Dynamics of asset prices in monetary policy; A case study of Kenya.

Name: Levin Langat;
Reg.No: 101880

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Strathmore Institute of Mathematical Science
Strathmore University
Nairobi, Kenya

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DECLARATION

I declare that this work has not been previously submitted and approved for the award of a degree by this or any other University. To the best of my knowledge and belief, the Research Project contains no material previously published or written by another person except where due reference is made in the Research Project itself.

Name: Levin Langat.

Sign:……..

Date:…02……../…06……/2021……..

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

Name: Dr. Godfrey Madigu.

Sign:…….

Date:……../……/20……..

Strathmore Institute of Mathematical Sciences

Strathmore University

Abstract

This study examines the extent to which stock returns are linked to interest rate, money supply and exchange rate in Kenya from 2000 to 2018, using GARCH (1,1). Some unanticipated results were uncovered, ultimately contributing to the existing body of literature, and illustrating how different markets respond to different stimuli. The most substantial was the significant positive relationship between stock returns and interest rates. A relationship that can be explained by the Keynesian hypothesis based on a sticky price model. In line with theory results revealed a negative and significant relationship between exchange rates and stock market price returns. Also, the study revealed a significant relationship between stock returns volatility and interest rates.

Abbreviations.

ARCH	Autoregressive Conditional Heteroskedasticity
GARCH	Generalized Autoregressive Conditional Heteroskedasticity
GDP	Gross Domestic Product
NASI	NSE all share index
NSE	Nairobi Securities Exchange
NSE20	NSE 20 share index

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1 CHAPTER 1

1.1 Background Information.

The prices of assets change over time. Hence, by predicting these changes, investors can purchase assets which may increase in value and generate profit from those assets. In all markets, there is at least one asset which is considered to keep its value constant over time (Copeland, Weston, & Shastri, 2005). Asset prices display different levels of volatility from one period to another, they exhibit volatility clustering where large changes in prices of assets tend to cluster together which results to persistence magnitudes of price changes (Tsay, 2010).

Asset prices are said to be related to the business cycle (Tsay, 2010). The business cycle, which encompasses the cyclical fluctuations in an economy over many months or a few years, can therefore be a critical determinant of asset market returns and the relative performance of various asset classes. Although every business cycle is different, historical analysis suggests that the rhythm of cyclical fluctuations in the economy has tended to follow similar patterns. Moreover, performance across asset categories typically rotates in line with different phases of the business cycle. As a result, a business cycle approach to asset allocation can add value as part of an intermediate-term investment strategy (Owen & Griffiths, 2006). Asset prices more preferably prices of equities tend to rise when the economy is in a boom and they tend to fall when the economy is in recession. Monetary policy aims at creating a favourable economic environment. This is achieved by trimming the volatility of asset prices hence control over the business cycle.

In frontier markets such as the Kenyan market, which is still developing, asset price discovery is not well enhanced compared to established markets such as the Chinese market (Yao, Luo, & Loh, 2013). This being the case it does not mean we cannot study a frontier market because they are still developing, but it provides us an opportunity of exploring asset price volatility under different business cycles.

Monetary policy aims at financial stability (Yao, Luo, & Loh, 2013). Financial markets are an important component in the transmission of monetary policy and a key role in fostering financial stability. Financial market development (FMD) aims at enhancing the capacity of the financial system to pool domestic savings and foreign capital in funding investment and consumption, and at enabling efficient risk-sharing.

A good monetary policy is depicted by the rise in economic growth and development both in the short run and long run.

By understanding the volatility of asset prices and their movement under different business cycles, the right monetary policy can be modelled to ensure market stability in the long run (Yao, Luo, & Loh, 2013). They can use such information to stir the economy in their desired direction by implementing monetary policies that will do just that for them.

The study employs a generalized autoregressive conditional heteroskedasticity model developed by Bollerslev (1986) to analyse volatility in asset prices. The main idea behind this model is that volatility is dependent upon past realizations of the asset process and related volatility process. This is a more precise formulation of the intuition that asset volatility tends to revert to some mean rather than remaining constant or moving in monotonic fashion over time.

1.2 Problem Statement.

The effects of the monetary policy variables on stock market volatility and returns have been widely researched in the context of well-developed markets (Gallo, Hann, & Li, 2016) ,(Habibullah, Azali, & Zare, 2013) and (Vähämaa & Äijö, 2011). Most of this literature concludes that monetary policy decision making by the central banks affects volatility and returns of stock markets. The emerging markets are fundamentally and technically different from developed markets (Marozva, 2020). Moreover, the level of efficiency is totally different, it is important to investigate the linkage in emerging markets like Kenya.

