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**THE EFFECT OF POLITICAL RISK ON EXCHANGE RATE VOLATILITY: THE CASE OF
KENYA**

OGOLLA FAITH AKINYI

082646

Strathmore Institute of Mathematical Sciences

Strathmore University

Nairobi, Kenya

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Name of the Candidate: OGOLLA FAITH AKINYI
Signature: [Signature]
Date: 11/12/2017

This Research Proposal has been submitted for examination with my approval as the Supervisor.

Name of the Supervisor: [Signature] EK
Signature: [Signature]
Date: 11/12/2017

Strathmore Institute of Mathematical Sciences
Strathmore University

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Abstract

The Kenyan economy, like many other economies in the world, is sensitive to the political events that occur. In modern day, economies with stable political environments and efficient economic policies have strong and healthy economies and are a big draw for investors. Stable exchange rates are an indicator of good economic performance.

This paper examines the effect of political risk in Kenya on the volatility of exchange rates. It uses daily time series data of the Euro and USD exchange rates that covers a period from June 2007 to August 2013. The period covers three major political events; the 2007 general election, the 2010 constitutional referendum and the 2013 general election. This study uses a TGARCH(1,1) with a dummy variable for political risk. Results from the data analysis show that political risk has significant effects on the volatilities of the Euro and USD exchange rates. Recommendations on additional studies are made. First, a possible study can be done to investigate the effect of political risk on additional exchange rates e.g. the Japanese yen (JPY), the British pound (GBP), etc. Similarly, further research could be done to establish the effect of both positive and negative political shocks on the Kenyan economy.



bbreviation

DI Foreign Direct Investment

ECD Organisation for Economic Development and Development

ARCH Generalized AutoRegressive Conditional Heteroskedasticity

PP Purchasing Power Parity

E International Fisher Effect

DP Gross Domestic Product

EER Real Effective Exchange Rate

SD American Dollar

URO Euro Currency

PR Log Price Relative



Chapter One: Introduction

1. Background

1.1 Exchange Rate

An exchange rate is the rate of transfer between two currencies. It is also called the foreign exchange rate or forex rate. An exchange rate is also the value of one's currency to another currency (O'sullivan & Sheffrin 2008). An individual or entity may feel the need to trade to and from a particular currency for some reasons. These reasons are majorly classified into three: transactions, speculation, and arbitrage.

An entity may have the need to buy or sell currencies in the currency market to enter and fulfill transactions. For example, in the case of a traveler, they may need to buy foreign currency when going abroad and sell it when they return. For a multinational, it may have inflows and outflows in a variety of currencies and will need to convert them. Similarly, for both individuals and institutions, to import or export goods and services may require them to exchange currencies accordingly.

Speculation can best be defined as trading in an asset that has a significant risk of losing most or all of the initial outlay with the expectation of a substantial gain (RAJKUMAR & RANI (2012)). If there is a risk of loss, it will raise the question as to why speculate at all. But this risk of speculation is still taken up by market participants because there is a possibility of making massive profits. "Just as mountain climbers scale mountains because the mountain simply exists, speculators look for profit opportunity simply because it can occur" (Dědek & Gregor 1994). Arbitragers on the other hand attempt to make a riskless profit from a mispricing in the market. However, transactions would cause a shift in demand and supply correcting the mispricing. Any meaningful discrepancy would offer arbitrage trading opportunities for large traders, which would quickly eliminate the discrepancy (Levich (1985)).

The foreign exchange rate is an essential determinant of any country's relative economic health level, ceteris paribus (with other factors unchanging such as interest rates and inflation rates) (Munthali, Simwaka, & Mwale 2010). A stable exchange rate is an indicator of good economic health and comes with its benefits.

1.1 Benefits of a stable exchange rate

A stable exchange rate is advantageous for firms that participate in international trade. It reduces their foreign exchange risk:

- **Transaction exposure:** this is the risk that a firm may face after having already entered into an obligation. This may arise where they are being paid in a foreign currency or expect to make a payment in a foreign

currency. The timing of the payments or receipts may lead to a gain or loss depending on the prevailing exchange rates.

- Translation exposure: this is the risk faced by multinational companies that the value of their financial statement items (i.e. profits, assets, etc.) may change during consolidation. The degree of this type of exposure is dependent on the accounting methods and principles used.
- Economic exposure: this is the risk that a company's competitive position may be compromised since exchange rate fluctuations may have altered future cash flows. It is long term, and so are its effects. Economic exposure does not affect only firms that participate in international trade, but also local firms. In this case, a company may have reduced profitability if the exchange rates favor importation of a cheaper substitute for its good/service.

Stable exchange rates reduce the exposure of firms to foreign currency risks. It will also reduce the costs they incur from activities meant to mitigate, transfer or hedge against these risks.

The theory of purchasing power parity describes the relationship between exchange rates and inflation. Therefore, a stable exchange rate will be beneficial as inflation too will stabilize.

The international Fisher effect describes the relationship between interest rates and exchange rates. This, therefore, implies that a stable exchange rate will promote stable interest rates. Stable interest rates encourage foreign investment. A high volatility in interest rates is usually an indication of high-risk countries. Due to the risk-averse nature of investors, they would prefer an assured return and therefore invest in countries with a stable interest rate.

However, investors may still prefer to invest in high-risk countries as the investment attracts a high return (Ceri & Borelli (2008)). They argue that FDI depends more on the openness of the economy rather than the volatility of exchange rates captured in its standard deviation. Obstfeld & Rogoff (2000) posit that the more open an economy; they should ideally have a less volatile real exchange rate. Their intuition being rather straightforward that a less volatile exchange rate gives higher FDI. However, if the theory of international Fisher effect holds, there would be no preference for either high risk or low risk since whatever gains achieved from a higher interest rate would be offset by the exchange rate during conversion.

For these reasons, countries attempt to stabilize their exchange rates. There has been the argument of whether a fixed or floating exchange rate offers a more stable exchange rate. Countries with a floating rate leave the forces of demand and supply to work and only intervene mainly through monetary policy whenever they feel that equilibrium is running away. Radelet & Sachs (1999) argue that the Asian Crises were supported by the pegged exchange rate. They argue that the stability of their exchange rate led to a false sense of security for investors which led to the over-accumulation of unhedged foreign currency debt, giving rise to the financial crises.

1.1.2 Political Risk

There have been many definitions of political risk in business and finance literature. From these many definitions, all seem to agree that it is the unwanted consequence of political activities Bernhard & Leblang (2006); Frieden (2002); OCHIENG (2013).

Political instability is rather difficult to quantify since it is more subjective than objective in nature. The degree of political risk is based on the perceptions and opinions of the public.

There exists a myriad of events that can be said to give rise to political risk. Foreign exchange markets are particularly sensitive to political events, for example, war and unrest, withdrawal of republics to create new sovereignties and threat of a country break-up.

Those most specific to Kenya include:

1.1.2.1 Government action and inaction

According to Frieden (2002), electoral periods pose uncertainty as there may be power shifts, and policies may be changed to favor those in power. Results from this study; conducted in 14 OECD (Organization for Economic Cooperation and Development) countries indicate that periods of election, in particular, affect the average annual depreciation rates and coefficients of variation

1.1.2.2 Political events: Elections and referenda

Markets react differently to political uncertainty. The following are reactions that are attributed to political instability: deterioration of Economic performance, a decrease in Foreign direct investment, an increased volatility of Interest rates and higher inflation Alesina & Perotti (1996); Brada, Kutan, & Yigit (2006); Henisz (2002). In most instances, political uncertainty is present in less developed countries for which financial information is not always reliable.

