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THE EFFECT OF MACROECONOMIC VARIABLES ON SHARE PRICE VOLATILITY IN THE COMPANIES LISTED AT NAIROBI SECURITIES EXCHANGE (NSE) FROM JANUARY 2007 TO DECEMBER 2016

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Abstract

The general objective of the study was to establish the effect of macroeconomic variables on share price volatility in the NSE. Specifically, the study sought to examine the effect of tax incentives on share price in the companies listed at Nairobi securities exchange to determine the effect of money supply on share price in the companies listed at Nairobi securities exchange, to assess the effect of Central Bank of Kenya (CBK) Lending rate on share price in the companies listed at Nairobi securities exchange and, to examine the effect of inflation on share price in the companies listed at Nairobi securities exchange. This study was anchored with three main theories namely: fisher's hypothesis theory, efficient market hypothesis theory as well as Tobin's Q theory. The research embraced a causal research design. The population of the study consisted of all the shares listed on Nairobi securities exchange as at the year 2017. The data used was from secondary sources. Nairobi Securities Exchange All Share Index (NASI) was used to measure stock performance, whose data was retrieved from the Nairobi Securities Exchange. Regression analysis model was used to determine the causal relationship between the macroeconomic variables and share prices volatility. The study concluded that the

selected macro-economic variables had a strong positive effect of 84.5% on the Share price volatility for the period of study 2007 to 2016. The effect was varying for the variables as money supply was found to have a positive effect on the Share price volatility, the Inflation rate had a negative effect on Share price volatility and the CBK lending rate was found to have a negative effect on the Share price volatility. The Tax incentives had a positive effect on the Share price volatility. The study recommends that the Central Bank of Kenya (CBK) should increase its regulation on money supply, the Inflation rate and its lending rate as it has an effect on the Share price volatility. The money supply should be too much as it leads to increase in the Share price volatility. The Inflation rate should also be minimized as it has a significant effect on the Share price volatility earned. If the Inflation rate is higher, the Share price volatility would be lowered.

Keywords: Macroeconomic variables, share price volatility, tax incentives, money supply, Central Bank of Kenya (CBK) lending rate, inflation

INTRODUCTION

There have been a lot of controversies with regards to the relationship that exists between the variables of macroeconomic on share price performance with different researchers showing varying findings. Based on the theoretically perspective, it is anticipated that share price performance is affected by macroeconomic variables. However, over the years there have been observed a varying pattern from one study to another with regard to how the variables of macro variables influence the share prices in terms signs and magnitude. This section presents a brief overview of the studies done regarding macroeconomic factors. It is notable from these studies that there exist significant relationships between the indicators of the macroeconomic and share prices from the global to the local studies reviewed.

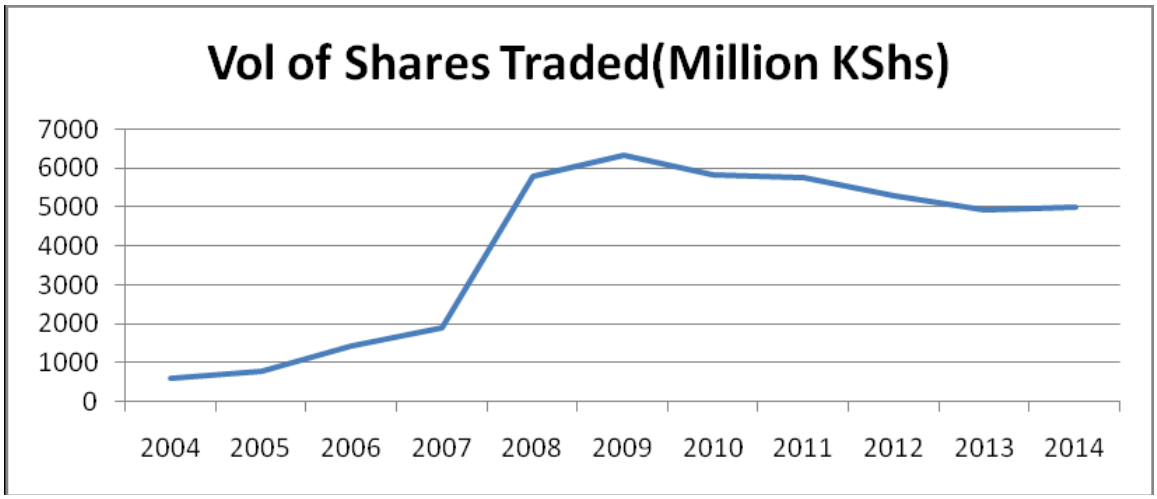
Ibrahim and Aziz (2003) undertook a study in Malaysia on the linkage between stock prices and consumer price index, industrial production, Inflation rate as well as money supply. It was revealed from the study that a positive relationship existed between CPI, industrial productions and share prices and that the relationship was long-term. However, a negative linkage was established between the money supply, Inflation rate and share prices. A study was done by Adam and Tweneboah (2008) on how the variables of macroeconomic affect stock prices in Ghana from 1991 to 2007. Both the short-run as well the long-run pattern on how the variables affect stock prices were examined. The variables under consideration included the rate of Treasury bill, foreign direct investment, consumer price index, the rate of exchange and average oil prices which were examined by the aid of Vector Error Correction Model (VECM) as

well as cointegration test. the cointegration between macroeconomic variable and stock prices was established, portraying a long-run relationship. By use of VECM analysis it was noted that interest rate and inflation affect share prices significantly. In addition, weak association was established between inward foreign direct investments, oil prices, and the Inflation rate on share price changes.

A multiple regression model was employed by Amadi, Oneyema and Odubo (2000) to estimate whether there exists relationship between inflation, money supply, the rate of exchange, the rate of interest and the stock prices. Consistency based on the postulations of theoretical work and findings of empirical studies in some countries with regards to linkage between stock prices and the variables of macroeconomic variables were found to exist. However, it was noted that the linkage between inflation and share prices differed with other empirical works done outside Nigeria. A long-run linkage between stock prices trends and some selected macroeconomic indicators was sought to be established by Nwokoma (2002),.