1.3 Research Objective.

1. The first objective is to look at the effect of monetary policy variables on stock market volatility.
2. The second objective is to look at the effect of monetary policy variables on stock market returns.

1.4 Research Questions.

One of the key arguments that has stood out is that monetary policy ought to respond to asset prices most effective to the level of their effect on growth, employment, and inflation, which are the core objectives of monetary policy (Kohn, 2008). But this perspective, however, has not shown how monetary policy could respond to asset

prices directly, although it is far presumed that it must in a few ways. Since that is the case the study clears this uncertainty by establishing if indeed monetary policy could respond to asset prices directly hence the question, do monetary policy variables affect stock market returns and volatility?

1.5 Significance of the Study.

The information on asset volatility, and the general market behaviour is going to be useful to investors, policymakers, and researchers. Belke & Wiedmann (2018) argues that the link between monetary policy and stock prices in an emerging country context is advantageous both to monetary authorities, stock market participants and traders.

2 CHAPTER 2

2.1 Literature Review.

Stock market volatility is widely considered important in portfolio evaluation, analysis and management, and changes in monetary policy variables including exchange rates, money supply, and interest rates are perceived to be determinants of stock market volatility (Marozva, 2020). Thus, the monetary policy significantly influences stock market return behaviour, as capital markets play a pivotal role in the transmission of monetary policy (Habibullah, Azali, & Zare, 2013). Wang & Mayes (2012) argues that the higher the discount rates the lower the present value of future cash flows and hence the price of the stocks.

Theoretically the linkage between interest rates, exchange rates and stock returns is explained with a couple of models. Kasman, Vardar, & Tunç (2011) argues that interest rate risk can be an extra market factor on the intertemporal capital asset pricing model (ICAPM) of Metron (1973). This implies that investors will require additional compensation for the risk associated with changes in interest rates. Also, stock market volatility will respond accordingly to changes in interest rates. Kasman, Vardar, & Tunç (2011), Yourougou (1990) and Warga & Sweeney (1986) point out that interest rates and exchange rates can be analysed through the implications of the Arbitrage pricing Theory (APT)first studied by (Ross, 1976). These scholars argue that interest rates and exchange rates are priced factors when stock market prices are in equilibrium. Thus, in equilibrium, changes in interest rates and exchange rates affects stock market prices. Despite a clear theoretical underpinning on the linkage between stock returns, interest rates and exchange rates very few papers investigated the relationship between these variables empirically in emerging markets (Marozva, 2020).

For equity prices to be a beneficial monetary policy indicator, a reputable relationship between adjustments in monetary policy and adjustments in equity prices as well as between adjustments in equity prices and changes in inflation should be established (Saxton, 2003). But this did not seem to be the case as evident in the empirical analysis that there was no reliable relationship between changes in monetary policy and equity prices. Mishkin & White (2002) argued that most fluctuations in stock prices occur for reasons not associated with monetary policy. The loose connection

between monetary policy and stock prices, therefore, implies the confined capacity of central banks to govern stock prices.

In analysing the linkage between stock markets and monetary policy, Batnyam, Lkhagvajav, & Gan-Ochir (2008) identified three factors that affect stock prices. First, the news that current or future dividends will be higher could raise stock prices. Second, news that current or future real short-term interest rates will be higher could lower stock prices, and third, news that leads investors to a higher risk premium on stocks could lower stock prices. Higher interest rates make a given future dividend less valuable in today's dollars; a higher interest rate reduces the value of a share of stock. Besides, higher interest rates make investments other than stocks such as bonds more attractive, raising the required return on stocks and reducing what investors are willing to pay for them. According to this study, the central bank's actions should affect stock prices only to the extent that they affect investor expectations about dividends, short-term real interest rates, or the riskiness of stocks.

Other authors, notably, Lagos (2010) examined the asset price-monetary policy linkage based on a dynamic equilibrium micro-founded monetary asset pricing framework. According to this author, money coexists with equity shares on a risky aggregate endowment. Agents may therefore use equity as a means of payment, so shocks to equity prices translate into aggregate liquidity shocks that disrupt the mechanisms of exchange and ensuing allocations in some key markets and through this channel propagate to the macro economy. The findings of this study indicate that persistent deviations from an optimal monetary policy may cause the real price of assets that could be used to relax the trading constraints to exhibit persistent deviation from their fundamental values.

