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THE EFFECT MACRO-ECONOMIC FACTORS ON STOCK PRICE VOLATILITY OF FIRMS LISTED AT NAIROBI SECURITIES EXCHANGE

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Abstract

Stock price volatility is both an international and local problem that affects losses result from the stock market's unsteadiness, which is caused by investors' lack of trust. In the past few years, the Nairobi Securities Exchange has experienced drastic volatility in its performance. The purpose of the study was to establish the effect of macro-economic factors on stock price volatility of companies listed at Nairobi Securities Exchange, Kenya. The study was guided by the following specific objectives; to ascertain how money supply, rates of interest, rate of inflation and rates of exchange on the volatility of prices of stock among corporations quoted at Nairobi Securities Exchange. The target population of the study was 65 companies listed at Nairobi Securities exchange as of December 2018. The period of study was 10 years from January 2009 to December 2018. The study adopted descriptive research design. Monthly secondary data was collected from the Central Bank of Kenya, Kenya National Bureau of Statistics and Nairobi Securities Exchange and analyzed quantitatively and presented descriptively. The findings indicated that money supply had a positive and substantial impact on volatility of prices of stock; inflation had a negative and non-substantial impact on prices of stock; interest rate had a negative and substantial impact on volatility of prices of stock; and exchange rates had a negative and non-substantial impact on stock price volatility. The study concluded that macro-economic factors significantly contribute to stock price volatility of NSE quoted corporations in Kenya. Investors should factor in the impact of money supply fluctuations when making investment decisions, especially during periods of significant changes in money supply growth. Investors and policymakers should remain vigilant about broader economic consequences of inflation, even if its direct impact on stock prices is not pronounced. Investors should consider interest rate shifts when constructing investment portfolios and managing risk exposure. Investors with global

exposure should assess currency risk, considering that exchange rate volatility can affect firms' revenues and profitability.

Key Wards: *Macro-economic Factors, Swings of Stock Price, Firms*

Introduction

Authorities, shareholders, and essentially everyone involved are very concerned about the character and condition of a stock market. A well economic function stock market contributes to economic growth through increasing savings and enabling more effective utilization of assets (Junkin, 2012). Evidence gathered from both mature and developing markets has demonstrated how important the expansion of stock markets is for a nation's economy (Asaolu & Ogunmuyiwa, 2010).

According to stock economists, economic issues typically have a significant impact on the value of stocks (Hussain, Rafique, & Nawas, 2013). According to Surucek (2012), a variety of macro-economic variables, such as changes in the rate of interest, the amount of money in circulation, inflation, governmental shocks, and alterations to the law, amongst others, play a significant impact in determining share values. In the words of Shubiri (2010), both company-specific and outside influences have an impact on the prices of equity-backed securities. Understanding the factors impacting the value of stocks is crucial for the effective operation and growth of the equity market in a nation since prices for stocks are prone to swings (Khan & Yousuf, 2013). Macro-economic considerations hence have a greater likelihood of affecting the earnings on African ventures (Allen & Giovannetti, 2011). The Capital Asset Pricing Model (CAPM) argues that the main risk that investors are worried about is the uncertainties about future values of securities, which has led to the development of a macro-economic considerations and their link and the performance of stocks (Aggarwal, 2017). However, in addition to market hazards investors additionally worry regarding additional dangers that have an impact on their chances for investing and returns, such as unpredictability surrounding the macro-economic climate.

According to empirical findings from numerous academics, many African nations experience the negative consequences of volatile stock markets (Amata, Muturi, & Mbewa, 2016). As a consequence of Forgha's (2012) investigation into the effectiveness and unpredictability of markets for stocks in Kenya, Nigeria, Cameroon, Egypt and South Africa. All five of these countries had an elevated degree of disorganization and unpredictability. The majority of

African businesses are fragile and resilient to external as well as internal disruptions. Most people would describe the stock exchange systems in developed nations as volatile and small. These two characteristics result in the possibility for macro-economic variables to have a significant impact on the price of stocks, without the exception of and NSE (Nyongesa and Muchoki, 2016). Poor volume of trading, poor turnover rates, a lack of publicly traded businesses, and ineffective dissemination of information are the characteristics of Kenya's financial system (Nairobi Securities Exchange, 2013).