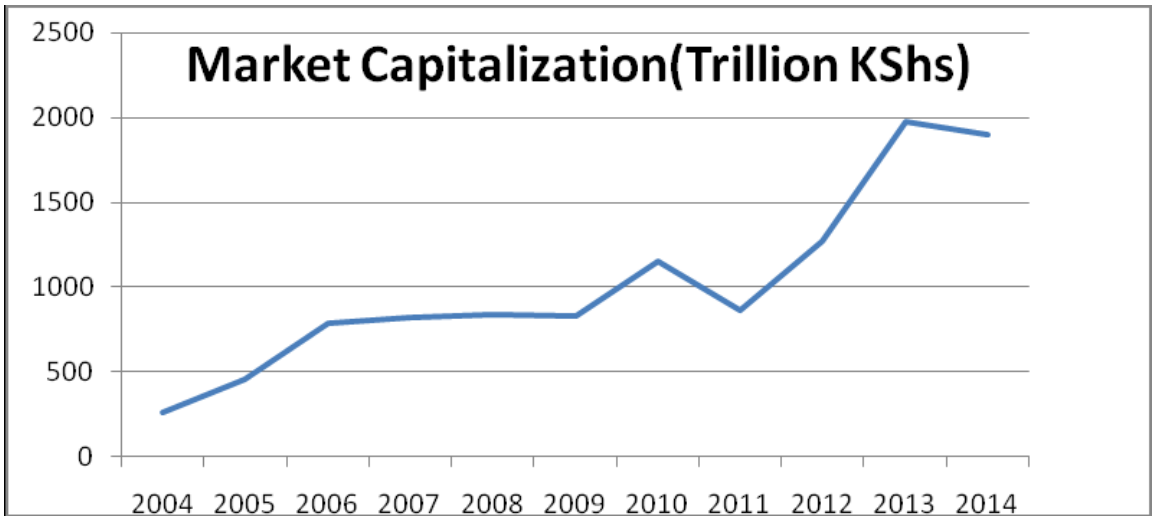
Since Kenya is one of the rising economies in Africa, its share price is astoundingly dependent upon the method for the macroeconomic components. These variables are believed to be explanations behind offer worth insecurity existing in NSE and may incite to protections trade crisis (Odhiambo, 2012). According to the International Finance Corporation (IFC), all business parts in the making countries are managed as creating. Kenya's capital market, the Nairobi protections Exchange Limited (NSE) is consequently one of the creating markets of the world. The market is portrayed by; low trading volume, low turnover extents, fewlisted organizations, and wasteful data conveyance (Nairobi Stock Exchange, 1997).

Figure 1: Trading Activity at the NSE between 2004 and 2014



(Source: Nairobi Securities Exchange)

Figure 2: Market Trends at the NSE between January 2004 and November 2014



(Source: Nairobi Securities Exchange)

As can been seen from, Figure 1 and Figure 2, the period somewhere in the range of 2004 and 2014 saw an expanded exchanging action and market developed from a Market Capitalization of about Kshs.250.0 billion of every 2004 to reach Kshs.1.9 trillion in November 2014. The volume of offers exchanged developed from 593million in 2004 to arrive at a high of 6.33 billion out of 2009 preceding dropping to 5.01 billion by end of 2014.

Stock price Volatility

According to Adam, Marcet and Nicolini, (2016) stock price volatility refers to the rate of increase or decline of cost of security for a given arrangement of profits. Volatility is estimated by the calculation of standard deviation yearly returns within a defined timeframe. Unpredictability demonstrates the valuing conduct of the security and helps gauge the variances that may occur in a brief timeframe. In the event that the costs of a security vacillate quickly in a brief span length, it is named to have high volatility. The stock market is a very volatile place for one to invest money in due to the risk involved in prices. Movement or shift in stock price occurs on a daily, monthly, and quarterly and annually basis and this can be detrimental to some investors. In finance volatility is important as it defines the decision making process of most or all investors in a market. For securities, the higher the risk involved, the greater the dispersion of returns (Kuranguri, 2006). Stock volatility is associated with commercial enterprise cycle, recessions, booms or recovery times. Stock volatility is better at some point of the recession and decrease at some point of the boom duration of the financial system. High inventory returns imply better normal increase of an economy and vice versa. Stock return volatility results in

uncertainty which hinders powerful overall performance of the financial zone in addition to the entire financial system at massive (Olweny & Omondi, 2011).

Corradi, Distaso and Mele (2013), examined the macroeconomics determinants of stock unpredictability and instability premiums utilizing the Vix record information kept up by the Chicago Board Options Exchange (CBOE) from 2007 to 2009. They created and evaluated a no mediate current where securities exchange unpredictability is unequivocally identified with various macroeconomic and undetectable variables. The authors found that the level and changes of stock instability are to a great extent clarified by business cycle factors and that some unobserved factors adds to about 20% of the general varieties in unpredictability, in spite of the fact that not its high points and low points. The authors additionally contend that there is solid proof that capital market instability has an extremely prominent business cycle drifting, being higher during economic slowdown than during economic boom.

Macroeconomic Variables and Stock Prices

The following selected macroeconomic variables have been considered based on other scholars" findings, economic importance of the variables as well as the performance indicators of growth and development of the Kenyan economy.

CBK lending rate is one of the key macroeconomic variables that shape economic growth and development. CBK lending rate has an impact on household income who may decide to invest part of their income in stock market depending on the rate of return on the alternative investment (Barro, 2010).