Evidence suggests that political uncertainty leads to a decline in the value of a country's currency. This increases in the foreign exchange bid-ask spread and in the volatility of foreign exchange rates Brada, Kutan, & Zhou (1993); Bussiere & Mulder (1999); Crowley & Loviscek (2002); Kutan & Zhou (1995); Melvin & Tan (1996). Kenya in particular experiences increased levels of political instability in election and referenda years.

Investors, both local and foreign develop a wait and see attitude. After the 2007 and 2008 PEV; the fear of insecurity arises. A common skewed perception of the country's security situation may lead to the preference to hold foreign currency rather than local currency increasing volatility and bid-ask spread.

1.1.2.3 Political news dominates headlines

The media plays an important role in painting a picture for the general public. They influence greatly people's opinions and perceptions; especially print media. Opinion polls may not correctly predict election winners. Economic actors may try and predict future policies based on the news and polls.

1.1.2.4 Possibility of dramatic political reforms

As elections approach, the incumbent government may try enhancing its popularity by manipulating policy to produce short-term expansions in economic activity.

On the flip side, there may be changes in government structure if the opposition wins the election or if new individuals are selected to occupy leadership positions. This would bring about differing ideologies and different priorities. Similarly, there exists the possibility of the new leadership attempting to make the previous government look bad by briefly imposing bad policies before changing them.

If there is uncertainty regarding the value of the currency in future, people will prefer to hold less of the weaker or rather weakening currency and hold more of the strengthening currency. The demand for Kshs goes down, and that of the dollar etc. goes up. As the dynamics of demand and supply keep adjusting, the variance should grow accordingly.

If there is uncertainty regarding the election, there will be a range of expectations of exchange rates.

1.1.3 Kenya's Background: Political Risk and Exchange Rate Fluctuations

Potter, Kniss, Riesenfeld, & Johnson (2010) identify certain structural weaknesses in the Kenyan government as the main influence of the repeated conflicts after presidential elections. According to a survey done by KNHCR, in 2007 out of the 210 constituencies, 136 faced violence after the elections. However, this was not anything new as there has been a conflict after every presidential election led in the country (1992, 1997, and 2002).

In 2013, despite the conflict raised by the opposition party questioning the credibility of the results of the just-completed election, there was no violence. This may be attributed to the fact that both parties and the public had confidence in the country's judicial system as a good conflict resolution mechanism.

1.2 Problem Statement

There have been only two empirical studies done for the Kenyan case concerning the effect of political risk on exchange rate volatility. Ntwiga (2012) in this study did an analysis of election violence shocks on the exchange rates using GARCH methodology. In his study, he used daily time series data from January 2007 to December 2008. OCHIENG (2013) in this study conducted an event study with daily time series data for the period between May 2010 and April 2013. Both studies were short-term and hence the importance of undertaking this

study. There is no empirical research focusing on the effect of political instability on exchange rates in the long run that is specific to Kenya.

1.3 Research Objective

To investigate the effect political risk has on exchange rates in Kenya.

1.4 Research Question

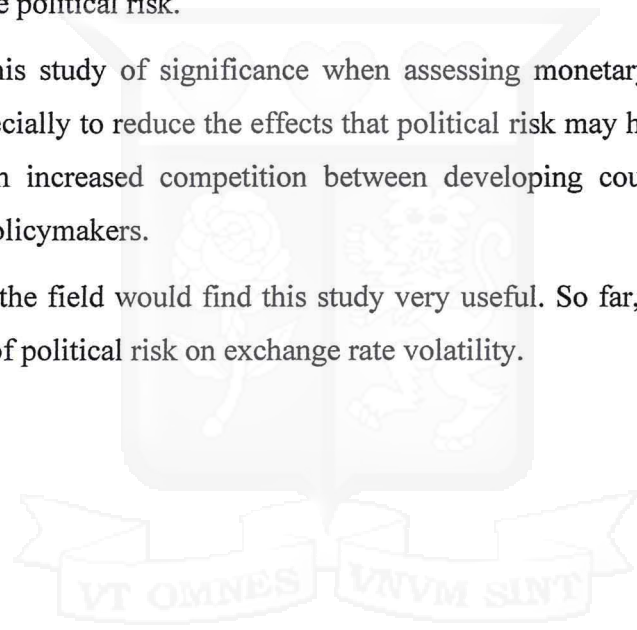
What effects does political risk have on exchange rates in Kenya?

1.5 Significance of the Study

This study is of significance to investors and multinational corporations as it will provide knowledge that will be useful when taking foreign currency positions. Similarly, to reduce their foreign exchange exposure, it will be useful when making hedging strategies. It will also provide the knowledge necessary for them to decide on the policies to use to mitigate political risk.

Policymakers would find this study of significance when assessing monetary policy and fiscal policy their possible effects. This is especially to reduce the effects that political risk may have to maintain stable exchange rates. Similarly, there is an increased competition between developing countries to obtain FDI and thus increasing the pressure on policymakers.

Students and researchers in the field would find this study very useful. So far, very little research has been in Kenya addressing the issue of political risk on exchange rate volatility.



Chapter Two: Literature Review

2.1. Determinants of exchange rates

In an attempt to determine the causes of movement in exchange rates, some theories were developed. These theories give an intuition of how factors: economic or otherwise; influence exchange rates. Those that inform this study are discussed below:

2.1.1. International Parity Conditions

International parity conditions offer a very simple explanation of how economic factors relate to exchange rates. These economic relationships between these variables and equilibrium exchange rates are called parity conditions. Its simplicity is its assumption of a perfect market i.e. no government intervention, no taxes and no transfer costs.

2.1.2. Purchasing Power Parity (PPP)

Purchasing power parity is a theory which states that foreign exchange rates are in equilibrium when their purchasing power is similar in the two countries. Its basis is formed in the law of one price which implies that the prices of similar goods should be equal even when expressed in different currencies. This is under the assumption of a perfect market with no international barriers and no transaction costs.

PPP comes in two forms:

2.1.2.1. Absolute form PPP

The law of one price has a direct implication that the price of goods would differ in transportation costs alone through the activities of arbitrage. However, this would only hold if the goods were identical. In reality, goods are not perfectly homogenous.

The main limitation of this theory is the difficulty in comparing prices of goods between different countries. This is because a perfect market is only theoretical in the sense that transport costs, barriers to trade and transaction costs have a significant impact on price in reality. Similarly, the difference in the market conditions, for example, the cost of labor, between the two countries may cause the prices of goods to vary. Absolute PPP only relies on the analysis of mobile goods and prices of goods such as real estate cannot be included in the analysis.

2.1.2.2. Relative PPP

Relative PPP proposes that changes in exchange rates should be equal to changes in the price i.e. inflation. It has been a concern that PPP does not always hold in the short run. However, it has been assumed that such deviations are temporary Baillie & McMahon(1990). These deviations reflect an overshooting of exchange rates that arise due either to indirect rate variability or the destabilizing effects of speculation. As a consequence,

deviations from PPP can be seen as an indication of excess volatility in exchange rates which should be regulated by official intervention Eichengreen (1992).

