and stock prices will be the dependent variable. Therefore; it is assumed that there exists a linear relationship between the independent and dependent variable. The association between dependent and independent variables can be precisely estimated using a standard multiple regression to find out if the nature of the relationships is linear even though sometimes in reality, some forms of non-linear relationships can also be designed within a linear regression framework. If the no linear relationship exists between the variables, the results of the regression analysis will under-estimatethe true relationship. This underestimation bears two risks: Type II error has increased chance for that independent variable, and, Type I errors has an increased risk (overestimation) in the case of multiple regression, for other independent variables that share variance with the

independent variable (Osborne & Waters, 2002). Multiple regressions is used to analyze the association between the two variables, the independent and dependent variable.

If a relationship is established, using the information in the independent variables will enhance the accuracy in estimating the dependent variable values. In standard multiple regression every independent variables is fed into the regression equation concurrently. Multiple R and R2 measure the strength of the association between the independent variables and the dependent variable set. An F-test is used to decide if the relationship can be generalized to entire population represented by the sample used. A t-test is used to establish the individual relationship between the dependent variable and each of the dependent variable.

This study was based on the following empirical model:

$$SP_t = \beta_0 + \beta_1 EX_t + \beta_2 EXVOL_t + \beta_3 CBR_t + \beta_4 CBIR_t + \beta_5 IBLR_t + \beta_6 IR_t + \varepsilon_t \ldots. (3.3)$$

Where:

SP_t = the annual stock returns at time t,

EX_t = the dollar exchange rate at time t

$EXVOL_t$= annual exchange rate volatility at time t

CBR_t= the annual Central Bank Rate at time t

$CBIR_t$= the annual Commercial Banks Interest Rates at time t

$IBLR_t$ = the annual Inter Bank Lending Rates at time t

IR_t = the annual Inflation Rate at time t

β_o = the constant term

β_1, β_2… β_6 = the coefficients of exchange rate and intervening factors respectively, and

ε_t = the error term.

3.6 Diagnostic Tests

3.6.1 Normality

Rawlings, *et al*. (2001) asserts that normality is not a condition for modeling but a prerequisite for testing the significance of the relationship and estimation of confidence interval estimates. Normality test ensures that the data conforms to normal distribution characteristics of the population. Kiragu, Gikiri and Iminza, (2015) tested for nomality using the Kolmogorov-Smirnov (K-S) test and the Shapiro Wilk test of normality, with its purpose being to obviate the effects of kurtosis and skewness. This tests will also be used by this study. To correct non-normality, the data will be trasformed using log transformations and square root. For purposes of volatility modeling, Jarque Bera test will be employed to test due to its asymptotic (it tests goodness of fit for large size samples). This test was aslo used by Atah (2013).

H_0: Residuals are not normally distributed

H_1: Residuals are normally distributed

3.6.2 Test of Serial Correlation

The presence of multi-colliniearity assumption makes it difficult to establish relationship amongst the variables. Collinearity is present when variables are highly correlated which

makes regression coefficient to flatuate widely making it difficult to interprete the regression result. Correlation is measured by correlation coefficients ranging from 0 to 1 with 0.9 denoting a high correlation co-effcient (Cooper & Schindler, 2014). Collinearity can also be measured by tolerance value and its inverse and the variance inflation factor (VIF). For the VIF, the value of 10 or more signifies higher collinearity whereas its inverse, the tolerance value has 0.1 signifying higer collinearity (Saunders *et al.*, 2009). Ljung-Box Q-Statistics test for serial correlations will be done with null hypothesis that serial correlation doesn't exist for standard residuals (Ndwiga&Muriu, 2016).

H_0: Serial correlation does not exist for standard residuals

H_1: Serial correlation exists for standard residuals

3.6.3 Heteroskedasticity

This means non-constant error terms which leads to bias in test statistic and confidence interval. The non-constant errors are as a result of measurement error, variable nonlinear effects, sub population differences and model misspecification such as omitted variable bias (Rencher, 2002). Non-constant variance causes significance test to be too low or too high. Heteroskedasticity will be tested by the Breusch-Pagan or Cook-Weisberg Test. A null hypothesis is derived and is that the residuals aren't homoscedastic. Presence of heteroskedasticity will be solved by model re-specification and variable transformation. Robust errors will also address the problem of non-constant residuals since it does not affect coefficient estimates provided by ordinary least squares but changes standard errors and significance test (Rencher, 2002).

3.6.4 Unit Root Analysis

Unit root analysis involves the test of stationary property on time series data. Due to serial correlation of time series data, Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) will be used to access the order of integration of the variables. Variables will be tested with a linear trend or and intercept. The null hypothesis will be tested by ADF that returns/ residuals have a unit root. Lower test statistic than the critical values at 5% level of significance will indicate acceptance of the null, that the residuals are non-stationary. ADF does not follow t-test distribution. PP test will supplements ADF test where the assumptions of constant error teams are violated. The study will eliminate non-stationary series by adopting continuously compounded exchange rates (Sukcharoensin, 2013).

CHAPTER FOUR

DATA ANALYSIS, RESULTS & DISCUSSIONS

4.1 Introduction

In this particular section, the determination of the outcomes of the rate of interest on exchange rate volatility on stock returns of firms listed in the Nairobi Securities Exchange are made. This will by establishing the relationship and influence that volatility of exchange has on the returns for the period of 120 months running from January 2007 to December 2016. Discussion of these findings confirms whether the objectives of the study were met or not. Here, a brief review of descriptive statistics of exchange rate volatility and stock returns is presented. Secondly, the time series stationary conditions of each of the time series variable were presented. Finally, the estimated results and inferential statistics are provided.

4.2 Descriptive Statistics

This was used to to make a description of the fundamental features in the research work. For time series data descriptive statistics provide mainly the trend/pattern of each of the variable. This information is useful in modeling and regression analysis. This study carried out descriptive analysis of key data series such as exchange rate volatility, stock returns central bank interest rate (cbr)commercial banks interest rates (cbir), inter-bank lending rates (iblr) inflation rate (ir for the period under review**.**

Table 4.2 Descriptive Statistics

	STOCK_RETURNS	EXCHANGE_RATE_VOLATILITY	DEXCHANGERATE	CBK_RATES	COMMERCIAL_BANK_INTEREST	INTERBANK_LENDING_RATES	INFLATION_RATE
Mean	109.1849	-4.73E-14	0.221891	9.460417	15.77633	6.629412	8.253333
Median	97.04567	0.481267	0.213997	8.500000	15.03500	5.000000	6.640000
Maximum	172.9277	21.25777	5.248001	18.00000	20.34000	25.00000	17.07000
Minimum	58.41550	-22.11823	-7.593994	5.750000	12.87000	1.000000	3.930000
Std. Dev.	33.98471	11.10248	1.853406	2.925007	2.040354	5.115817	3.898976
Skewness	0.428331	0.007950	-0.998399	1.620702	0.667756	1.780345	1.024548
Kurtosis	1.755725	2.336123	7.892073	5.506365	2.402618	5.962270	2.691717
Jarque-Bera	11.41045	2.204927	127.9648	83.94278	10.70228	106.3738	21.46918
Probability	0.003329	0.332052	0.000000	0.000000	0.004743	0.000000	0.000022
Sum	13102.18	-5.80E-12	24.40800	1135.250	1893.160	788.9000	990.4000
Sum Sq. Dev.	137440.3	14668.53	374.4273	1018.124	495.4024	3088.247	1809.040

The mean value for stock returns was given at a unit price of 109.1849 for all the stocks listed at NSE, the exchange rate volatility value was -4.73e-14, the mean for exchange rate was 0.221891, central bank interest rate was capped at 9.460417, while banks doing business operated their commercial bank interest rates at 15.77633, inter-bank lending rates between financial institutions was at 6.629412.Finally the inflation rate was at 8.253333.

