

# Election Violence Shocks in Kenya and its Effect on Foreign Currency Exchange Rates

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## **Abstract**

*Foreign exchange markets are extremely sensitive to rare events. Kenyan election violence of January and February 2008 was such an event. Kenya, an emerging market has information asymmetry, skewed perception and inherent volatility. We analyze the election violence shocks on the foreign currency rates. Daily time series data is from January 2007 to December 2008, for pre-violence, violence and post-violence periods. The GARCH model tests for asymmetry volatility and estimates annual volatility. Friedman nonparametric test was used to test for the significance difference between the countries' and periods' volatility. Correlation tests for linear relationship between the countries and each of the three periods under study, while descriptive statistics summarizes the data. The violence period had highest correlation with GARCH parameters indicating a reactive period, showing over reaction in the market. Emerging and developed markets exchange rates correlate negatively but positively amongst themselves, with similar perception on the crisis. The violence shocks adversely affected the exchange rates by increasing asymmetrical volatility, market over reaction and negative perception of the country. Emerging and developed markets differed in perception, information flow and reactions to the violence. Therefore, significant change in economic and political scene is bound to shift the market equilibrium.*

**Keywords:** Foreign exchange, currency, volatility, election, violence

## **INTRODUCTION**

Foreign exchange markets, Kenya's included, are sensitive to political and economic events, for example, coup attempts, terrorist attacks and hyperinflation, among others. On December 27, 2007, Kenyans went to the polls to elect their president and members of parliament. In the aftermath, disputations of the election results triggered violence that resulted in death and destruction not witnessed before in the history of the country. Reactions to the unfolding events varied across the world.

When an event like the one that occurred in Kenya happens, observers around the globe are suddenly drawn. Millions of decisions that drive that market are no longer randomly independent but subject to a common shared perception. Reactions to unusual events, like election violence

are strongly influenced by the most recent information while heavily discounting older information. The surprise component of any new information is the difference between the announced value and an estimate of its expected value. Unusual events elicit different reactions in the market affecting the volatility of the currency rates and market liquidity.

Foreign exchange market liquidity is affected by market depth, tightness of the market, and the immediacy of the market, that is the speed at which traders will quote prices to other trades. In times of distress, volatility is usually large. This volatility depends on information flow that is highly dictated by the level of the financial markets integration and general market perceptions among other factors. Skewed perception on emerging market induces investor's to withdraw during the periods of crises, making the markets extremely volatile. These emerging markets are usually less mature and have less developed institutional framework making them less liquid.

Large market players can have similar trades; react similarly and simultaneously to an event, creating the herd behavior. This tends to increase the initial effects of an event due to over-reaction in the market by the investors. Given the linkages of international markets, contagion and feedback effects are felt for few days after the event due to after-shocks. In particular, an event in one part of the world will influence the volatility of world currencies differently. Globalization and integration of financial markets implies such unusual events correlate to the information imperfection that creates a diverse market reaction to changes in the global conditions (Dunis, Laws and Naim, 2003; Mende, 2005; Goyal, 2007; Kilian, 2008).

This paper analyzes how election violence shocks in Kenya affected the foreign exchange market. The asymmetrical volatility and correlated market reactions as evidenced during the crisis, and how these fluctuates on country to country basis. Section one is the introduction. Section two reviews over-reaction hypothesis, volatility asymmetry and correlation in exchange rate movements while Section three expounds on the methodology, data analysis and results. Finally, in Section four, we proffer some concluding remarks.

## **ELECTION VIOLENCE EFFECTS**

### **Overreaction Hypothesis**

Goyal (2007) observe that investor's withdrawal from emerging markets during the periods of crises were always large, which makes the markets extremely volatile. Between 1982 and 1999, Fair (2002) observed sixty-nine events with an effect of greater than or equal to 0.75%

absolute change in the S & P 500 futures. Time duration between trades is important and might contain useful information about market microstructure (Dunis et al., 2003; Goyal, 2007; Mende, 2005). An analysis is presented of possible extreme market movements in the exchange rate during the crisis period compared to the pre and post violence periods. Data available for analysis in the study is the daily mean exchange rates.