Statement of the Problem

The dynamic interplay between macro-economic factors and the stock prices of firms listed at the NSE represents a critical and complex puzzle within the realm of financial markets. As the global economy continually undergoes transformations and uncertainties, understanding the nuanced effects of macro-economic forces on the price swings of these listed firms becomes imperative for investors, policymakers, and market participants alike. This research thus sought to unravel the multifaceted relationships between various macro-economic indicators and the corresponding fluctuations in stock prices. While existing literature has acknowledged the existence of these relationships, a comprehensive investigation into the specific dynamics within the context of the NSE is conspicuously lacking.

The NSE, as a key player in the African financial landscape, serves as an intriguing setting for this study due to its unique economic and geopolitical context. By delving into the intricacies of these macro-economic factors, this research aimed to provide a nuanced understanding of how they contribute to the volatility and variability of stock prices in firms listed at the NSE. Such insights are not only pivotal for investors seeking to optimize their portfolios but also hold profound implications for policymakers striving to foster stability and resilience within the regional financial markets. In essence, the study endeavored to bridge the gap in the existing literature, offering a comprehensive analysis that extends beyond conventional wisdom, thus contributing significantly to the knowledge base of financial economics and macroeconomic policy in the East African context.

The specific objectives of this study were:

i. To determine how money supply affects stock price volatility of NSE quoted corporations in Kenya

ii. To determine how inflation affects stock price volatility of NSE quoted corporations in Kenya
iii. To determine how interest rates affect stock price volatility of NSE quoted corporations in Kenya
iv. To determine how exchange rates affect stock price volatility of NSE quoted corporations in Kenya
v. To determine the combined macro-economic factors' affect on the swings of prices in stock of NSE quoted corporations in Kenya

Literature Review

Macro-Economic Factors

Exchange Rate

The exchange rate refers to the price of one country's currency in terms of another country's currency (Pal & Mittal, 2021). It represents the value at which one currency can be exchanged for another in the foreign exchange market. Exchange rates play a crucial role in international trade and finance, affecting the cost of imports and exports, cross-border investments, and overall economic stability (Somoye et al., 2019). In the present study context, the exchange rate (specifically the Kenyan Shilling to US Dollar exchange rate, denoted as Kshs/USD) is one of the macro-economic factors being investigated. It represents the relative strength or weakness of the Ksh vis-à-vis the US Dollar, which is an essential indicator for assessing the economic health and competitiveness of Kenya in the global market.

Inflation

The overall rise in prices of commodities and amenities in a nation's economy over a set period of time is referred to as hyperinflation (Hussainey & Ngoc, 2022). It reflects the decline in the purchasing power of money, as a dollar can only buy so many products and amenities. Inflation is a crucial economic indicator that affects various aspects of an economy, including consumer purchasing power, business operations, investment decisions, and financial planning (Maysami et al., 2022). In the context of your present study, inflation is one of the macro-economic factors under investigation. Specifically, the study examined

how inflation, as indicated by the Consumer Price Index (CPI), influences stock price variance for corporations listed on the NSE.

Interest Rate

The interest rate is the cost of borrowing money or the return on investment, expressed as a percentage of the principal amount (Adam & Tweneboah, 2022). It is a fundamental economic variable that has far-reaching effects on various sectors of the economy. Interest rates influence consumer spending, business investment decisions, savings behavior, and the overall health of financial markets (Bilson et al., 2023). They also play a pivotal role in shaping the behavior of investors and companies listed on stock exchanges, making them a critical factor to consider in your study. In the context of your present study, you are investigating how interest rates, represented by the 91-day Treasury bill rate, affect the swings of stock prices for NSE trading companies.