The Standard deviation for stock returns was 33.98471, results for exchange rate volatility 11.10248, exchange rate was 1.853406, commercial banks interest rates was

2.925007, commercial banks interest rates was 2.040354 inter-bank lending rates indicated it was 5.115817,Finally the inflation rate 2.691717.

Skewness is used to measure the probability of the distribution in the random variable that is of the real value. The Skewness for stock returns was 0.428331, results for exchange rate volatility 0.007950, exchange rate was -0.998399, commercial banks interest rates was 1.620702, commercial banks interest rates was 0.667756 inter-bank lending rates indicated it was 1.780345,Finally the inflation rate skewness was 1.024548. A sckew that is negative shows that the left side tail of the density probability function is much longer than the left side of the bulked value hence the mean lying to the right. The positively skewed data contains a tail located on the right hence tha values that are bulk are located in the left side of the mean.

Kurtosis is defined as any measure of the "peakedness" of the probability distribution of the variables that are distributed randomly. The Kurtosis for stock returns was 1.755725, results for exchange rate volatility 2.336123, exchange rate was 7.892073, commercial banks interest rates was 5.506365, commercial banks interest rates was 2.402618 inter-bank lending rates indicated it was 5.962270,Finally the inflation rate kurtosis was 1.024548. any distribution that has a negative or even a positive kurtosis is referred to as platykurtic type of distribution or also called leptokurtic type of distribution respectively.

4.2.1 Analysis of Stock Returns

The data for monthly value of Stock prices/returns traded on NSE for the period January 2007 to December 2016 was summarized (Appendix XVI) and entered into the software for analysis. The graphical results are presented in figure 4.1. The vertical axis represents the log Stock Returns and the horizontal axis represents the time intervals in years.

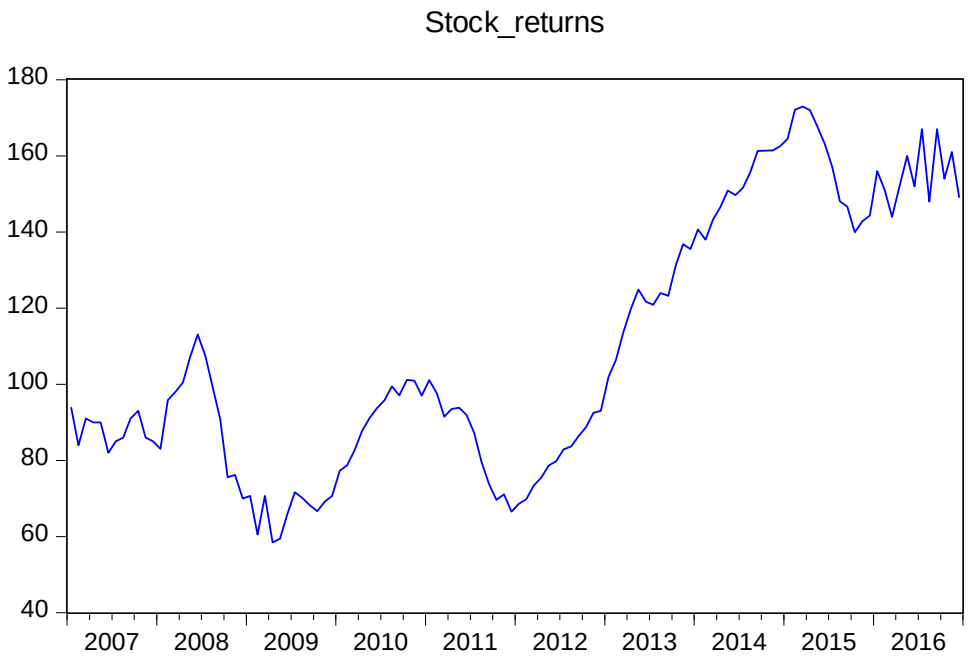

Figure 4.1: Trending Monthly Log of Stock Returns from January 2007 to October 2016

Source: Nairobi Securities Exchange

Line graph of monthly Log of Stock Returns in NSE indicates increasing trend in the series, this implies that the data set for the value of Stock Returns is stationary since the graph does not show linear trend in the long run but rather an upward trend. The graph further reveals that on average the value of Stock Returns during the period under review was highly volatile. The highest Stock Returns was recorded in the first quarter of 2015 while the lowest Stock Returns was recorded in the first quarter of 2009. However, since then the value of Stock Returns was on the upward trend up to mid-2010 thereafter, the stock market started experiencing downward trend up to the first quarter of 2012. However, since 2012, the share of values has been on upward trend with some seasonal variations.

The empirical results are in agreement with early studies by (Waheed 2012, Maana 2011, and Kiptoo 2007) who stated that global exchange rate volatility has increased after the collapse of Breton Woods' system and that large volatilities have been witnessed in Kenya since liberalization of exchange rates in October 1993. The high volatility of Stock Returns might have been contributed by political and some macroeconomic factors which were not captured in the study. For example, the plunging of share value in the years 2007/2008 and 2011/2012 could be due to election and campaign periods in Kenya. In addition to this,, the gaining of Stock Returns in the years 2009/2010 and 2013/2014 could be due to some macroeconomic factors other than those mentioned in the study. Even though the graph in figure 4.1 suggests that the data may be stationary, there is need to perform the Augmented Dickey-Fuller statistical test for unit roots to investigate thus confirm the presence of the stationary status of the data set.

4.2.2 Analysis of Exchange rate volatility

The data for Exchange rate volatility between January 2007 and December 2016 was summarized (Appendix XVIII) and entered into the software for analysis. The graphical results are presented in figure 4.2. The vertical axis shows the Exchange rate volatility while the horizontal axis shows the time intervals in years.

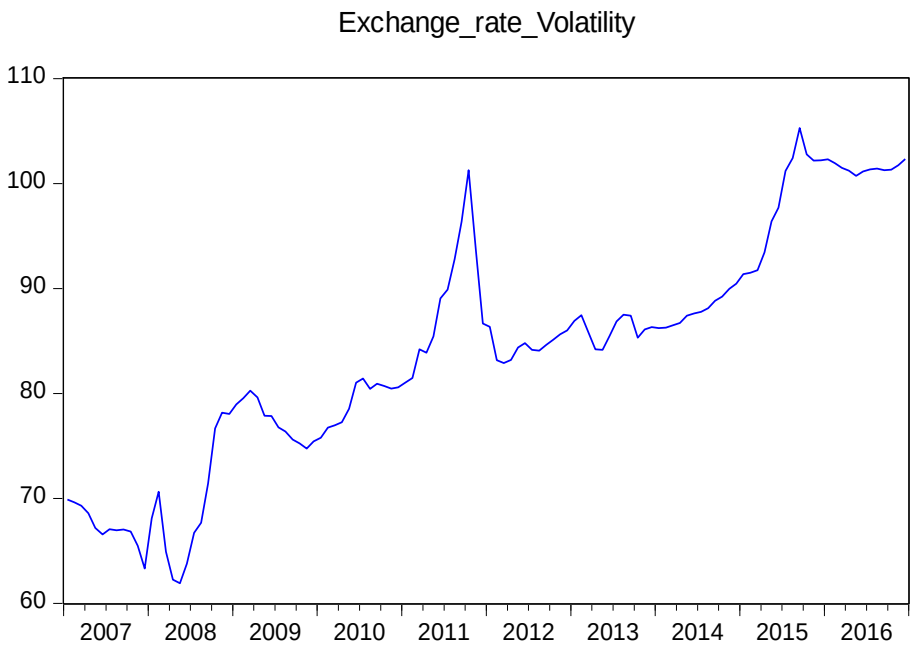

Figure 4.2: Trending Monthly Log of Exchange rate volatility from January 2007 to December 2016

Line graph of monthly Log of Exchange rate volatility in NSE indicates increasing trend in the series, this implies that the data set for the value of Stock Returns is stationary since the graph does not show linear trend in the long run but rather an upward trend. The graph further reveals that on average the value of Exchange rate volatility during the period under review was highly volatile. The highest Exchange rate volatility was experienced in the first quarter of 2011 while the lowest Exchange rate volatility was recorded in the first quarter of 2009. However, from the first quarter of 2008 the value of Exchange rate volatility was on the upward trend up to mid-2012 thereafter, the Exchange rate volatility started experiencing downward trend up to the first quarter of 2013. However, since 2013, the Exchange rate volatility has been rising with some seasonal variations.