Tax incentives affect the competitive position of companies and their profitability. One additional factor that can exacerbate cyclical volatility in share prices are the myriad tax incentives governments provide. A tax system that contains generous incentives for share ownership not only results in a higher, steady-state level of share prices but may also result in greater cyclical volatility of share prices (Poterba & Weisbenner, 2001).

Inflation is a key macroeconomic variable in the Kenyan economy. According to Young (2006), increased inflation leads to low consumer purchasing power thereby decreasing economic activity resulting in lower earnings for the firms. The potential lower earnings should result in a decrease in stock valuations resulting in stock losses.

According to Mohammed, (2015), the most significant factor impacting the advancement of share prices in the long haul is the measure of cash in the economy (for example cash supply). Cash supply can influence share prices straightforwardly, when there is more cash in the economy than can be used so they are apportioned to speculations. In any case, as of now referenced, for instance, by utilizing quantitative discharge results in a roundabout way in the

decrease of the loan costs rendering the outside financing less expensive, prompting expanding ventures (development in the interest for offers) and utilization (better monetary consequences of organizations).

Engle and Rangel (2008) research the spline GARCH display for low recurrence unpredictability and its macroeconomic causes. They noted, that high recurrence total capital market unpredictability has short-run and long-run part and propose that the longrun, measurement is identified with the variance of financial exercises. Attari and Safdar (2013) analyzed the connection between macroeconomic unpredictability and securities exchange instability in Pakistan. They utilized the EGARCH strategy to produce unpredictability from the Karachi Stock Exchange (KSE – 100 file). The macroeconomic factors incorporate loan cost, growth and gross domestic product. The outcomes demonstrate that macroeconomic factors have critical effect on the security.

Statement of the Problem

There are competing views on the interplay between stock price and the macro economy. One view begins with the idea that some real factors (typically unobservable to researchers) lead to variations in prospective real rate of return on capital. Given the discount rates for owners of capital, an increase in prospective returns raises stock prices and vice versa. Researchers have attempted to use surrogate measures for these real factors (or economic fundamentals) that determine stock prices. The commonly used surrogates include overall economic activity (as captured by GDP), business investment, consumption, national income, household wealth, household investment, inflation, interest rates, money supply and so on. The second approach considers stock prices to behave in a random manner and as such they are unrelated to economic fundamentals. This appears to be the view that Keynes held when he termed stock markets as gambling casinos. Economists who view the stock market as gambling casinos would not carry out regressions between stock prices and economic variables (Munene, 2007).Wang (2010) explain that the variations in the price of stock constantly act as the base of interest in the entire financial markets because their impacts affect investment strategies.

Inflation, alongside money supply are significant factors for deciding the necessary paces of return used to infer the estimation of ventures (Reilly, 20144). Accordingly, one would anticipate that inflation should have some effect on Stock patterns. Financial portfolio hypothesis recommends that adjustments in money supply changes the balance position of cash, subsequently modifying the arrangement and cost of advantages in a speculator's portfolio. What's more, changes in money supply may affect on genuine financial pointers in

this manner impacting stock patterns, (Rogalski and Vinso 2010). Governments everywhere throughout the world use charge motivations to upgrade monetary exercises and ventures by firms, they utilize these type of impetuses to channel some uncommon monetary exercises towards some significant areas of the economy where they are either not felt or not existing by any stretch of the imagination (Kaplan, 2011). This upgrades the share prices of a firm over the long haul. Afonso and Sousa (2011) consider independently the income and use segments of the financial deficiency and find that administration consumption stuns negatively affect share prices, while government income stuns have a little and constructive outcome.

The Nairobi securities exchange market plays a very key role in creating potential investment opportunities for domestic and foreign investors and a leading economic growth indicator. Quoted companies at the Nairobi securities exchange suffer from increasing share price volatility. Since Stock prices influences investment decisions, excessive share prices volatility undermines the usefulness of stock prices since stock prices shows the true intrinsic value of a firm (Karolyi, 2011). In order to inform quality policy making process, it is vital that factors causing volatility need to be established.

Studies that have been conducted in developed and developing economies on the macroeconomic variables, share price and volatility realize a lot of conflicting findings in terms of the causality. Olweny and Omondi (2014) and Kirui (2014), investigated the effect of macroeconomic variables on share price in Kenya where the former found inflation to be significant while the latter found it to be insignificant. Ouma and Muriu (2014) found inflation to be significant while Robert (2008) who investigated the effect of macroeconomic variables on share price for four economies; Brazil, China, Russia and India where found no relationship between Inflation rate, oil prices and the share price.

If volatility of share prices could be predicted by use of the available macroeconomic information, therefore information on rational portfolio selection and diversification geared towards increasing returns would be easily established. It is evident that there is no consensus in literature of the main factors causing volatility where factors vary from one study to another. There was need for an in-depth and an extensive evaluation to determine which factors that causes volatility of NSE index in Kenya.

Objectives of the study

General Objective

To establish the effect of macroeconomic variables on share price volatility in the NSE.

Specific Objectives

1. Examine the effect of tax incentives on share price in the companies listed at Nairobi securities exchange.
2. Determine the effect of money supply on share price in the companies listed at Nairobi securities exchange.
3. Assess the effect of Central Bank of Kenya (CBK) Lending rate on share price in the companies listed at Nairobi securities exchange.
4. Examine the effect of inflation on share price in the companies listed at Nairobi securities exchange.