Fabozzi and Focardi (2004: 573) observes that, according, to the overreaction hypothesis, investors react to unanticipated news that will benefit a company's stock and this pushes the price up more than anticipated in a normal situation. Subsequently, there is a decline in the price of the stock. A possibility is that consumers and firms respond only to change in prices that are unprecedented in recent history. They also tend to respond to changes in prices proportionately showing a nonlinear transformation between the price and the level of information flow (Kilian, 2008; Shrivastava, 2005; Wang and Yang, 2006; Andrew, Hodrick, Xing and Zhang, 2006). We test the overreaction hypothesis with an expectation of increase in the exchange rate volatility during the days of the crisis, compared to the pre and post violence periods.

### **Asymmetry in Volatility**

Wang et al. (2006) tackle the issue of asymmetric volatility in the foreign exchange markets in depth. They found that currency rates are not symmetric, for some currencies have greater economic importance than others and bad news leads to greater exchange rate movements than good news. Studies on the informed and uninformed customer show that the amount of asymmetric information in the market plays an important role in determining the equilibrium exchange rate (Onur, 2007; Goudarzi and Ramanarayanan, 2011). We expect an asymmetry in information to play a role between emerging and the developed markets, with contrasting market reactions.

One fact about volatility is that it persists and clusters. High-volatility days tend to group together and that the same is true for low-volatility days (Poon and Granger, 2005; Braun, Nelson and Sunier, 1995; Wang et al., 2006; Mende, 2005). The celebrated Black and Scholes model shows that the mean return on the stock is irrelevant and volatility is the most important factor in determining option prices. Braun et al., (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.

### **Correlation in Exchange Rates**

A study between major currencies indicates that European currencies have high correlations with each other and the Euro, on the order of 0.90. The British Pound has high correlations with European currencies, around 0.60 – 0.70 (Jorion, 2003; Brooks and Hinich, 2006). When successive returns are uncorrelated, the volatility increases. Sudden shift in volatility realized with every significant economic and political event both in the domestic and global scenes is due to markets correlation (Goyal, 2007; Goudarzi et al., 2011). We expect volatility and correlation to shift depending on market conditions in the study and vary between the countries sampled.

### **METHODOLOGY**

The period under study is January 2007 to December 2008. The data has three sections. The first part runs from January to December 2007, the pre-election period, the second part from January - February 2008, election violence period, and the third, from March - December 2008, post-election violence period. The peace agreement between the warring parties was signed on 28<sup>th</sup> February 2008, after two months of violence.

The currencies for the study are the British pound (GBP), the American dollar (USD), the Ugandan Shilling (USHS) and the Tanzanian shilling (TSHS). The sample is selected on the following basis, the USD is the dominant foreign currency in the Kenyan market, the GBP, Britain was Kenya's former colonial master, and the TSHS and the USHS, Kenya's neighbors, members of the East Africa Community and also emerging market currencies. Data is available from the Central Bank of Kenya website (Central Bank of Kenya, 2012).

The hypotheses that capture the objectives of the study are:

*H<sub>1a</sub> : Election violence induced asymmetry in volatility*

*H<sub>1b</sub> : Correlation in foreign exchange rates amongst the countries increased*

*H<sub>1c</sub> : There is evidence of over-reaction in the market*

## **Data Analysis**

We use Ms Excel and Matlab 7.1 software to analyze the data. Descriptive statistics ascertains the variations in the general movements of the exchange rates. The Friedman nonparametric test is used to test whether the variability in the exchange rate between the Kenya Shilling and the currencies of the countries under study have any significant change over the three periods. Correlation captures the correlated patterns in the data. The Generalized Autoregressive Conditional Heteroskedasticity (GARCH) is used in analyzing volatility clustering, its asymmetry and variations. The GARCH model further estimates the daily and annual volatility of the data for each of the three periods, using the GARCH parameters generated. These parameters have both the persistent and reactive coefficients. We test the data with GARCH (1, 1) and GARCH (2, 2) models.