4.2.3 Analysis of Central Bank rates

The data for Central Bank rates for the period January 2007 to December 2016 was summarized (Appendix XVIII) and entered into the software for analysis. The graphical results are presented in figure 4.3. The vertical axis shows the Central Bank rates while the horizontal axis shows the time intervals in years.

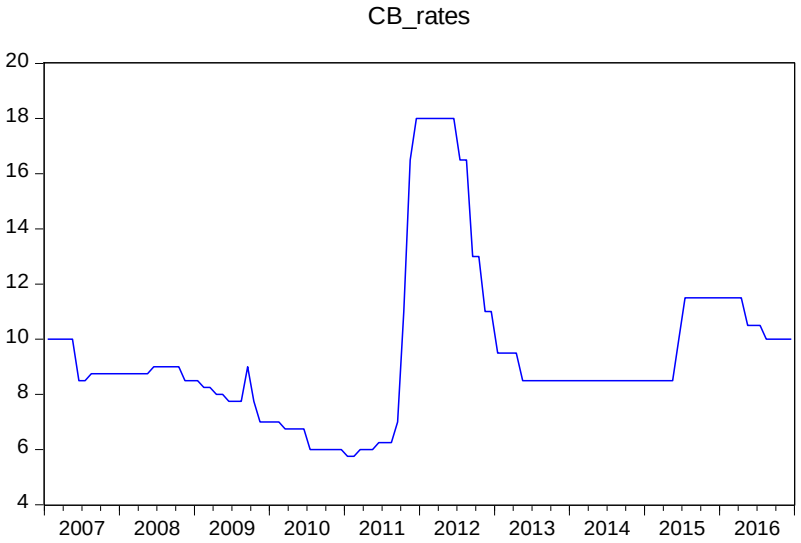

Figure 4.3: Trending Monthly Log of Central Bank rates from January 2007 to December 2016

Line graph of monthly Log of Central Bank rates in NSE indicates increasing trend in the series, this implies that the data set for the value of Stock Returns is stationary since the graph does not show linear trend in the long run but rather an upward trend. The graph further reveals that on average the value of Central Bank rates during the period under review was highly volatile. The highest Central Bank rates was experienced in the first half of 2012 while the lowest Exchange rate volatility was recorded in the first half of 2010. However, from the first quarter of 2007 the value of Exchange rate volatility was on the downward trend up to mid-2011 thereafter, the Exchange rate volatility started

experiencing downward trend up to the first quarter of 2012. However, since 2013, the Exchange rate volatility has been erratic with some seasonal variations of upwards and downward trends.

4.2.4 Analysis of Commercial bank interest rate

The data for Central Bank rates for the period January 2007 to December 2016 was summarized (Appendix XVIII) and entered into the software for analysis. The graphical results are presented in figure 4.4. The vertical axis shows the Commercial bank interest rate while the horizontal axis shows the time intervals in years

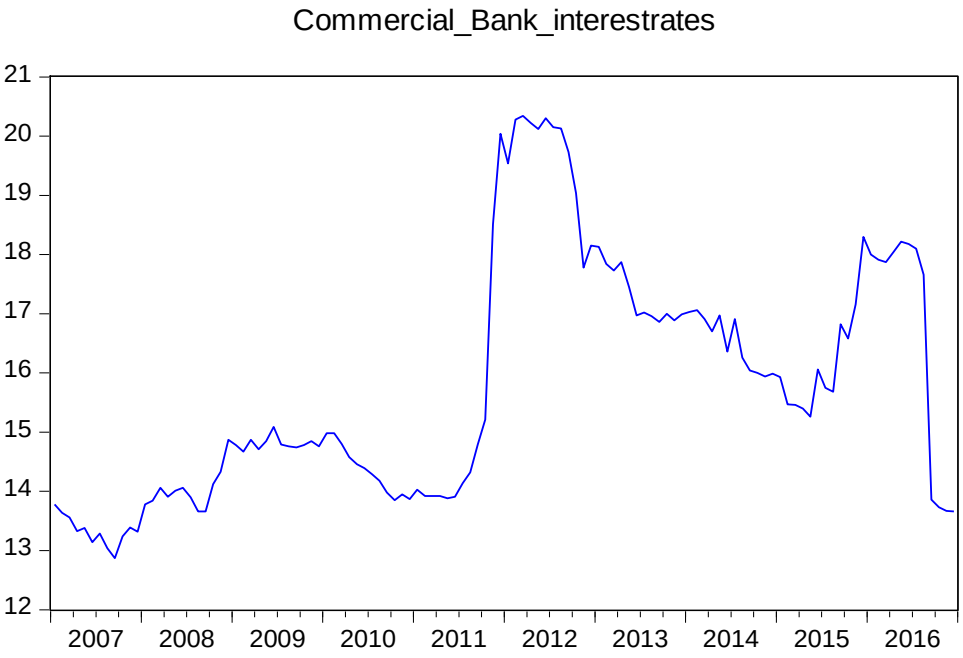

Figure 4.4: Trending Monthly Log of Commercial bank interest rate from January 2007 to December 2016

Line graph of monthly Log of Commercial bank interest rate in NSE indicates increasing trend in the series, this implies that the data set for the value of Stock Returns is stationary since the graph does not show linear trend in the long run but rather an upward trend. The graph further reveals that on average the value of Central Bank rates during

the period under review was highly volatile. The highest Commercial bank interest rate was recorded in the first half of 2012 while the lowest Commercial bank interest rate was recorded in the first half of 2007. However, from the first quarter of 2007 the value of Commercial bank interest was on the upward trend up to mid-2011 thereafter, Commercial bank interest started experiencing downward trend up to the first quarter of 2015. However, since 2016, the Exchange rate volatility has been dropping with some seasonal variations of upwards and downward trends.