Many of those using the PPP as criteria have the presumption that substantial deviations from PPP in the short run may be caused by a myriad of factors- such as adjustment lags and capital flows. However, in the long run, exchange rates will return to the equilibrium as predicted by PPP. Thus, avoiding unnecessary exchange rate fluctuations in the short run could simply be done by intervening to maintain the approximate equilibrium exchange rate as predicted by PPP.

2.1.3. International Fischer Effect (IFE)

The International Fischer Effect theory explains the relationship between spot exchange rates and interest rates. According to Bers & Madura(2000), if IFE holds, high-interest rates call for weaker currencies. This theory also suggests that the differences between the nominal exchange rates of two countries will tend to be equated by their spot exchange rate changes. Demirag & Goddard (1994).

2.1.4. Interest Rate Parity

Interest rate parity shows the relationship between interest rates and forward exchange rates. The theory specifies that if nominal interest rates in a country are high, then the forward rate for the currency of a country with a lower nominal interest rate should be at a premium sufficient to prevent arbitrage.

Interest rate parity is a no-arbitrage condition that represents a state of equilibrium where investors will be indifferent to interest rates available on bank deposits in different countries Joshi, Azuma, & Feenstra (2008).

2.1.5. Unbiased Forward Rates

Unbiased forward rates specify that the forward rate should be an unbiased estimator of the future spot rates of exchange rates. This implies that forex markets are unbiased.

The relationship between spot exchange rates and forward exchange rates may also be influenced by politics. In a study conducted by Bernhard & Leblang (2002), they show that during election campaign periods, cabinet negotiations and cabinet dissolutions, forward exchange rates are a biased estimator of future exchange rates. A direct implication of this study is that the unbiased forward rate theory does not hold during periods of political uncertainty, especially elections.

2.1.6. Government Controls

The government attempts to regulate the economy through macroeconomic policies (especially monetary and fiscal policy). Countries may use macroeconomic policies with the aim of manipulating economic variables: exchange rates, interest rates, inflation, the balance of payments, GDP. However, it is necessary to note that even when macroeconomic policies are not being implemented to regulate exchange rates, changes in the other

economic variables will cause a change in the exchange rates. Therefore, it would correct to say that government controls affect exchange rate volatility either directly or indirectly.

An expansionary monetary policy will cause a decline in exchange rate since the local currency depreciates. A contractionary monetary policy will cause an opposite reaction; the local currency appreciates, and the exchange rate will rise. However, some argue that expansionary monetary policy, in the long run, has destabilizing effects. A high money supply causes both a lower exchange rate and inflation. For a country with a negative balance of payments, it would be extremely detrimental as it would worsen the trade deficit. Fiscal policy has an unclear impact on exchange rates because the price and income effects work in opposite directions. The income effect leads to a weaker currency exchange rate, while the price effect leads to a strengthened currency exchange rate.

"Unless they are fully anticipated, changes in the monetary expansion are likely to have at least temporary real effects, and even anticipated changes in the money supply might have real effects in the fact of long-term contracts and other sources of wage and price rigidity" Frenkel & Mussa (1980).

2.1.7. Expectations

An important role is played by expectations in the theory of exchange rate determination. Current exchange rates are determined by what expectations of future exchange rates investors have. Expectations are mainly founded on information that sends a signal to investors. Signals of future exchange rate movements are what drive speculation.

Findings of surveys indicate that the short-term or high-frequency exchange rate fluctuations are caused by speculation or the herding behavior of investors that cause them to follow trends in the market; rather than macroeconomic fundamentals Hossain (2008).

Calvo & Mendoza (2000) arrive at the concept of "rational contagion" as a cause of high volatility in emerging financial markets. They describe this as a scenario where investors make a choice not to pay for information as it is expensive and instead make their investment decisions based on rumors.

When investors make decisions based on unverified rumors, depending on the nature and expectations of the future, they produce large capital flows into and out of the country. Ideally, positive news encourages capital inflows, and negative news causes negative outflows. As a consequence, the capital flows generate significant volatility in the currency markets Hays, Freeman, & Nesseth (2003).

During politically uncertain periods, rumors are in abundant supply. During campaign and election periods of Kenya in particular, rumors tend to be negative, and there are major security concerns. All this negativity creates a skewed perception on the side of investors. Due to the abundance of rumors, investor behavior is likely to be more erratic.

2.2. Causes of exchange rate volatility

There has been an ongoing controversy about the cause-effect relationship between exchange rate volatility and other variables. Some are of the opinion that exchange rate volatility has worsened inflation-unemployment tradeoffs and caused harsh cycles of inflation and depreciation. However, there are those whose perspective is that the cause-effect relationship runs in the opposite direction. Economic variables, underlying financial conditions, and policies primarily cause exchange rate volatility.

Habeler (1954) in this study is among those who believe that macroeconomic instability is the primary cause of volatility of exchange rates rather than vice-versa.

2.3. Exchange rate regimes

The Bretton Woods system was established after the Second World War. It required countries to have a pegged exchange rate tied to the value of gold. Its main goals were to achieve a balance of payments for countries and the prevention of competitive devaluation of currencies. However, in the 1960s, some economists were of the idea that the system of pegged exchange rates despite its benefits, was not worth the costs it imposed. They believed that a more flexible exchange rate was of great need.

In the August of 1971, the Bretton Woods system officially came to an end, and the pegged rate system collapsed. Many industrialized countries exchange rates against the dollar remained flexible but have been heavily regulation and intervention imposed on occasion. A major criticism of the pegged exchange rate system is the attempt to rescue it by the use of trade restrictions. The irony in this is that one of the intended purposes of the pegged exchange rate system was to promote trade McKinnon (2010); Mundell (1961). A fixed exchange rate reduces the volatility of exchange rates and as a consequence reduces exchange rate risk.

However, a study by Haberler(1954) argues that a pegged exchange rate is less flexible in comparison to a floating rate. Willett (1976) is of a similar opinion. A major criticism is that empirical evidence shows that the macroeconomic performance has been extremely poor in the floating exchange rate era when compared to the pegged exchange rate era. Kohlhagen (1977) gives unbiased evidence that on average the accuracy with which subsequent spot rates are predicted by forwarding rates has deteriorated. Similarly, bid-ask spreads were not as wide in the pegged exchange rate system when compared to floating exchange rates.

2.4. Implications of political risk

2.4.1. FDI

A major concern for governments especially those of developing countries is how to attract foreign direct investment. This happens to have even greater complexities for developing countries that have a particularly high political risk. Kobrin (1979) argues that a country may be unable or unwilling to provide a favorable political environment for FDI. Unwillingness arises mostly from the policymakers' choices in unfavorable

policies, and inability mostly arises from social unrest and inability raising security concerns. Similarly, Butler & Joaquin(1998) argue that for a multinational to undertake FDI in a country with relatively high political risk, it will require a higher return on its investment.

Le & Zak (2006) show that capital flight occurs due to political risk in the host countries. However, political risk in foreign countries may also affect the FDI of the local country. If the country of origin is experiencing higher political risk, the FDI inflow from that particular country is most likely to increase Aguiar, Aguiar-Conraria, Gulamhussen, & Magalhães (2012). Political risk has a negative effect on FDI but is more significant in developing countries. Extensive research has been done, and many models have been developed with political risk as a variable in the determination of FDI inflows Bennett & Green(1972).

2.4.2. Economic Performance: Growth

In 1992, economic growth shrunk by 0.8%. In 1997, growth was 0.5%. In 2002, economic growth was only a mere 0.55% deteriorating from the previous growth of 3.8% in the previous year. In 2003, growth increased approximately four times to 2.23%. In 2008, the country exhibited economic growth of only 0.25% after a tremendous growth of 7% in 2007.