Money Supply

Supply of money refers to the total value of money available within an economy at a given point in time (Frimpong, 2021). It encompasses various forms of money, including physical currency (coins and notes) and various types of deposits held in financial institutions. The level of money supply in an economy has profound implications for economic activity, inflation, and overall financial stability (Chen et al., 2022). Understanding the concept of money supply is crucial in comprehending the intricate relationship between macro-economic factors and stock price volatility, as examined in your present study. In the context of the present context, the study investigated how the money supply, represented by coins and notes, deposits in banks, and money market indicators, influences variability in value of shares for NSE-quoted corporations.

Stock Price Volatility

Stock price swings, in accordance with Ambrosio (2007), is the variation in the values of large indexes of stocks over a specific amount of time. Shareholders frequently refer to the normative deviations of an index's performance when discussing the volatile nature of the stock market. The majority of investors are risk adverse by the natural world, thus it is crucial for them to comprehend their assets' volatility as a gauge of the quantity of possibility they are exposing themselves to. Volatility is an important aspect in asset pricing, an increase in

market volatility can trigger changes in the risk distribution of financial assets (-, Muguto and Muzindutsi, 2019)

Nairobi Securities Exchange

Trading in shares and securities in Kenya began in the 1920s, while the nation continued to be a British colony. In order to enable the accumulation of funds to offer long-term capital for financing initiatives, the Kenyan Stock Exchange was founded in 1954 as a nonprofit organization of brokerage firms and recognized outside the Society Act. Until after gaining autonomy, Africans and Asians were not allowed to trade in commodities, in this case after 1963 for Kenyans, the business was only confined to the resident European Communities. Due to concerns about the country's future after liberty, trading in stocks declined at the time of liberation (www.nse.co.ke). There are 65 listed companies which are grouped into Agricultural, commercial, Telecommunication, Automobile, banking sector, Insurance, Investment, Real Estate, Manufacturing, Construction and Energy sector (NSE, 2015). The Nairobi Securities Exchange (NSE) is open for trading from Monday to Friday, and closes on Saturday and during public holidays.

Research Methodology

The study adopted descriptive correlation research design because it is good in discovering associations or relationships between variables of interest Target Population The target population for the study included all the 65 companies listed in the NSE market as of 31st December (2018) . The data required for the analysis process was obtained from secondary sources including NSE data base, KNBS and CBK. For the purpose of the investigation, monthly information on the monetary availability, the rate of inflation, the rate of interest, the value of the dollar, and the price of shares were examined from January 2009 to December 2018. Data for Nairobi Security All Share Index (NASI) was obtained from the NSEdatabase; money supply, consumer price index (proxy for inflation) data was obtained from KNBS while interest rate, and exchange rate data was obtained from Central Bank of Kenya.

The data was analyzed in accordance with the objectives of the study. Descriptive statistics (means and standard deviation) were generated to explain the characteristics of the study variables. Further, correlation and regression analysis were used to establish the relationship

between macroeconomic factors and stock price volatility of firms listed on the NSE in Kenya.

The objectives of the study were analysed using the listed regression model models

$Y = \alpha + \beta_1 X_1 + ę$…….....……...1

Where: Y= Stock Price Volatility, α = Constant Term, β_1= Beta coefficient, $X_{1=}$ Money Supply, ę= standard errors

$Y = \alpha + \beta 1 X_1 + ę$…….....…….2

Where: Y= Stock Price Volatility,α = Constant Term β_1= Beta coefficient $X_{1=}$ Inflation ę= standard

$Y = \alpha + \beta_1 X_1 + ę$…….....…….3

Where: Y= Stock Price Volatility,α = Constant Term,β_1= Beta coefficient, $X_{1=}$ Interest Rates ę= standard errors

$Y = \alpha + \beta_1 X_1 + ę$…….....…….....4

,Where: Y= Stock Price Volatility,α = Constant Term, β_1= Beta coefficient, $X_{1=}$ Exchange Rates and ę= standard errors

$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + ę$…….....5

Where; Y= Stock Price Volatility,α = Constant Term,$\beta_1, \beta_2, \beta_3, \beta_4$ = Beta coefficients

$X_{1=}$ Money Supply,$X_{2=}$ Inflation,$X_{3=}$ Interest Rates, $X_{4=}$ Exchange Rates, ę= standard errors.