4.2.5 Analysis of Interbank Lending Rates

The data for Interbank Lending Rates for the period January 2007 to December 2016 was summarized (Appendix XVIII) and entered into the software for analysis. The graphical results are presented in figure 4.4. The vertical axis shows the Interbank Lending Rates rate while the horizontal axis shows the time intervals in years

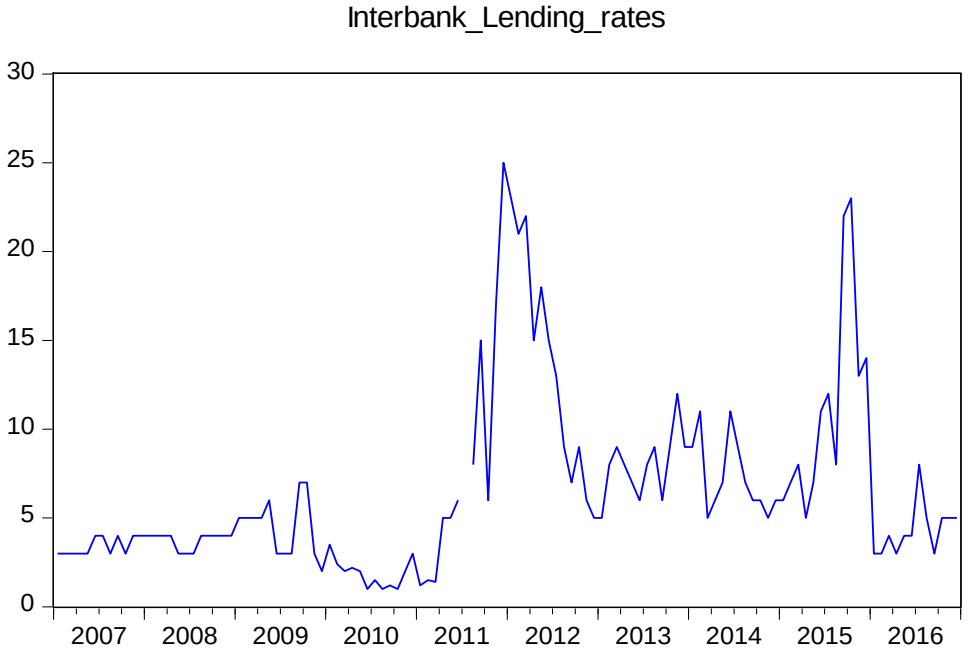

Figure 4.4: Trending Monthly Log of Commercial bank interest rate from January 2007 to December 2016

Line graph of monthly Log of Interbank Lending Rates in NSE indicates increasing trend in the series, this implies that the data set for the value of Stock Returns is stationary since the graph does not show linear trend in the long run but rather an upward trend. The graph further reveals that on average the value of Central Bank rates during the period under review was highly volatile. The highest Commercial bank interest rate was recorded in the first half of 2012 while the lowest Commercial bank interest rate was recorded in the first half of 2007. However, since 2007, the Exchange rate volatility has been erratic with some seasonal variations of upwards and downward trends.

4.2.6 Analysis of Inflation rate

The data for Inflation rate between January 2007and December 2016 was summarized (Appendix XVIII) and entered into the software for analysis. The graphical results are presented in figure 4.4. The vertical axis shows the Inflation rate while the horizontal axis shows the time intervals in years.

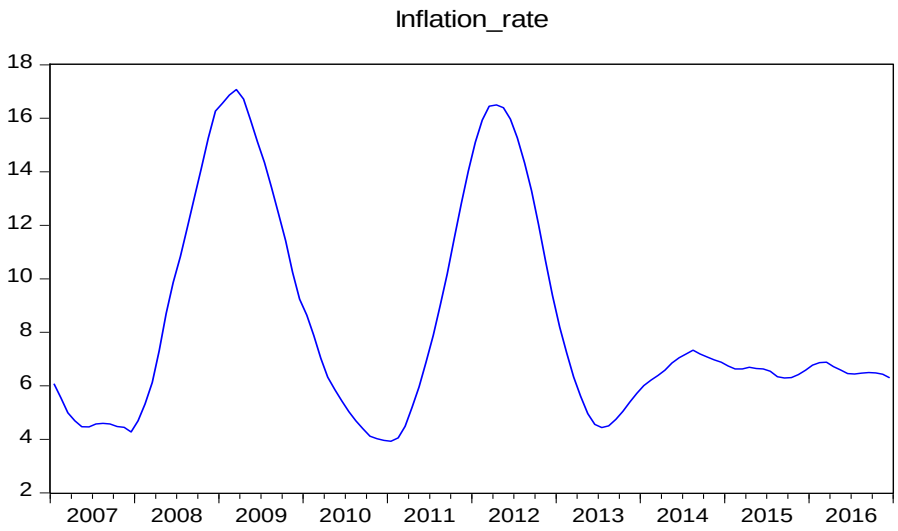

Figure 4.5: Line Graph of monthly Log Inflation Rate in NSE from January 2007 to December 2016

Line graph of monthly Log Inflation rate in NSE indicates increasing trend in the series, this implies that the data set for the value of Inflation rate is stationary since the graph does not show linear trend in the long run but rather an upward trend. The graph further reveals that on average the value of Inflation rate during the period under review was highly volatile. The highest Inflation rate was experienced in the first half of 2009 while the lowest Inflation rate in the first half of 2013. However, from the first quarter of 2007 the value of Inflation rate was on the upward trend up to mid-2010 thereafter rose to a high in mid-2013. However, since 2013, the Inflation rate has been dropping with some seasonal variations of upwards and downward trends.

4.3 Diagnostic tests

As part of data diagnostics, the assumptions of the classical linear regression model was tested for Stationarity test for Unit Root normality, multicollinearity, autocorrelation and heteroscedasticity

4.3.1 Stationarity test for Unit Root

This section presents for Stationarity conditions results for all key variables. For the time series data to give accurate and reliable information it is assumed that the series is stationary that is, the series has statistical properties (mean and variance) that are constant. Such will tend to return to its mean (mean reversion). This study followed the standard procedure of unit root testing by employing the Augmented Dickey Fuller (ADF) test. The results of stationarity test for unit root are shown in table Table 4.3.1

Table 4.3.1: Stationary test for Unit Root

		ADF Test		Remark
		Test statistic	Critical value	
Stock returns	Level	-4.346	-2.785	Stationary with Zero lag
Exchange rate	Level	-6.895	-2.864	Stationary with zero lag
Exchange rate Volatility	Level	-6.957	-2.674	Stationary with zero lag
Central Bank Rate	Level	-2.758	-1.894	Stationary with a drift and one lag
Commercial Bank Interest Rate	Level	-1.896	-1.284	Stationary with a drift and two lags
Inter-Bank Rate	Level	-3.965	-1.783	Stationary with a drift with zero lag
Inflation	Level	-8.894	-2.752	Stationary with one lag

However, in the most of series that has been observed, the component of trend leads to the non-stationary. This kind of trend is classified to be either stochastic or deterministic. This fully depends with the type of transformation that is expected. For instance, the unit root which is also called stochastic is only eliminated through series differential by the process of moving average. The subtraction of trend that is deterministic leads to rendering of the stochastic type of the series null hence its application. The proper application of a proper series leads to unit transformation of the series units.

It can be observed from table 4.3.1: that Stock returns ,Exchange rate, Exchange rate Volatility were stationary at level or integrated of order 1 I(0).The table further shows that total number of Stock returns, Exchange rate, and exchange rate volatility were stationary with a constant and zero lag. Central Bank Rate were stationary with a drift and one lag.Commercial Bank Interest Ratewere stationary with a drift and two lags. Inter-Bank Rate was Stationary with a drift with zero lag, Finally Inflation was Stationary with one lag. Given that the data is stationary; this implies that both ordinary Least Squares (OLS) and Vector Autoregressive (VAR) Models could be used for estimation and analysis of relationships. As mentioned above, when time series is stationery then cointegration tests and error correction models are rendered void and therefore were not applied.

4.3.2 Multicollinearity Test

Before modeling the regression, multicollinearity test was first performed. This is usually done so as to avoid spurious regression results. According to William et al. (2013), multicollinearityis the correlation presence existing between the variables predictor. In the cases of severe and very perfect type of correlation existing between variable of the

predictor of the variables. This is an implication that a very unique solutions of the squares that leads to the regression analysis cannot easily be computed (Field, 2009). The impact of the result in the table 4.3.2 makes a presentation to be at 1.26 which is even lower than 10 hence in accordance to Field (2009) makes an indication of its absence.