2.4.3. Inflation

If the purchasing power parity holds, higher inflation calls for higher spot rates. The relationship between inflation and exchange rates is quite simple. On average, inflation rates that are well above the world average tend to have depreciating exchange rates. Similarly, inflation rates that are substantially below the world average tend to have appreciating exchange rates.

However, this may not always be the exposition, and there may exist instances when purchasing power parity does not hold. Obstfeld & Rogoff (1996) argues that in a majority of situations, it is found that political risk will lead to real appreciation or depreciation of exchange rates regardless of country classification according to income or region. There are instances where developing countries with high prices exhibit appreciating exchange rates. Both points of view have a similar view that real exchange rates are impacted by political risk. The study argues that high inflation rates are more variable than low inflation rates, and hence generally generate great uncertainty Ackley(1978). For the case of Kenya in particular, inflation is higher in election years.

2.4.4. Bonds and Stocks

Lin & Roberts (2001) demonstrate how in Taiwan certain stocks exhibited an abnormal return as a result of the effect of expectations of investors. The expectations were during a period of political uncertainty as the investors were unsure of the outcome of the 2000 presidential election.

Similarly, Pantzalis, Stangeland, & Turtle(2000) discovered that the weeks before elections exhibited the strongest abnormal returns in stock price movements. They attributed this discovery to the high political uncertainty during the final weeks of campaign activity. According to Schwert (1989), the high volatility exhibited in the US stock markets during the great depression of 1929 to 1939 could be attributed to the political uncertainty regarding whether or not the capitalist system would survive in the US.

2.4.5. Exchange Rates

Brada et al. (1993); Kutan & Zhou (1995) conducted an empirical study on 36 countries -both industrial and developing- on how spreads vary with the variability of exchange rate volatility and country risk. They particularly focused on the politically risky events in South Africa and its effect on the rand spread: demonstrations, armed attacks, and related deaths. Time series evidence yielded estimates that the spread on the South African rand increased during the particular occurrences. They also concluded that the greater the intensity of the risk events in a country, the greater the conditional variance of spot exchange rates.

Bernhard & Leblang (2002) investigate the impact of parliamentary processes on the volatility of exchange rates. Using daily data from four currencies: British pound, French franc and Swedish krona they obtained results that volatility of exchange rates is often increased by political events.

In Kenya, Ntwiga (2012) examined the effects of the 2007/2008 post-election violence shocks on foreign currency exchange rates. He concluded that a shift in volatility will always occur when market equilibrium changes due to economic and political reasons.

OCHIENG (2013) conducted an empirical study examining the effect of political risk on exchange rates in Kenya. His main results were based on the event study methodology conducted between May 2010 and April 2013. He used daily time series data of 3 currencies: American dollar, Euro, and Ugandan Shilling. From his results, he observed that politically risky events had a statistically significant effect on the dollar, the Ugandan shilling showed no significant relationship and the Euro showed a very minimal reaction.

2.5. Political risk in developed vs. developing countries

Hausmann, Panizza, & Rigobon (2006) conducted a study on the real effective exchange rate (REER) volatility in developed and developing countries. From a sample of 74 countries and data from 1980 to 2000, they concluded that REER volatility is around three times lower in developed countries than in developing countries. They attributed the difference in the long-run volatility to the persistence of volatility; but not magnitude or frequency of shocks.

2.6. GARCH models

GARCH stands for the general autoregressive conditional variance. It was first proposed by Bollerslev in 1986. It is a modification of ARCH (autoregressive conditional heteroskedasticity). Conditional implies a dependence

of observations on the immediate past. GARCH is a mechanism that includes past variances in the explanation of future variances.

Foreign exchange markets couple high persistent periods of volatility and tranquility with significant fat tailed behavior. GARCH is appropriate as takes into account the fat tailed behavior (excess kurtosis) and volatility clustering of exchange rates Braun, Nelson, & Sunier(1995) posit that if shocks to volatility persist for long periods, then changes in asset prices due to volatility movements can be large, and the GARCH model can be used to capture volatility clustering.

It is evident that there are many difficulties that arise in the direct estimation of equilibrium exchange rates. This increases the importance of exchange rate analysis involving the investigation of the time series properties of the behavior of exchange rates. This type of analysis can't prove the efficiency of speculation so that equilibrium conditions changes are a reflection of the observed exchange rate volatilities. However, such analysis can be used to rule out the empirical relevance of particular types of hypotheses about badly behaved speculation.



Chapter Three: Methodology

This chapter outlines the research methodology the study adopted. It covers the research design, population of the study, sampling methods used, data collection methods and data analysis techniques.

3.1. Research design

Research design provides guidelines that direct the researcher towards solving the problem and may vary depending on the nature of the problem being studied.

This study adopted the descriptive research design. A descriptive research attempts to get the descriptive existing phenomenon by exploring the existing status of two or more variables at a given position time hence was the most suited to this research.

3.2. Population sampling

This study intended to cover the period from June 2007 to August 2013. This period covers three major political events: the 2007 general elections, the 2010 constitutional referendum, and the 2013 general election.

The currencies for the study are the USD and EURO. The basis for the sample selection is as follows: the USD is the dominant foreign currency traded in the world and also the most widely held. The EURO is the currency used in the largest trading bloc in the world: the European Union and the second most traded currency Hawkins, J., & Masson, P. (2003).

3.3. Data collection

This research purely used secondary sources of data. Data was retrieved from Central Bank of Kenya, Kenya national bureau of statistics (KNBS) and Kenyan newspapers. The data collected was the daily quoted exchange rates for the currencies under this study.

3.4. The model

3.4.1 Log Price Relative (LPR)

The LPR can be considered an adequate measure of exchange rate returns Cai, Chen & Fang (2010). The following are reasons:

i) Change in natural log \approx percentage change

Infinitesimally changes in the natural log of a variable are approximately equal to percentage changes to a very close approximation. This property of the natural log function is defined by

$$LN(1 + r) \approx r$$

ii) Errors measured in natural-log units \approx percentage errors

Errors in the predicted logged series are approximately equivalent to the percentage errors in predicting the original series.

iii) Coefficients in log-log regressions \approx proportional percentage changes

The negligible impact of one variable on the expected value of another is linearly approximate and *proportional* to the *percentage* changes. Therefore, applying a diff-log transformation to both dependent and independent variables may be appropriate. The exchange rate returns are obtained as follows:

$$Y_t = \ln\left(\frac{X_t}{X_{t-1}}\right) = \ln(X_t) - \ln(X_{t-1})$$

Where:

Y_t is the LPR (rate) at time t, and

X_t is the exchange rate at time t.

3.4.2 Volatility Description and Measurement

The risk of an asset return is at times explained by the volatility of the asset return. Statistically, it's represented by the standard deviation.

$$\sigma_{\bar{x}} = \frac{1}{T-1} \sqrt{\sum_{i=1}^T (r_t - \mu)^2}$$

Where:

r_t is the log-normal return on day t, and

μ is the average return over the T-day period.

In this paper, the exchange rate volatility was depicted as the volatility of the LPR.

