

**THE EFFECT OF FOREIGN EXCHANGE FLUCTUATIONS ON EQUITY  
MARKET PERFORMANCE OF THE NAIROBI SECURITIES  
EXCHANGE**

**BY  
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## DECLARATION

I declare this research paper to be my authentic work and, to the best of my knowledge, it has not been submitted to any other University or Institution for academic credit:

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DATE: .....

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This research paper has been presented for examination with my approval as the University Supervisor:

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I would also like to pay homage to my fellow students, friends and family who offered support, wisdom and optimism throughout the undertaking of this project and my time in the course.

## **DEDICATION**

My research paper is dedicated to loving family who encouraged and enabled me to strive for the best in all my endeavours.

R.I.P. Mickey Joe!

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## LIST OF ABBREVIATIONS

ATS – Automated Trading System

BIS – Bank for International Settlements

CBK - Central Bank of Kenya

CPI – Consumer Price Index

EGARCH - Exponential Generalized Autoregressive Conditional Heteroscedasticity

GARCH - Generalized Autoregressive Conditional Heteroscedasticity

FISMS - Fixed Income Securities Market Segment

IFE – International Fisher Effect

IRP – Interest Rate Parity

KES – Kenya Shillings

NSE – Nairobi Securities Exchange

OLS – Ordinary Least Squares

PPP – Purchasing Power Parity

TGARCH - Threshold Generalized Conditional Heteroscedasticity

UEP – Uncovered Equity Parity

USD – US Dollars

VECM – Vector Error Correction Model

## ABSTRACT

The stock market serves to symbolize the performance and well-being of the economy and is tracked as an indicator of overall economic activity. The effects of various macroeconomic indicators on the stock exchange have been evaluated in numerous studies over the years. This study sought to establish the nature of the interaction between foreign exchange fluctuations and their impact on equity market performance at the Nairobi Securities Exchange. Previous studies have offered up mixed results as to the direction of this relationship. A correlational research design was drawn up with the NSE 20 Share Index as the dependent variable representing market performance; the Kenya Shilling-US Dollar exchange rate served as the independent variable representing exchange rate fluctuations. The paper employed monthly time series data covering a 10-year span, dating from July 2006 until June 2016. The exchange rate and market performance were found to be asymmetric and not follow a normal distribution, instead they were found to follow leptokurtic distributions; such a distribution has fat tails and the data points are more clustered around the mean. From a correlation perspective, it was observed that the two variables were negatively associated and moved in opposing directions to one another. The study applied an Exponential Generalized Autoregressive Conditional Heteroskedasticity (EGARCH) model to assess the impact of foreign exchange fluctuations on stock market performance. The exchange rate was found to have a negative significant effect on stock market returns, albeit of low magnitude. This fit in with the overarching theory that adverse currency movements would impact the stock market performance. The study findings can be helpful to investors in understanding how exchange rate dynamics impact market performance and guide them in making decisions on investment strategy. It is recommended measures aimed at ensuring stability in the foreign exchange market should be employed so as to build up investor confidence and encourage improved market performance at the Nairobi Securities Exchange.

# CHAPTER ONE

## INTRODUCTION

### 1.1 Background of the Study

Throughout the globe, capital markets are closely monitored as they serve as a bellwether of national economies. The capital markets are an intermediary link that allow for funds to flow from savers to investors (Aduda, Masila & Onsongo, 2012). Securities exchange serve as a means through which excess funds move from lenders to borrowers who are in need of funds (Mishkin, 2000). Equity securities listed on an exchange provide a basis to understand how those companies are performing and act as a barometer of the public's sentiment about a nation's current and future economic prospects. In times of optimism about the future of the economy, the markets tend to rally. Whilst when people are skeptical of the future, the markets typically behave in a converse manner.

Globalization refers to the integration and interaction of people, corporations, and governments; a process driven by international trade and finance and aided by international technology. We today live in a highly integrated world in which changes in policies or movements in a nation's economy can have significant impact on other countries' economies. Inflows into the Kenyan market, including the Nairobi Securities Exchange (NSE) have been on an upward trend in recent years. Foreign investors have taken up a greater proportion of the trading activity at the bourse (NSE Trading Report, 2015). This has largely been driven by the foreigners seeking out attractive returns in emerging and frontier markets.

The total return from an equity investment is a factor of capital gains/loss and dividends (Adam & Tweneboah, 2008). Investors in equity markets need to factor in quite a number of metrics when making their investment decisions. These metrics could be at a company, industry, national economy or international level. In making the choice to invest, one needs to be cognizant of how the different factors interplay and overlap each other.

In the international investment environment, the worthwhile benefits of low interdependence across different markets can be offset by counter-productive changes in the exchange rate, and vice versa. The base currency of an investment portfolio plays a role in the outcome of an international investment (Shetty & Manley, 2006). This potentially has the ability to erode or boost their returns depending on what is happening in the foreign exchange market. Investment decisions made as a result of foreign exchange movement could also have a knock-on impact on the performance of the equity market at the NSE.

### **1.1.1 Foreign Exchange Fluctuations**

Foreign exchange basically refers to the exchange of a nation's currency for another or the conversion of one currency into another. The market participants in the foreign exchange market range from tourists, importers/exporters, large corporations to banks and financial institutions investing in other countries. The exchange rate in conjunction with domestic prices determines the cost of products in foreign nations, having a great influence in international finance. According to the Bank for International Settlements (BIS), as of April 2013, daily forex transactions averaged US Dollars (USD) 5.3 trillion. These transactions take the form of simple

spot transactions or more complicated derivatives like forward contracts, currency swaps and options contracts.

There are varying exchange rate regimes: fixed, floating or managed float. In a fixed system, the exchange rate is pegged by a country's government or central bank to other international currencies or the price of gold. A floating exchange regime is dependent on the forces of demand and supply and the currency freely fluctuates based on the market. A managed float system is a hybrid of a fixed and floating system. It is dependent on market forces and the central bank may intervene to influence the exchange rate. Various research studies point to macroeconomic fundamentals like the balance of payments, interest and inflation rates as sources of exchange rate volatility. Volatility in the forex market dramatically increased after the Bretton Woods fixed exchange rate arrangement disintegrated in 1973 (Flood & Rose, 1999).

The early 1990s saw the liberalization of Kenya's foreign exchange market with a dual system being introduced in 1990. A market-rate existed based upon bearer certificates working in tandem with a government-determined rate. A floating rate system was embraced in October 1993. Restrictions on current account transactions were smoothed out in 1994. Most of the capital account controls had been removed by the middle of 1995 (Ndung'u & Ngugi, 1999).

Currency values are affected by a number of factors including capital flows, demand and supply factors, interest rate differentials, economic output, technical support and resistance levels. With most of these factors continually adjusting and being in a general state of perpetual flux, currency values are constantly fluctuating (Ansari & Changle, 2012).