Table 4.3.2: Multicollinearity test

Variable |	VIF	1/VIF
Central Bank Rates	3.41	0.293565
Commercial banks Interest Rates	3.07	0.326079
Interbank Lending Rates	2.35	0.425305
Exchange Rate Volatility	1.70	0.586971
Inflation Rate	1.51	0.663774
Exchange Rate	1.26	0.792816
Mean VIF	**2.22**	

4.3.3 Normality test

The normality test was first investigated using the graphical method as indicated in figure 4.3.3 The results in the figure indicate abnormal distribution of residuals. Since the number of observations was large normality was not influencing results. Alternatively we logged the variables to achieve normal distribution.

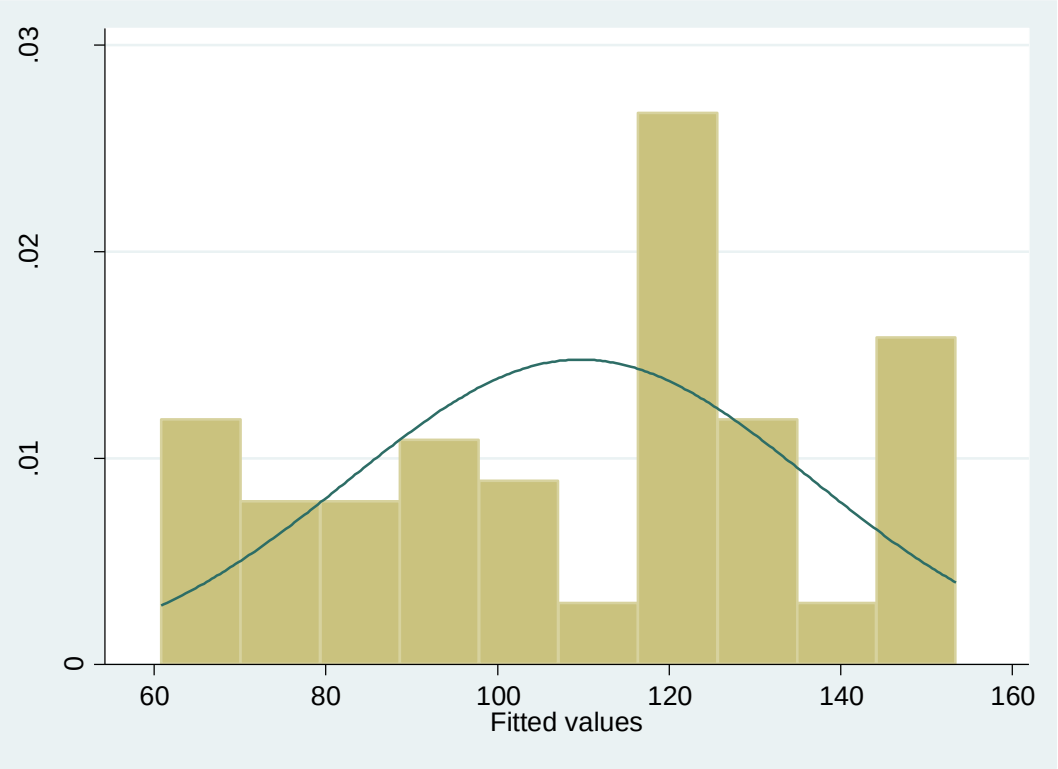

Figure 4.3.3: Normality Test

4.3.4 Heteroskedasticity Test

The test of Modified wald is basically used in testing heteroskedasticity. The error term is the null hypothesis which has the variance that is very constant. The outcome in the below table 4.3.4 which makes an indication that the term of error are very homoscedastic, as the p-value is even more than 5%.

Table 4.3.4 Heteroskedasticity Test

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	2.535233	Prob. F(6,102)	**0.1250**
Obs*R-squared	14.14574	Prob. Chi-Square(6)	0.0280
Scaled explained SS	11.74563	Prob. Chi-Square(6)	0.0679

4.3.5 Autocorrelation Test

To establish whether or not the residual is serially correlated over time, Wooldridge test for autocorrelation was conducted. The null hypothesis is that no first order serial /auto correlation exists. The results are as indicated in Table 4.3.5 below and therefore the null hypothesis of no autocorrelation is accepted and that residuals are not auto correlated (p-value=0.10).

Table 4.3.5: Autocorrelation Test

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	403.7648	Prob. F(2,100)	**0.3400**
Obs*R-squared	96.98937	Prob. Chi-Square(2)	0.1000

4.4 Granger causality between Exchange Rate Volatility and Mean Stock returns

This sub-section addressed the first objective which sought to find out whether there is causal relationship between exchange rate volatility and stock returns. To address this objective, granger causality test was conducted between exchange rate volatility and Central Bank Rates, Commercial Interest Rates, Interbank Lending Rates, Exchange Rate Volatility, Inflation Rate, Exchange Rate.

Table 4.4: Granger causality

Pairwise Granger Causality Tests

Date: 11/19/17 Time: 06:17

Sample: 2007M01 2016M12

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
EXCHANGE_RATE_VOLATILITY does not Granger Cause STOCK_RETURNS	110	2.17946	0.0083
STOCK_RETURNS does not Granger Cause EXCHANGE_RATE_VOLATILITY		5.00129	0.1178

Table 4.4 shows that the F-Statistic of the null hypothesis stating "exchange_ rate_ volatility does not Granger Cause Stock Returns" is 2.17946 with a probability value of 0.0083. Given that the probability value is greater than 5 percent (0.05). The null hypothesis is not rejected at 5 percent and 10 percent level of significance. The second null hypothesis in table 4.2 states that "stock returns does not Granger Cause exchange_rate_volatility". The F-Statistic is 5.00129 with a probability value of 0.1178. The probability value is greater than 5 percent (0.05) but less than 10 percent (0.1). The null hypothesis is not rejected at five percent level but rejected at 10 percent level of significance. This implies that there is some evidence supporting the argument that exchange rate volatility granger causes changes in stock returns.

4.5 Correlation Analysis

The values of the coefficient in this research paper ranges from -1 to 1 which helps in measurement of the level of degree in which the variable are related in the linear way Adejimi, Oyediran and Ogunsanmi (2011). This type of observation leads to the analysis of the coefficient of correlation that has a magnitude of 0.3 to 0.5 this indicate a medium dependence of linearity existing between the two variables. The values between 0.5 to 1.0 which also shows the dependence level that is linear.

Correlation						
Probability	Stock Returns	Exchange Rate Volatility	CBK Rates (CBR	Commercial Bank Interest (CBIR	Interbank Lending Rates(IBLR	Inflation Rate (IR)
Stock Returns	1.000000					
Exchange Rate Volatility	0.629526	1.000000				
	0.0000	-----				
CBK Rates (CBR)	-0.058330	0.235301	1.000000			
	0.5469	0.0138	-----			
Commercial Bank Interest (CBIR)	0.159418	0.471807	0.751697	1.000000		
	0.0978	0.0000	0.0000	-----		
Interbank Lending Rates(IBLR)	0.056459	0.392866	0.708997	0.667530	1.000000	
	0.5598	0.0000	0.0000	0.0000	-----	
Inflation Rate (IR)	- 0.520648	-0.084473	0.501362	0.358785	0.333045	1.000000

The results indicated that there was a negative relationship (r= - 0.520648) between Exchange Rate Volatility and stock returns.This suggests that Volatility of Exchange

Rate negatively affects the stock returns this can be attributed to the fact that the varying rates thus creating tension.

