EFFECT OF FOREIGN EXCHANGE RATES VOLATILITY ON FINANCIAL PERFORMANCE OF AGRICULTURAL SECTOR IN KENYA

GRACE WAMBUI WANGURU

A RESEARCH PROPJECT SUBMITTED IN PARTIAL FULLFILMENT FOR THE AWARD OF A DEGREE IN MASTER OF BUSINESS ADMINSTRATION, SCHOOL OF BUSINESS, UNIVERSITY OF NAIROBI

2019

DECLARATION

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

Signature:……. Date:……

Grace Wambui Wanguru

D61/9589/2018

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

Signature:……. Date:……

Dr. Cyrus Iraya

School of Business - University of Nairobi

DEDICATION

To the family members, I am grateful for the support I received.

ACKNOWLEDGEMENTS

I thank and honor the Almighty God for the gift of life and everything else that I have. It is because of God's grace that I was able to achieve this milestone.

I thank my supervisor, Dr. Cyrus Iraya for the continued guidance, availability, patience and immense knowledge on the subject matter that has shaped this research project.

This goes to my family, colleagues and MBA students who they used to encourage me to press on to the completion.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

ABBREVIATIONS AND ACRONYMS

CMA	Capital Market Authority
FAO	Food and Agriculture Organization
GDP	Gross Domestic Product
KCC	Kenya Cooperative Creameries
KNBS	Kenya Bureau of Statistics
NCPB	National Cereals and Produce Board
ROA	Return on Assets
ROE	Return on Equity
USD	United States Dollar

ABSTRACT

The effect of how volatile exchange rates are and how this affects ability of firms to perform financially has been a subject of discussion among policy makers and scholars around the world. Most agricultural firms rely on exports to generate revenues that finance their operations. However, there has been volatility in exchange rates in Kenya as explained by political instability and the changes in other macro-economic variables including inflation and interest rate which has affected the agricultural sector. As such this study looks to answer the research question on how does volatility in foreign exchange rates influence financial performance of agricultural sector in Kenya? The study was anchored the purchasing power parity (PPP) theory, international fisher effect theory and the flow oriented model. The study design adopted was the cross sectional as well as descriptive and secondary data was collected from KNBS and CMA reports. The result findings from trend analysis indicated that the agriculture sector has had instability and fluctuation in financial performance as determined by ROA. The study noted that inflationary pressure was relatively higher in comparison to interests' rates across the entire period that the study focused on. From correlation analysis the study noted that foreign exchange rate volatility had positive relationship with financial performance. The control variables (interest and inflation) also had direct and significant interaction with ability of the firm to perform financially. Regression analysis was conducted value of adjusted R square was 0.606; which was interpreted to mean that 60.6% variability in the ability of the firm to perform is explained by changes in exchange rates. It was concluded that volatility in exchange rate and the ability of the firm to perform financially are positively and significantly related. It was recommended that entities in the agriculture sector need to ensure that proper strategies of managing exposure to foreign exchange risk are adopted for instance the use of derivatives.

CHAPTER ONE: INTRODUCTION

1.1 Background of the Study

The effect of how volatile exchange rates are and how this affects ability of firms to perform financially has been a subject of discussion among policy makers and scholars around the world. The available literature does not offer conclusive evidence on how fluctuations in rate of foreign exchange affects the firm performance financially. According to Sui and Sun (2016), volatility in foreign exchange rates is brought about by a number of factors including a surge in government debt, changes in balance of payments, volatility in inflation as well as interest rates. Nyoni (2018) indicates that export driven firms are the ones that are worst affected with fluctuating exchange rates. Basnet and Upadhyaya (2015) consider volatility in foreign exchange as an equivalent of exchange rate volatility which is caused by macro-economic shocks. According to Ferraro, Rogoff and Rossi (2015), these volatility erodes the real purchasing power in the foreign market.

The study will be anchored on the following theories; the purchasing power parity (PPP) theory, international fisher effect theory and the flow oriented model. According to the international fisher effect theory, any volatility in foreign rate is counter balanced by the changes in interest rates (Bahmani-Oskooee & Saha, 2015). Therefore, the theory implicitly links volatility in exchange rates with changes in interest rate of the county. The PPP theory as advanced by Menon and Viswanathan (2005) argues that goods that are homogenous in nature tend to have similar values on the basis of the currencies of these respective countries. The purchasing power parity theory further suggests that by

having similar purchasing power in difference states, it means that there would be stability in exchange rates between these countries. According to the flow oriented model, volatility in exchange rates will impact firms share prices which ultimately affects financial performance.

The agricultural companies belong in the larger agriculture sector of the economy. In Kenya, majority of firms in the agriculture sector deals with processing of raw agriculture products including tea, avocadoes, coffee, pyrethrum as well as sugarcane. According to Food and Agriculture Organization (FAO) (2019), agriculture is key in Kenyan economy since it contributes 26% and 27% of the GDP to the country and across other economic sectors respectively. FAO further estimates that about 40% of the entire population in Kenya is employed either directly or indirectly in the agriculture sector. In rural areas, agriculture sector employs about 70% of the population (FAO, 2019). Presently, the agriculture sector is envisaged as a back-borne for realization of Big-4 Agenda by the National government in Kenya. Since this agriculture is an export driven sector, this study sought to assess how volatility in exchange rates would affect its financial performance.

1.1.1 Foreign Exchange Rates Volatility

Foreign exchange rate is the value of a given foreign currency in terms of the local currency of the country (Fratzscher, Rime, Sarno & Zinna, 2015). Gradojevic and Lento (2015) indicate that similar to other products and commodities, exchange rates can be explained by economic dynamics. While fiscal policies can be used to explain the supply of currency, its demand can be explained by changes in macro-economic factors

including interest and inflation rates. Foreign exchange rate is important because its facilitates comparison of commodity prices that are denominated in various units of currencies (Della Corte, Ramadorai & Sarno, 2016).

Foreign exchange volatility is how a given currency changes relative to a domestic one (Qin, Lu, Zhou & Qu, 2015). The two systems of foreign exchange rate include fixed as well as floating. While floating exchange rate systems keep fluctuating within the year, fixed exchange rate are meant to remain constant across the specified time (Hussain, Zebende, Bashir & Donghong, 2017). In a fixed exchange rate, any change in exchange rates is commonly referred to revaluation and devaluation rates. However, there is little devaluation or revaluation in the fixed exchange rate system hence they can change over a given time horizon.

1.1.2 Financial Performance

How well a firm utilizes resources at disposal to attain the set goals and objectives is defined as performance. Performance according to Ho, Nguyen, Adhikari, Miles and Bonney (2018) is the ability of the organization to attain the set deliverables using resources in stock. The key financial measures of the firm include returns on assets and equities. Non-financial indicators and measures of performance on the other hand include timely delivery, customer satisfaction and efficiency in production systems (Piening & Salge, 2015).

Through performance, a firm is able to leverage on its investment as well as operational strategies and decisions in realization of stability. Financial performance is used to gauge how the firm realizes its formulated goals in realization of the profits (Ahmed, 2015). In

this study, financial performance will be operationalized as returns on value of assets as well as equities. ROA represents the portion of revenues that an organization generates from utilization of its assets in place. On the other hand, ROE is a measure of how well an organization generates profits as financed by its equity portion of the balance sheet.

1.1.3 Foreign Exchange Rates Volatility and Financial Performance

Empirically, there exists ambiguous, mixed and inconclusive link between changes in rates of exchange and the ability of the firm to make profits. For instance, Adetayo, Dionco and Oladejo (2004) argue that volatility in foreign exchange rate leads to the country's balance of trade as shown in financial performance of export driven firms. According to Ahmed (2015), volatility in exchange rates has directly influence on import prices hence the external sector of the country is adversely affected. Watkins (2014) indicates that changes in foreign exchange rates have an influence on the price of the country through import price of the raw materials. Beckmann and Czudaj (2017) opine that significant gain or loss is generated whenever there is volatility in exchange rates.

Theoretically, interest rate and inflation have been recognized as the key factors influence volatility in exchange rate and thus affecting financial performance. An increase in inflation erodes the real purchasing power of firms hence adversely affecting the gains generated from foreign activities like exports (Yildirim & Ivrendi, 2016). According to Jamal and Khalil (2011), export driven sectors are the most affected ones as they face financial gain or loss exposure and transaction from the foreign operations and activities.

1.1.4 Agricultural Sector

Agricultural activities in Kenya are predominantly carried out in small scale, accounting for 75% and more that 70% of produce in the markets (World Bank Group, 2015 report). Smallholders produce 70% of maize and beef, half of all tea, 65% coffee and 80% of milk, in terms of production (GoK 2013). Due to Kenya's open trade regime and highly integrated markets, domestic prices in Kenya for agricultural commodities, including major staple foods, are relatively sensitive to both internal and exogenous pressures and shifts in supply and demand. The government of Kenya has an active role in increasing productivity, stabilizing prices, and ensuring that there is food availability. The government also functions to direct the private sector in supply and storage of products.

The agricultural sector has six sections underneath it, which cover food and industrial crops, livestock, horticulture, forestry and fisheries. The sector uses land and water for production purposes. The key players in the Kenyan agricultural industry is; the Kenya Sugar Board (KSB) which regulates the Kenya's sugar industry while the CBK regulate coffee production and sales and on the other hand, manages the auction of Kenyan coffee and ensure that the coffee marketed in Kenya is sold, with a small proportion sold through private contract arrangements. The most common risks to agricultural production in Kenya are as a result of drought, flooding, and crop and livestock pest and disease outbreaks (Omare et al., 2016).