THEORETICAL FOUNDATION

Efficient Market Hypothesis

The market where the prices of security give real and true value of the asset is an efficient market. It is important to understand the term „efficient" as used in this theory. Efficient as used here done not mean that the security prices are often a true reflection of the real value of the asset but simply means that the quoted price takes into account all the information in the public domain to all potential investors. The efficient market theory or hypothesis (EMH) become widely adopted after a series of empirical tests in economic theory have been developed by a finance theorist Fama (1970). Fama (1970) argued that depending on the kind of data that is revealed in the stock prices, the markets are efficient in three levels. All historical price information are incorporated in the current price in a weak form of the efficient market hypothesis. This means that the security prices variations are random and cannot be predicted using past information. This is often referred to as the „random walk" theory. Under semi-strong efficient market hypothesis, the present-day price reveals not only all historically price shaping info however all info in the public domain (as well as organizations comprehensive statements of financial position) and therefore no method will uses this kind of information would help in identifying undervalued stocks under this market form. The strong form of efficiency market hypothesis postulates the present-day price reveals all price-shaping information in private and public domain and barely any investors will be able to constantly find underestimated stocks. This theory is helpful in determining stock prices are explained by other variables that are not specific to the organization, these variables include macro-economic variables.

Tobin's Q Theory

This hypothesis was hypothesized in 1969 by Tobin. It contends that yield development is driven by the ceaseless assortment of physical, human or data capital. The pace of genuine

speculation decides the pace of capital collection. The methodology focuses on the extent of an organization's protections trade an incentive to the substitution cost of its capital. Increment in the arrival to capital will raise the market benefit of existing capital flagging the gainfulness of extra speculation. Extra venture will drive down the minimal result of capital, decreasing the benefit cost of capital products until balance is reestablished a training that will energize broad speculation (Tobin, 1969).

The theory advocates for estimating money related execution of a firm by focusing on the extent of the market estimation of an organization's benefits. The market estimation of a firm is shown up at by the market estimation of its wonderful stock and commitment to the substitution cost of the organization's advantages. Right when a firm is worth more than its incentive taking into account what it would cost to recreate it, at that point excess benefits are being earned and therefore the firm is beneficial (Tobin, 1969).

Modern Portfolio Theory

Markowitz (1952) developed Modern Portfolio Theory (MPT) to enable investors to examine their expected returns primarily based on the predisposed risks. This theory seeks to maximize the investors return on the portfolio and to minimize the portfolio risk in any level of expect return of a portfolio. Markowitz therefore encourages diversification of assets to avoid market risks. This enables in controlling both the kind and the amount of expected risk and return.

MPT emphasizes determination of the numerical interactions among the specific securities that encompass the total investments rather than analyzing the characteristics of individual investments (Omisore et al., 2012). However, they further suggest that it is important to consider how each asset changes in price relative to how every other asset in the portfolio changes in price considering other internal or external factors. Markowitz claims that investment portfolio is an important concept leading to applicability of the theory to this study. This is because it shows how investors approach varied risks due to perceived better returns from their investment decisions, even when there is no outright feasible return on investing in particular securities. In this regard therefore, macroeconomic conditions in addition to known market risks need to be evaluated to avoid making rational decisions based on market behavior.

Inflation Theory

According to Fisher (1930) hypothesis, common stock portrays a right to the real assets of the listed firm; and should therefore suffice as a guard opposed to inflation. In the case of validation of this assertion, investors then have the ability to trade their financial assets in exchange for real assets to hedge against prevailing inflation. In which case, the nominal price should

absolutely mirror inflation expectations through a positive correlation. The inflation illusion hypothesis of Modigliani and Cohn (1979) sets the premise that the real influence of inflation is as a result of the illusion of money. Bekaert and Engstrom (2010), postulate this illusion to proven by a rise in inflation, which stimulates an increase in bond yields, regardless of this, investors in stocks erroneously discount cash flows which are real by a nominal rate. As a consequence the stocks end up underpriced pegged on the negative correlation that would exist in relation to increased nominal returns. Feldstein's (1980) determined a divergent view on the stock market performance to inflation relationship in that stock performance was curtailed by inflation primarily due to asymmetric inventory depreciation and taxation regiment that diminished profit after taxes. Further to this, he detected that capital gains tax stunted share prices when inflation was high caused by the historic depreciation costs. 13 Fama (1981) on the premise of money demand theory ascertained a negative correlation between inflation and stock market owing to the fact that inflation reacts in a negative manner to corresponding related economic enterprise; on the contrary there is a positive correspondence between economic enterprise and performance of stock. Despite this assertion, external factors employed by firms can alter this correlation from a directly proportional one to a relatively dependent one. Hoguet (2008) asserts that firms in a bid to hedge against inflation often transfer inflation related costs to consumers; therefore the real interest rate remains unchanged. As a result, valuations of these firms using discounted cash flows are immune to changes in inflation

Keynesian Economic Theory

Keynes economic theory developed in 1936 implies that an investor prefers a higher percentage of interest on securities that have an extended maturity period, which exerts higher risk, because all other variables being constant, individuals desire cash or highly liquid resources. Liquid assets are simple to sell rapidly for the full cost. The liquidity preference theory suggests that shortterm bonds or investments carry lower interest rates because investors are risking minimal liquidity compared to long-term securities (Demirgüç-Kunt, & Huizinga, 1999).