### **1.1.2 Equity Market Performance**

Equity markets offer companies' access to capital and investors the opportunity to own a stake in those companies with the potential to realize gains based on their future performance. Capital gains/loss and dividends are how stock market returns are tallied. Markets by their very nature are volatile. There is a risk-reward element in markets, which ties in with the investment horizon and uncertainty of investing in different asset classes. Further to this, stock markets are not always rational and sometimes over-react or under-react relative to the likely change in these underlying business fundamentals.

A company's stock market performance transmits information to the market on its continued performance. Investors would ideally base their investment decisions on a company's ability to sustain its performance in the long-run. It is thus incumbent on investors and/or their advisors to understand the dynamics at play before committing to a position on stock. Fundamental analysis is typically used to gauge the key drivers of a shares price. Whereas for shorter-term investors, technical analysis can be used and relies on models based around price and volume transformations and chartism to predict the movement of share prices. Eugene Fama, via the Efficient Market Hypothesis (EMH) developed in the 1960s, disputed both these forms of analysis. He argued that the valuation of a selected stock is assumed to be accurate based on the information available.

The overall performance of the market can be influenced by a number of factors: some of these would be at a micro-level and may be company or industry specific; whilst other factors would impact the economy as a whole. Typically, in tracking the performance of the market, market

indices are used. Indices are normally made up of selected listed stocks, bonds, etc. Indices are sampled to be surrogate representative of the different sectors and the general change in price in line with Dubravka and Petra (2010) finding that tracking the market index offered up the largest statistical significant explanation of stock returns. One of the key considerations in setting up and evaluating an index is that it should convey information to a large number of investors about the general performance of stocks factored in. Events unique to one or two stocks should not exert unduly large effect on the overall index. Each stocks relative importance (weighting) in representative portfolios changes as the price of individual stocks change over time (Thomas, 2006).

### **1.1.3 Effect of Foreign Exchange Fluctuations on Equity Market Performance**

With the culmination of the Bretton Woods monetary management system in 1973, exchange rate volatility took on greater importance in international finance. Exchange rate volatility refers to the risk associated with random movements in the exchange rate. Money tends to flow to investments that offer the highest return with the least amount of risk. Foreigners will seek out a nation's currency to invest in a country if that nation's financial instruments have higher returns, whilst factoring-in risk (Gonelli, 1993). Frontier and emerging economies are perceived to have higher level of risk that international investors shy away from or demand significant returns and risk premia before investing. This perception is more prone when we consider foreign exchange fluctuations (Muriu, 2003).

At the micro level, Jorion (1990) showed that currency appreciation might decrease stock prices by reducing business profits for export-oriented firms and multinationals, and also for domestic

companies, which in turn impacts stock prices. According to Hussain and Liew (2004), from the traditional point of view, the depreciation (appreciation) of a local currency has two major implications. Firstly, an increase (decrease) in the debt burden in terms of foreign denomination currency. Local firms would end up paying more (less) for the foreign-denominated debt and their cash flows would deteriorate (improve). Secondly, an increase (decrease) in production costs, especially in developing economies in which the production process was reliant on foreign-sourced inputs. The consequences would be a drop-off in company revenues and loss (gain) in price competitiveness.

Stock prices, considered a measure of the future cash flow of companies (discounted back to the present), should recalibrate based upon the economic outlook. Economic factors may lead an appreciation (depreciation) of a nation's currency which would stimulate an upturn/downturn in the performance of listed equities. For instance, currency appreciation is anticipated to boost market prices of an import-laden economy and depress them in an export-led country (Obben et al., 2007).

In fairly recent theory (Hau & Rey, 2006), they suggested that foreign exchange and equity market performance should bear a negative correlation due to portfolio rebalancing. This is based upon a viewpoint of a foreign institutional investor with money invested in the US. When the US stock market rises relative to the foreigners market, the investor is overweight with American equities. To return their portfolio to a neutral position, they sell and reduce their holding of US stocks and sell the US dollar for local currency. Selling of dollars leads the dollar to depreciate at



the same time that American equities are outperforming other markets; tying in with the uncovered equity parity (UEP) condition (Melvis & Prins, 2015).

Thus, based on the above dynamics, the expectation would be that foreign exchange rate fluctuations cause movements in stock market returns and is a key factor in influencing the share price for listed equities and the market on the whole.

#### **1.1.4 Nairobi Securities Exchange**

The Nairobi Stock Exchange was incorporated under the Societies Act (1954) as a willing association of market intermediaries and tasked with the duty of advancing the securities market and regulating trading activities. In the formative years, transactions were discussed over telephone and prices determined through negotiation. In 1991, the Nairobi Stock exchange was registered as a private company limited by shares. Share trading shifted to a floor-based open outcry system. There have been significant technological developments over the years with an Automated Trading System (ATS) now in place where trading is live, expanded trading hours and there is timely information for investors to access.

As at June 30<sup>th</sup> 2016, the NSE comprised of approximately 64 listed companies and one Real Estate Investment Trust. In addition to the quoted equities, NSE also has a debt market known as the Fixed Income Securities Market Segment (FISMS) where fixed income securities in the shape of government and corporate bonds are traded. The listed companies are divided into strategic sectors that enable market followers to monitor their performance in comparison to their peers; these are: Agricultural, Banking, Telecommunications, Manufacturing, Construction &

Allied, Energy & Petroleum, Investment Services, Insurance, Investment, Commercial & Services, Automobiles & Accessories and Real Estate Investment Trust.

The market capitalization of the NSE has grown considerably over the past 10 years with a market cap of about Kshs. 620 Billion at the start of July 2006, to about Kshs. 2.00 Trillion at the end of June 2016. There have been numerous listings over the time, either by initial public offering or via introduction – the largest of which was the Safaricom IPO in 2008 that raised \$800Mn.

In terms of market performance, the NSE has gone through a number of bull and bear runs over the same 10-year time frame (using the NSE-20 share index as the measure of performance). There was a sharp bear run from June 2008 to March 2009 (index lost more than half its value from a price of 5,298 to 2,545); similarly, from October 2010 to December 2011, the local bourse witnessed a significant drop-off. On the other side, there have been bull markets from March 2009 to October 2010(2,545 points up to 4,640 points) and a long upward run from December 2011 to February 2015(3,123 points to 5,370 points). From January 2016 to the end of June 2016, the NSE-20 index was down 9.90%.