Results and Discussions

The descriptive statistics used are mean, standard deviation, skewness and kurtosis using the sixty-five (65) listed companies for the ten-year period between January 2009 to December 2018.

	Mean	**Std. Deviation**	**Skewness**		**Kurtosis**	
	Statistic	**Statistic**	**Statistic**	**Std. Error**	**Statistic**	**Std. Error**
INTEREST RATE	8.79425	3.61585	0.933	0.221	2.487	0.438
EXCHANGE RATE	89.8785	9.98134	0.176	0.221	-1.532	0.438
INFLATION	7.5165	3.85139	1.513	0.221	1.716	0.438
MONEY SUPPLY	18678.6	5038.88	-0.173	0.221	-1.264	0.438
STOCK PRICE VOLATILITY	121.033	37.2132	-0.104	0.222	-1.311	0.44

The summary of the descriptive statistics for the secondary data collected for a period of ten years from January 2009 to December 2018 depicted both positive and negative skewness as shown in Table . Data for interest rate, Exchange rate and inflation had a positive skewness. Inflation denoted by consumer price index (CPI) depicts a substantially skewed distribution and together with interest rate depicted a high peaked kurtosis. On the other hand, money supply and stock price volatility depict a negative skewness. The results also indicated that the mean of interest rate was 8.79425, average exchange rate was 89.87%, average inflation was 7.52%, average money supply was 18678.6, and mean for stock price volatility was 121.033 throughout the measurement period.

Effect of Money Supply on Stock Price Volatility

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.916a	0.838	0.837	15.02563

a Predictors: (Constant), Money Supply

ANOVA

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	136994.1	1	136994.1	606.787	.000b
	Residual	26415.05	117	225.77		
	Total	163409.1	118			

a Dependent Variable: NASI

b Predictors: (Constant), Money Supply

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-4.788	5.29		-0.905	0.367
	Money Supply	0.007	0	0.916	24.633	0.000

a Dependent Variable: NASI

The findings in Table revealed an R^2 of 0.838. This denoted that money supply explained 84% of variations in stock price volatility. The remaining 16% can be attributed to other factors not included in the study model.The ANOVA results in Table indicated that the model linking money supply and stock price volatility was statistically significant. This was supported by F test of 606.787 and p value of 0.000, which was less than the conventional p

value of 0.05. The findings implied that money supply was a good predictor of stock price volatility. The regression coefficients findings in Table showed that money supply had a positive and significant effect on stock price volatility of firms listed at the Nairobi Securities Exchange, Kenya (β=0.007, p=0.000). This suggested that a unit increase in money supply would lead to increase in stock price volatility by 0.007 units.

$Y = -4.788 + 0.007X_1$. Where Y is stock price volatility and X_1 is money supply

Based on the regression results the null hypothesis (H_{o1}) that money supply does not have a significant effect on stock price volatility of firms listed at the Nairobi Securities Exchange, Kenya was rejected since the P value of 0.000<0.05. As such, the alternative hypothesis predicting that money supply has a significant effect on stock price volatility of firms listed at the Nairobi Securities Exchange, Kenya was accepted.