The results indicated that there was a negative relationship (r= --0.084473) between CBK Rates (CBR) and stock returns .This suggests that CBK Rates, negatively affects the stock returns this can be attributed to the fact that CBK inhibits free market rules of demand and supply .

The results indicated that there was a positive relationship (r= 0.501362) between (CBIR and stock returns, suggesting that positive relationship affects the stock returns this can be attributed to the fact that Commercial Bank Interest increases investor confidence.

The results indicated a positive relationship (r= 0.333045) between Inflation Rate (IR) and stock returns. This suggests that Inflation Rate (IR) positively affects the stock returns this can be attributed to the fact that banks inflation helps people to save more possibly in anticipation of avoiding depreciation of their savings in cash form.

4.6 Regression between volatility of Exchange Rate and Stock Returns (Before including the control variables)

The study sought to establish the effect of volatility of exchange rateon Stocks value for companies listed in NSE. To achieve this objective, the data relating to the two variables was regressed to determine the actual relationship between the variables in the empirical model R square value of 0.396 means that 39.6 % of the corresponding variation in value of Stocks for companies listed in NSE can be explained or predicted by (Exchange rate

volatility). This implied that other factors contributed 60.4% of value of Stocks companies listed in NSE.

Dependent Variable: STOCK_RETURNS
Method: Least Squares
Date: 11/19/17 Time: 07:01
Sample: 2007M01 2016M12
Included observations: 110

Variable	Coefficient	Std. Error	t-Statistic	Prob.
EXCHANGE_RATE_VOLATILITY	-1.928008	0.218867	8.809046	0.0000
C	109.1849	2.419818	45.12110	0.0000

R-squared	0.396726	Mean dependent var	109.1849
Adjusted R-squared	0.391613	S.D. dependent var	33.98471
S.E. of regression	26.50778	Akaike info criterion	9.409280
Sum squared resid	82914.17	Schwarz criterion	9.455738
Log likelihood	-562.5568	Hannan-Quinn criter.	9.428147
F-statistic	77.59929	Durbin-Watson stat	0.081209
Prob(F-statistic)	0.000000		

4.7 Regression between volatility of Exchange Rate and Stock Returns with all the control variables

The study sought to establish the effect of exchange rate volatility on the value of Stocks for companies listed in NSE. To achieve this objective, the data relating to the two variables was regressed to find the actual relationship between the variables in the empirical model. Vector Autoregressive (VAR) Models were used to determine the nature of the relationship between variables. Therefore, this section presents the

regression model results. The section is organized thematically based on the objectives of the study.

The outcome as presented in table 4.11, show the level of fitness of the regression method in making the explanation of the phenomena. The rate of exchange volatility, the central bank interest, CBIR, IBLR and the rate of inflation was discovered during explanation of the return and its stocks

The empirical results indicate that there is a negative relationship between exchange rate volatility and stock returns in Kenya for the period under view. From this result, it can be deduced that an increase in exchange rate volatility will lead to a significant decrease in s returns and therefore a decrease in the value of companies shares listed in Nairobi Securities Exchange, this will consequently lead to a fall in market capitalization (value of shares traded on NSE).

The regression equation established that taking all factors into account (Exchange rate volatility, Central Bank Interest Rate (CBR) Commercial Banks Interest Rates (CBIR) Inter-Bank Lending Rates (IBLR) Inflation Rate (IR) constant at zero, stock returns of firms listed in the Nairobi Securities Exchange) will be an index of 115.5035.

The results also showed that taking all other independent variables at zero, a unit increase in Exchange rate volatility leads to a decrease of -1.677732 in stock returns of firms listed in the Nairobi Securities Exchange. The P-value was 0.00 which is less than 0.05 therefore the relationship was significant.

The findings presented also showed that taking all other independent variables at zero, a unit increase in CBK Rates will lead to an increase of 0.927318in stock returns of firms

listed in the Nairobi Securities Exchange. The P-value was 0.0481which is less than 0.05 and thus the relationship was significant.

The findings presented also showed that taking all other independent variables at zero, a unit increase in commercial bank interest will lead to an increase of 1.701482in stock returns of firms listed in the Nairobi Securities Exchange. The P-value was 0.0336 which is less than 0.05 and thus the relationship was significant.

The findings presented also showed that taking all other independent variables at zero, a unit increase in interbank lending rates will lead to a decrease of -0.703927in stock returns of firms listed in the Nairobi Securities Exchange. The P-value was 0. 02648which is less than 0.05 and thus the relationship was significant.

The findings presented also showed that taking all other independent variables at zero, a unit increase in Inflation Rate leads to an decrease of -4.484617 in stock returns of firms listed in the Nairobi Securities Exchange. The P-value was 0.0000which is less than 0.05 and thus the relationship was significant.

Dependent Variable: STOCK_RETURNS
Method: Least Squares
Date: 11/19/17 Time: 07:35
Sample (adjusted): 2007M02 2016M12

Variable	Coefficient	Std. Error	t-Statistic	Prob.
EXCHANGE_RATE_VOLATILITY	-1.677732	0.239088	7.017224	0.0000
CBK_RATES	0.927318	1.312266	2.706654	0.0481
COMMERCIAL_BANK_INTEREST	1.701482	1.760540	2.966455	0.0336
INTERBANK_LENDING_RATES	-0.703927	0.627803	-1.121255	0.02648
INFLATION_RATE	-4.484617	0.647687	-6.924045	0.0000
C	115.5035	21.95224	5.261584	0.0000

R-squared	0.627253	Mean dependent var	109.7004
Adjusted R-squared	0.605326	S.D. dependent var	34.09059

S.E. of regression	21.41675	Akaike info criterion	9.028289
Sum squared resid	46785.07	Schwarz criterion	9.201128
Log likelihood	-485.0417	Hannan-Quinn criter.	9.098381
F-statistic	28.60731	Durbin-Watson stat	0.158153
Prob(F-statistic)	0.000000		

4.8 Discussion of Findings

Taking all factors into account, (Exchange rate volatility, Central Bank Interest Rate (CBR) Commercial Banks Interest Rates (CBIR) Inter-Bank Lending Rates (IBLR) Inflation Rate (IR) constant at zero, the regression equation established that firms' returns of stock listed in the Nairobi Securities Exchange) will be an index of 115.5035. Returns in a security exchange are the yield a speculator gets over a predefined period of time. It is now and then viewed as synonymous to stock costs. Securities exchange returns have predictive power for investment and yield since stock exchange returns are a forward-looking variable that consolidates assumptions about money streams in the future and discount rates. Securities exchange returns serves as an index to investors or governments to in settling on their investment

The findings presented also showed that taking all other independent variables at zero, a unit increase in Exchange rate volatility will lead to a decrease of -1.677732 in stock returns of firms listed in the Nairobi Securities Exchange. The P-value was 0.00 which is less than 0.05 and thus the relationship was significant. Volatility speaks to how much a variable changes over time. Along these lines, volatility in exchange rates may allude to

the propensity of appreciation or depreciation of foreign currencies in value with respect to time. The more rapidly it changes over time, the more unstable it is. Fluctuations in stock prices of companies sometimes may lead to a multiple of consequences. First, people beholding shares will experience a drop in their riches and in case this drop in wealth is significant the investors may shy off from investing in stocks thereby leading to a loss of confidence in the stock market. Second, most of the time share price movements reflect what's going on in the economy. Bad headlines of falling prices in shares can create panic among investors which may affect the stock market operations. Thirdly, a fall in share prices may reduce firms' ability to increase finance on the market exchange system

The findings presented also showed that taking all other independent variables at zero, a unit increase in CBK Rates will lead to an increase of 0.927318in stock returns of firms listed in the Nairobi Securities Exchange. The P-value was 0.0481which is less than 0.05 and thus the relationship was significant. Cutting interest rates stimulates economic activity and should increase inflation, while raising interest rates has the reverse effect. Low interest rates encourage banks to lend, and firms and households to borrow – supporting economic activity and staving off deflation, or falling prices

The findings presented also showed that taking all other independent variables at zero, a unit increase in commercial bank interest will lead to an increase of 1.701482in stock returns of firms listed in the Nairobi Securities Exchange. The P-value was 0.0336 which is less than 0.05 and thus the relationship was significant.