## **1.2 Research Problem**

There are number of reasons to believe that foreign exchange fluctuation should be a contributing factor in determining the performance of the NSE. Significant value of a nation's capital is tied up in the stock market and investors' wealth is at stake depending on how the market performs. There are cost implications on all economic agents as a result of foreign

exchange market occurrences. Benita and Lauterbach (2004) maintained that exchange rate fluctuations have economic costs that impact inflation, firm profitability and economic stability. The internationalization of capital markets has led to greater flows of money between market exchanges and in the cross-listing of firms. The appreciation of a currency reduces its ability to compete for exports; thereby hurting the domestic stock market (Yucel & Kurt, 2003).

In Kenya, foreign investors were first allowed to actively participate in the stock market under guided policy in January 1995 following the Kenya Gazette Supplement of January 1995. Their involvement has continually grown with the government passing an amendment to the Capital Markets (Foreign Investors) Regulations in June 2015 that abolished the foreign ownership limit, previously at 75% of issued shares for listed firms. Data from the Nairobi Securities Exchange indicates that foreigners accounted for about 61% of market trading activity on equities in 2015(NSE Trading Reports).

As shown by Obben et al (2007), currency movements are expected to boost or depress stock markets depending on the direction of the movement and whether the countries are net importers or exporters. According to Muriu (2003), international investors shy away or demand significant premiums and risk premia before investing in frontier and emerging markets like Kenya. Foreign exchange is a key benchmark in their decision-making process. Thus, movements in foreign exchange could encourage or discourage market participation which could then have an impact on the market performance.

Empirical evidence is largely inconsistent and quite varied on the influence of foreign exchange on the securities markets. Mishra (2004) was of the opinion that there was no clear theoretical unanimity on the interaction of foreign currency movements and stock market performance. Wongbangpo and Sharma (2002) discovered a negative relationship between the exchange rate and market prices in three Asian countries, but positively related in two others. Kolari et al. (2008), found stock returns said to be uncertain and to be very sensitive to foreign exchange risk. Solnik (1987) found a negative association between listed equities and the local unit of currency. Sifunjo (1999) concluded that developments in exchange rates apply noteworthy impact on determination of stock value in Kenya. In another paper by Omondi and Olweny (2011), on foreign exchange and its impact on the market, they found that the magnitude of volatility is low and significant.

With their being fairly few studies being done on the subject matter in the Kenyan setting and those studies having found significantly different levels of impact (if any) of stock prices on market performance, I believe there is gap that requires further study in this area. More recent data on foreign exchange movement and market performance could offer fresh insights into the phenomenon. Thus, I am seeking to answer the question as to: what is the effect of foreign exchange fluctuations on equity market performance on the NSE?

### **1.3 Research Objective**

To establish the effect of foreign exchange fluctuations on equity market performance at the Nairobi Securities Exchange.

#### **1.4 Value of the Study**

The output of the paper will be relevant to the market players at the NSE. Be they retail investors, local insurance companies or pension funds, or international portfolio managers. The information will be used in further guiding them to make more effective investment decisions.

From a policy viewpoint, it will give insight to the Nairobi Securities Exchange and Central Bank of Kenya (CBK) in terms of regulations. Uncovering the true nature of the relationship will serve to assist the regulatory agencies and policymakers on how to improve and conserve greater capital inflows.

It will serve as a basis for future research by academicians and scholars. It will also add to existing knowledge on the subject matter of foreign currency movements and their impact on the market, thereby contributing to academic reference materials.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

This chapter assesses the literature review on foreign exchange and the performance of equities by studying the theories relevant to the two variables. Also, there is an evaluation of global empirical studies that other researchers have conducted on foreign exchange movement and the impact on the performance of stock markets.

#### **2.2 Theoretical Review**

A number of the theories relating to the study are examined below:

##### **2.2.1 Purchasing Power Parity**

Purchasing Power Parity (PPP) is an economic concept that was developed in its current shape by Gustav Cassel in 1918. Taking account of exchange rate adjustment, price levels between two states should be equivalent to one another. The foundation of the theory is the law of one price, where an identical good should be priced the same across different markets. Arbitrage opportunities would be created if large price differences existed between two countries for the same product, because the product could then be obtained from the country that sells it at the cheaper price. The exchange rate thus has to adjust for this. The rate of change in the exchange rate is a factor of the difference between the inflation rates in country 1 and country 2, divided by the inflation rate of the second country (plus one).

The theory is therefore important in the study as it implies that price levels between countries are a source of exchange rate volatility and should be considered when looking at currency movements. Also, per law of one price, securities cross-listed in different markets should be priced the same factoring-in for currency adjustment.

### **2.2.2 Interest Rate Parity**

The Interest Rate Parity (IRP) suggests that to avoid a marketplace with arbitrage occurrences, similar assets in two different nations should have similar rates of interest, provided the risk is equal for both assets. The theory was formalized J.M. Keynes in 1923 and is based upon the law of one price. The investment yield on an asset across two countries should be the same; if not, exchange rates would alter to redress this difference. IRP is arrived at as a factor of the interest rate differentials, existing forward and spot exchange rates between 2 nations. This situation arises due to the variation interest rates across states being equal to the difference between the forward exchange values in comparison to the spot exchange rate. Investments in different currencies, accounting for risks, should yield the same return which is a possible cause of market instability in both the forex market and stock market.

### **2.2.3 International Fisher Effect**

The International Fisher Effect (IFE) is an exchange rate framework that was developed by Irving Fisher in the 1930s. The theory implies that changes in the exchange rate between states are derived from differences in their nominal interest rates. Differences in nominal rates between nations will lead to a currency appreciation of the currency of the state with the lower nominal rate. The rationale being that the nation with a higher interest rate regime will similarly have a

higher price index, causing currency depreciation in the high interest economy vis-a-vis the nation experiencing a lower interest rate level. This theory offers up two key macroeconomic indicators with interest rates, functioning alongside inflation, as a possible cause of exchange rate volatility.

#### **2.2.4 Balance of Payments Theory**

The theory traces its origins back to the 18<sup>th</sup> Century when English economist David Hume developed the price-specie mechanism. It was further developed by the likes of Ohlin (1929) and Meade (1951). The current account and capital accounts measure and keep tabs of the flow of capital and goods in and out of that nation. The theory normally focuses on the current account, which deals with trade of physical goods, as a guide to the direction of currency movement.

The exchange rate is out of balance when it sits with a large current account surplus or deficit. To correct this disequilibrium in the current account, the exchange rate will have to correct. A country operating with a large trade deficit should experience a depreciation of its currency. A currency appreciation should occur in a situation in which a surplus exists. The balance of payments position is arrived at by summing up the current, capital and reserves account balance. The theory is important in explaining how Balance of Payments leads to exchange rate determination. This is of importance to the study as the inflow and outflow of funds into the NSE is at the heart of the study.