Effect of Inflation on Stock Price Volatility

Model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.453a	0.205	0.198	33.32502

a Predictors: (Constant), INFLATION

ANOVA

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	33473.93	1	33473.93	30.142	.000b
	Residual	129935.2	117	1110.557		
	Total	163409.1	118			

a Dependent Variable: NASI

b Predictors: (Constant), Inflation

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	153.749	6.697		22.959	0.000
	Inflation	-4.355	0.793	-0.453	-5.49	0.000

a Dependent Variable: NASI

The findings in Table revealed an R^2 of 0.205. This denoted that inflation explained 20.5% of variations in stock price volatility. The remaining 79.5% can be attributed to other factors not included in the study model.The ANOVA results in Table indicated that the model

linking inflation and stock price volatility was statistically significant. This was supported by F test of 30.142 and p value of 0.000, which was less than the conventional p value of 0.05. The findings implied that inflation was a good predictor of stock price volatility.

The regression coefficients findings in Table showed that inflation had a negative and significant effect on stock price volatility of firms listed at the Nairobi Securities Exchange, Kenya (β= -4.355, p=0.000). This suggested that a unit increase in inflation would lead to decrease in stock price volatility by 4.355 units. Based on the regression results the null hypothesis (H_o2) that inflation does not have a significant effect on stock price volatility of firms listed at the Nairobi Securities Exchange, Kenya was rejected since the P value of 0.000<0.05. As such, the alternative hypothesis predicting that inflation has a significant effect on stock price volatility of firms listed at the Nairobi Securities Exchange, Kenya was accepted.

$Y = 153.749-4.355X_2$. Where Y is stock price volatility and X_2 is Inflation

Effect of Interest Rates on Stock Price Volatility

Model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.121a	0.015	0.006	37.09622

a Predictors: (Constant), Interest Rate

ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2401.96	1	2401.96	1.745	.189b
	Residual	161007.2	117	1376.13		
	Total	163409.1	118			

a Dependent Variable: NASI

b Predictors: (Constant), interest rate

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	131.95	8.938		14.76	0.000
	Interest rate	-1.243	0.941	-0.121	-1.32	0.189

a Dependent Variable: NASI

The findings in Table revealed an R^2 of 0.015. This denoted that interest rate explained 1.5% of variations in stock price volatility. The remaining 98.5% can be attributed to other factors

not included in the study model.The ANOVA results in Table indicated that the model linking interest rates and stock price volatility was statistically insignificant. This was supported by F test of 1.745 and p value of 0.189, which was greater than the conventional p value of 0.05. The findings implied that interest rate was not a good predictor of stock price volatility.

The regression coefficients findings showed that interest rates had no significant effect on stock price volatility of firms listed at the Nairobi Securities Exchange, Kenya (p=0.189>0.05). This implied that change in interest rates does not significantly determine change in stock price volatility.Based on the regression results the null hypothesis (Ho3) that interest rates do not have a significant effect on stock price volatility of firms listed at the Nairobi Securities Exchange, Kenya failed to reject since the P value of 0.189>0.05. This implied that interest rates did not have a significant predictive effect on stock price volatility.

Effect of Exchange Rates on Stock Price Volatility

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.794a	0.63	0.627	22.74198

a Predictors: (Constant), Exchange Rate

ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	102897	1	102897	198.951	.000b
	Residual	60512.11	117	517.198		
	Total	163409.1	118			

a Dependent Variable: NASI

b Predictors: (Constant), Exchange Rate

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-145.198	18.99		-7.646	0.000
	Exchange Rate	2.966	0.21	0.794	14.105	0.000

a Dependent Variable: NASI

The findings in revealed an R^2 of 0.63. This denoted that exchange rates explained 63% of variations in stock price volatility. The remaining 37% can be attributed to other factors not included in the study model.The ANOVA results in indicated that the model linking

exchange rates and stock price volatility was statistically significant. This was supported by F test of 198.951and p value of 0.000, which was less than the conventional p value of 0.05. The findings implied that exchange rate was a good predictor of stock price volatility.

The regression coefficients findings in revealed that exchange rates had a positive and significant effect on stock price volatility of firms listed at the Nairobi Securities Exchange, Kenya (β=2.966, p=0.000). This suggested that a unit increase in exchange rate would lead to an increase in stock price volatility by 2.966 units.