3.4.3 The Generalized Autoregressive Conditional Heteroskedastic (GARCH) Model

Consider the return equation based on Cai, Chen & Fang (2010) for exchange rates:

:

$$R_t = \mu_t + a_t$$

Where μ_t is the mean LPR over a period of time.

a_t =residual returns with $a_t = \sigma_t \varepsilon_t$ where ε_t is a random walk and is δ_t^2 is the conditional variance

$$a_t = \sigma_t \varepsilon_t$$

The GARCH model is used to model changes in the variance of the LPR of some financial data Dukich, Kim, & Lin (2010). The GARCH model is appropriate as it takes into account excess kurtosis in the distribution of exchange rate returns (heavy-tailed distribution). It also considers that the variance of time series is not constant, and in which the variance of one period is dependent on the variance of the previous period. The GARCH model can be expressed as:

$$\delta_t^2 = \omega + \beta(L)\delta_{t-k}^2 + \alpha(L)\eta_t^2$$

Where δ_t^2 is called the conditional variance. B(L) and $\alpha(L)$ are polynomials of the lag operators and $\eta_t^2 = Y_t - \mu$ which is known as the innovation. The variance at time t is a function of the variance at time $t - i$ and the innovation at time t. The GARCH model with lag parameters β_p and α_q are referred to as GARCH(p,q) Bollerslev (1986,1987).

Alternatively, GARCH (p,q) could be expressed as:

$$a_t = \sigma_t \varepsilon_t$$

$$\sigma_t^2 = \alpha_0 + \sum_{i=1}^p \alpha_i a_{t-i}^2 + \sum_{j=1}^q \beta_j \sigma_{t-j}^2$$

Where:

$$\varepsilon_t \sim \text{idd}(0,1), \alpha_0 < 1 \text{ and } \sum_{i=1}^{\max(p,q)} (\alpha_i + \beta_i) < 1.$$

α_0 , α_i 's and β_i 's are constants.

We will be using a GARCH (1,1) which is defined by

$$a_t = \sigma_t \varepsilon_t$$

$$\sigma_t^2 = \alpha_0 + \alpha_1 a_{t-1}^2 + \beta_1 \sigma_{t-1}^2$$

Where:

$$\varepsilon_t \sim \text{idd}(0,1), \alpha_1 + \beta_1 < 1, \text{ and } \alpha_0, \alpha_1, \beta_1 > 0.$$

A GARCH model can be extended to reflect or model the leverage effect. A leverage effect is the relationship between asset returns stating that as volatility increases then stock prices fall. This leverage effect is model using a threshold GARCH (TGARCH). A TGARCH (1,1) is defined below:

$$a_t = \sigma_t \varepsilon_t$$

$$\sigma_t^2 = \alpha_0 + (\alpha_1 + \gamma_1 D_{t-1})a_{t-1}^2 + \beta_1 \sigma_{t-1}^2$$

Where:

D_{t-1} is the dummy variable for political risk. Beaulie, Cosset & Essaddam (2005); Cai, Chen and Fang (2010) similarly use a dummy variable for political risk in both their models.

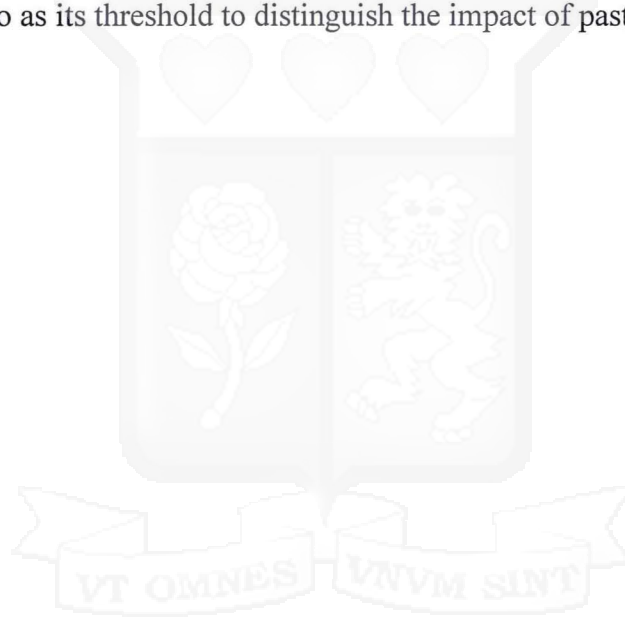
$$D_{t-1} = \begin{cases} 1 & \text{if } a_{t-1} < 0 \\ 0 & \text{if } a_{t-1} \geq 0 \end{cases}$$

$\gamma_1 > 0$ is a constant.

All the other variables are as previously defined.

Note that $a_{t-1} < 0$ implies that the days are politically risky, otherwise $a_{t-1} \geq 0$ implies that the days are not politically risky.

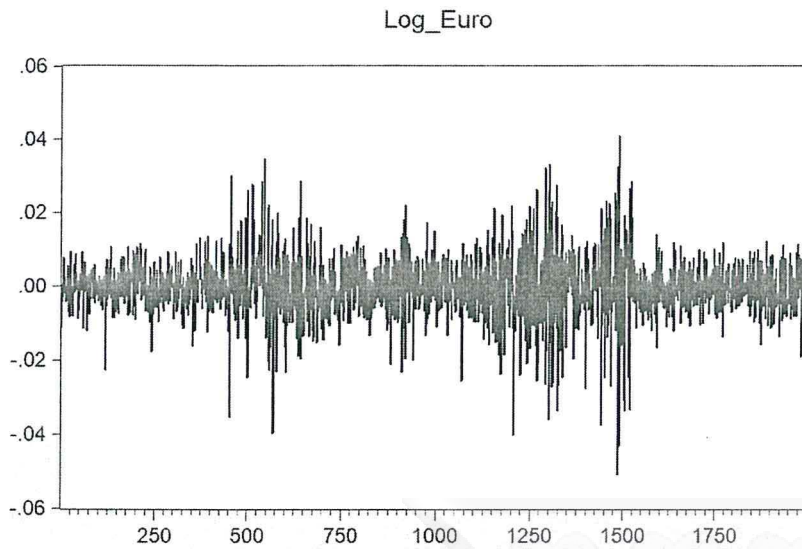
Also note that a positive a_{t-1} will contribute $\alpha_1 a_{t-1}^2$ to σ_t^2 , and a negative a_{t-1} has a larger impact $(\alpha_1 + \gamma_1) a_{t-1}^2$. The model uses zero as its threshold to distinguish the impact of past shocks (news).



Chapter Four: Data Analysis

Analysis of the data was conducted using E-views.

4.1. Log euro heteroskedasticity tests



The magnitude of the seasonal changes is greater when the data values are greater, and therefore the seasonal changes are multiplicative. The magnitude of the seasonal change increases over time as the data values increase.