## **2.3 Determinants of Equity Market Performance**

Key factors that are believed to play a part in the overall performance of stock markets are as follows:

### **2.3.1 Company News and Performance**

Company news and performance affect the share price directly through the signalling effect. This could be in the form of profits/losses, future estimated earnings, dividends and other relevant corporate information such as change of management or new projects. According to the signalling theory, financial data serves the purpose of forwarding information from managers to stockholders. General company performance has a knock-on effect on the overall performance of the various indices in a stock exchange.

Dividend announcements are also signalling mechanism. They inform current and potential investors about the future profit prospects of their investments in a company (Osei, 2002). Kane, Lee and Marcus (1985) gauged abnormal market returns occurring around earnings and dividend notices. Their evidence suggested a statistically significant interaction effect.

### **2.3.2 Interest Rates**

Monetary policy is used to stimulate or stabilize the economy. From the perspective of the firm, borrowing money to finance working capital and/or for capital expenditure will drive up their cost of debt. This will likely hamper company profits and the dividends available for shareholders. As a result, it would be expected that the share price may drop. Higher interest rates reduce the present value of future dividend income, which should lower stock prices. From

the investing side of things, high-yielding fixed income investments would tend to be more attractive and relatively safer to investors than equities.

### **2.3.3 Inflation**

Higher inflation rates lead to higher prices for consumers which tend to slow business and reduce earnings for firms. Higher prices also tend to trigger a higher interest rate regime. Fama (1981) argued that inflation would have a negative correlation with real economic activity, which in turn would have a positive association to market performance. Thus, the stock index should be negatively correlated with the anticipated price level, with short-term interest rates serving as the proxy similar to the International Fisher Effect.

### **2.3.4 Economic Outlook**

General investor sentiment in the economy is an important factor that should not be understated. An environment with a positive economic outlook and the economy looking likely to expand, would lead to stock prices rising as investors are bullish and anticipate larger profits and improved market prices. Market sentiment is thus important in shaping investor expectation and speculation of the direction and momentum of the stock market.

### **2.3.5 Economic and Political Shocks**

Economic and political shocks locally and globally affect the stock market and economy in general. For instance, terrorist activity often leads to a loss of confidence and a wait-and-see approach towards new or continued projects which causes a downturn in economic activity and stock prices in many sectors. New leadership of a government or of a key institution like a

central bank could have influence in terms of new policies which may help or hinder business, and as a result stock prices.

## **2.4 Empirical Studies**

Over the years, there have been numerous empirical investigations on the nature of the relationship between currency movements and the possible impact on stock markets. Some of the relevant studies to this paper are discussed below.

Mukherjee and Naka (1995) modelled their investigation on the relationship between six macroeconomic variables with the Japanese stock market being the setting. The variables under study included the exchange rate. A positive relationship was hypothesized between the exchange rate and stock prices. Depreciation in the Japanese Yen against the US Dollar would lead to greater exports thereby causing increased yen-denominated cashflows to Japanese companies, and higher stock prices. Using a 20-year sample from January 1971 up to December 1990, Johansen's Vector Error Correction Model (VECM) was employed. As hypothesized, they found a positive relationship between the performance of the stock market and the exchange rate.

Abdalla and Murinde (1997) undertook an investigation on the four states of the Philippines, India, Korea and Pakistan. They were out to uncover the nature of the relationship between prices in the forex market and the selected stock markets. They used monthly market price observations in comparison with the exchange rate over a 10 year period between 1985 and 1994. A bivariate Vector Autoregressive model was used and they found uni-directional causalities from exchange rates in all the countries except for the Philippines.

Fang (2002) looked into the effects of currency depreciation during the Asian financial crisis (1997 – 1999). Countries under observation were the markets of Thailand, Taiwan, Singapore, Hong Kong and South Korea. A bivariate GARCH model was used to ascertain the effects. Fang found statistically significant effects between currency depreciation and stock market returns. Stock returns were considerably affected and/or market volatility was increased. The exchange rate was detected to negatively impact local stock prices.

Wongbangpo and Sharma (2002) investigated the link between stock market prices and certain macroeconomic variables including the exchange rate. The study was conducted in the Philippines, Indonesia, Singapore, Thailand and Malaysia to ascertain the connection between the variables with the growth of those stock markets and economies. Interestingly, they found a positive relationship in Indonesia, Malaysia and Philippine but negative association in Singapore and Thailand.

Murinde and Poshakwale (2004) studied a number of financial markets in the European Union before and after the adoption of the Euro. They conducted their tests using a Vector Autoregressive model. They used daily observations of the stock price and foreign exchange rate from 1995-1998, before the Euro introduction, and 1999-2003 for the post-Euro cycle. Pre-Euro, stock prices uni-directionally Granger-caused exchange rates to shift in Hungary; bi-directional causality was found to exist in the Czech Republic and Poland. With the euro becoming the common currency across the continent, exchange rates uni-directionally Granger-caused stock prices to adjust in the nations under observation. They also found higher correlation among the markets during the period of the Euro currency.

Joseph and Vezos (2006) examined how foreign exchange rate movements and interest rates affected stock returns of US banks. The study utilized an EGARCH model to record for the ARCH impacts in every day returns. The outcomes recommended that exchange rate represented a significant portion of the fluctuation in market performance at the portfolio level and individual bank; and the level of the affect-ability of the stock performance to exchange rate fluctuations was not exceptionally maintained regardless of the utilization of high recurrence information. The study further demonstrated that ARCH impacts had an effect on measures of affectability.

Looking at African markets, Subair and Salihu (2004) investigated the relationship of the currency and stock markets in Nigeria. The variables under investigation were the exchange rate, inflation, market capitalization, interest rate and gross domestic product. Johansen Co-integration test proved that a long-run association exists between the variables. Using the Error Correction model; it was discovered that foreign exchange exerts a strong negative effect on the stock markets. Increased volatility in the exchange rate reduces the growth rate of stock market capitalization. They recommended a coordinated fiscal and monetary policy to counter the fluctuation of the exchange rate so as to build confidence and depth market exchange.