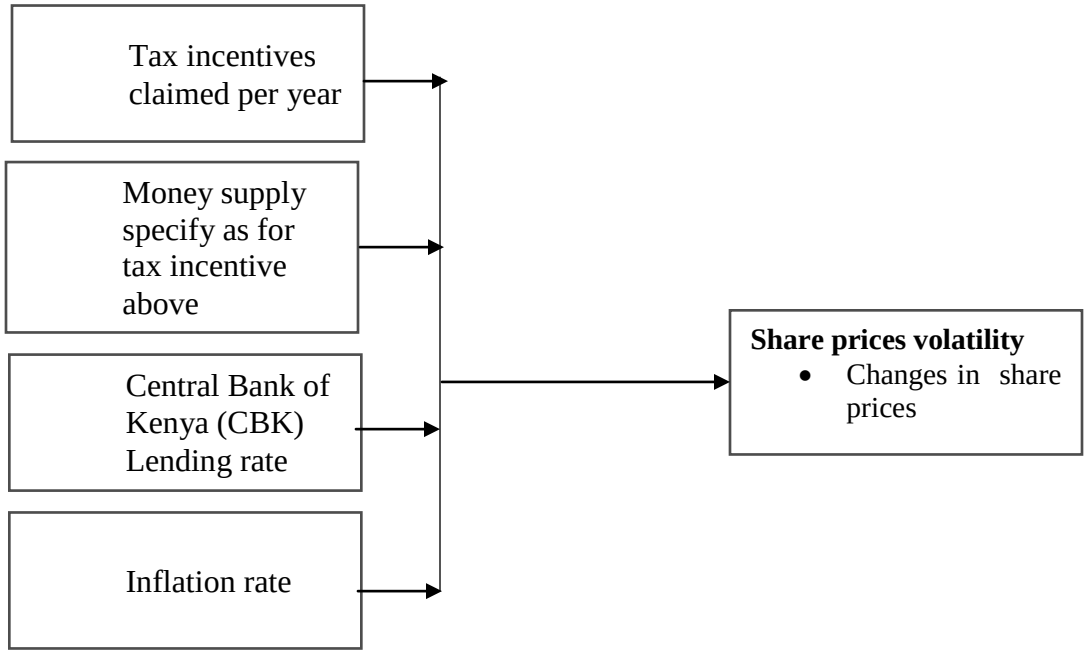
The three motives that Keynes identified enlighten people to why people would want to have money and therefore the urgency to have it. These motives affect the demand for money and therefore the banks will adjust the lending rates based on the demand accordingly maximize profits (Hammond, 1991). Supply represents the total goods or services available in the market, which comprises of physical products like vehicles, or non-physical products like booking an appointment with a consultant. At any given time, the supply is definite (Demirgüç-Kunt, & Huizinga, 1999).

Demand relates to the markets yearn for the materials. At any given moment, there is limited demand. The demand changes based on different variables like availability of products, affordability (Pollin & Zhu, 2006). When the supply and demand are at a balance, the economy is at the equilibrium point. If the price surpasses the equilibrium, consumers may shy away from the product. Conversely, if the cost is meager, the demand may be excess than the supply available (Pollin & Zhu, 2006).

CONCEPTUAL FRAMEWORK

This section presents the relation about the independent and dependent variables of the study. According to (Mugenda and Mugenda, 2003) the framework outlines a working definition of variable and uses a diagram to pose a vivid and easy clarification of the movement of conceptual-framework. In this study, the dependent variable will be stock price volatility while the independent variables will be tax incentives, money supply, Central Bank of Kenya (CBK) Lending rate and inflation.

Figure 3: Conceptual Framework



Tax Incentives raise the arrival to capital accordingly making interest in an area progressively appealing and thus increment gainfulness of the firm. There are different kinds of monetary motivators. These incorporate government arrangement of underneath advertise intrigue

advances, charge alleviation using credits, findings, or reductions, direct awards of land and offices, and citizen financed work power preparing for focused firms and businesses

Money supply is one of the most essential parameters in an economy and measures the bounty or shortage of cash. Share prices will in general move higher when the money supply in an economy is high. A lot of cash coursing in the economy the two gets more cash-flow accessible to put resources into stocks and furthermore makes elective speculation instruments, for example, bonds less alluring.

Government expenditure influences the advancement of the financial exchange through its impact on the choices and exercises of the private area firms and family units (Razin, 1987). Taking everything into account, the turnover of firms which appreciate high government support, may encounter a lift, which could convert into improved benefit and noteworthy profits for the investors of the organizations (contingent upon the degree of the association's costs and its profit approach). Improved benefit and great profits upgrade the engaging quality of firms recorded on the stock trade, and drive up interest for them on the exchanging floor. This drives up the stock cost and the market capitalization of the organizations, and thus, the market capitalization of the whole stock trade, just as the estimation of exchanges, given that the market is utilitarian and productive.

In case of an expansion in inflation, the organization's income will likewise die down and this will antagonistically influence the share prices and in the long run the profits from organization stocks. The ostensible financing cost comprises of a genuine rate in addition to expected expansion rate. The normal genuine pace of an economy is dictated by the genuine factors, for example, profitability of capital and time inclination of savers. It is autonomous of the normal inflation rate.

RESEARCH METHODOLOGY

Research Design

The research embraced a causal research design. Brains, Willnat, Manheim and Rich (2011) explain that causal research design proves the effect and cause correlation between variables. Thus, the research design was instrumental in investigating the correlation between macroeconomic factors (supply of money, tax incentives, Central Bank of Kenya (CBK) Lending rate and inflation) and volatility in stock prices such that predictions will be made based on the level of association. According to Zikmund, Babin, Carr and Griffin (2012), causal design also looks at the state and nature of the relation between the causal variables and has the advantage of greater levels of internal validity.

Target Population

The population of the study consisted of all the shares listed on Nairobi securities exchange as at the year 2017. This population is considered appropriate as it gave insights on how macroeconomic variables affect Share prices volatility. There are 62 firms listed firms in NSE which forms the basis of our study population.

Sample Size and Sampling Technique

Kothari (2004) portrays a sample as an assortment of units browsed the universe to speak to it. Dark (2004, 2011) characterizes examining as the determination of people from inside a populace to yield some information about the entire populace, particularly to make forecasts dependent on factual surmising. Gay (2003) prescribes that where the objective populace is under 100, the entire populace ought to be remembered for the examination and an evaluation review embraced. For this investigation, a registration study was embraced since our objective populace is under 100, thus no inspecting is finished. The yearly time series data was analyzed using secondary data from January 2007 to December 2016. The period for 10 years was considered for increase of results accuracy as well as comprehensive coverage.