Disagreements also exist in terms of a monetary policy response to instability in the financial system (Bordo & Jeanne, 2002). The debate on whether the central should prick, target, take an interest or ignore asset price bubbles is still raging (Yao, Luo, & Loh, 2013). Some authors such as Prasad (2010) support the idea that central banks should track asset prices arguing that asset prices are often subject to bubbles and crashes. This may have strong pro-cyclical effects and may also affect the stability of financial markets. Since central banks are responsible for financial stability, they should monitor asset prices and try to prevent the emergence of bubbles (that

invariably lead to crashes). According to this view, the use of the interest rate is seen as effective in preventing bubbles from emerging. Moreover, as pointed by Kontonikas & Montagnoli (2006), the financial-market channel plays an important role in the transmission of monetary policy. Thus, in the presence of wealth effects and inefficient markets, asset price misalignments from their fundamentals should be included in the optimal interest rate reaction function.

Expectations surrounding monetary policy shifts play an imperative role in the understanding of the market value of financial instruments. Two fundamental hypotheses have been identified by theorists for identifying the role of expectations in financial markets (Sourial, 2002). The first is the Brown & Rozeff (1979) adaptive expectations process, where only past information is used to identify the market value of a derivative and history is predictor of the future. The second, a process formulated by Muth (1961) and Lucas (1975), is the rational expectations process, where both past and current information is taken into consideration and understanding market dynamics. A shift towards an expansionary monetary policy approach, according to the adaptive expectations process, will not solicit immediate deviations in derivative prices, and it will take time until investors anticipate an increase in inflation (Sourial, 2002). Conversely, with reference to rational expectations process, investors will anticipate increases in the inflation rate; consequently, prices will increase instantaneously (Sourial, 2002).

3 CHAPTER 3.

3.1 Research Design.

The study will employ Generalised Autoregressive Conditional Heteroscedasticity (GARCH) model to establish the effect of the monetary policy variables on the volatility of the stock returns. GARCH (1,1) model will be adapted as stock volatility is clustering, that is periods of high stock price volatility are followed by periods of high stock volatility. This model will be used because it very simple, yet it delivers good fit and accurate predictions (Bollerslev, 1986). The returns of the stocks were computed as monthly returns of NSE all share index and NSE 20 index. Standard deviation of stock returns was used as a proxy of the stock volatility. The standard deviation is calculated on the returns of the NSE All Share index and NSE 20 index. To capture how monetary policy evolve and its effectiveness interest rates, exchange rates and money supply variables are used (Marozva & Magwedere, 2017). The entire economic performance will be captured by the growth in GDP.

3.2 Target Population.

The target population will consist of the NSE all share index, interest rates, exchange rates, money supply and gross domestic product between 2000 and 2018. The NSE all share index is designed to represent the performance of Kenyan companies, providing investors with a comprehensive and complementary set of indexes, which measure the performance of the major capital and industry segments of the Kenyan market. Interest rates, exchange rates and money supply will capture the expansionary and contractionary monetary policy. Gross Domestic Product will capture the general economic performance.

3.3 Sample Population.

The sample population will comprise of NSE 20 index from the beginning of 2000 to the end of 2018. NSE 20 index comprises top 20 firms listed on the NSE in terms of market capitalisation.

3.4 Data Collection.

The study will use annual time series data for the period between 2000 and 2018 and all data used in the research will be obtained from the Kenya National Bureau of Statistics and the central bank of Kenya.

3.5 Data Analysis.

3.5.1 Regression Model.

NSE all index returns, interest rates, exchange rates, money supply and gross domestic product are incorporated into a function to motivate a linear regression framework in equation 1 (Marozva, 2020).

$$NSE_t = \alpha_0 INT_t + \alpha_1 EX_t + \alpha_2 MS_t + \alpha_3 GDP_t + \varepsilon_t \quad (1)$$

For the empirical estimation, the relationship between NSE all index stock return volatility, interest rates, exchange rates, money supply and gross domestic were expressed mathematically in equation 2 (Marozva, 2020).

$$NSE\_SD_t = \alpha_0 INT_t + \alpha_1 EX_t + \alpha_2 MS_t + \alpha_3 GDP_t + \varepsilon_t \quad (2)$$

To estimate the deterministic relationship between NSE 20-Share index, interest rates, exchange rates, money supply and gross domestic product a linear regression framework was motivated in equation 3.