The findings presented also showed that taking all other independent variables at zero, a unit increase in interbank lending rates leads to a decrease of -0.703927in stock returns of firms listed in the Nairobi Securities Exchange. The P-value was 0. 02648which is less than 0.05 and thus the relationship was significant.

The findings presented also showed that taking all other independent variables at zero, a unit increase in Inflation Rate will lead to a decrease of -4.484617 in stock returns of firms listed in the Nairobi Securities Exchange. The P-value was 0.0000which is less than 0.05,therefore the relationship was significant.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This section describes the summary of the research paper. It aims at giving relevant conclusion derived from the study based on various econometric tests and their significance and contribution to theory and practice. Further, the chapter makes suggestions for further study.

5.2 Summary of the Study

In the framework, concepts of the foreign exchange market and stock market has been established. The underlying studies linking the two markets have been elaborated in detail. These results tend to hold in all the economies (whether developed, emerging and/or developing) as noted in the literature review. The study also explored whether macroeconomic indicators including inflation, commercial bank lending rate, lending rate between banks and Central Bank rate have an effect on the relationship between exchange rate volatility and stock price returns in Kenya.

The study was pinned on the flow-oriented theory developed by Dornbusch and Fisher (1980), "portfolio balance approach" andMonetary theory developed by Gavin (1989). Flow-oriented theory holds that exchange rate influences stock prices while portfolio balance holds that the converse is true. Monetary model approach holds there is no influencing direction between stock return movement and foreign currency movement but both are caused by common factors. To test applicability of the above theories to the Kenyan scenario, data from January 2007 to December 2016 was used for the

investigation. Granger causality test was used to test for causal direction and thereafter Vector Autoregressive Models were used to test for the nature of the relationship.

5.3 Conclusion

The study was conducted with an aim of understanding the effects of forex rate volatility on stock returns of organisations listed in Nairobi Securities Exchange. The main outcomeshowed that exchange rate volatility influences stock returns movement but the opposite is not applicable in Kenya. It was also established that exchange rate volatility is more important than actual changes in exchange rate as determinant of stock returns movement. Secondly, the study showed that monetary policy instruments and financial sector indicators such as Central Bank rate, interbank rate, have an significant influence on Stock returns.

Therefore, the analysis contributes by analyzing the impact of financial risk (volatility) on the earnings of companies and investors' wealth and subsequently how business decisions can be affected due to financial risk.

5.4 Recommendations for Policy and Practice

With reference to the above summary of the study, the following recommendations can be made:

First, the findings relating to objectives 1, 2, and 3 allude that foreign exchange rate volatility has a spillover outcome on the Kenyan economy in general and in particular stock prices of companies listed in NSE. This is evident by the behaviour of trend curves – the exchange rate volatility curve tends to have a general upward trend while the stock

price curve tends to have a general downward trend. The interpretation is that a change in one variable will have an opposite effect in the behaviour of another variable. For example, in the years 2007/2008 and 2011/2012, the exchange rate was highly volatile represented by an upward trend. However, during the same period, the stock prices were trending downwards. Continuous increase in rate volatility may erode the value of shares and make investors lose confidence in the operations of the stock market.

From these outcomes, Kenya policy makers should always consider the exchange rate volatility in making monetary policy decisions. Further, there is need for developing hedging instruments for example, derivatives market in Kenya. The derivatives market should be put in place to mitigate negative effects of foreign exchange volatility. However, it is important to note that hedging instruments should be efficient so as not to distort the normal functioning of the NSE because financial cases on derivatives have shown that application of these instruments are at times costly and can interfere with the performance of firms and subsequently their market value.

Second, the findings relating to fourth objective indicate that control variables have effect on stock returns movement. Therefore, these results confirm that the financial stability, real sector performance and monetary policy stance are not only indicators of stock price movement but may influence the market performance in the long run.

As a result of the outcomes of this analysis,it may be proposed that theKenya government should consider both the volatility of other macroeconomic variables in making monetary policy and investment decisions respectively.

Monthly observations used in the present study may be considered as long periods by those who strongly favour shorter periods. On the other hand, these observations may be considered as short periods by those who strongly prefer longer periods.

Based on these observations it is recommended that experts should come up with a clear cut policy that will define short and long periods in research; just like statisticians have clear boundary between small and large samples.

5.5 Limitations of the Study

The data collected had limiting factors. First, some stock prices were missing as for specific periods since some firms were listed after the study period. The missing observation may somewhat distort the accuracy of the findings. Furthermore, there were a few missing observations for interbank lending rates and extrapolation had to be done. This may also affect the accuracy of the study results. The study also is limited to the extent that it did not take into consideration shocks such as the 2007 post-election violence and the global financial meltdown of 2009.

5.6 Recommendations for further research

This analysis used time-series. There are a number of areas in which future studies could focus. First, exchange rate volatility affects various sectors of the economy in different ways. Therefore, a study on the various business sectors represented at the Nairobi Securities Exchange should be undertaken to throw more light on the effect of exchange rate fluctuations on the various sectors of Kenyan economy.

The NSE has categorized Kenya into ten broad economic sectors namely; technology, automobiles, services and commercial, insurance, petroleum and energy, investment as well as telecommunication. The study concerning the impact of the exchange rate on the volatility of the areas of the economy is very imperative.

Second, the current financial globalization has been increasing in the financial market thorugh the listing of the cross border. Hence, the study of the future could lead to a creation of focus in the integration market as well as volatility in East African, and or Sub-Saharan African regions.

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APPENDIX

APPENDIX I: COMPANIES LISTED IN NAIROBI SECURITIES EXCHANGE AS AT 01 OCTOBER 2017

S/NO	COMPANY
1	Eaagads Limited
2	Kakuzi Limited
3	Kapchorua Tea Company Limited
4	Limuru Tea Company Limited
5	Rea Vipingo Plantation Limited
6	Sasini Tea and Coffee Limited
7	Williamson Tea Kenya Limited
8	Car and General (Kenya) Limited
9	CMC Holdings Limited
10	Marshalls (EA) Limited
11	Sameer Africa Limited
12	Barclays Bank of Kenya Limited
13	CFC Stanbic Bank
14	Co-Operative Bank of Kenya
15	Diamond Trust Bank (Kenya) Limited
16	Equity Bank Limited
17	Housing Finance Company Limited
18	Kenya Commercial Bank Limited
19	National Bank of Kenya

20	NIC Bank Limited
21	Standard Chartered Bank Kenya Limited
22	Express Kenya Limited
23	Hutchings Biemer Limited
24	Kenya Airways Limited
25	Longhorn Kenya Limited
26	Nation Media Group Limited
27	Scan group Limited
28	Standard Group Limited
29	TPS Eastern Africa Limited (Serena Hotels)
30	Uchumi Supermarkets Limited
31	ARM Cement Limited
32	Bamburi Cement Company
33	Crown Paints Kenya Limited
34	East African Cables Limited
35	East African Portland Cement Company
36	KenolKobil Limited
37	Kenya Electricity Generating Company
38	The Kenya Power & Lighting Co. Limited
39	Total Kenya Limited
40	Umeme Limited
41	Britam Limited
43	CFC Insurance Limited