The Management of agricultural risks Kenya has always been majorly done by the Kenyan government. The Kenyan government often invests in risk mitigation strategies that help to deal with the risks that lie in the sector. The coping mechanisms adopted in the Kenyan agricultural sector is mostly linked to government operations this is because

the sector is vulnerable to a lot of risks that stagnate and upset the growth of the economy, undermine food security. When there is price volatility in maize for instance, subsidized fertilizers are given to smallholders in Kenya by NCPB. In addition, NCPB also purchases maize at fixed prices from large-scale farmers and from some smallholders in a few major surplus zones especially when domestic maize farmers have to compete with imported maize (D'Alessandro et al., 2015).

1.2 Research Problem

Foreign exchange rate arises whenever one firm transacts with another firm in a different country resulting in differences in value of currencies. Volatility in foreign exchange rate has empirically been linked to factors like inflation and exchange rates. Changes in these factors result into erosion in value of one currency relative to a local currency. Financial performance of firms with greater transaction and foreign exposure is adversely affected by exchange rate fluctuations. Osigwe (2015) indicates that changes in foreign exchange rate can result into gain or losses to firms whose activities are exposed to foreign transactions and activities.

Most agricultural firms rely on exports to generate revenues that finance their operations. Some of these export driven agriculture firms in Kenya include tea processing firms like Kapchorua and Kakuzi Ltd (KNBS, 2018). However, there have been volatility in interest rates in Kenya as explained by political instability and the changes in other macro-economic variables including inflation. In the recent past, agricultural firms' performance has not been impressive. For instance, some firms like Uniliver Kenya Ltd and Rea Vipingo got delisted from the NSE in 2009 and 2015 respectively majorly attributed to by

their poor financial performance and Kenya Cooperative Creameries (KCC) closed down for several years, before re-opening as New Kenya Cooperative Creameries. Efforts should therefore be put in place to improve the performance of these agriculture companies because the country stands to significantly loose when the entire is affected. In fact, it would not be possible to realize the Big-4 Agenda if the agriculture sector continues to perform as such poorly.

There are a number of studies as far as volatility in exchange rates is concerned for instance Mahapatra and Bhaduri (2019) examined how volatility in currency influences performance of securities market context of India. The study established that share returns significantly react towards changes in foreign exchange rates. In a similar study, Basirat, Nasirpour and Jorjorzadeh (2014) noted a negative interaction between change in currencies and the growth of economies. The study linked changes in foreign exchange with growth of the economy and it was done among developing countries and not in Kenya specifically. Reaz, Mahat, Dahir, Sahabuddin and Al Mahi (2017) also established a negative link between changes in currency rates and ability of firms to perform in financial terms.

Locally in Kenya, Mwangi (2017) focused on performance of stock markets and established weak and inverse relationship. The study looked at stock performance and not on financial performance in general. Mbaka (2016) looked at changes in rates of exchange and performance among banking institutions. It was shown that operations of banks are exposed to a number of risks. This study was carried out among listed banks in NSE and not the agriculture firms. While focusing on Kenya's commercial banks, Osano (2016) was interested in establishing the link between volatility performance and a weak

but positive link was established. Kairu (2016) covered the Kenyan banks and influence of exchange rate volatility on performance, financially. The findings were that fluctuations in exchange rate results into weak but positive influence on firm performance. Rutto and Ondiek (2014) relied on co-integration to establish how volatility in exchange rate impacts on tea exports in Kenya and established a negative relationship.

Thus, from the above mentioned studies, it is evident that some of them were carried out in different countries and not in Kenya. Other studies were carried out in different sectors like banking and not the agriculture sector. Other studies related changes in foreign exchange rate and economic performance or stock performance and not specifically financial performance. This brings about a research gap which shall be filled by providing answers to this research question: How does volatility in foreign exchange rates influence financial performance of agricultural sector in Kenya?

1.3 Research Objective

To establish the effect of foreign exchange rates volatility on financial performance of agricultural sector in Kenya

1.4 Value of the Study

The findings were of value and inferences on practice, theory and policy. In theory, the study will increase information that is in place on change in rates of exchange. Future scholars carrying out similar studies will have an opportunity to review literature of this study.

In policy, the study will be important to the Capital Market Authority (CMA) that is responsible for formulating rules and regulations. Through the findings of the study, CMA will be able to come up with relevant regulations that will promote the agricultural sector. In practice, managers of the various firms will have a clear understanding of currency rates and their interaction with performance.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

During literature review, a number of materials are considered including the theories and past studies and the key factors determining performance will also be considered.

2.2 Theoretical Review

The PPP theory, international fisher effect (IFE) theory and the Flow Oriented Model will inform the study.

2.2.1 International Fisher Effect Theory

It was Fisher (1930) who advanced this IFE theory and it relies on market interest rates as opposed to inflationary pressure to explain the reasons as to why there is variation in interest rate over a given period of time (He, 2018). The theory argues that variability in currency rates is counter balanced by changes in interest rates in an economy. The theory indicates that because of the possibility of arbitrage, there is equality in real interest rates across countries (Dimand, 2019). This equality in interest rate suggests that in countries where there are higher interest rates, the rate of inflation is also higher and this lowers the real value of the currency of the country over a given time frame (Lê, 2017).

The theory is of the view that foreign currencies having higher interest rates will have higher chances of depreciation because the expected inflation rate is reflected and captured in nominal interest rate (Islam & Goyal, 2017). The theory has been applied in various fields to explain a number of phenomena. For instance, in the field of economics, the theory was relevantly used to explore the link between inflation; real as well as

nominal interest rate through a simply process called the Fisher Effect. The theory will explain two variables; inflation and interest rate and how they influence foreign exchange.

2.2.2 Purchasing Power Parity Theory

The theory was formulated by Menon and Viswanathan (2005) and it argues that goods with homogenous value would be same in various countries on the basis of the specific currency of the country. The theory argues that similarity in purchasing power is same in various countries makes exchange rates between countries to be stable. The ratio of price levels of commodities should be equivalent to the currency of a given country (Jiang, Bahmani-Oskooee & Chang, 2015).

When money does not have purchasing power against the commodity, the currency may be deemed to have been valued incorrectly. The theory is premised on perfect world with no transaction costs, the barriers to trade do not exist and the goods in exchange process is of a homogenous attribute (Bahmani-Oskooee, Chang, Chen & Tzeng, 2017). The theory indicates the need to leverage on price indices in determination of prices of goods having commodities that are homogenous. According to Menon and Viswanathan (2005), the two common classes of PPP are absolute as well as relative.

Absolute indicates that irrespective of currencies, same commodities need to have same costs. The relative PPP argues that attention and consideration should be given to imperfections that exist in the market (Ross, 2008). The theory is used to explain one country's currency in relation to the other. The theory argues that exchange rates at

equilibrium ensure that the exchanged value can be used to purchase goods of same values from more than one country involved.

2.2.3 The Flow Oriented Model

The theory was advanced by Fisher and Dornbusch (1980) and it argues that the competitiveness and position of the firm of local firm in an international market is shaped and determined by changes in interest rates. Rate of exchange an output as well as real output of an economy and market securities. In general, the theory indicates that volatility in exchange rate affects competitive position of the domestic goods and services and the trade balances which will affect firms' stock prices (Bonga-Bonga & Gnagne, 2017).

The theory indicates link between exchange rate and prices of securities is positive. In other words, the prices of securities of the firm have an interaction with changes in currencies. More specifically, variability in rates of exchange will bring about a resultant movement in prices of stocks. For firms with foreign operations, volatility affects foreign activities of the firm and thus triggering the same effect on share prices. In particular, volatility affects earnings of the firm and thus share prices (Chansa, Sundewall & Östlund, 2018).

The theory indicates that domestic currency depreciation and appreciation affects will have an effect of an effect on the value of the foreign currency and the cost of production mostly in developing economies. In this context, developing economies are countries that strongly rely on raw materials that are imported. Any efforts to appreciate or depreciate exchange rates would affect performance of the firm in the markets hence affecting the prices of share (Aggarwal, 1981).

2.3 Determinants of Financial Performance of Agricultural Companies

This chapter presents a discussion on factors that influence financial performance of agricultural firms.

2.3.1 Exchange Rate Volatility

Exchange rate refers to the amount of local currency against the foreign currency exchange rate usually keeps on varying (it is fixed) and the changes in this is brought about by a number of factors (Bahmani-Oskooee & Gelan, 2018). Foreign exchange rate arise because of international trade as seen through exports and imports. The common foreign currencies around the world include the USA Dollar, Sterling Pound, the Yen and the Euro. Variability in rates of exchange has significant influence on firms that deal with foreign operations as compared to local firms. An increase in foreign exchange rate means that most foreign investors will not readily invest in firms and thus adversely affecting performance (Abraham, 2016).

Mahapatra and Bhaduri (2019) established that share returns significantly react towards changes in foreign exchange rates. Basirat, Nasirpour and Jorjorzadeh (2014) noted a negative interaction between change in currencies and the growth of economies. Reaz, Mahat, Dahir, Sahabuddin and Al Mahi (2017) also established a negative link between changes in currency rates and ability of firms to perform in financial terms. Mwangi (2017) established weak and inverse relationship. Mbaka (2016) looked at changes in rates of exchange and performance among banking institutions. It was shown that operations of banks are exposed to a number of risks.

2.3.2 Inflation Rate

Inflation has an effect on all the sectors of the economy from global operations all through to the common citizen in the country (Majok, 2015). An increase in prices of goods complicates the entire process of transacting business activities. It also reduces the purchasing power of people and reduces the real value of money in an economy. Too much inflation in an economy may be considered as an economic crisis that adversely affects the growth and development of a country. Inflation is commonly measured through the consumer price index (CPI) (Della-Corte, Ramadorai & Sarno, 2016).