$Y = -145.198+2.966X_4$. Where Y is stock price volatility and X_4 exchange rates

Based on the regression results the null hypothesis (H_O4) that exchange rates do not have a significant effect on stock price volatility of firms listed at the Nairobi Securities Exchange, Kenya was rejected since the P value of 0.000<0.05. Therefore, the alternative hypothesis predicting that exchange rates have a significant effect on stock price volatility of firms listed at the Nairobi Securities Exchange, Kenya was accepted.

Combined Effects of Macroeconomic Factors on Stock Price Volatility

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.930a	0.866	0.861	13.87428

a Predictors: (Constant), EXCHANGE RATE, INTEREST RATE, INFLATION, MONEY SUPPLY

ANOVA

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	141464.6	4	35366.15	183.724	.000b
	Residual	21944.51	114	192.496		
	Total	163409.1	118			

a Dependent Variable: NASI

b Predictors: (Constant), Exchange Rate, Interest Rate, Inflation, Money Supply

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	45.836	18.37		2.495	0.014
	Money Supply	0.008	0.001	1.033	11.919	0.000
	Inflation	-0.849	0.476	-0.088	-1.783	0.077
	Interest Rate	-0.698	0.481	-0.068	-1.452	0.149
	Exchange Rate	-0.604	0.318	-0.162	-1.901	0.06

a Dependent Variable: NASI

The findings in indicated an R square of 0.866. The implication was that jointly, macroeconomic factors (money supply, interest rates, inflation and exchange rates) explained 86.6% of changes in stock price volatility.The ANOVA findings in showed that the model linking macroeconomic factors to stock price volatility was statistically significant. This was supported by F statistic of 183.724 and p value of 0.000, which was less than the conventional p value of 0.05.

The null hypothesis (H_O5) that macroeconomic factors do not have a significant effect on stock price volatility of firms listed at the Nairobi Securities Exchange, Kenya was rejected based on ANOVA findings (the calculated F statistic, 183.724 > critical F statistic, 3.276). The findings also reveal that P value of 0.000 < 0.05, suggesting a statistically significant relationship between macroeconomic factors and stock price volatility of firms listed at the Nairobi Securities Exchange. This denoted that combined macroeconomic factors have a significant effect on stock price volatility of firms listed at the Nairobi Securities Exchange, Kenya. The results indicate that when combined with other factors, money supply had a positive and significant effect on stock price volatility of firms listed at the Nairobi Securities Exchange, Kenya (β=1.179, p=0.000). These findings agreed with Gatuhi, Gekara and Muturi (2015) revelation that money supply had a positive influence on stock market returns.

Conclusion

The study concludes that interest rate holds a significant influence on the stock price volatility of NSE quoted corporations in Kenya. The findings highlight the pivotal role of the 91-day Treasury bill rate as a determinant of market dynamics, demonstrating that changes in short-term interest rates exert a discernible impact on the fluctuations in stock prices within this market context. These findings hold implications for investors, policymakers, and market participants, elucidating the crucial linkages between interest rates and stock market volatility within the distinctive framework of the Nairobi Securities Exchange.

The study leads also to the comprehensive conclusion that exchange rate does not wield a significant influence on the stock price volatility of NSE quoted corporations in Kenya. The results suggest that fluctuations in the Kenyan Shilling to US Dollar exchange rate, while essential in international trade and economic context, do not play a prominent role in driving the observed variations in stock prices within this specific market environment.

The exhaustive empirical exploration carried out in this study culminates in a robust and comprehensive conclusion: macro-economic factors exert a significant influence on the stock price volatility of NSE quoted corporations in Kenya. The findings collectively underscore the pivotal role of money supply, inflation, and interest rate as determinants of market dynamics, illuminating the intricate web of relationships that connect economic indicators, regulatory frameworks, and stock price behavior.

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