44	Jubilee Holdings Limited
45	Kenya Reinsurance Corporation Limited
46	Liberty Kenya Limited
47	Pan Africa Insurance Limited
48	Centum Investment Company (ICDCI) Ltd
49	City Trust Limited
50	Olympia Capital Holdings Limited
51	Transcentury Limited
52	A Baumann & Company Limited
53	BOC Kenya Limited
54	British American Tobacco Kenya Limited
55	Carbacid Investments Limited
56	East African Breweries Limited
57	Eveready East Africa Limited
58	Kenya Orchards Company Limited
59	Mumias Sugar Company Limited
60	Unga Group Limited
61	Access Kenya Group
62	Safaricom

APPENDIX II:

Year	Month	EXCHANGE RATE VOLATILITY	(CBr)central ank	CBIR commercial bank interestvrates	Inter bank BLR	STOCK RETURNS
2007	1	69.885	10	13.78	3	94
2007	2	69.616	10	13.64	3	84
2007	3	69.293	10	13.56	3	91
2007	4	68.577	10	13.33	3	90
2007	5	67.191	10	13.38	3	90
2007	6	66.575	8.5	13.14	4	82
2007	7	67.068	8.5	13.29	4	85
2007	8	66.946	8.75	13.04	3	86
2007	9	67.024	8.75	12.87	4	91
2007	10	66.845	8.75	13.24	3	93
2007	11	65.49	8.75	13.39	4	86
2007	12	63.303	8.75	13.32	4	85
2008	1	68.081	8.75	13.78	4	83
2008	2	70.624	8.75	13.84	4	95.838
2008	3	64.924	8.75	14.06	4	98.05884
2008	4	62.256	8.75	13.91	4	100.4744
2008	5	61.899	8.75	14.01	3	107.373
2008	6	63.783	9	14.06	3	113.0394
2008	7	66.704	9	13.9	3	107.4341
2008	8	67.679	9	13.66	4	99.08586
2008	9	71.409	9	13.66	4	90.85257
2008	10	76.657	9	14.12	4	75.5285
2008	11	78.176	8.5	14.33	4	76.14895
2008	12	78.04	8.5	14.87	4	69.94
2009	1	78.95	8.5	14.78	5	70.67762
2009	2	79.533	8.25	14.67	5	60.508
2009	3	80.261	8.25	14.87	5	70.67762
2009	4	79.626	8	14.71	5	58.4155
2009	5	77.861	8	14.85	6	59.4135
2009	6	77.851	7.75	15.09	3	65.90714
2009	7	76.751	7.75	14.79	3	71.6213
2009	8	76.372	7.75	14.76	3	70.192
2009	9	75.605	9	14.74	7	68.16905
2009	10	75.244	7.75	14.78	7	66.63381
2009	11	74.739	7	14.85	3	69.16262

2009	12	75.431	7	14.76	2	70.65182
2010	1	75.786	7	14.98	3.5	77.2745
2010	2	76.73	7	14.98	2.4	78.7425
2010	3	76.947	6.75	14.8	2	82.64957
2010	4	77.254	6.75	14.58	2.2	87.6625
2010	5	78.541	6.75	14.46	2	91.14857
2010	6	81.018	6.75	14.39	1	93.73333
2010	7	81.426	6	14.29	1.5	95.735
2010	8	80.44	6	14.18	1	99.392
2010	9	80.912	6	13.98	1.2	97.0909
2010	10	80.714	6	13.85	1	101.1182
2010	11	80.46	6	13.95	2	100.9201
2010	12	80.568	6	13.87	3	97.00045
2011	1	81.029	5.75	14.03	1.2	101.0746
2011	2	81.473	5.75	13.92	1.5	97.61505
2011	3	84.206	6	13.92	1.4	91.49039
2011	4	83.89	6	13.92	5	93.46316
2011	5	85.433	6	13.88	5	93.83476
2011	6	89.049	6.25	13.91	6	91.96667
2011	7	89.898	6.25	14.14		87.2919
2011	8	92.786	6.25	14.32	8	79.51727
2011	9	96.357	7	14.79	15	73.82045
2011	10	101.27	11	15.21	6	69.6125
2011	11	93.676	16.5	18.51	17	71.08227
2011	12	86.663	18	20.04	25	66.5235
2012	1	86.343	18	19.54	23	68.56333
2012	2	83.176	18	20.28	21	69.74143
2012	3	82.897	18	20.34	22	73.36027
2012	4	83.188	18	20.22	15	75.44895
2012	5	84.384	18	20.12	18	78.68864
2012	6	84.789	18	20.3	15	79.7288
2012	7	84.14	16.5	20.15	13	82.84368
2012	8	84.075	16.5	20.13	9	83.68764
2012	9	84.613	13	19.73	7	86.369
2012	10	85.112	13	19.04	9	88.74391
2012	11	85.629	11	17.78	6	92.43018
2012	12	85.994	11	18.15	5	93.03059
2013	1	86.9	9.5	18.13	5	101.9086
2013	2	87.446	9.5	17.84	8	106.366
2013	3	85.818	9.5	17.73	9	113.6058
2013	4	84.189	9.5	17.87	8	119.703

2013	5	84.146	8.5	17.45	7	124.8291
2013	6	85.488	8.5	16.97	6	121.7135
2013	7	86.859	8.5	17.02	8	120.8674
2013	8	87.493	8.5	16.96	9	123.9524
2013	9	87.413	8.5	16.86	6	123.2029
2013	10	85.31	8.5	17	9	131.1138
2013	11	86.103	8.5	16.89	12	136.7824
2013	12	86.309	8.5	16.99	9	135.4489
2014	1	86.214	8.5	17.03	9	140.6241
2014	2	86.278	8.5	17.06	11	137.9605
2014	3	86.489	8.5	16.91	5	143.231
2014	4	86.716	8.5	16.7	6	146.542
2014	5	87.412	8.5	16.97	7	150.8376
2014	6	87.612	8.5	16.36	11	149.6675
2014	7	87.773	8.5	16.91	9	151.585
2014	8	88.106	8.5	16.26	7	155.7219
2014	9	88.836	8.5	16.04	6	161.27
2014	10	89.227	8.5	16	6	161.3345
2014	11	89.963	8.5	15.94	5	161.437
2014	12	90.444	8.5	15.99	6	162.54
2015	1	91.358	8.5	15.93	6	164.4262
2015	2	91.489	8.5	15.47	7	172.1315
2015	3	91.727	8.5	15.46	8	172.9277
2015	4	93.438	8.5	15.4	5	171.948
2015	5	96.389	8.5	15.26	7	167.621
2015	6	97.705	10	16.06	11	163.0633
2015	7	101.196	11.5	15.75	12	157.0223
2015	8	102.431	11.5	15.68	8	148.0286
2015	9	105.275	11.5	16.82	22	146.6468
2015	10	102.779	11.5	16.58	23	139.8681
2015	11	102.168	11.5	17.16	13	142.7535
2015	12	102.195	11.5	18.3	14	144.3018
2016	1	102.313	11.5	18	3	156
2016	2	101.932	11.5	17.91	3	151
2016	3	101.485	11.5	17.87	4	144
2016	4	101.228	11.5	18.04	3	152
2016	5	100.732	10.5	18.22	4	160
2016	6	101.145	10.5	18.18	4	152
2016	7	101.332	10.5	18.1	8	167
2016	8	101.41	10	17.66	5	148
2016	9	101.271	10	13.86	3	167

2016	10	101.323	10	13.73	5	154
2016	11	101.748	10	13.67	5	161
2016	12	102.32	10	13.66	5	149