Various researchers have looked at inflation like for instance, Alimi (2014) looked at inflation and financial sector performance in Nigeria's context. Negative link was found between inflation and the ability of the firm to perform in financial terms. This negative relationship implies that an increase in inflationary pressure would reduce the ability of firms to generate profits. While adopting panel data methodologies, Zermeño, Martínez and Preciado (2018) sought to understand the link of inflation and performance in financial terms showing the link was a negative one between inflationary pressure and financial performance of the firm.

2.3.3 Interest Rate

This is the money that commercial banks charge on their lending. Interest rate raise is associated a decrease in borrowing and investment activities of the firm. Firms borrow and invest more when interest rates are relatively low (Okwuchukwu, 2015). There exists direct relationship between interest rate and the demand in an economy. An increase in demand is linked with possible increase in the value of a currency. Interest rate is an important monetary tool used to regulate and curb increased inflationary pressures.

Interest rate can be measured by the value of interest that commercial banks charger either on deposit savings from customers or on borrowing (Isola, Oluwafunke, Victor & Asaleye, 2016).

A study was conducted by Ngure (2014) with the aim of establishing how interest rate interacts with financial performance of Kenyan banks. It was shown that interest rate positively and significantly having a link to financial performance. Murage, Muya and Mogwambo (2018) focused on SACCOs and how interest rates adjustments affected affect their capacity to generate profits. A positive link was established between interest rates and firm's financial performance. Another study was carried out in Pakistan by Ahmed, Rehan, Chhapra and Supro (2018) to relate interest rate and commercial banks' ability to generate profits using in the context of Pakistan. This study established a negative link between interest rate and financial performance.

2.4 Empirical Literature Review

It covers literature from an international and local perspective.

2.4.1 International Literature Review

Kočenda, and Moravcová (2019) looked at how the movement in exchange rates influence firm performance using evidence from European Union member states. The period covered by the study was 1999 all through to 2018. Sharing that exchange rate movements influenced firm performance. Reaz, Mahat, Dahir, Sahabuddin and Al-Mahi (2017) looked at exchange rate instability and how its influence the ability of agricultural firms in Malaysian context to perform. The study considered a time horizon from 2001

all through to 2015. The findings were changes in exchange rates are inversely related with firm performance.

Kausar and Zulfiqar (2017) studied volatility in exchange rate and its influence of growth of economies with specific reference to countries in Asia. The study period was 1985 all through to 2015. The study established that changes in exchange rates leads to inverse and significant effect on growth of economies. Pham (2018) examined the link between liquidity and volatility in exchange rates. The methodology used in the study was panel data and the period of consideration was 1980 all through to 2015. The study documented that fluctuations are associated with significant influence on liquidity.

Using a case of Pakistan, Kumar, Bhutto, Mangrio and Kalhoro (2019) looked at the exchange rates and external debt. The study variables included external debts and exchange rate. Data was gathered covering a time frame from 1980 all through to 2014. Foreign currency rates were established to influence debts. Barguellil et al. (2018) studied volatility in rates and impact on the growth of economies. The focus of the study was on emerging as well as developing countries within a time horizon from 1985 all through to 2015. Negative link was established. Daoui (2017) looked at changes in exchange rates and the resultant effect on prices of shares. The study was carried out in the context of Morocco with a focus on listed firms. Significant interaction between currency rates and price of share was established.

Mahapatra and Bhaduri (2019) did a study on volatility in currency and its influence on stock markets. The study was conducted in India covering 2005 - 2016. The analysis was divided into periods; before as well as after the onset of the financial crisis period. The

analysis of the findings indicated that changes in exchange rate are associated with volatility in share returns. Šimáková (2017) examined the movement in exchange rate and how it influences the value of the firm. The study used a caser of Visegrad Countries and panel data methodologies and Jorion's model in the analysis. The time horizon of the study was 2002 all through to 2016. The findings showed exchange rate change negatively influence on the value of the firm.

Kurihara (2013) studied volatility on exchange rates and the influence on development of financial sector. The study sampled developing as well as developed countries. Data was gathered from past empirical studies. It was documented that exchange rate changed was associated with negative effect on financial development. Reaz, Mahat, Dahir, Sahabuddin and Al Mahi (2017) carried out an assessment of exchange rate volatility on financial performance of firms in the agriculture sector in Malaysian context. The study used panel data methodologies covering a time horizon from 2001 all through to 2015. Secondary data was gathered within this time frame with a findings revealing negative influence of the variables.

Isaac (2015) conducted a study in Nigeria to establish how exchange rate risk influences performance using the banking sector using secondary data. It was established that changes in exchange rate positively influence financial performance as reflected in profitability of the firm. Stefanescu and Dumitriu (2013) studied influence of volatility and share returns. The study was done in Roman and secondary data was collected on a time horizon of 2000 all through to 2012. The study established that factors like the inflow of foreign capital and global crisis influence how changes in foreign exchange rates influence share returns. Works (2016) looked at the determinants of exchange rate

through market classification. The study was carried out in Japan and South Korea. The time horizon was 1989 all through to 2015. It was established that money supply and influence have an influence on changes in foreign exchange rates.

2.4.2 Local Literature Review

Mackton, Nyongesa and Odondo (2018) studied how real exchange rates are volatile in Kenyan context. The type of design used was correlational since some hypotheses were developed and tested. The period of consideration was from 1972 all through to 2015. It was shown that across the period of consideration, there has been volatility in real exchange rates. Nandwa, Waititu and Wanjoya (2018) studied how volatility in exchange rates influences firm performance in Kenyan context and the analyzed data shows a relationship of exchange rate and inflationary pressure.

Onyango (2018) studied exchange rate and its influence on prices of shares with a focus Kenya's listed firms. The period of study was 2007 all through to 2014 and it was shown having a negative linkage associated with share prices. Mwangi (2017) studied changes in exchange rate and stock markets performance in Kenyan context. The period covered was (2013-2016). Data was sought from secondary sources. Changes in exchange rates were found to significantly influence performance of securities.

Mbaka (2016) looked at foreign exchange trading and its influence on financial performance. The study was done specifically in the banking industry through adopting a descriptive design. A total of 11 listed banks were covered with data over a time horizon of 2010 all through to 2011. It was established that foreign exchange trading has positive influence on financial performance. Singh (2013) looked at trading in forex and its

influence on firm's financial performance with key focus on Kenyan commercial banks was used. Survey research method was used where a total of 42 banking institutions were covered. Information was sought from auxiliary sources and the analysis indicated that foreign trading has influence on financial performance.

Ahmed (2015) examined how exchange rate exposure and the ability to perform in financial ways by banks. It was shown that interest rate has no influence on performance although the link is positive. Kairu (2016) looked at volatility and its influence on performance using a case of Kenyan banks. The design adopted was descriptive and data was collated from 43 banking firms in Kenya showing a weak and significant effect on firm performance. Chirchir, Muse and Jagongo (2015) studied the role played by volatility and performance of tea sector on Kenyan context. The design adopted was descriptive and data was gathered from a period of 2008 all through to 2012. The study established that volatility in exchange rate is associated with positive influence on performance of export.

2.5 Summary of Literature and Research Gaps

Table 2.1: Summary of Literature and Research Gaps

Author	Topic	Research Methodologies	Key Findings	Research Gaps
Kočenda and Moravcová (2019)	how the movement in exchange rates influence firm performance	Panel data methodology	Ability of firms of firms to perform is shaped by change in currency rates	The study covered EU countries and not Kenya
Reaz, Mahat, Dahir, Sahabuddin and Al-Mahi (2017)	volatility in exchange rate and how its influence the ability of agricultural firms in Malaysian context to perform	Panel Data	Changes in exchange rates are inversely related with firm performance.	The study was carried out in Malaysia and not in Kenya
Kausar and Zulfiqar (2017)	volatility in exchange rate and its influence of growth of economies with specific reference to countries in Asia	Panel Data methodology	changes in exchange rates leads to inverse and significant effect on growth of economies	The study covered Asian countries and not in Kenya
Kumar, Bhutto, Mangrio and Kalhoro (2019)	the connection between changes in exchange rates and external debt in Pakistan	Secondary data collected	Changes in foreign exchange rate influences external debts.	The context of the study was not in Kenya but rather in Pakistan
Barguellil, Ben-Salha and Zmami (2018)	Volatility in exchange rate and how it influences the growth of economies.	Secondary data collected	Volatility in exchange rate negatively impacts on growth of economies.	The focus of the study was on growth of economy and not ability of firms to perform financially
Mahapatra and Bhaduri (2019)	volatility in currency and its influence on stock markets	Cross sectional design	changes in exchange rate are associated with volatility in share returns	The study conducted in India and not in Kenya
Mackton, Nyongesa and Odondo (2018)	how real exchange rates are volatile in Kenyan context	Correlational design	across the period of consideration, there has been volatility in real exchange rates	The study failed to bring out the connection between volatility in exchange rate and financial performance
Onyango (2018)	volatility in exchange rate and its influence on prices of shares with a focus on listed firms in Kenya	Cross sectional design	Volatility in exchange rate is negatively associated with share prices.	The study focused on share prices and not financial performance
Mwangi (2017)	exchange rate and how they influence performance of stock markets	descriptive design	Changes in exchange rates were found to significantly influence performance of securities.	The study looked at stock market performance and not specifically financial performance
Kairu (2016)	volatility in exchange rate and its influence on financial performance using a case of Kenyan banks	descriptive design adopted	A significant link was established between variables	The study concentrated on Kenyan banks some of which are not listed
Chirchir, Muse and Jagongo (2015)	Role played by volatility on exchange rate on export performance of tea firms in Kenyan context.	descriptive design adopted	Volatility in exchange rate is associated with positive influence on performance of export.	The study looked at Kenyan tea firms, the current study will cover agricultural firms listed

2.6 Conceptual Framework

Figure 2.1 was used in conceptualizing the study.