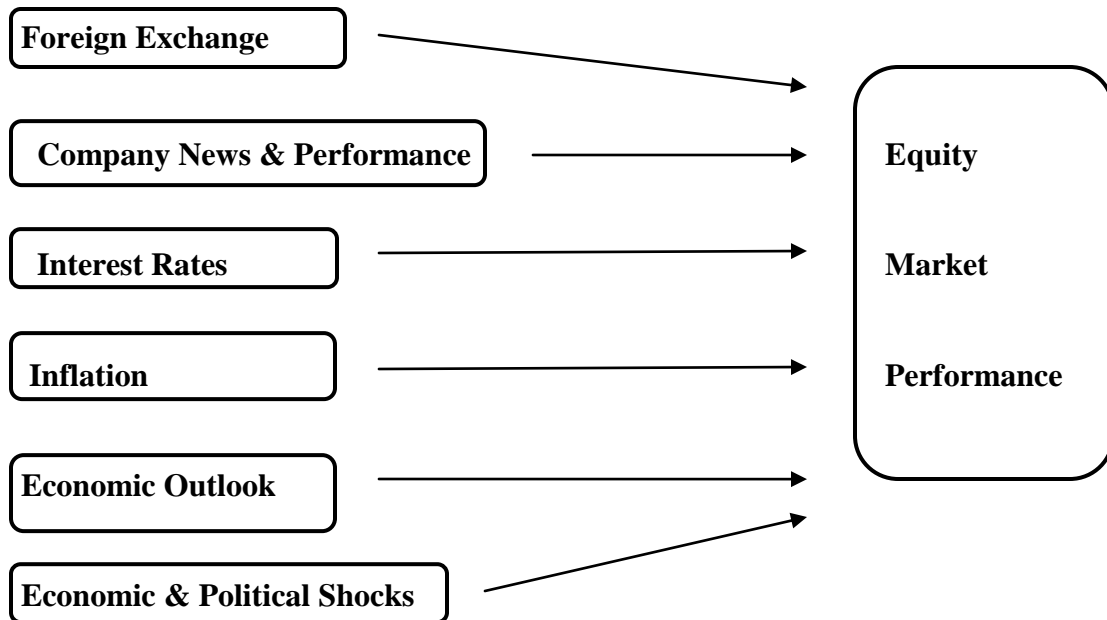
Adjasi et al (2008) analyzed the forex and stock markets in Ghana to determine whether movements in the currency rates impacted the stock exchange. The EGARCH model was utilized in establishing the relation between the variables and a negative relationship was observed. A loss of value in the home currency leads to an increase in equity returns in the long run; in the short run, the opposite was observed with stock market returns reducing.

Locally, Sifunjo (1999) investigated the causal linkages between currency exchange rates and market prices at the Nairobi Stock Exchange (NSE). He was seeking to uncover the relation between movements in the foreign exchange and the stock exchange markets. He utilized monthly observations from November 1993 to May 1999 of the stock index and Kenya Shilling-US Dollar exchange rate. With regard to stationarity, he found that the variables are non-stationary both in first differences and level forms. The empirical results deduced evidence of co-integration. Lastly, using error-correction models, the results indicated that exchange rates Granger-cause stock market prices at the NSE.

Omondi and Olweny (2011) mulled over the impacts of macroeconomic factors at the Nairobi Securities Exchange on stock return unpredictability. The study's focus was on foreign exchange, inflation and interest rate fluctuations on market returns and volatility in Kenya. They used monthly time series data over a ten-year period from the start of 2001 until the end of 2010 and employed the EGARCH methodology. They found the returns to be symmetric but leptokurtic and non-normally distributed. On foreign exchange, they found evidence of relatively low though significant effect of currency movement on stock returns. Stock return volatility was also affected by interest and inflation rates.

Chirchir (2011) looked into the nexus between the exchange rate and share price in Kenya. He employed a data set from 1993 to 2011. The research used Toda and Yamamoto (1995) method to hypothesize the possible relationship between stock prices and exchange rates. The results indicated a negative causal relationship and existence of a bi-directional causal relationship.

## 2.5 Conceptual Framework



From a conceptual point of view, the diagram details the key factors believed to play a part in the market performance of a stock exchange. As detailed earlier in this section of the study (Chapter 2.3), relationship of these factors and the market performance are explained. Positive information in terms of company performance, economic outlook and economic and political shocks should reflect result in the stock exchange doing well. It would be the opposite with negative news.

The expectation is that inflation has a negative correlation with market performance. Similarly, with interest rates, the expectation is that there is negative correlation. On foreign exchange, the expectation is a negative correlation, though this is debatable based on past studies and thus the focus of this study.

## **2.6 Summary of Literature Review**

The chapter has delved into four theories that provide a basis for understanding how foreign exchange is determined. The interrelationship between interest rates, inflation and balance of payments across borders are articulated.

The appropriate direction of the association between currency rates and equity market returns has generated a fair amount of empirical investigations, but a generally accepted consensus is yet to be found. Studies done in this area have resulted in relatively mixed and at times contradictory findings, with regard to the significance and direction that the variables have on each other. As shown, there also discrepancies between studies done in emerging and developed economies.

The determinants of stock market performance have been reviewed. The factors cut across company, industry and economy levels. The literature generally indicates that changes in value, instigated by currency movements and stock prices, are reflected in substantial swings in international portfolio positions.



## **CHAPTER THREE**

### **RESEARCH METHODOLOGY**

#### **3.1 Introduction**

The research methodology is discussed in this chapter. Research design, collection of data and its operationalization and data analysis techniques are all expressed.

#### **3.2 Research Design**

The design utilized is firstly descriptive in nature as the researcher will be seeking to establish whether exchange rate movements are associated with equity market performance at the NSE. The study is then correlational as the researcher shall be able to derive the possible direction of the relationship that may exist between the variables and ascertain the significance, or lack thereof, of the relationship. The nature of the study is macroeconomic and thus the population under survey consists of all equity counters listed at NSE as at June 2016.

#### **3.3 Data Collection**

Secondary data in this paper consists of average monthly time series data of the stock market index (NSE 20 share index) retrieved from the NSE over a ten year period from July 2006 to June 2016. The data source is the NSE Price Lists and Trading Reports. The NSE 20 share index has been selected as the proxy best representing an accurate picture of the overall stock market performance. NSE 20 share index is a price-weighted index. The constituent firms represented are chosen based on a weighted market performance that factors in trading activity, market capitalization and liquidity. This index was selected because the blue chip stocks are more liquid, trade regularly and their share prices adjust fairly rapidly to company and market factors as a

result. Also, these stocks tend to have high foreign participation and these are the investors most at risk to the adverse effects of exchange rate fluctuation.

The forex rate data to be used is the average monthly indicative rates as collated from the Central Bank of Kenya from their website and monthly and annual reports. In the case of foreign exchange, the Kenya Shilling (KES)-US Dollar (USD) exchange rate has been picked as being most representative. The US Dollar is the pre-eminent global currency with most international transactions denominated in it and it being most commonly used in asset valuations.

### **3.4 Validity and Reliability**

The accuracy of data is largely dependent on the instruments used in collection in terms of ascertaining the validity and reliability (Mugenda & Mugenda, 2003). The information used was obtained from the reports compiled by Nairobi Securities Exchange and the Central Bank of Kenya. As the information relied upon was coming directly from the regulator (CBK) and the exchange (NSE), it was deemed to be valid and reliable.

### **3.5 Data Analysis**

Data was analyzed using econometric and statistical models. SPSS and E-Views were used to analyze and test the data to give the appropriate statistics and coefficients on the variables.