Data Collection Procedures

The data used from secondary sources. Nairobi Securities Exchange All Share Index (NASI) will be used to measure stock performance, whose data was retrieved from the Nairobi Securities Exchange. Statistics concerning tax incentives, inflation rates, money supply and and Central Bank of Kenya (CBK) Lending ratewas acquired from the Central Bank of Kenya. The relationship of variables was illustrated in table 1 which shows their respective indicators.

Table 1: Variable Definition and Measurement

Variables	Measures	Measurement Scale	Tools of Analysis
Tax incentives	log of tax incentive claimed per year	-Nominal -Ordinal	Descriptive statistics Inferential statistics
Money supply	total value of Kenya's yearly broad money	-Nominal -ordinal	Descriptive statistics Inferential statistics

Table 1…

Central Bank of Kenya (CBK) Lending rate	Annual CBK Lending rate	-Nominal -ordinal	Descriptive statistics Inferential statistics
Inflation	consumer price index	-Nominal -ordinal	Descriptive statistics Inferential statistics
Share prices volatility	Changes in share prices	-Nominal -ordinal	Descriptive statistics Inferential statistics

Data Analysis

Descriptive statistics including mean, standard deviation, and regression was used. Regression analysis model was used to determine the causal relationship between the macroeconomic variables and Share prices volatility. The regression analysis model was used and the equation below presents the algebraic expression of the analytical model.

$\varepsilon S = \beta_0 + \beta_1 TI + \beta_2 MS + \beta_3 LR + \beta_4 IRS$

Where

S: Stock price volatility measured by Nairobi Securities Exchange All Share Index (NASI)

TI: Tax incentives (log of tax incentive claimed per year)

MS: Money supply measured as total value of Kenya's yearly broad money

LR: CBK lending rate measured by CBK average yearly lending rate

IR: Inflation rate (consumer price index)

Diagnostic Tests

Diagnostic tests or tests of statistical assumptions were conducted on the data collected to determine if they are suitable for multiple linear regressions. This included test of sampling adequacy, normality, linearity, independence, and homogeneity and multi-co linearity.

Normality

To check for normality, descriptive statitics was used, that is Kurtosis and Skweness of the distribution of the data. Also a Jarque-Bera test will be used. It a test based on the residuals of the least squares regression model. For normal distribution Jarque-Bera statistics is expected to be zero.

Muilticollinearlity

The existence of strong correlation between independent variables will be tested using Variance Inflation Factor and correlation co-efficient among the independent variables. Farrar, & Glauber, (1967) states that a score of 1.0 and 0.8 for correlation co-efficient shows existence of multi collinearity. The rule of thumb on variance inflation factor is, if it greater than 4 it requires investigation and muilticlolinearity is a problem.

Heteroskedasticity

This occurs when the variance of the error term is not constant. If the residuals have a constant variance they are said to be homoscedastic that is the variance for each disturbance (error) term is constant and independent of the explanatory variables. The study used the white's test to detect heteroskedasticity. It examines whether the error variance is affected by any of the regressors', their squares or cross products. Therefore, it is also large sample test but it does not depend on any normality assumption. White, (1980) opines that a score of p-values of less than 0.05 (at 95% level of significance) shows non-existence of heteroscedastic

Autocorrelation

Autocorrelation refers to the correlation of a time series with its own past and future values that is correlation between members of a series of numbers arranged in time. Durbin waston test was used to detect autocorrelation on the residual on the regression analysis. According to Legendre, (1993), a score of less than 2 shows that there is serial correlation.

RESULTS AND DISCUSSION

Descriptive Statistics

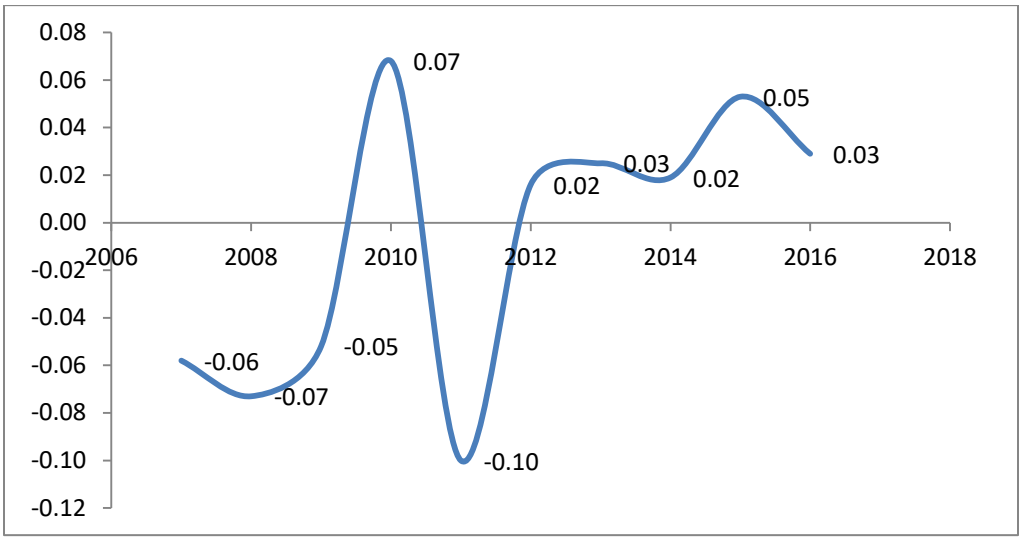
Monthly data on NSE 20 share index was collected from NSE and the tax incentives, money supply, CBK lending rate and inflation rate were obtained from the Central Bank of Kenya and was subject to descriptive statistics.