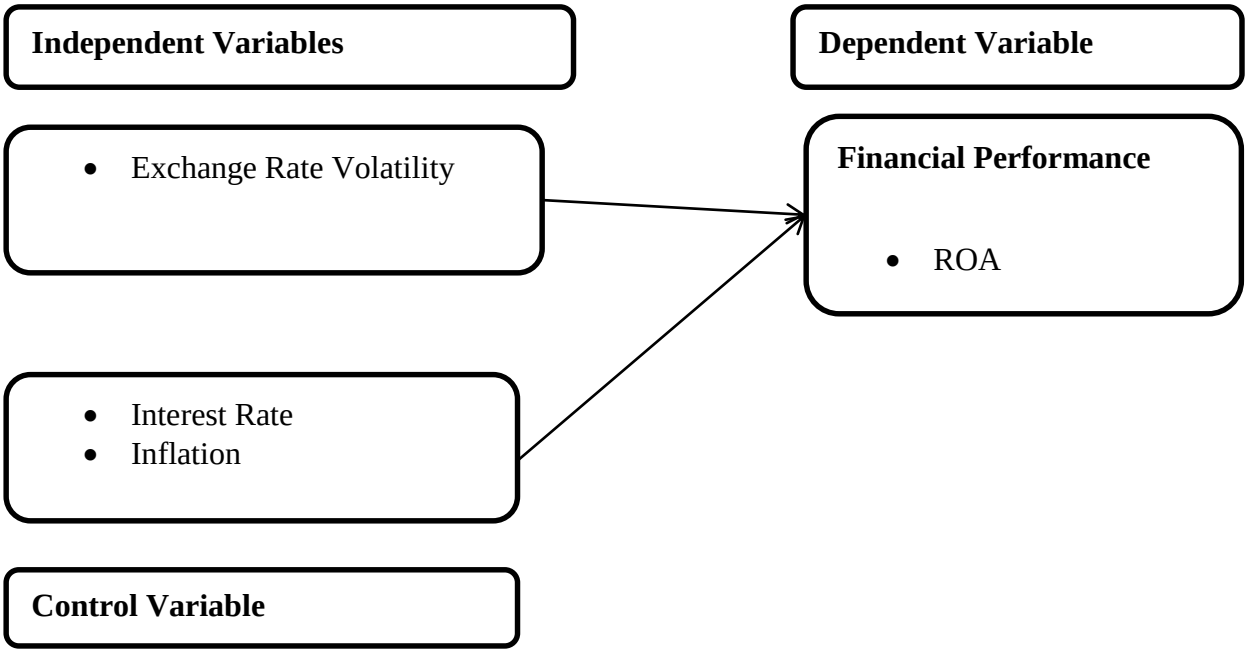

Figure 2.1: Conceptual Framework

From Figure 2.1 the independent study variable is exchange rate volatility which was measured by the deviation of the dollar versus Kenyan shilling rate variations. The control variables are of interest rates and inflation adjustments. The dependent study variable is financial performance measured by return on assets (ROA) which is measured by Net Income over total assets.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

This chapter lays the foundation of analysis of the findings by detailing steps that shall be followed. The chapter will discuss the type of design that study shall embrace, the targeted respondents, how information shall be sought and the steps as far as processing of the collected data is concerned.

3.2 Research Design

It is a guide that determines how the study is to be carried out (Merriam & Tisdell, 2015). The study design adopted was cross sectional as well as descriptive. This is because the study will cover a number of listed agriculture firms. On the other hand, the design will descriptive because it will be ideal in determining how foreign exchange rate volatility influences financial performance.

3.3 Data Collection

Auxiliary sources of information were used in gathering of information for the study (Appendix I). Quarterly data was collected on inflation, interest rate, exchange rate, net income and total assets of respective firms. A ten -year period was considered in collection (2009-2018). The study collected quarterly data with this time frame. Information for the study will be sought from KNBS and CMA reports besides public reports by the respective agriculture listed firms.

3.4 Data Analysis

In most cases, information from the field is usually raw and cannot be effective in decision making. Analysis ensures that these information is processed to make it meaningful. The study findings were analyzed descriptively as well as inferentially.

3.4.1 Model Specification

Below is the model that shall be used:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \alpha$$

Where Y is = Financial Performance (ROA=Net Income/Total Assets)

X_1= Exchange Rate Volatility (Standard Deviation of rates of Kshs/US Dollar)

X_2 = Interest Rate (Treasury Bills Coupon Rate)

X_3 = Inflation (Consumer Price Index CPI)

β_0= Constant and μit is the error term

3.4.2 Diagnostic Tests

Before inferential analysis, a number of tests will be conducted. These tests will ensure that the assumptions of regression are not in violation before analysis goes on. The key tests that shall be done will cover normality tests, testing for presence of autocorrelation, multicollinearity and Heteroscedasticity

It is important to ensure that the values in the study obey a normal distribution; where mean and deviation values are believed to be 0 and 1 respectively (Kang, Laing, Hong & Xie, 2017). In testing for normality, Skewness as well as kurtosis statistics will be applied. The rule thumb usually is that these values should range between +2 and -2 for the conclusion of presence of normality to hold (Wallentin, Olsson & Jöreskog, 2016).

Whenever a situation arises where one variable of the study has strong correlation with another, this is seen as multicollinearity (Strijov & Katrutsa, 2017). In essence, no variable should be correlated with another one in conducting regression. In this regard, Variance of Inflation Factor (VIF) shall be leveraged on in testing for multicollinearity. The general rule is that when the values of VIF are within the range of 1 all through 10, then it means there is such symptom of multicollinearity (Rahbar, McCormick, Lee, & Vatcheva, 2016).

In the event that there is correlation in respect to values of the process within various time points, this situation is deemed as autocorrelation (Giles & Beattie, 2018). To test for this, Durbin Watson Statistics shall be employed, where statistics from this that is so close to the value of 2 signals that that autocorrelation is not as issue (Rho & Vogelsang, 2018).

Any situation where the error term is systematically spread within various values measured is defined as heteroscedasticity (Lewbel & Baum, 2018). For this study, scatter plots shall play an important role in testing for this. The rule of thumb is that its absence is reflected in scatter plots having no clear pattern (Chasco, Le-Gallo &López, 2018).

3.4.3 Test of Significance

F-test and the values of the coefficient of determination will test the overall regression model. In use of F-test, the value of F calculated in the Analysis of Variance Table will be compared with the value of F critical that shall be read from the F Distribution Table using appropriate degrees of freedom. When F calculated is greater than F critical, then the model is significant. Similarly, values of R square above 0.6% will show the overall model is a fit. F-test is usually used where there is equal variance between two

populations. This is in contrast to t-test that is used when means of two populations are same or equal.

The significance of each individual variables of the study will be determined by their respective p-values. In this regard, a significant variable has p-values that are less than 5%. Testing of hypothesis will also be conducted at 0.05 significance level. In this regard, $p<0.05$ will result into rejection of the formulated null hypotheses in favor of the alternative ones. In addition to the p-values, the t-test will also be used where the t-values will be compared with 1.96 to infer whether the relationship is significant or insignificant.

CHAPTER FOUR: RESEARCH FINDINGS AND DISCUSSION

4.1 Introduction

The study findings from the collected secondary data was presented in this chapter. The collected data was relied on a ten-year data gathered on the agricultural sector in Kenya. The period 2009 all through to 2018 and information was obtained on a quarterly basis hence 40 data points were covered in the study. The results are discussed in details in the subsequent sections.

4.2 Descriptive Statistics

Table 4.1 gives the findings on means and standard deviations shown in Table 4.1

Table 4.1: Descriptive statistics

	N	Min	Max	Mean	Std. Dev
Return on Assets (%)	40	.08	.17	.1212	.01715
Exchange Rate(USD/Kshs)	40	75.00	105.29	91.2993	9.74752
Interest Rate (%)	40	12.51	20.34	15.7055	2.19197
Inflation (%)	40	3.30	19.20	7.7258	3.79918

Table 4.1 indicates that on average, the agricultural firms generate 12.12% of their net incomes from use of asset. Furthermore, the exchange of Kshs against a dollar averaged at 91.2993 across the study period, the interest rate stood at 15.7005% while inflation averaged at 7.7258& across the period of the study. There was variation in the variables of the study as supported by the higher values of standard deviations.

4.3 Trend Analysis on the Study Variables

This section will graphically present the information on the movement of the study variables across the ten-year period of consideration (2009-2018).

4.3.1 Trend Analysis of the Dependent Financial Performance

Figure 4.1 gives the findings of the trend analysis of firms in the agricultural sector which was operationalized as return on asset (ROA). To determine ROA, the study used the values of net incomes divided by total asset base.