Foreign exchange fluctuation will be measured based upon the difference in the monthly average of the KES-USD exchange rate taken in natural logarithmic form. Foreign exchange will represent the independent variable. This is expressed as follows:

$$FX = \ln FX_t - \ln FX_{t-1}$$

Whereas the market performance, as the dependent variable, will be measured using the difference in the monthly average movement of the NSE 20 Share Index in natural logarithmic form as well. Algebraically, this is shown below:

$$MP = \ln MP_t - \ln MP_{t-1}$$

Due to the nature of financial time series data, the researcher felt it prudent to perform diagnostic tests to ascertain the linearity, or lack thereof of the variables to decipher the most appropriate model to use. Relationships between variables may at times appear linear, but upon further investigation, a non-linear model would best be employed to explain the relationship. Normality tests were thus required.

It was necessary to account for stationarity in the time series under investigation. Stationarity refers to the lack of presence of a unit root, and is a situation in which the time series mean and variance are constant over time. It was desirable to establish a stationary relationship between the two variables by performing a Unit Root Test. A stationary relationship between the variables avoids the use of a spurious regression in which test statistics show the existence of significant relationship in the regression model even though no such relationship exists between the variables (Riman & Eyo, 2008).

### **3.5.1 Exponential Generalized Autoregressive Conditional Heteroscedasticity Model**

The GARCH model fine-tuned by Bollerslev (1986) and Taylor (1986), led to further studies on the dynamics of conditional stock market volatility. These models accounted for ARCH impacts not captured by the standard OLS procedure. The model allows for conditional variances to be dependent upon previous own lags. The standard GARCH (1,1) model captures volatility clustering, but fails to account for asymmetry in the conditional variance of information shocks

and volatility. Asymmetry, in this case, refers to downward movements in the market followed by higher volatilities than upward movements of similar magnitude. GARCH models have been employed in previous studies including Fang (2002) and Subair and Salihu (2004).

An extension of the GARCH model, the EGARCH (1, 1) model captures for the effects of asymmetry. Koulakiotis et al (2006), found it to be a relatively stronger model in looking into financial markets phenomenon. EGARCH model helps to explain the leverage effect, volatility magnitude effect and its persistence in the market. The model has been employed in studies by Adjasi (2008) and Omondi and Olweny (2011).

## CHAPTER FOUR

### DATA ANALYSIS, FINDINGS AND INTERPRETATIONS

#### 4.1 Introduction

Empirical analysis of the secondary data collected and tested is contained in this chapter. The data is subjected to a number of tests providing descriptive statistics, correlation statistics, causal and diagnostic statistics that are discussed and interpreted.

#### 4.2 Descriptive Statistics

**Table 4.1 Summary Descriptive Statistics**

	<b>MP</b>	<b>FX</b>
Mean	0.001055	-0.002665
Median	-0.005239	-0.002598
Maximum	0.197329	0.084153
Minimum	-0.118526	-0.072765
Std. Dev.	0.048431	0.022785
Skewness	0.807420	0.529162
Kurtosis	5.081697	7.090022
Jarque-Bera	34.41663	88.49799
Probability	0.000000	0.000000
Observations	119	119

From the above table, we observe monthly average returns of 0.11%. We see that the market performance and foreign exchange are both asymmetrical to the right with the skewness being asymmetrical around their means. Kurtosis exceeds 3 in both cases showing evidence of fat tails and implying a leptokurtic distribution which is sharper than a normal distribution and implies a

higher occurrence for extreme values. The Jarque Berra Normality tests reject the null hypothesis of normality and shows evidence of non-normal distribution.

### 4.3 Stationarity Test

To tackle the issue of unit roots, the Augmented Dickey-Fuller (ADF) test was employed. The criteria in rejecting or accepting the hypothesis of a unit root involved assessing the test statistic against the MacKinnon critical values. If the computed statistic is less negative relative to the critical values, the conclusion would be that market performance and/or foreign exchange are stationary.

**Table 4.2.1 Results of ADF Test on MP**

		t-statistic	Prob*
Augmented Dickey-Fuller Test Statistic		-7.742918	0.0000
Test critical values:	1% level	-3.486551	
	5% level	-2.886074	
	10% level	-2.579931	

\*Mackinnon (1996) one-sided p-values

**Table 4.2.2 Results of ADF Test on FX**

		t-statistic	Prob*
Augmented Dickey-Fuller Test Statistic		-7.629705	0.0000
Test critical values:	1% level	-3.487046	
	5% level	-2.886290	
	10% level	-2.580046	

\*Mackinnon (1996) one-sided p-values

The obtained statistics for both market performance and foreign exchange, -7.743 and – 7.630 respectively, lie to the left of the critical values. We thus reject the null hypothesis and find the variables to be stationary.

#### 4.4 Correlation Analysis

**Table 4.3 Correlation Matrix**

	MP	FX
MP	1	-0.3109*
FX	-0.3109*	1

\*Correlation is significant at the 0.05% level (2- tailed)

Pearson’s Bivariate Correlation was utilized to estimate the direction and strength of the association between the study variables. The correlation coefficient was observed to be -0.3109 at a statistically significant level of 5%. The implication of this being that a moderately weak negative correlation exists between currency movement and market performance. Depreciation in the forex rate has an unfavorable impact on the equity market which fits in with the expected findings. The likely cause of this being that as the Kenya Shilling depreciates against foreign currency; investors whose primary currency is foreign either sell-off some of their positions in the market or hold back further investment to mitigate against currency exposure.

#### 4.5 Test for Presence of ARCH Effects

Based on a null hypothesis that there no serial correlation is present in the residuals, the LM test was used to test for the presence of ARCH effects. The low values of probability (Table 4.4) indicated that the presence of ARCH effects in the equation and necessitated the rejection of the null hypothesis and use of the EGRACH model.

**Table 4.4 LM Serial Correlation Results**

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	1.614922	Prob. F(1,117)	0.2063
Obs*R-squared	1.620165	Prob. Chi-Square(1)	0.2031
Scaled explained SS	427265.6	Prob. Chi-Square(1)	0.0000

Test Equation:

Dependent Variable: WGT\_RESID^2

Method: Least Squares

Date: 11/08/16 Time: 09:52

Sample: 2006M07 2016M05

Included observations: 119

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.172261	0.142351	8.235013	0.0000
FOREX	7.918365	6.231028	1.270796	0.2063

R-squared	0.013615	Mean dependent var	1.151159
Adjusted R-squared	0.005184	S.D. dependent var	1.546276
S.E. of regression	1.542263	Akaike info criterion	3.721043
Sum squared resid	278.2933	Schwarz criterion	3.767750
Log likelihood	-219.4020	Hannan-Quinn criter.	3.740009
F-statistic	1.614922	Durbin-Watson stat	2.057907
Prob(F-statistic)	0.206322		

#### 4.6 Estimation of EGARCH Model

The variables were modeled under an EGARCH model as shown in Table 4.5. The negative coefficient (-0.617) between foreign exchange and market performance fits in with expected findings that currency movements cause the NSE 20 index to move in the opposite direction. However, the coefficients of determination are at 9.6% indicating that foreign exchange explains a relatively small portion of the movement in the dependent variable.