Heteroskedasticity Test: White

F-statistic	12.23874	Prob. F(1,1995)	0.0005
Obs*R-squared	12.17631	Prob. Chi-Square(1)	0.0005
Scaled explained SS	36.38404	Prob. Chi-Square(1)	0.0000

Test Equation:

Dependent Variable: RESID^2

Method: Least Squares

Date: 11/22/17 Time: 11:36

Sample: 2 1998

Included observations: 1997

Collinear test regressors dropped from specification

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	6.45E-05	3.81E-06	16.91725	0.0000
POLITICAL_RISK^2	5.51E-05	1.57E-05	3.498391	0.0005
R-squared	0.006097	Mean dependent var		6.77E-05
Adjusted R-squared	0.005599	S.D. dependent var		0.000166
S.E. of regression	0.000165	Akaike info criterion		-14.57782
Sum squared resid	5.44E-05	Schwarz criterion		-14.57221
Log likelihood	14557.95	Hannan-Quinn criter.		-14.57576
F-statistic	12.23874	Durbin-Watson stat		1.486733
Prob(F-statistic)	0.000478			

F-statistic

The F-statistic is simply a ratio of two variances. Variances are a measure of dispersion, or how far the data are scattered from the mean. Larger values represent greater dispersion. At this point, the F-statistic is used to assess whether the variance is heteroscedastic. F-statistic is defined by

$$F = \frac{\left(\sum_{i=1}^K \frac{n_i(\bar{Y}_i - \bar{Y})^2}{K-1} \right)}{\sum_{i=1}^K \sum_{j=1}^{n_i} \frac{(Y_{ij} - \bar{Y}_i)^2}{N-K}}$$

The hypothesis is defined as:

Null hypothesis: The variances are constant over time.

Alternative hypothesis: The variances vary over time.

For an F-statistic, if the critical value is greater than the level of significance $\alpha = 0.05$, then reject the null hypothesis. The F-statistic is 12.38 which is greater than the level of significance and thus the null hypothesis is rejected and concludes that the variances vary over time, that is heteroskedastic.

R-squared and Adjusted R-squared

R-squared is a statistical measure of how close the data are to the fitted regression line. It is also known as the coefficient of determination, or the coefficient of multiple determination for multiple regressions. Adjusted R-squared is usually adjusted for the degrees of freedom. The **adjusted R-squared** is a modified version of **R-squared** that has been **adjusted** for the number of predictors in the model. The **adjusted R-squared** increases only if the new term improves the model more than would be expected by chance. It decreases when a predictor improves the model by less than expected by chance. R-squared is defined by

$$R^2 = \left(\frac{n(\sum xy) - (\sum x)(\sum y)}{\sqrt{[n\sum x^2 - (\sum x)^2][n\sum y^2 - (\sum y)^2]}} \right)^2$$

Adjusted R-squared is defined by

$$R^{2*} = 1 - \frac{(1 - R^2)(N - 1)}{N - p - 1}$$

Where p is the number of predictors and N is the total sample size.

R-squared in our case is 0.006097 and adjusted R-squared is 0.005599 implying that the model explains 0.56% of the data's variation around its mean.



Akaike Information Criterion

The **Akaike information criterion** (AIC) is an estimator of the relative quality of statistical models for a given set of data. Given a collection of models for the data, AIC estimates the quality of each model, relative to each of the other models. Thus, AIC provides a means for model selection. AIC is defined by

$$AIC = 2k - 2 \ln(\hat{L})$$

Where \hat{L} is the maximum value of the likelihood function, and k is the number of parameters to be estimated.

The value of AIC in this case is -14.58.

Schwarz Criterion

The **Schwarz criterion** is also called the Bayesian information **criterion** (BIC). This is a **criterion** for model selection among a finite set of models; the model with the lowest BIC is preferred. It is based, in part, on the likelihood function and it is closely related to the Akaike information **criterion** (AIC). BIC is defined by

$$BIC = \ln(n) k - 2 \ln(\hat{L})$$

Where \hat{L} is the maximum value of the likelihood function, n is the sample size, and k is the number of parameters to be estimated.

The SIC for this case is -14.5722.

Durbin-Watson Test

The **Durbin–Watson** statistic is a **test** statistic that is used to detect the presence of autocorrelation in the residuals. **The Durbin Watson test looks for a specific type of serial correlation, the AR(1) process.** The Hypotheses for the Durbin Watson test are:

Null hypothesis: No first order autocorrelation.

Alternative hypothesis: First order correlation exists. (For a first order correlation, the lag is one time unit).

Assumptions are:

1. That the errors are normally distributed with a mean of 0.
2. The errors are stationary.

The Durbin-Watson (DW) test statistic is defined by

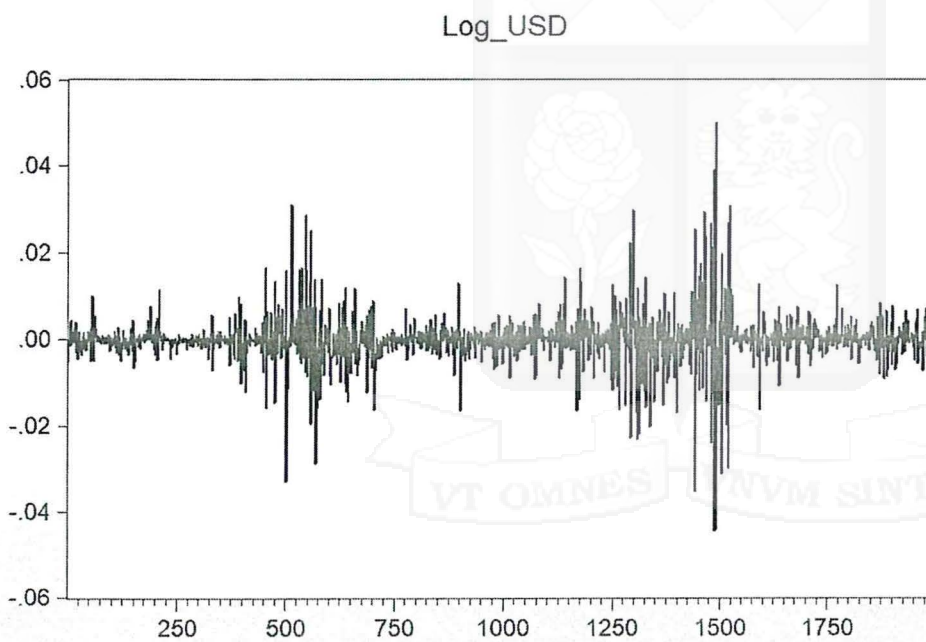
$$D = \frac{\sum_{t=2}^T (e_t - e_{t-1})^2}{\sum_{t=1}^T e_t^2} \text{ where } E_t \text{ are the residuals.}$$

The Durbin Watson test reports a test statistic, with a value from 0 to 4, where:

1. 2 is no autocorrelation.
2. 0 to <2 is positive autocorrelation (common in time series data).
3. >2 to 4 is negative autocorrelation (less common in time series data).

From the data, the DW test statistic is 1.49 implying that there is a positive autocorrelation. Since the test statistic is greater than the level of significance $\alpha = 0.05$, reject the null hypothesis and conclude that there exists a first-order correlation.

4.2. Log USD heteroskedasticity tests



The magnitude of the seasonal change increases over time as the data values increase.

Heteroskedasticity Test: White

F-statistic	27.98944	Prob. F(1,1995)	0.0000
Obs*R-squared	27.62986	Prob. Chi-Square(1)	0.0000
Scaled explained SS	261.6582	Prob. Chi-Square(1)	0.0000

Test Equation:

Dependent Variable: RESID^2

Method: Least Squares

Date: 11/22/17 Time: 11:38

Sample: 2 1998

Included observations: 1997

Collinear test regressors dropped from specification

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.57E-05	2.94E-06	8.736922	0.0000
POLITICAL_RISK^2	6.42E-05	1.21E-05	5.290504	0.0000
R-squared	0.013836	Mean dependent var		2.94E-05
Adjusted R-squared	0.013341	S.D. dependent var		0.000128
S.E. of regression	0.000127	Akaike info criterion		-15.09826
Sum squared resid	3.24E-05	Schwarz criterion		-15.09265
Log likelihood	15077.61	Hannan-Quinn criter.		-15.09620
F-statistic	27.98944	Durbin-Watson stat		1.424221
Prob(F-statistic)	0.000000			

F-statistic

The hypothesis is defined as:

Null hypothesis: The variances are constant over time.