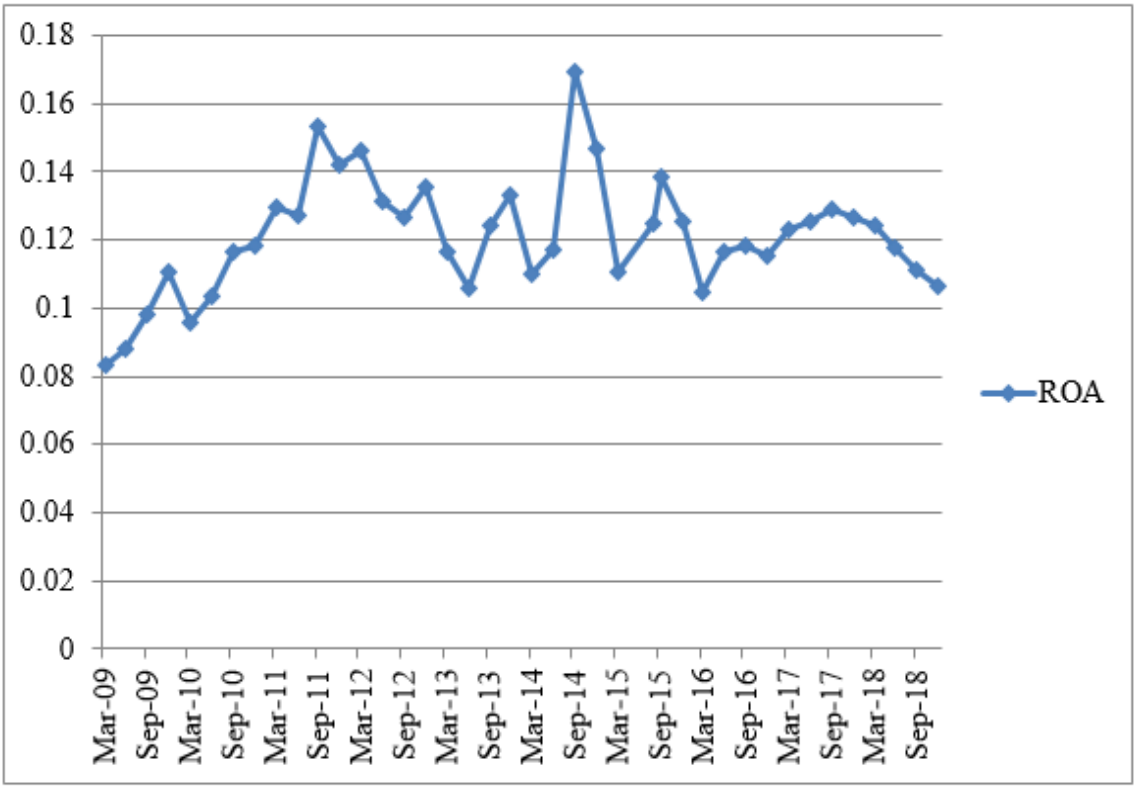

Figure 4.1: Trend Analysis on Financial Performance

From Figure 4.1 on average, the study noted that the studied agricultural firms had fluctuation in their financial performance. This fluctuation in financial performance could be attributed to volatility in exchange rates which was the key focus of the study.

4.3.2 Trend Analysis of the Independent Exchange Rate Volatility

The independent variable was exchange rate volatility and the findings of trend analysis are shown in Figure 4.2.

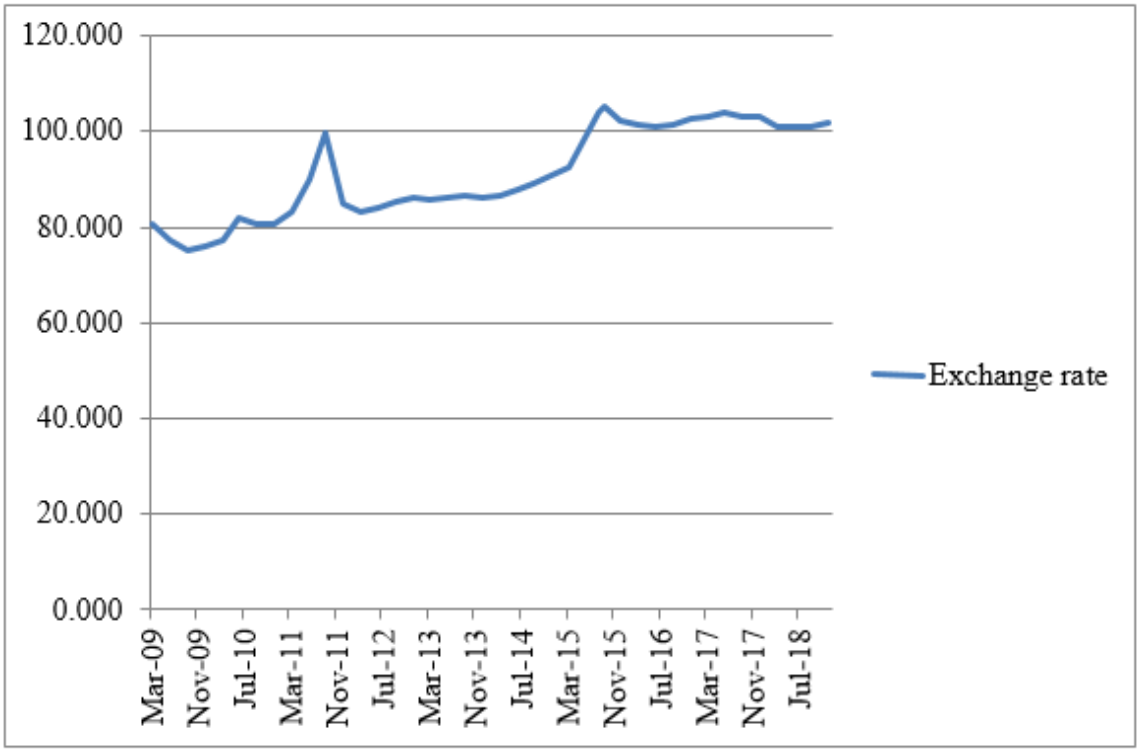

Figure 4.2: Trend Analysis on Exchange Rate

Figure 4.2 shows a general rise in exchange rate across the study period, this rise may perhaps have affected the dependent variable as depicted by fluctuations in ROA and which is what the study is investigating.

4.3.3 Trend Analysis of the Control Variables

Inflation was measured by consumer price index while interest rate was taken from lending, this were the control variables in the study. The findings on trend analysis of the control variables are indicated in Figure 4.3.

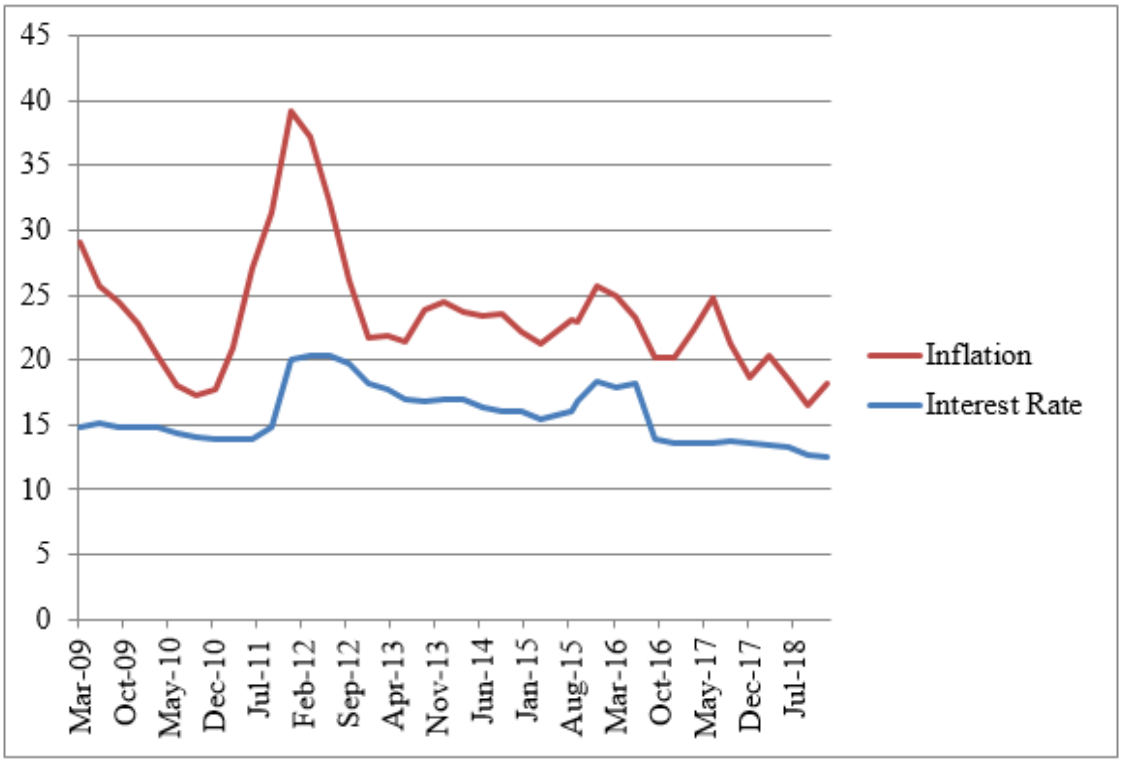

Figure 4.3: Trend Analysis on Control Variables

Two key findings can be observed from the movement in the control variables in Figure 4.3. First, inflationary pressure was relatively higher as compared to interest rate across the entire period that the study focused on. Secondly, both interest rate and inflation were instable across the period of consideration. It is this fluctuation in the control variables that perhaps affected financial performance of the agricultural sector as supported by fluctuation in ROA.

4.4 Diagnostic Tests

The key tests that were done covered normality tests, testing for presence of autocorrelation, multicollinearity, Heteroscedasticity

4.4.1 Autocorrelation Test

In the event that there is correlation in respect to values of the process within various time points, this situation is deemed as autocorrelation (Giles & Beattie, 2018). To test for this, Durbin Watson Statistics was employed, where statistics from this that is so close to the value of 2 signals that that autocorrelation is not as issue (Rho & Vogelsang, 2018).

Table 4.2: Autocorrelation Test

Model	Durbin-Watson
1	2.047

a. Predictors: (Constant), Inflation, Exchange Rate, Interest Rate
b. Dependent Variable: Return on Assets

From Table 4.2, the value of Durbin Watson is 2.047; which is within the required threshold of + or -2. It can therefore be deduced that there was serial correlation in the data set hence suitable for use in the study.

4.4.2 Normality Tests

It is important to ensure that the values in the study obey a normal distribution; where mean and deviation values are believed to be 0 and 1 respectively (Kang, Laing, Hong & Xie, 2017). In testing for normality, Skewness as well as kurtosis statistics were applied. The rule thumb usually is that these values should range between +2 and -2 for the conclusion of presence of normality to hold (Wallentin, Olsson & Jöreskog, 2016).