Table 2: Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Stock price volatility	10	-.10	.07	-.0073	.05810
Tax incentives	10	122.40	136.90	130.3100	5.00898
Money supply	10	1914717.00	2142256.00	2038430.2000	78503.60449
CBK lending rate	10	6.40	15.80	9.4600	2.51493
Inflation rate	10	3.97	16.27	8.3370	4.08587

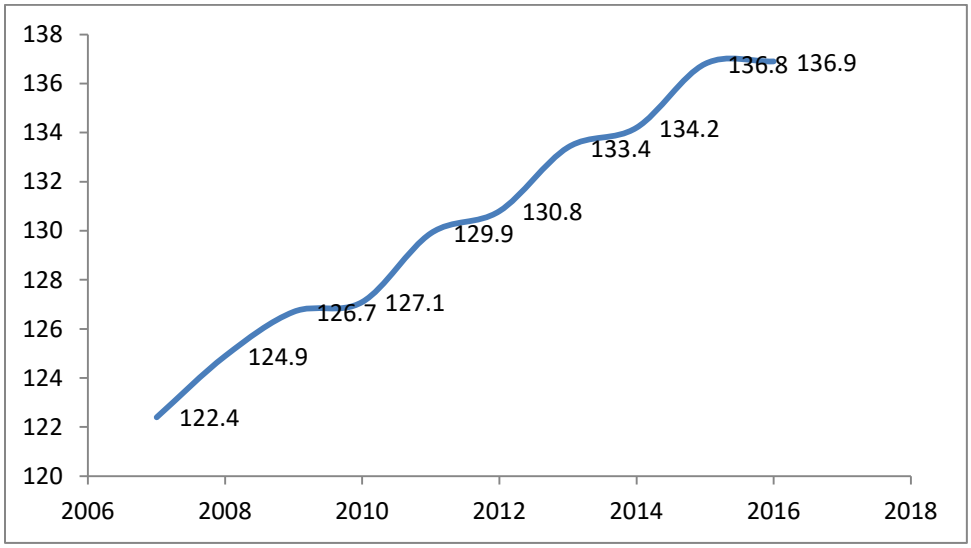
The average stock return for the period of study was -0.0073 with a small standard deviation around the mean of 0.05810. The lowest return for the period was -0.10 while the highest was 0.07. Stock Return in the period under study, the NSE 20 share index was converted into stock return using the formulae Rt = $\frac{(NSE_t - NSE_{t-1})}{NSE_{t-1}}$

Figure 1: Line Graph of Stock price volatility



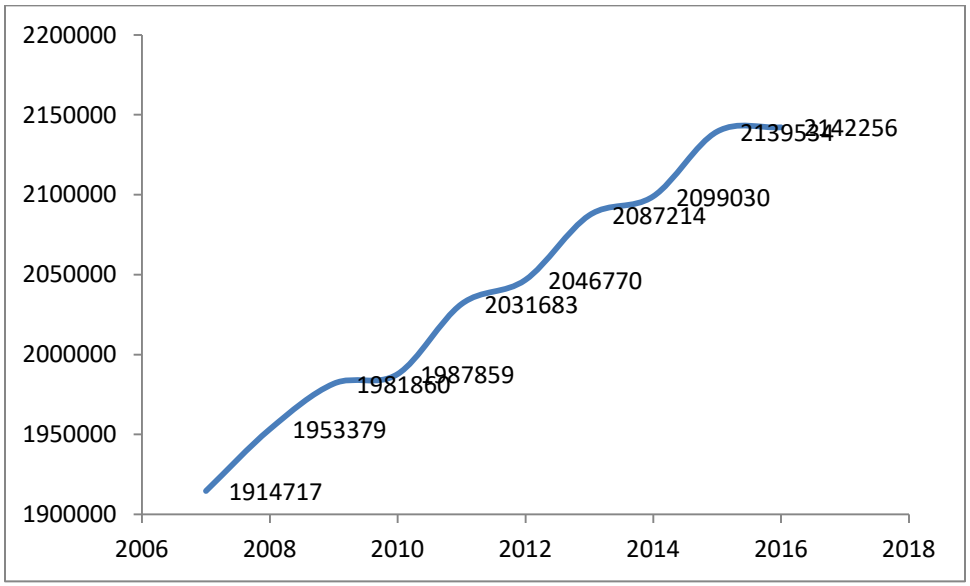
The line graph indicated that the stock return at the NSE was a minimum of -0.1 and maximum of 0.08.

Figure 2: Line Graph of Tax incentives



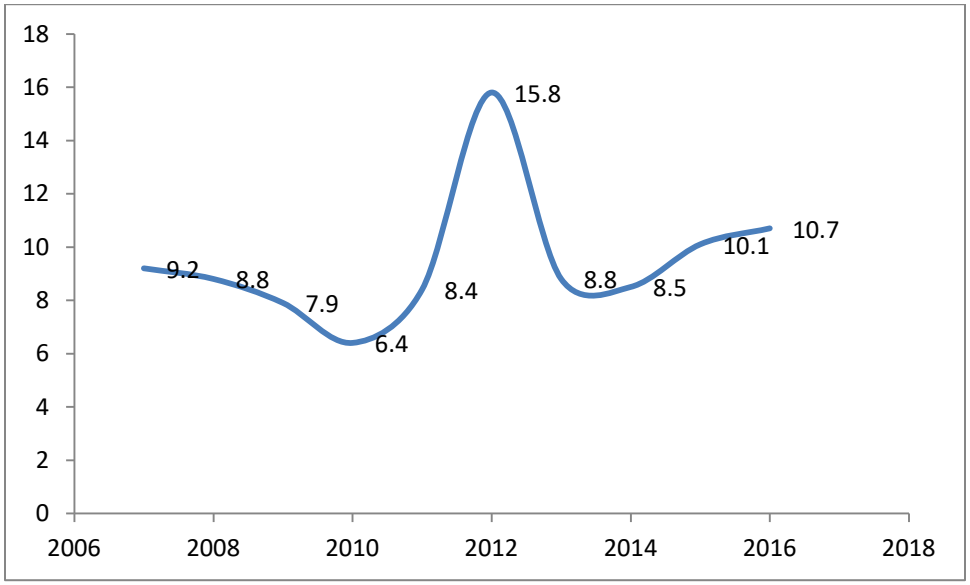
The study established an upward trend of tax incentives in the Country throughout the study period as shown below in Figure 5.