$$N20_t = \alpha_0 INT_t + \alpha_1 EX_t + \alpha_2 MS_t + \alpha_3 GDP_t + \varepsilon_t \quad (3)$$

For the empirical estimation, the relationship between NSE 20-Share return volatility, interest rates, exchange rates, money supply and gross domestic were expressed mathematically in equation 4.

$$N20\_SD_t = \alpha_0 INT_t + \alpha_1 EX_t + \alpha_2 MS_t + \alpha_3 GDP_t + \varepsilon_t \quad (4)$$

3.5.2 GARCH (1,1) Model.

Generalised Autoregressive Conditional Heteroscedasticity (GARCH) method will be employed to establish the effect of the monetary policy variables and GDP on the volatility of the stock returns. The GARCH model is the most appropriate model to use since it is very simple, yet it delivers good fit and accurate predictions.

The Engle (2002) GARCH model will be employed to primarily investigate the relationship between NSE stock return volatility and Kenya's monetary policy variable because of its advantages. Firstly, Marozva & Magwedere (2017) argue that GARCH (1,1) model allows the researcher to observe the pair-wise conditional correlation coefficients for the indices returns under examination. Secondly, the methodology can be used to analyse the relationship between variables for different periods. Lastly, the model gives a better estimation of volatility than standard

deviation which does not account for volatility clustering Zakoian (1994) and Chen, Gerlach, & Lin (2008). The GARCH (1, 1) models are presented in the following equations (Marozva, 2020).

3.5.2.1 Mean equations (ARCH)

$$NSE_t = \phi + \alpha GDP_t + \varepsilon_t \quad (5)$$

$$N20_t = \phi + \alpha GDP_t + \varepsilon_t \quad (6)$$

3.5.2.2 Variance Equations (GARCH)

$$NSE\delta_t^2 = \phi + \beta NSE\delta_{t-1}^2 + \vartheta\varepsilon_{t-1}^2 + \varphi_1 INT_t + \varphi_2 EX_t + \varphi_2 MS_t \quad (7)$$

$$N20\delta_t^2 = \phi + \beta N25\delta_{t-1}^2 + \vartheta\varepsilon_{t-1}^2 + \varphi_1 INT_t + \varphi_2 EX_t + \varphi_2 MS_t \quad (8)$$

Where $NSE\delta_t^2$ and $N25\delta_t^2$ are the error terms derived from the lag polynomial model A(L), ϕ is a constant, the $NSE\delta_{t-1}^2$ and $N25\delta_{t-1}^2$ is the squared residual from one period lag of time as derived from the A (L) model which is the previous month's volatility of NSE All-Share index returns and NSE 20-Share Index returns respectively, i.e. the GARCH term in each of these equations, the GDP_t is the gross domestic product for Kenya at a given point in time. The INT_t, EX_t, MS_t are the monetary policy variables for Kenya at a given point in time, the β, ϑ and $\varphi_1, \varphi_2, \varphi_3$ are coefficients and the $\vartheta\varepsilon_{t-1}^2$ is the previous period squared residual derived from the mean equations i.e., the ARCH term.

4 CHAPTER 4

4.1 Descriptive Statistics.

Below is a table summary for descriptive statistics for the variables been used in the study.

Table 4.1 Descriptive Statistics

Mean

GDP. growth rate %.	*Interest rates%*	*NSE_20 returns%.*	*N20_SD volatility%*	*NASI returns%*	*NASI_SD volatility %*	*Exchange. Rates*	*Money supply%*
4.67	7.63	0.24	4.88	0.40	4.97	83.22	13.17

summary statistics

Variables	*observations*	*stdev*	*skewness*	*Excess kurtosis*	*Min*	*Max*
N20 returns%	228	5.71	-0.14	-1.43	-22.64	17.37
N20_Volatility%	228	16.23	1.32	-0.39	20.84	96.67
NASI returns%	228	29.39	0.72	-3.23	-47.18	91.23
NASI_Volatility%	228	5.98	0.49	-3.99	0.00	20.99
Interest rate%	228	1.14	1.09	-3.21	6.00	10.25
GDP rate% change	228	0.89	-0.03	-3.91	-1.54	1.97
Money supply% change	228	1.02	1.51	4.39	-3.32	5.98
Exchange rates	228	2.12	0.49	6.25	-10.08	12.57

From table 1 above growth in money supply has the highest mean of 13.17% with the average exchange rate being 83.22. NSE all share index and NSE 20 index volatility exhibit high volatility. GDP growth rate and NSE 20 returns are negatively skewed. Money supply, NSE all share index returns, NSE 20 volatility, NSE all share index volatility and exchange rates are positively skewed. Money supply growth and GDP growth rates have a small deviation between their minimum and maximum values.