Table 4.3: Normality Tests

	N	Skewness		Kurtosis	
	Statistic	Statistic	Std. Error	Statistic	Std. Error
Return on Assets	40	1.308	.374	1.888	.733
Exchange Rate	40	1.028	.374	-1.518	.733
Interest Rate	40	1.646	.374	-1.536	.733
Inflation	40	1.473	.374	1.831	.733

From the findings in Table 4.3, all the values of Skewness and Kurtosis were within the established thresholds. This infers that the data set was normally distributed as supported by Wallentin, Olsson and Jöreskog (2016).

4.4.3 Multicollinearity Test

Whenever a situation arises where one variable of the study has strong correlation with another, this is seen as multicollinearity (Strijov & Katrutsa, 2017). In essence, no variable should be correlated with another one in conducting regression. In this regard, Variance of Inflation Factor (VIF) was leveraged on in testing for multicollinearity. The general rule is that when the values of VIF are within the range of 1 all through 10, then it means there is such symptom of multicollinearity (Rahbar, McCormick, Lee, & Vatcheva, 2016).

Table 4.4: Variance of Inflation Factor

	Collinearity Statistics	
	Tolerance	VIF
Exchange Rate	.935	1.070
Interest Rate	.870	1.150
Inflation	.913	1.096

a. Dependent Variable: Return on Assets

The findings in Table 4.4 indicate that VIF are within the range of 1-5; this shows that there was no multicollinearity in the data.

4.4.4 Heteroscedasticity Test

Any situation where the error term is systematically spread within various values measured is defined as heteroscedasticity (Lewbel & Baum, 2018). The rule of thumb is that its absence is reflected in scatter plots having no clear pattern (Chasco, Le-Gallo &López, 2018).

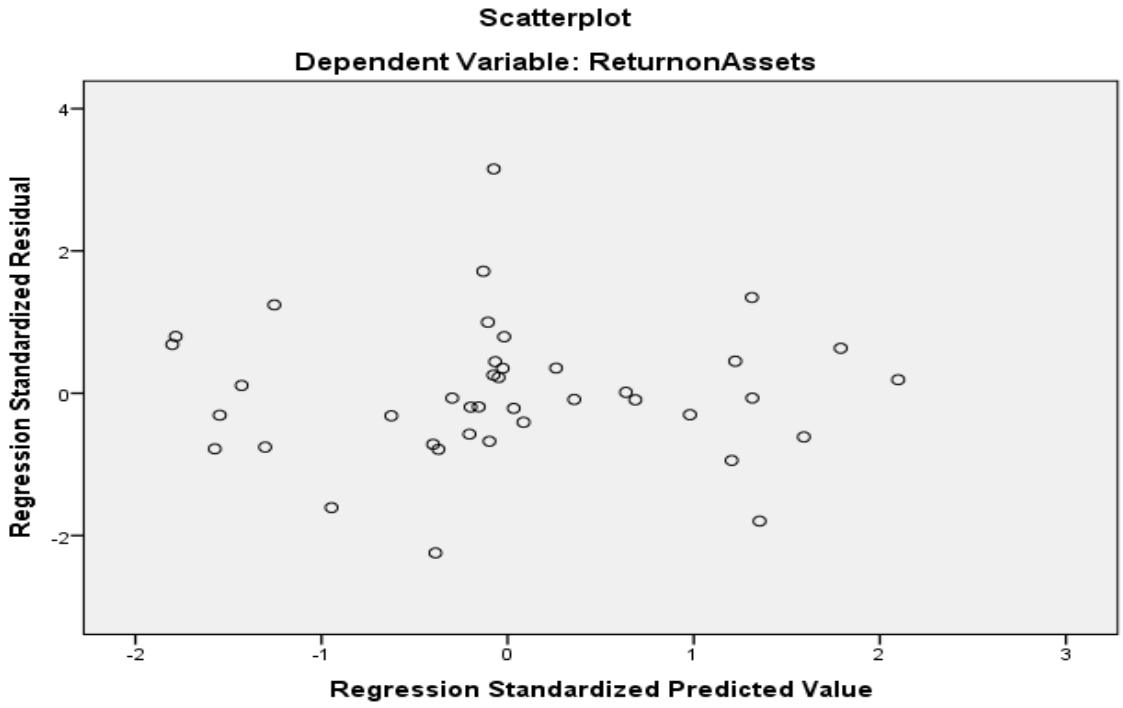

Figure 4.4: Scatter Plots

Figure 4.4 indicates the pattern in movement of the data points. From the results, there is clearly established pattern or trend in the spread of the data points. This could be an indication of absence of heteroscedasticity.

4.5 Correlation Analysis

The finding of correlation analysis is shown in Table 4.5.

Table 4.5: Correlation Analysis

		ROA	Exchange Rate	Interest Rate	Inflation
ROA	Pearson Correlation	1			
	Sig. (2-tailed)				
	N	40			
Exchange Rate	Pearson Correlation	.257	1		
	Sig. (2-tailed)	.000			
	N	40	40		
Interest Rate	Pearson Correlation	.301	-.249	1	
	Sig. (2-tailed)	.000	.121		
	N	40	40	40	
Inflation	Pearson Correlation	.255	-.126	.291	1
	Sig. (2-tailed)	.003	.440	.069	
	N	40	40	40	40

From Table 4.5, exchange rate (r=0.257) was found to have a positive relationship with financial performance. Interest rate (r=0.301) also had a positive relationship with ability of the firm to perform financially. Inflation (r=0.255) had a positive relationship with FP.

4.6 Regression Results

The study conducted regression analysis to measure the impact that volatility of exchange rates has on performance, the results are on table 4.6.

Table 4.6: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.817[a]	.667	.606	.01093

a. Predictors: (Constant), Inflation, Exchange Rate, Interest Rate

Table 4.6 shows that R square is given as 0.667 showing the fitness of the overall model and it also infers that 60.6% change in financial performance of the studied agricultural firms is explained by volatility in exchange rates.

Analysis of Variance results are shown on Table 4.7

Table 4.7: Analysis of Variance

	Sum of Squares	df	Mean Square	F	Sig.
Regression	.008	3	.00267	24.273	.000[b]
Residual	.004	36	.00011		
Total	.012	39			

a. Dependent Variable: Return on Assets
b. Predictors: (Constant), Inflation, Exchange Rate, Interest Rate

The results in Table 4.7 indicate that the value of F calculated is 24.273; which is large enough to infer on the significance of overall regression model.

Table 4.8 shows regression results on Beta Coefficients

Table 4.8: Regression Beta Coefficients

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	-.044	.029		-1.506	.141
Exchange Rate	.002	.001	1.264	3.272	.002
Interest Rate	.021	.006	.077	3.500	.013
Inflation	.006	.002	1.396	3.358	.002

a. Dependent Variable: Return on Assets

From the results in Table 4.8, the following equation is formulated:

$$\mathbf{Y = -0.044 + 0.002X_1 + 0.021X_2 + 0.006X_3}$$

Where Y is = Financial Performance

X_1= Exchange Rate Volatility

X_2 = Interest Rate

X_3 = Inflation

Thus, at 5% level of significance, volatility in exchange rate (β=0.002, p=0.002<0.05) positively and significantly impacted on financial performance. Interest rate (β=0.021, p=0.013<0.05) positively and significantly impacted on financial performance. Inflation (β=0.006, p=0.002<0.05) positively and significantly impacted on financial performance.

4.7 Discussion of the Findings

Adjusted R squared value is 0.817 showing that volatility in exchange rate has strong impact to the firms' financial performance. Which is similar to Mahapatra and Bhaduri (2019) who established that share returns significantly react towards changes in foreign exchange rates. Basirat, Nasirpour and Jorjorzadeh (2014) noted a negative interaction between change in currencies and the growth of economies. The adjusted square of R IS AT 0.606; showing that 60.6% financial performance change was due to volatility in exchange. The study has established a positive interaction between volatility in exchange rate and financial performance. Reaz et al. (2017) established a negative link between changes in currency rates and ability of firms to perform in financial terms. Kairu (2016)

noted that that fluctuations in exchange rate results into weak but positive influence on firm performance.

CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

It shares the study findings as informed by the objectives. The conclusions and recommendations of the study are also provided besides the limitations and areas for future research.

5.2 Summary of the Findings

The study was set out to determine the interaction between exchange rate volatility and financial performance of the agricultural sector of the economy. The findings of trend analysis indicated that the agriculture sector has had instability and fluctuation in financial performance as determined by ROA. There was a consistent rise in exchange rate across the period of consideration by the study. The study noted that inflationary pressure was relatively higher as compared to interest rate across the entire period that the study focused on. Both inflation and interest rates were instable across the period of consideration.

The study used correlation in determining how foreign exchange rate volatility related to financial performance. From study findings the exchange rate volatility positively affected the financial performance (FP) and the control variables (interest and inflation) also positively related to financial performance. Therefore, an increase in foreign exchange rate volatility would increase financial performance of the agriculture sector.

Regression analysis was to assess effect of rate of volatility of foreign exchange on financial performance. The value of adjusted R square was 0.606; which was interpreted to mean that 60.6% variation in financial performance of the agricultural sector firms as explained by volatility in exchange rates. The ANOVA results gave an F calculated value which was large enough resulting into an assertion that volatility in foreign exchange rate has significant effect on financial performance. The beta of the model was all positive with p-values less than 0.05; showing the independent as well as control variables in the study had significant effect on financial performance.

5.3 Conclusion

It was expected that volatility in foreign exchange rate adversely affected financial performance of the firm. However contrary to these expected results, results showed that foreign exchange volatility rate positively influenced the ability of the firm to perform financially. This finding could hold and justified in the event that the firm has adopted risk management practices for foreign exchange including using hedging and derivatives so that shocks in exchange rates would be cushioned.