The coefficient (0.984) on the leverage effect was found to be positive indicating lack of the effect for the sample period under observation. Leverage effect implies negative shocks exert a stronger influence on market volatility than positive shocks of similar weighting. This indicates that investors are as indifferent to negative news on foreign exchange as they are to positive news. The magnitude of volatility in the short-run (month-to-month) is relatively low (-0.14) and



insignificant; whereas the volatility persistence in the long-run is also relatively low (0.08), but significant in the long run.

**Table 4.5 EGARCH Model Results**

Dependent Variable: NSE\_20  
Method: ML ARCH - Normal distribution (BFGS / Marquardt steps)  
Date: 11/08/16 Time: 09:51  
Sample (adjusted): 2006M07 2016M05  
Included observations: 119 after adjustments  
Failure to improve likelihood (non-zero gradients) after 77 iterations  
Coefficient covariance computed using outer product of gradients  
Presample variance: backcast (parameter = 0.7)  
 $\text{LOG}(\text{GARCH}) = \text{C}(2) + \text{C}(3) * \text{ABS}(\text{RESID}(-1) / \text{SQRT}(\text{GARCH}(-1))) + \text{C}(4) * \text{RESID}(-1) / \text{SQRT}(\text{GARCH}(-1)) + \text{C}(5) * \text{LOG}(\text{GARCH}(-1))$

Variable	Coefficient	Std. Error	z-Statistic	Prob.
FOREX	-0.616926	0.148035	-4.167436	0.0000

Variance Equation				
C(2)	0.010210	0.078582	0.129923	0.8966
C(3)	-0.139988	0.087947	-1.591728	0.1114
C(4)	0.084914	0.047884	1.773306	0.0762
C(5)	0.983511	6.35E-05	15482.32	0.0000

R-squared	0.096097	Mean dependent var	0.001055
Adjusted R-squared	0.096097	S.D. dependent var	0.048431
S.E. of regression	0.046045	Akaike info criterion	-3.525645
Sum squared resid	0.250180	Schwarz criterion	-3.408875
Log likelihood	214.7759	Hannan-Quinn criter.	-3.478229
Durbin-Watson stat	1.496322		

#### 4.7 Interpretation of Findings

It was observed that the variables, market performance and foreign exchange, showed evidence of skewness to the right. Market performance was at a 4.8% monthly deviation, implying a fair amount of market volatility on average. The Jarque Berra Normality proved that the variables were non-normally distributed, instead they followed leptokurtic distributions. The ADF test offered up evidence of stationarity at level forms. Serial correlation was detected using the Breusch-Godfrey LM test implying ARCH effects in the residuals.

Correlation between the variables was found to be moderately negative. This was in line with anticipated theory that currency movements would move in the opposing direction to the stock market performance. The strengthening of value in their home currency for foreign investors would result in their potential gains being eaten up and cause them to re-evaluate some of their holdings and investment decisions. Investment inflows or outflows could occur with the NSE being impacted.

The EGARCH model allowed for the capturing of the asymmetric effect of market returns. Leverage effects were not found in the study. Market volatility was shown to be relatively low and insignificant in the short run, albeit significant in the long-run. This, together with the lack of leverage effects, implies that investors may take time to fully weigh-up the positive or negative changes in currency before adjusting their portfolios either way.

## CHAPTER FIVE

### SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

#### 5.1 Introduction

This chapter discusses the summarized findings, as well as the conclusions and recommendations of the study. Limitations of the research, together with suggestions for more research are also looked into.

#### 5.2 Summary of Findings

The difference in the monthly averages of the Kenya Shilling-US Dollar exchange rate and NSE 20 Index were obtained and converted into log normal form. From the descriptive statistics, it was observed that both variables were positively skewed and followed leptokurtic distributions. The Jarque Berra statistics confirmed that the distributions were not normal normally distributed with the critical values being exceeded. The ADF test on stationarity revealed that the time series were stationary at level form. Based upon correlation analysis, a moderately weak and inverse correlation of -0.31 was observed at a significance level of 5%. This fit in with the anticipated theory of the study that the two variables would move in opposing directions.

The presence of ARCH effects was discovered via the LM Serial Correlation test. Evidence of autocorrelation lead the researcher to employ the EGARCH process to estimate the model as a better means of factoring-in asymmetric conditional variance. The model results indicated the presence of volatility, though its effect was relatively low. Of interest, there were no signs of the leverage effect being present. This implies that bad news in the foreign exchange market does not cause significantly more volatility than good news.

### **5.3 Conclusions**

The study offered up a number of interesting conclusions. A relatively weak association was found to exist between the two variables. The direction of the correlation was negative implying that investors are prepared to hold-off investing or pull out of some of their positions to counter the effect of currency volatility. In terms of the EGARCH model, we observed that foreign exchange fluctuation has a low magnitude of volatility persistence which is significant in the long-run. This ties in with the findings of Olweny and Omondi (2011) who observed a similar relationship.

It can thus be concluded that movements in the currency market have an impact on the Kenyan stock exchange. With the R-squared and adjusted R-squared coefficients at only 9.6%, we it shows that foreign exchange only partly explains the overall movement of stock prices. It can therefore be assumed that there are probably other factors like inflation, company news/announcement and overall economic outlook that play a part in explaining price movements at the NSE.

### **5.4 Policy Recommendations**

This study recommends that policymakers in the government look at devising measures to cushion the market, and country as a whole against exchange rate fluctuations. Continued stabilization of the exchange rate would lend to lowering market risk and increase confidence amongst market participants. This would encourage further trading activity and greater participation in the securities market. Continued intervention of the Central Bank of Kenya, in times of adverse currency movement and/or due to pure speculation on the foreign exchange market, is necessary to safeguard our markets and economy.

From the perspective of the NSE, as well as the Capital Markets Authority, more focus should be put into encouraging local investors to participate in our stock exchange. With foreign investors, whose base currency is not Kenya Shillings most at risk from exchange rate volatility, having higher local participation would mean that the market performance would not be as heavily influenced by the positions of foreign investors. Deepening of the financial markets and an increased culture of saving and investing is good for the whole economy. The government can look at privatizing shares in some of the well-performing parastatals that would spur greater interest from the public.