4.2 Test for Unit Root.

To determine the order of integration of the variables of the study, stationarity tests were performed in order to carry out regression analysis and the GARCH (1,1) tests. Since volatility was assumed to cluster, it is vital to assess the stationarity of data series before using GARCH (1,1) model (Marozva, 2020). Results are in table 2 below.

Table 4.2 ADF (level)

Variables	Augmented Dickey Fuller (level)			
	Lags	P -value	T- statistic	C.V at 95%
GDP growth rate	1	0.00000000000000022	-4.5969	-1.96
Interest rates	1	0.9224	-0.1633	-1.96
NSE 20 index	1	0.00000000000000022	-7.3466	-1.96
NSE 20 volatility	1	0.00000000000000022	-3.3917	-1.96
NASI returns	1	0.4929	-0.538	-1.96
NASI volatility	1	0.00000000000000022	-2.1145	-1.96
Exchange rates	1	0.000000000007214	-7.0157	-1.96
Money supply	1	0.00000000000000022	-4.97	-1.96

Based on the results above that is the p- values, t-values and with a critical z score value of 1.96 the null hypothesis for GDP growth rate, NSE 20 volatility, NSE 20 index, NASI volatility, Exchange rates and money supply is rejected. The null hypothesis is generally defined as the presence of unit root and the alternative hypothesis is that the series is stationary. Interest rates and NASI returns are not stationary. To make these variables stationary, a first difference is done. The results are as follows in table 3 below.

Table 4.3 ADF (First Difference)

Variables		Augmented Dickey Fuller (First Difference)		
	Lags	P-value	T- statistic	C.V at 95%
NASI returns	1	0.00000000000000022	-6.4012	-1.96

Interest rates	1	0.00000000000000022	-9.4325	1.96

Interest rates and NASI returns are stationary as evident by the above results.

4.3 Regression Analysis.

The regression model was then run to investigate the deterministic relationship between the stock returns (NSE All-Share index and NSE 20-Share index return/ volatility) and selected macro-economic variables. The F-statistic, t-statistic and P-values were used to establish the best fit of the model and the significance of the relationship between these variables, the results are presented in table 4.

Table 4.4 Regression Analysis

Regression analysis output				
	Model 1	**Model 2**	**Model 3**	**Model 4**
	NASI	**NASI_SD**	**NSE20**	**NSE_SD**
(Intercept)	-72.466***	-6.695**	2.476	571.389***
	(11.180)	(2.377)	(2.352)	(67.531)
INT	11.931***	1.699***	-0.259	-39.252***
	(1.584)	(0.337)	(0.333)	(9.565)
EXR	0.059	0.270	-0.692***	5.596
	(0.820)	(0.174)	(0.173)	(4.954)
MSG	-1.830	1.145**	-0.054	5.505
	(1.708)	(0.363)	(0.359)	(10.319)
GDP	9.357***	1.049*	-1.067*	-19.531
	(2.034)	(0.432)	(0.428)	(12.287)
R^2	0.226	0.155	0.092	0.075
Adj. R^2	0.213	0.140	0.076	0.058
Num. obs.	228	228	228	228
	***p < 0.001; **p < 0.01; *p < 0.05			

In model 1 we examine the relationship between NASI returns and the selected predictor variables: interest rates, exchange rates, money supply and gross domestic product growth rate (GDP growth rate). Results shows that changes in interest rates and GDP growth rate have a significant positive influence on NASI returns while money supply and exchange rates have no significant effect. In Model 2 we examine the relationship between NASI volatility and the selected predictor variables, results show that changes in interest rates, money supply and GDP growth rate affects the volatility of NASI returns positively while exchange rates have no significant effect. For model 3 results shows that even though changes in NSE 20 returns can be explained by exchange rates and GDP growth rate, interest rates and money supply have no significant effect. In model 4 we find that changes in interest rates have a negative effect on the NSE 20 volatility whereas the other variables in the model have no effect.

4.4 GARCH Analysis.

To further analyse the relationship between stock returns and volatility, the generalised autoregressive conditional heteroscedasticity GARC (1,1) model was adopted. Results are presented in table 6 and 7.