The study has noted, most of the firms in agriculture sector in Kenya have been characterised by fluctuations in their financial performance. This could be as a result of adjustments in control variables like interest and inflationary pressure had an effect on how these firms performed.

5.4 Recommendations of the Study

Exchange rate volatility is shown to be a powerful force shaping the financial performance of firms. In order to fully enhance financial performance, the study recommends that firms in the agricultural sector should adopt proper foreign exchange risk management strategies including using derivatives and swaps. This would safeguard financial performance of these firms even when there is volatility in exchange rate.

Variation in inflation and interest rate was seen to have a positive impacting financial performance of the firm. Thus this study's recommendations are that the Central Bank (CBK) should push for stabilizing the interest levels and rates of inflation through adoption of sound monetary policies tools and instruments.

5.5 Limitations of the Study

The agriculture sector in the Kenyan context was the focus of the study. The study covered a total of 40 firms operating the agriculture sector. The study focused on use of secondary data that was gathered in a ten-year period (2009-2018). The research gathered quarterly data hence a total of 40 data points were covered. The rationale for use of secondary data was that it was readily available.

5.6 Areas for Further Research

Future studies should be conducted in other economic sectors apart from the agricultural sector for comparison of the findings. Future studies should sample a wider number of firms and adopt advanced methods including the use panel data and collecting information using primary and secondary data so that the two sources of information complement each other.

REFERENCES

Abraham, T. W. (2016). Exchange rate policy and falling crude oil prices: Effect on the Nigerian stock market. *CBN Journal of Applied Statistics*, *7*(1), 111-123.

Ahmed, A., Rehan, R., Chhapra, I. U., & Supro, S. (2018). Interest rate and financial performance of banks in Pakistan. *International Journal of Applied Economics, Finance and Accounting*, *2*(1), 1-7.

Ahmed, L. (2015). The effect of foreign exchange exposure on the financial performance of commercial banks in Kenya. *International journal of scientific and research publications*, *5*(11), 115.

Alagidede, P., & Ibrahim, M. (2017). On the causes and effects of exchange rate volatility on economic growth: Evidence from Ghana. *Journal of African Business*, *18*(2), 169-193.

Alimi, R. S. (2014). Inflation and financial sector performance: The case of Nigeria. *Timisoara Journal of Economics and Business*, *7*(1), 55-69.

Bahmani-Oskooee, M., & Gelan, A. (2018). Exchange-rate volatility and international trade performance: Evidence from 12 African countries. *Economic Analysis and Policy*, *58*, 14-21.

Bahmani-Oskooee, M., & Saha, S. (2015). On the relation between stock prices and exchange rates: a review article. *Journal of Economic Studies*, *42*(4), 707-732.

Bahmani-Oskooee, M., Chang, T., Chen, T. H., & Tzeng, H. W. (2017). Revisiting purchasing power parity in Eastern European countries: quintiles unit root tests. *Empirical Economics*, *52*(2), 463-483.

Barguellil, A., Ben-Salha, O., & Zmami, M. (2018). Exchange rate volatility and economic growth. *Journal of Economic Integration*, *33*(2), 1302-1336.

Basirat, M., Nasirpour, A., & Jorjorzadeh, A. (2014). The effect of exchange rate fluctuation on economic growth considering the level of development of financial markets in selected developing countries. *Asian Economic and Financial Review*, *4*(4), 517-528.

Basnet, H. C., & Upadhyaya, K. P. (2015). Impact of oil price shocks on output, inflation and the real exchange rate: evidence from selected ASEAN countries. *Applied Economics*, *47*(29), 3078-3091.

Beckmann, J., & Czudaj, R. (2017). Exchange rate expectations since the financial crisis: Performance evaluation and the role of monetary policy and safe haven. *Journal of International Money and Finance*, *74*, 283-300.

Bonga-Bonga, L., & Gnagne, P. X. (2017). The impact of exchange rate volatility on capital flows in BRICS economies.

Chansa, C., Sundewall, J., & Östlund, N. (2018). Effect of currency exchange rate fluctuation on Aid Effectiveness in the Health Sector in Zambia. *Health policy and planning*, *33*(7), 811-820.

Chinn, M. D. (2019). Purchasing Power Parity and Real Exchange Rates. In *Oxford Research Encyclopedia of Economics and Finance*.

Chirchir, F. K., Muse, M. A., & Jagongo, A.(2015). Exchange Rate Volatility and Export Performance of Tea Firms in Kenya. *International Journal of Science and Research (IJSR), 2166*.

Daoui, D. (2017). Analysis of the Exchange Rate Volatility Influence on the Share Price: Morocco, as Case Study. *Journal of Public Administration, Finance and Law*, 114.

D'Alessandro, S., Cabalero, J. Simpkin, S., & John, L. (2015). Kenya. Agricultural sector risk assessment.

Della Corte, P., Ramadorai, T., & Sarno, L. (2016). Volatility risk premia and exchange rate predictability. *Journal of Financial Economics, 120*(1), 21-40.

Dimand, R. W. (2019). The Debt-Deflation Theory of Great Depressions. In *Irving Fisher* (pp. 175-200). Palgrave Macmillan, Cham.

Ferraro, D., Rogoff, K., & Rossi, B. (2015). Can oil prices forecast exchange rates? An empirical analysis of the relationship between commodity prices and exchange rates. *Journal of International Money and Finance*, *54*, 116-141.

Fratzscher, M., Rime, D., Sarno, L., & Zinna, G. (2015). The scapegoat theory of exchange rates: the first tests. *Journal of Monetary Economics, 70*, 1-21.

Gradojevic, N., & Lento, C. (2015). Multiscale analysis of foreign exchange order flows and technical trading profitability. *Economic Modelling*, *47*, 156-165.

He, Y. (2018). A Study on the International Fisher Effect: An Investigation from South Korea and China. *(IJIDB)*, *9*(7), 33-42.

Hussain, M., Zebende, G. F., Bashir, U., & Donghong, D. (2017). Oil price and exchange rate co-movements in Asian countries: Detrended cross-correlation approach. *Physica A: Statistical Mechanics and its Applications*, *465*, 338-346.

Isaac, L. (2015). Assessing the Impact of Exchange Rate Risk on Banks Performance in Nigeria. *Journal of Economics and Sustainable Development*, *6*(6), 1-13.

Islam, K. U., & Goyal, M. M. (2017). Examining the Fisher Effect in Short and Long Run: A Study of NSE Sectoral Indices. *International Journal of Financial Management*, *7*(2).

Isola, L. A., Oluwafunke, A. I., Victor, A., & Asaleye, A. (2016). Exchange rate volatility and the Nigeria economic growth. *EuroEconomica*, *35*(2), 127-142.

Jiang, C., Bahmani-Oskooee, M., & Chang, T. (2015). Revisiting purchasing power parity in OECD. *Applied Economics*, *47*(40), 4323-4334.

Kairu, E. K. (2016). *Effects Of The Exchange Rate Volatility On The Financial Performance Of Commercial Banks In Kenya* (Doctoral Dissertation, School Of Business, University Of Nairobi).

Kar, A. K., & Swain, R. B. (2014). Interest rates and financial performance of microfinance institutions: Recent global evidence. *The European Journal of Development Research*, *26*(1), 87-106.

Kausar, R., & Zulfiqar, K. (2017). Exchange Rate Volatility And Productivity Growth Nexus In Selected Asian Countries. *Pakistan Economic and Social Review*, *55*(2), 595-612.

Kioko, N. P. (2013). The relationship between firm size and financial performance of commercial banks in Kenya. *Unpublished Master's thesis, University of Nairobi*.

Kočenda, E., & Moravcová, M. (2019). Exchange rate comovements, hedging and volatility spillovers on new EU forex markets. *Journal of International Financial Markets, Institutions and Money*, *58*, 42-64.

Kumar, A., Bhutto, N. A., Mangrio, K. A., & Kalhoro, M. R. (2019). Impact of external debt and exchange rate volatility on domestic consumption. New evidence from Pakistan. *Cogent Economics & Finance*, *7*(1), 1568656.

Kurihara, Y. (2013). Effects of exchange rate fluctuation and financial development on international trade: Recent experience. *International Journal of Business, Management and Economics Research*, *4*(5), 793-801.

Lê, L. H. (2017). Fisher theory and stock returns: An empirical investigation for industry stocks on Vietnamese stock market.

Mackton, W. S., Nyongesa, D., & Odondo, A. (2018). An Econometric Assessment of the Real Effective Exchange Rate Volatility in Kenya. *Asian Journal of Economics, Business and Accounting*, 1-14.

Majok, E. (2015). Effects of exchange rate v fluctuation on financial performance of commercial banks in Kenya. *Universitas of Naibori*.

Mbaka, J. M. (2016). *Relationship between Foreign Exchange Trading and Financial Performance of Commercial Banks Listed on the Nairobi Securities Exchange* (Doctoral dissertation, United States International University-Africa).

Muhindi, K. A. & Ngaba, D. (2018). Effect of firm size on financial performance on banks: Case of commercial banks in Kenya. *International Academic Journal of Economics and Finance,* 3(1), 175-190

Murage, J.. Muya, J. & Mogwambo, V. (2018). Effects of interest rates on financial performance of deposit taking saccos in Kisii County, Kenya

Mwangi, A. W. (2017). *The Effects of Exchange Rate Changes on the Stock Market Performance in the Nairobi Securities Exchange* (Doctoral dissertation, United States International University-Africa).

Nandwa, C. A., Waititu, A., & Wanjoya, A. (2018). Modelling Volatility of the US Dollar Against the Kenyan Shilling Exchange Rate and Investigating the Effect of Kenyan Inflation Rates on this Volatility in Kenya. *International Journal of Statistical Distributions and Applications*, *4*(3), 60.