Alternative hypothesis: The variances vary over time.

The F-statistic is 27.99 which is greater than the level of significance and hence reject the null hypothesis and conclude that the variances vary over time, that is heteroskedastic.

R-squared and Adjusted R-squared

R-squared is 0.0138 and adjusted R-squared is 0.01334 implying that the model explains 1.334% of the data's variation around its mean.

Akaike Information Criterion

The value of AIC in our case is -15.01. This shows that the EURO is a better model than the USD but by a small margin.

Schwarz Criterion

The SIC for our case is -15.09. This shows that the EURO is a better model than the USD but by a small margin.

Durbin-Watson Test

The Hypotheses for the Durbin Watson test are:

Null hypothesis: No first order autocorrelation.

Alternative hypothesis: First order correlation exists.

From the data, the DW test statistic is 1.42 implying that there is a positive autocorrelation. Since the test statistic is greater than the level of significance $\alpha = 0.05$, reject the null hypothesis and conclude that there exists a first-order correlation.

4.3. GARCH (1,1) euro returns

Dependent Variable: LOG_EURO

Method: ML ARCH - Normal distribution (BFGS / Marquardt steps)

Date: 11/22/17 Time: 13:03

Sample (adjusted): 2 1998

Included observations: 1997 after adjustments

Convergence achieved after 24 iterations

Coefficient covariance computed using outer product of gradients

Presample variance: backcast (parameter = 0.7)

GARCH = C(3) + C(4)*RESID(-1)^2 + C(5)*GARCH(-1)

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	-0.000338	0.000150	-2.260682	0.0238
POLITICAL_RISK	0.001291	0.000620	2.083270	0.0372

Variance Equation

C	1.05E-06	1.74E-07	6.040010	0.0000
RESID(-1)^2	0.083650	0.008989	9.305712	0.0000
GARCH(-1)	0.901013	0.009997	90.12598	0.0000

R-squared	-0.001737	Mean dependent var	-0.000163
Adjusted R-squared	-0.002239	S.D. dependent var	0.008229
S.E. of regression	0.008238	Akaike info criterion	-7.028554
Sum squared resid	0.135398	Schwarz criterion	-7.014534
Log likelihood	7023.011	Hannan-Quinn criter.	-7.023406
Durbin-Watson stat	1.995289		

Z-statistic

A **Z-test** is any statistical **test** for which the distribution of the **test statistic** under the null hypothesis can be approximated by a normal distribution. Because of the central limit theorem, many **test statistics** are approximately normally distributed for large samples. For a one sample Z-test, the Z score is defined by:

$$Z = \frac{x - \mu}{\sigma} \quad \text{for } n > 30$$

The hypotheses test is:

Null hypothesis: Are the variables independent.

Alternative hypothesis: Are the variables dependent.

The probability of the Z test is known as the p-value. If the p-value is less than the level of significance, reject the null hypothesis. The p-value for the variables C and political risk are 0.0238 and 0.0372 respectively, which are less than the level of significance, $\alpha = 0.05$ and therefore rejected the null hypothesis and concluded that the variables are dependent.

R-squared and Adjusted R-squared

R-squared in our case is -0.0017 and adjusted R-squared is -0.0022 implying that the model explains (0.22)% of the data's variation around its mean.

Akaike Information Criterion

The value of AIC in our case is -7.03.

Schwarz Criterion

The SIC for our case is -7.015.

Durbin-Watson Test

The Hypotheses for the Durbin Watson test are:

Null hypothesis: No first order autocorrelation.

Alternative hypothesis: First order correlation exists.

From the data, the DW test statistic is 1.9953 implying that there is a positive autocorrelation. Since the test statistic is greater than the level of significance $\alpha = 0.05$, the null hypothesis is rejected and conclude that there exists a first-order correlation.

Hannan-Quinn Criterion

The **Hannan–Quinn information criterion (HQC)** is a criterion for model selection. It is an alternative to Akaike information criterion (AIC) and Bayesian information criterion (BIC). It is given as

$$HIC = -2L_{\max} + 2k \ln(\ln(n))$$

Where L_{\max} is the log-likelihood, k is the number of parameters, and n is the number of observations.

In our case, the HIC value is -7.0234.

4.4. GARCH (1,1) USD returns

Dependent Variable: LOG_USD
 Method: ML ARCH - Normal distribution (BFGS / Marquardt steps)
 Date: 11/22/17 Time: 13:05
 Sample (adjusted): 2 1998
 Included observations: 1997 after adjustments
 Convergence achieved after 24 iterations
 Coefficient covariance computed using outer product of gradients
 Presample variance: backcast (parameter = 0.7)
 GARCH = C(3) + C(4)*RESID(-1)^2 + C(5)*GARCH(-1)

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	-9.48E-05	4.51E-05	-2.099543	0.0358
POLITICAL_RISK	0.000477	0.000296	1.611373	0.1071
Variance Equation				
C	2.17E-07	2.46E-08	8.821516	0.0000
RESID(-1)^2	0.279011	0.014531	19.20111	0.0000
GARCH(-1)	0.775557	0.007065	109.7672	0.0000
R-squared	-0.001483	Mean dependent var	-8.79E-05	
Adjusted R-squared	-0.001985	S.D. dependent var	0.005427	
S.E. of regression	0.005433	Akaike info criterion	-8.451345	
Sum squared resid	0.058881	Schwarz criterion	-8.437326	
Log likelihood	8443.668	Hannan-Quinn criter.	-8.446197	
Durbin-Watson stat	1.833069			

Z-statistic

The hypotheses tests are:

Null hypothesis: Are the variables independent.

Alternative hypothesis: Are the variables dependent.

The p-value of the variable C is 0.0358 which is less than the level of significance, $\alpha = 0.05$ and therefore the null hypothesis is rejected and concludes that the variable C is dependent. The p-value of the political risk variable is 0.1071 which is greater than the level of significance $\alpha = 0.05$ and therefore fail to reject the null hypothesis and conclude that the variable is independent.

R-squared and Adjusted R-squared

R-squared in our case is -0.00148 and adjusted R-squared is -0.00199 implying that the model explains (0.199)% of the data's variation around its mean.

Akaike Information Criterion

The value of AIC in our case is -8.45. The smaller the AIC, the better the model. The GARCH (1,1) Euro model has a smaller AIC than the GARCH (1,1) USD model hence the Euro is a better model.

Schwarz Criterion

The SIC for our case is -8.437. The smaller the BIC, the better the model. The GARCH (1,1) Euro model has a smaller BIC than the GARCH (1,1) USD model hence the Euro is a better model.

Durbin-Watson Test

The Hypotheses for the Durbin Watson test are:

Null hypothesis: No first order autocorrelation.