Table 4.5 NSE all share index

STATISTIC Z FOR ARCH AND GARCH TEST: DEPENDENT VARIABLE (NSE ALL-SHARE INDEX)	
Independent Variables	**Z - Statistic (Normal distribution)**
Constant	982.5
Resid-squared	43.093***
Lagged Volatility	6.0642
Interest rate	0.1491
Exchange rate	0.1336
Money supply	0.00000000000755
Diagnostics	NA/NS/RN

*** shows 1% level of significance. NS denotes No serial correlation, NA indicate that there is no ARCH effect, and RN denotes that the residual is normally distributed using Jarque-Bera statistic.

Table 5 summarises the Z-statistic for ARCH and GARCH test for exchange rates, money supply and interest rate factors relative to the NSE All Share Index. Results showed that the GARCH effect is not significant under the normal distribution model. This indicated that though NSE All Share Index volatility was not persistent meaning that the period (t-1) stock returns volatility did not significantly influence stock returns volatility at time (t). The ARCH coefficient is significant indicating that previous period mean stock returns residuals had influence on the current period stock returns volatility. Interest rates, exchange rates and money supply have no significant effect related to volatility.

Table 4.6 NSE 20 share index

STATISTIC Z FOR ARCH AND GARCH TEST: DEPENDENT VARIABLE (NSE ALL-SHARE INDEX)	
Independent Variables	**Z - Statistic (Normal distribution)**
Constant	25.83
Resid-squared	0.0012413
Lagged Volatility	14.682***
Interest rate	0.1427
Exchange rate	0.2049
Money supply	0.0000000000001127
Diagnostics	NA/NS/RN

*** shows 1% level of significance. NS denotes No serial correlation, NA indicate that there is no ARCH effect, and RN denotes that the residual is normally distributed using Jarque-Bera statistic.

Table 6 summarises the Z-statistic for ARCH and GARCH test for relationship between the NSE 20-Share Index volatility and monetary policy variables. Results showed that the ARCH coefficient is not significant, this means that the previous period mean stock returns residual cannot influence the current period of NSE 20-Share Index volatility. The GARCH effect is significant, an indication that the NSE 20-Share Index volatility was persistent meaning that the period (t-1) stock returns volatility significantly influenced stock returns volatility at time (t). Interest rates, exchange rates and money supply have no significant effect on volatility.

5 CHAPTER 5.

5.1 Conclusion.

According to the results in model 1, there is a positive and significant relationship between stock returns and interest rates. This is consistent to what Kalu (2017) found. He explored the association between stock returns and interest rates and finds a significant positive relationship between these variables. Firth (1979) suggested that holding stocks might be an effective hedge against inflation, and hence that the Fisher effect would explain this positive correlation. This a possible theoretical explanation for the positive relationship.

Results in model 3 indicate that there is a negative and significant relationship between exchange rates and stock returns. Theoretically, the relationship can be positive or negative depending on the nature of the companies under investigation. The results of this study are consistent with research conducted by Cifter (2015). Results also show a positive and significant relationship between GDP and stock returns in model 1, 2 and 3. As expected, the growth in economy is stimulus to the growth of companies in general. Money supply has positive effect on stock volatility but has no effect on stock returns as evident in model 2.

GDP was used as a control variable and the results were as expected, a significant positive relationship was revealed between stock market returns and GDP. Further analysis on the relationship between stock return volatility and the variables under consideration revealed that whether volatility is measured as standard deviation or under the GARCH (1, 1) scenario the results were the same on the effects of interest rates, exchange rates and money supply. For the period between 2000 and 2018 results revealed no significant relationship between stock returns volatility and the predictor variables: interest rates, exchanges rates and money supply.

5.2 Policy Recommendations.

This study assists stock market regulating authorities, monetary policy authorities and other stock market participants in understanding the effects of monetary policy variable on stock returns. The authorities are advised to monitor the developments in the world financial market, such as movements in major world stock markets since they also affect the Kenyan stock market performance. The use of periodicity in the

study shows how different variables changes over time hence the better understanding of the variables that are being analysed.

5.3 Areas of further research and limitation of the study.

Further research may dwell on the causality and cointegrating relationships as deterministic relationship may not be dependable on policy formulation and forecasting.

This study made use of data for the period between 2000 and 2018. Since the stock market is under constant evolution, there would probably be need to replicate the study for different time periods and possibly compare the results and findings.

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