Ngure, I. M. (2014). The effect of interest rates on financial performance of Commercial banks in Kenya. *An Msc. Research Project Submitted to the Department of Business Admin., University of Nairobi*.

Nyoni, T. (2018). Modeling and Forecasting Naira/USD Exchange Rate In Nigeria: a Box-Jenkins ARIMA approach.

Ochieng, I. L., Olweny, T. O., Oluoch, O. J., & Ochere, G. O. (2019). Effect of foreign equity flows on stock market volatility in Kenya Empirical evidence at Nairobi securities exchange. *Journal of Finance and Investment Analysis*, *8*(3), 1-5.

Okwuchukwu, O. (2015). Exchange rate fluctuation, stock market performance and foreign direct investment in Nigeria. *International Journal of Academic Research in Accounting, Finance and Management Sciences*, *5*(2), 172-184.

Omare, M. N., Nambiro, E., & Nkamleu, G. B. (2016). Agricultural Growth, Poverty Reduction and Millennium Development Goals in Africa: Outcomes of AAAE Conference.

Onyango, A. O. (2018). *Exchange rate volatility and stock prices of companies listed on Nairobi securities exchange, Kenya* (Doctoral dissertation, Kenyatta University).

Osano, S. A. (2016). Exchange rate volatility and financial performance of listed commercial banks in Kenya.

Osigwe, A. C. (2015). Exchange rate fluctuation, oil prices and economic performance: empirical evidence from Nigeria. *International Journal of Energy Economics and Policy*, *5*(2), 502-506.

Perera, M. (2015). The Effect of Foreign Exchange Market Returns on Stock Market Performance in Sri Lanka.

Pham, T. H. H. (2018). Liquidity and exchange rate volatility.

Qin, J., Lu, X., Zhou, Y., & Qu, L. (2015). The effectiveness of China's RMB exchange rate reforms: An insight from multifractal detrended volatility analysis. *Physica A: Statistical Mechanics and its Applications*, *421*, 443-454.

Reaz, M., Mahat, F., Dahir, A. M., Sahabuddin, M., & Al Mahi, A. S. M. M. (2017). Exchange rate volatility and financial performance of agriculture firms in Malaysia: An empirical analysis using GARCH, wavelet and system GMM. *Business and Economic Horizons (BEH)*, *13*(1232-2017-2430), 409-427.

Shim, H., Kim, H., Kim, S., & Ryu, D. (2016). Testing the relative purchasing power parity hypothesis: the case of Korea. *Applied Economics*, *48*(25), 2383-2395.

Šimáková, J. (2017). The Impact of Exchange Rate Movements on Firm Value in Visegrad Countries. *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis*, *65*(6), 2105-2111.

Singh, K. S. (2013). The relationship between foreign exchange trading and financial performance of commercial banks in Kenya. *Unpublished Masters thesis, University of Nairobi*.

Sritharan, V.(2018). Firm Size Influence On Profitability Of Sri Lankan Diversified Holdings Firms. *International Journal of Advanced Research in Management and Social Sciences* 7(6), 30-45

Stefanescu, R., & Dumitriu, R. (2013). Impact of the foreign exchange rates fluctuations on returns and volatility of the Bucharest Stock Exchange. *Available at SSRN 2250937*.

Sui, L., & Sun, L. (2016). Spillover effects between exchange rates and stock prices: Evidence from BRICS around the recent global financial crisis. *Research in International Business and Finance*, *36*, 459-471.

Tinoco Zermeño, M. Á., Venegas Martínez, F., & Torres Preciado, V. H. (2018). Effects of inflation on financial sector performanc

Works, R. F. (2016). Econometric modeling of exchange rate determinants by market classification: An empirical analysis of Japan and South Korea using the sticky-price monetary theory.

Yildirim, Z., & Ivrendi, M. (2016). Exchange rate fluctuation and macroeconomic performance: Evidence from four fast-growing emerging economies. *Journal of Economic Studies*, *43*(5), 678-698.

APPENDICES

APPENDIX I: LIST OF AGRICULTURE SECTOR FIRMS

1. Kenya Coffee Growers Association
2. Kenya Highland Seed
3. Karoa Coffee Estate
4. The Fancy Farmyard Brands
5. Kenya Nut Company
6. Kenya Horticultural Exporters
7. Kenya Orchards Limited
8. My Commercial Forest
9. Dominion Farms Limited
10. Kapchorua Tea
11. Kakuzi Ltd
12. De Ruiter East Africa
13. Asper Worldwilde Enterprises
14. Magana Flowers Kenya
15. Mbaki Agric- Inputs Distributors
16. Mea Limited
17. Moore Industries Limited
18. Mugoya Vegetables Shop Limited
19. National Poultry Development Programme
20. Millenium Millers
21. Orion East Africa
22. Panar Seed Company
23. Bio Foods
24. Ridgeways Coffee Dealers Limited
25. Speedfresh Limited
26. Hardi Kenya
27. Sower Solutions Limited
28. Sibro Company, Nairobi
29. Homan Brothers, Nairobi
30. Mid-Coffee Trade Association
31. Mkomani Fresh Fruit and Vegetables
32. Capwell Industries
33. Delmonte Kenya
34. Brookside Dairy Limited
35. Limuru Tea
36. British American Tobacco (BAT)
37. Amiran Kenya
38. Kenya Seed Company
39. New Kenya Cooperative Creameries
40. United Millers

Source: KNBS (2019)

APPENDIX II: DATA COLLECTION SHEET

Year	Quarter	Interest rate(On Lending)	Inflation (CPI)	Exchange rate (Kshs/USD)	Net Income	Total Assets
2009	Q_1					
	Q_2					
	Q_3					
	Q_4					
2010	Q_1					
	Q_2					
	Q_3					
	Q_4					
2011	Q_1					
	Q_2					
	Q_3					
	Q_4					
2012	Q_1					
	Q_2					
	Q_3					
	Q_4					
2013	Q_1					
	Q_2					
	Q_3					
	Q_4					
2014	Q_1					
	Q_2					
	Q_3					
	Q_4					
2015	Q_1					
	Q_2					
	Q_3					
	Q_4					
2016	Q_1					
	Q_2					
	Q_3					
	Q_4					
2017	Q_1					
	Q_2					
	Q_3					
	Q_4					
2018	Q_1					
	Q_2					
	Q_3					
	Q_4					

APPENDIX III: RAW DATA COLLECTED

Year	Company	ROA	Exchange rate	Interest Rate	Inflation
Mar-09	Kenya Coffee Growers Association	0.083069	80.431	14.87	14.1
Jun-09	Kenya Highland Seed	0.088189	77.158	15.09	10.6
Sep-09	Karoa Coffee Estate	0.098349	74.999	14.74	9.8
Dec-09	The Fancy Farmyard Brands	0.110689	75.820	14.76	8.0
Mar-10	Kenya Nut Company	0.095658	77.331	14.8	5.5
Jun-10	Kenya Horticultural Exporters	0.103214	81.917	14.39	3.7
Sep-10	Kenya Orchards Limited	0.116455	80.778	13.98	3.3
Dec-10	My Commercial Forest	0.118356	80.752	13.87	3.8
Mar-11	Dominion Farms Limited	0.129756	82.989	13.92	7.0
Jun-11	Kapchorua Tea	0.127461	89.864	13.91	13.2
Sep-11	Kakuzi Ltd	0.153193	99.832	14.79	16.5
Dec-11	De Ruiter East Africa	0.141958	85.068	20.04	19.2
Mar-12	Asper Worldwilde Enterprises	0.146203	83.056	20.34	16.9
Jun-12	Magana Flowers Kenya	0.131304	84.233	20.3	11.8

Sep-12	Mbaki Agric-Inputs Distributors	0.126774	85.283	19.73	6.4
Dec-12	Mea Limited	0.135735	86.029	18.15	3.5
Mar-13	Moore Industries Limited	0.116462	85.639	17.73	4.1
Jun-13	Mugoya Vegetables Shop Limited	0.105778	86.008	16.97	4.4
Sep-13	National Poultry Development Programme	0.124471	86.646	16.86	7.0
Dec-13	Millenium Millers	0.13331	86.310	16.99	7.4
Mar-14	Orion East Africa	0.109867	86.441	16.91	6.8
Jun-14	Panar Seed Company	0.116874	87.627	16.36	7.0
Sep-14	Bio Foods	0.169408	89.279	16.04	7.5
Dec-14	Ridgeways Coffee Dealers Limited	0.146625	90.598	15.99	6.2
Mar-15	Speedfresh Limited	0.110505	92.335	15.46	5.8
Aug-15	Hardi Kenya	0.124818	103.870	16.06	7.0
Sep-15	Sower Solutions Limited	0.138539	105.293	16.82	6.1
Dec-15	Sibro Company, Nairobi	0.125181	102.311	18.3	7.4
Mar-16	Homan Brothers, Nairobi	0.104817	101.334	17.87	7.1

Jun-16	Mid-Coffee Trade Association	0.116763	101.102	18.18	5.0
Sep-16	Mkomani Fresh Fruit and Vegetables	0.118157	101.262	13.86	6.3
Dec-16	Capwell Industries	0.115568	102.486	13.66	6.5
Mar-17	Delmonte Kenya	0.122853	103.000	13.61	8.8
Jun-17	Brookside Dairy Limited	0.125569	103.712	13.66	11.2
Sep-17	Limuru Tea	0.12886	103.247	13.69	7.5
Dec-17	British American Tobacco (BAT)	0.12637	103.232	13.64	5.0
Mar-18	Amiran Kenya	0.124209	100.847	13.49	6.89
Jun-18	Kenya Seed Company	0.117559	101.050	13.22	5.2
Sep-18	New Kenya Cooperative Creameries	0.110919	100.956	12.66	3.83
Dec-18	United Millers	0.106619	101.846	12.51	5.71