## **Results**

The dominant foreign currency, USD, had higher volatility and more market reaction. GARCH shows an above average volatility clustering in the violence period due to overreaction and lag effects in the post violence. GARCH persistent and reactive coefficients vary in the three periods being lowest during the violence period as the violence lasted for only two months. USHS had the highest persistent coefficient, then GBP. USHS, pre-violence, and TSHS, post-violence period indicates that the expected future and current volatility are the same (summation of persistent and reactive coefficients is one). Generally, volatility and market reaction varies on period and country basis. Accepting that, market over reacted and induced asymmetry volatility.

The historical data has serial correlation. Correlation doubled during the crisis compared to the pre- and post violence periods. All the periods, there is positive correlation between the USHS and the TSHS, and between the USD and the GBP, and negative correlation for emerging versus developed markets. Information asymmetry, perception and volatility linked to emerging markets explain the observations. The hypothesis, the correlation in exchange rate movement increased during the violence period is true.

Highest standard deviation, low kurtosis and positive skewness are observed during the violence period, a nonlinear response to the crisis. The pre- and post violence periods had fat tails, a general characteristic of emerging markets, but equalized out by the crisis. Overall, USD had more stable changes in comparison to the other three currencies.

## **CONCLUSIONS**

The Kenyan foreign exchange market over reacted to the crisis, market became volatile, and an increase in correlated perception of the situation in Kenya by the world countries was observed. The correlation between the USD and the GBP with the Kenyan Shilling, versus the USHS and the TSHS correlation with the Kenyan Shilling in the three periods shows that the variations are due to importance of the currency to the Kenyan economy. Countries in the same block, in terms of economic and market growth will have high correlations. Information asymmetry from uninformed and informed investors in the Kenyan market triggered the volatility clusters during the crisis. A shift in volatility will always be realized when market equilibrium changes due to economic and political reasons.

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**APPENDIX A**  
**Correlation Tables**

**TABLE 1**  
**Correlation matrix – Pre election period**

|      | USHS  | TSHS  | USD | GBP |
|------|-------|-------|-----|-----|
| USHS | 1     |       |     |     |
| TSHS | 0.47  | 1     |     |     |
| USD  | -0.42 | -0.71 | 1   |     |
| GBP  | -0.39 | -0.49 | 0.7 | 1   |

**TABLE 2**  
**Correlation matrix – election violence period**

|      | USHS  | TSHS  | USD  | GBP |
|------|-------|-------|------|-----|
| USHS | 1     |       |      |     |
| TSHS | 0.84  | 1     |      |     |
| USD  | -0.94 | -0.86 | 1    |     |
| GBP  | -0.88 | -0.77 | 0.94 | 1   |

**TABLE 3**  
**Correlation matrix – post violence period**

|      | USHS  | TSHS  | USD  | GBP |
|------|-------|-------|------|-----|
| USHS | 1     |       |      |     |
| TSHS | 0.6   | 1     |      |     |
| USD  | -0.49 | -0.63 | 1    |     |
| GBP  | -0.3  | -0.36 | 0.55 | 1   |

**TABLE 4**  
**Annualized Volatility (%) per the period – GARCH**

|                | USHS  | TSHS  | USD   | GBP   |
|----------------|-------|-------|-------|-------|
| Pre-Violence   | 11.46 |       | 7.18  | 10.01 |
| Violence       | 25.82 | 26.85 | 27.61 | 25.88 |
| Post -Violence |       | 17.65 | 14.49 | 22.58 |

**APPENDIX B**  
**Visual Plots of the daily returns**