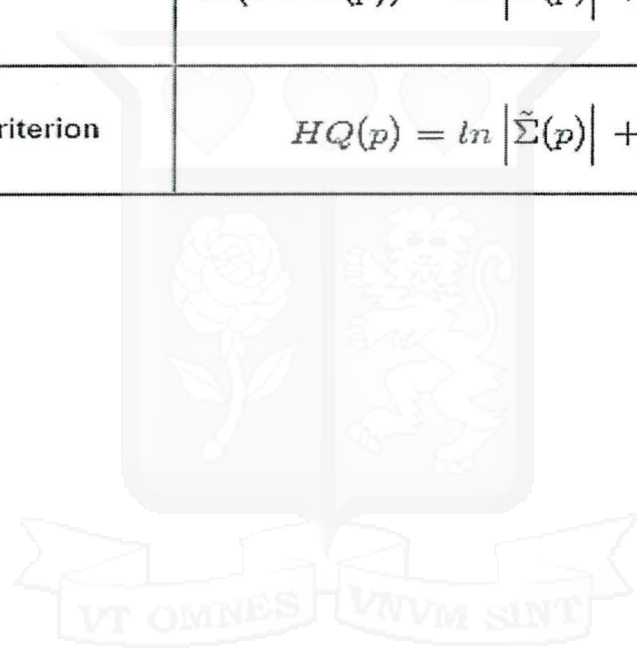
Alternative hypothesis: First order correlation exists.

From the data, the DW test statistic is 1.833 implying that there is a positive autocorrelation. Since the test statistic is greater than the level of significance $\alpha = 0.05$, reject the null hypothesis and conclude that there exists a first-order correlation.

Hannan-Quinn Criterion

In our case, the HIC value is -8.446. The smaller the HIC, the better the model. The GARCH (1,1) Euro model has a smaller HIC than the GARCH (1,1) USD model hence the Euro is a better model.

Estimator	Formula
Schwarz-Bayes Criterion (Bayesian Information Criterion)	$SBC(p) = \ln \tilde{\Sigma}(p) + \frac{\ln(\hat{T})}{\hat{T}} pM^2$
Akaike Information Criterion	$AIC(p) = \ln \tilde{\Sigma}(p) + \frac{2}{\hat{T}} pM^2$
Akaike's Final Prediction Error	$FPE(p) = \tilde{\Sigma}(p) + \left(\frac{\hat{T} + Mp + 1}{\hat{T} - Mp - 1} \right)^M$ <p>and its logarithm (used in SIFT)</p> $\ln(FPE(p)) = \ln \tilde{\Sigma}(p) + M \ln \left(\frac{\hat{T} + Mp + 1}{\hat{T} - Mp - 1} \right)$
Hannan-Quinn Criterion	$HQ(p) = \ln \tilde{\Sigma}(p) + \frac{2 \ln(\ln(\hat{T}))}{\hat{T}} pM^2$



Chapter Five: Conclusion

The study used various test statistics to test for:

1. Heteroscedasticity.
2. Model selection.
3. Dependency.
4. Autocorrelation.

5.1. Heteroscedasticity

The study used the F-statistic to test for heteroscedasticity in two models: Log Euro and Log USD. Both models are heteroscedastic.

5.2. Model selection

The study used various information criterions such as the Akaike Information Criterion (AIC), Schwarz Information Criterion (BIC), and the Hannan-Quinn Information Criterion (HQC) to determine which model is the best fit. We have also used R-squared and adjusted R-squared to determine the model fit, that is how close the data are to the fitted regression line. The following is a table representing all the information criterions tested:

	AIC	BIC	HIC/HQC
Log Euro	-14.578	-14.572	-14.576
Log USD	-15.098	-15.093	-15.096
GARCH (1,1) Euro	-7.029	-7.015	-7.023
GARCH (1,1) USD	-8.451	-8.437	-8.446

The smaller the information criterion, the better the fit of the model. Comparing the log Euro and the GARCH (1,1) Euro, GARCH (1,1) Euro has a smaller AIC, BIC and HQC than the log Euro which is actually half the information criterion of the log Euro and this implies that the GARCH (1,1) Euro is a better model than the log Euro. Comparing the log USD and the GARCH (1,1) USD, the GARCH (1,1) USD has smaller information criterions compared to the log USD which is actually half the information criterions of the log USD and this implies that the GARCH (1,1) USD is a better model than the log USD.

The model also used R-squared and adjusted R-squared to determine how much of the model is explained by the predictor/explanatory variable. Adjusted R-squared is a modified value of R-squared that is adjusted to the degrees of freedom of the predictors. The following table shows the values of the adjusted R-squared for the four models:

Model	Adjusted R-squared
Log Euro	0.56%
Log USD	1.33%
GARCH (1,1) Euro	(0.22)%
GARCH (1,1) USD	(0.199)%

5.3. Dependency

The model used the Z-statistic to test for the dependence of the variables in the GARCH (1,1) Euro and USD models. The following table shows the results probability of the Z statistics or the p-values:

	C	Political Risk
GARCH (1,1) Euro	0.0238	0.0372
GARCH (1,1) USD	0.0358	0.1071

The p-values of the variable C in both the GARCH (1,1) Euro and USD models are less than the level of significance $\alpha = 0.05$ implying that the variables are dependent. The p-values of the political risk variables in GARCH (1,1) Euro and GARCH (1,1) USD are 0.0372 and 0.1071 respectively, which are less than and greater than the significance level therefore rejected the null hypothesis in GRACH (1,1) Euro and failed to reject the null hypothesis in GARCH (1,1) USD. This implies that the political risk variable in GARCH (1,1) Euro is dependent whereas the political risk variable in the GARCH (1,1) USD is partially dependent.

5.4. Autocorrelation

The model used the Durbin-Watson test statistic in the four models to determine if the models are auto-correlated. The Durbin Watson test reports a test statistic, with a value from 0 to 4, where: 2 is no autocorrelation, 0 to <2 is positive autocorrelation (common in time series data), and >2 to 4 is negative autocorrelation (less common in time series data). The table below shows the DW test statistics for the four models:

Model	DW Statistic
Log Euro	1.49
Log USD	1.42
GARCH (1,1) Euro	1.995
GARCH (1,1) USD	1.83

All the models have a Durbin-Watson test statistic that lies between 0 and 2 implying that they all have a positive autocorrelation.

5.5 Limitations

There was a difficulty in obtaining data from all the trading days for the exchange rates. However, majority of the observations had reliable sources.

A major limitation was that during some of the politically risky periods, other events were occurring. Particularly in the 2007/2008 period, the global financial crisis was also taking place. There is a possibility that this too contributed to the excess volatilities but there is no certain way of separating the effects from both.

5.6 Recommendations

Additional studies could be done to investigate the effects of political risk on other major currencies, for example rates the Japanese yen (JPY), the British pound (GBP), etc.

Similarly, further research is necessary to establish the effects of both negative and positive political shocks on the Kenyan economy. A particular focus could be put a comparison between the reactions for positive and negative shocks.

5.7. Summary

Volatility models have been applied in a wide variety of applications. In most cases, volatility is itself an interesting aspect of the problem. In some cases, volatility is an input used for purposes of measurement, like in the example of estimating the value at risk. In other cases, volatility may be a causal variable, as in models expected volatility is a determinant of expected returns. We model the conditional volatility of the EURO and USD exchange rates using a TGARCH(1,1) model with a political risk dummy. We reject the null hypothesis in GRACH (1,1) Euro and fail to reject the null hypothesis in GARCH (1,1) USD. This implies that the political risk variable in GARCH (1,1) Euro is dependent whereas the political risk variable in the GARCH (1,1) USD is partially dependent. In general, the results of the analysis suggest that the Kenyan market reacts to political risk causing higher volatility i.e. there is a shift in volatility when market equilibrium changes due to political risk.

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