On a broader perspective, foreign exchange movement has significant effect across the economy. It impacts imports, exports, tourism, government debt, amongst other factors. Companies listed at the NSE are affected in terms of their future cashflows if they are reliant on export markets, foreign-denominated debt or importing inputs. Thus, a stable exchange rate allows these firms to operate in fairly predictable environment in which they can estimate their revenues, expenditures and budgets without having to deal with currency shocks. This serves to boost the performance of these companies and the whole stock exchange as a whole and relatively.

## **5.5 Limitations of the Study**

The paper focused on the NSE 20 share index made up of the large cap companies as the researcher felt that these are stocks that are most heavily traded by the foreign investors with high exposure to currency risk. The study was therefore biased in that it did not look at the whole population of the listed firms at the NSE.

The study was based around the non-linear relationship between the two variables. However, based upon the correlational relationships discovered it is obvious that there are other variables and multiple relationships at play in determining market performance. It is thus not clear as to the extent the findings can be generalized to explain the market performance. Other factors that are believed to influence the stock exchange such as interest rates, inflation and company performance were not factored into the study model.

The study revolved around monthly data of foreign exchange and market performance. This summarized and obscures daily movements in the two variables which could potentially offer a more detailed relationship between the variables.

## **5.6 Suggestions for Further Research**

The bivariate relationship between foreign exchange and market returns was the epicenter of this study. As evidenced from the findings in this study, foreign exchange fluctuations do not solely explain market movement. It would thus be prudent for a future researcher to look into other macro-economic factors that would likely impact the stock exchange, either in a bivariate or multivariate framework.

Beyond this, from a policy perspective, it would be interest to gauge how foreign exchange policy is handled by the central banks of other comparable African/emerging market countries. This comparison, relative to its impact on the stock exchange, could offer fresh insights on how CBK could improve forex management to spur on the stock exchange and economy as a whole.

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Nairobi Securities Exchange information retrieved from <http://www.nse.co.ke>.

## APPENDICES

### Appendix I: Constituent Companies of the NSE 20 Index as at June 30<sup>th</sup> 2016

#### **Agricultural Sector**

Sasini Ltd

#### **Commercial & Services Sector**

Nation Media Group

Scangroup Ltd

#### **Banking Sector**

Kenya Commercial Bank Ltd

The Cooperative Bank of Kenya Ltd

Diamond Trust Bank Ltd

Barclays Bank Ltd

Equity Bank Ltd

CFC Stanbic Holdings Ltd

#### **Manufacturing & Allied Sector**

East African Breweries Ltd

British American Tobacco Kenya Ltd

Athi River Mining

Bamburi Cement Ltd

#### **Energy & Petroleum Sector**

KenolKobil Ltd

Kenya Power & Lighting Ltd

Kengen Ltd

#### **Insurance Sector**

British-American Investments Company  
(Kenya) Ltd

CIC Insurance Group

#### **Telecommunications & Technology Sector**

Safaricom Ltd

#### **Investment Sector**

Centum Investment Ltd

Source: NSE Press Release, April 2016

**Appendix II: Data Collection Form**

<b>NSE 20 Share Index/Exchange Rate</b>											
<b>Month\Year</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>
<b>January</b>											
<b>February</b>											
<b>March</b>											
<b>April</b>											
<b>May</b>											
<b>June</b>											
<b>July</b>											
<b>August</b>											
<b>September</b>											
<b>October</b>											
<b>November</b>											
<b>December</b>											

### Appendix III: NSE 20 Share Index Data

Month	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Jan		6,012.96	5,046.77	3,410.11	3,458.74	4,536.57	3,199.13	4,371.05	5,016.81	5,161.48	3,854.33
Feb		5,721.63	4,858.62	2,799.43	3,587.90	4,321.09	3,193.30	4,537.27	4,847.63	5,370.29	3,823.17
Mar		5,321.10	5,050.24	2,556.96	3,922.81	3,992.34	3,341.34	4,731.93	4,941.39	5,338.67	3,953.97
Apr		4,999.18	5,081.95	2,776.02	4,142.22	4,005.36	3,481.85	4,911.50	4,917.55	5,107.20	3,977.06
May		5,138.55	5,210.76	2,845.04	4,263.85	4,026.40	3,631.55	4,925.89	4,931.74	4,957.97	3,911.56
Jun		5,109.06	5,286.65	3,095.03	4,286.15	4,016.08	3,681.78	4,797.72	4,831.83	4,787.05	3,758.95
July	4,261.88	5,189.42	5,044.98	3,298.11	4,336.18	3,816.61	3,814.49	4,710.47	4,893.27	4,653.69	
Aug	4,396.75	5,250.85	4,717.82	3,205.11	4,568.10	3,558.84	3,827.03	4,794.09	5,030.51	4,365.61	
Sep	4,672.51	5,415.71	4,345.65	3,088.49	4,532.14	3,403.05	3,928.67	4,724.38	5,226.99	4,205.87	
Oct	4,981.94	5,050.57	3,676.93	3,022.14	4,640.24	3,316.50	4,033.72	4,918.47	5,261.36	3,978.63	
Nov	5,608.85	5,129.84	3,621.36	3,128.09	4,578.21	3,375.52	4,142.96	5,041.08	5,128.51	3,933.95	
Dec	5,563.53	5,296.40	3,302.85	3,190.50	4,371.69	3,122.78	4,076.67	4,929.33	5,076.50	3,987.10	

\*Monthly average NSE 20 Index Price from July 2006 to June 2016

### Appendix IV: Foreign Exchange Data

Month	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Jan		69.885	68.081	78.950	75.786	81.029	86.343	86.900	86.214	91.358	102.313
Feb		69.616	70.624	79.533	76.730	81.473	83.176	87.446	86.278	91.489	101.932
Mar		69.293	64.924	80.261	76.947	84.206	82.897	85.818	86.489	91.727	101.485
Apr		68.577	62.256	79.626	77.254	83.890	83.188	84.189	86.716	93.438	101.228
May		67.191	61.899	77.861	78.541	85.433	84.384	84.146	87.412	96.389	100.732
Jun		66.575	63.783	77.851	81.018	89.049	84.789	85.488	87.612	97.705	101.145
July	73.657	67.068	66.704	76.751	81.426	89.898	84.140	86.859	87.773	101.196	
Aug	72.870	66.946	67.679	76.372	80.440	92.786	84.075	87.493	88.106	102.431	
Sep	72.866	67.024	71.409	75.605	80.912	96.357	84.613	87.413	88.836	105.275	
Oct	72.289	66.845	76.657	75.244	80.714	101.270	85.112	85.310	89.227	102.779	
Nov	71.127	65.490	78.176	74.739	80.460	93.676	85.629	86.103	89.963	102.168	
Dec	69.627	63.303	78.040	75.431	80.568	86.663	85.994	86.309	90.444	102.195	

\*Monthly average KES/USD Exchange Rate