Figure 3: Line Graph of Money supply



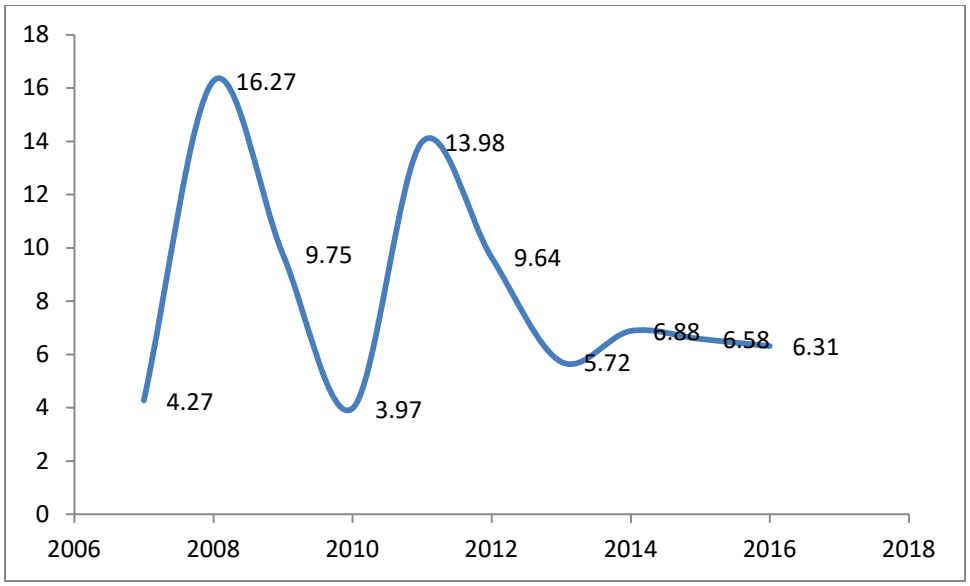
The study established an upward trend of broad money supply in the Country throughout the study period as shown below in Figure 6.

Figure 4: Line Graph of CBK lending rate



The CBK lending rate started with a minimum of 6.4% in year 2010 increasing to a higher rate of 15.8% in 2010 to 2012. It later dropped up to 8.5% in 2015 when it stabilized before it increased by 1.6%.

Figure 5: Line Graph of Inflation rate



The inflation rate had a minimum of 3.97 and a maximum of 6.27 as indicated in the figure above.

Correlation Analysis

The correlation analysis presents the strength of relationship between the variables. Pearson correlation was preferred to analyse the connection between the predicted and the predictor variables. The magnitude of the linear relations was measured using correlation coefficient (r). The value of r is assumed to be between -1 and +1. For r = +1, implies perfect positive (+) correlation, 0 means no correlation, -1 means the variables are perfectly negatively correlated. The nearer to +1, the stronger the relationship whereas the nearer to -1, the meager the relationship between the variables.

Correlation analysis measures the relationship that exists between the variables. The study undertakes a Pearson correlation that measures the linear relationship of variables. A correlation of 1 shows a perfect positive correlation while correlation of 0 or value close to zero shows no relationship or weak relationship respectively. -1 value, shows a negative perfect relationship and values close to it have strong negative relationship. The table 3 shows the value of Pearson correlations for the variables.

Table 1: Correlation Matrix

	Share price Volatility	Tax incentives	Money supply	CBK lending rate	Inflation rate
Share price Volatility (r)	1	0.773	0.463	-0.618	-0.652
(p) Sig. (2 tailed)		0.036	0.018	0.025	0.031
Tax incentives (r)	0.773	1	0.316	0.163	0.161
(p) (2 tailed)	0.036		0.047	0.019	0.029
Money supply (r)	0.463	0.316	1	0.216	0.233
(p) Sig. (2 tailed)	0.018	0.047		0.047	0.0464
CBK lending rate (r)	-0.618	0.163	0.216	1	0.462
(p) Sig. (2 tailed)	0.025	0.019	0.047		0.014
Inflation rate (r)	-0.652	0.161	0.233	0.462	1
(p) Sig. (2 tailed)	0.031	0.029	0.0464	0.014	

With reference to Table 3, there is a significant positive relationship between Share price Volatility and Tax incentives (rho=0.773, p-value <0.05). Therefore, it can be implied that an increase in tax incentives is associated with increased Share price Volatility. Secondary, the showed that there is a weak significant relationship between Share price Volatility and Money supply (rho=0.463, p-value <0.05). Thirdly, the findings showed that there is a strong negativde significant relationship between CBK lending rate and Share price Volatility (rho=-0.618, p-value <0.05). Finally, there was a significant negative relationship between Inflation rate and Share price Volatility (rho=-0.652, p-value <0.05).

Regression Analysis

The study used regression analysis to determine effect of dependent variable on independent variables.

Model Summary

Model summary' table, provides information about the regression line's ability to account for the total variation in the dependent variable

Table 2: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.921[a]	.849	.845	.04131

Dependent Variable: Share price Volatility

Predictors: (Constant), tax incentives, Money supply, CBK lending rate and inflation rate

The findings on table 4 indicate that R square value is 0.849, which is an indication that 84.9% variation on share price volatility due to changes in tax incentives, Money supply, CBK lending rate and inflation rate at 95% confidence interval.

ANOVA Results

Table 3: ANOVA of the Regression

	Sum of Squares	df	Mean Square	F	Sig.
Regression	195.568	4	48.892	9.44956	0.0008179
Residual	294.918	57	5.174		
Total	490.486	61			

Dependent Variable: Share price Volatility

Predictors: (Constant), CBK lending rate, tax incentives, Money supply, and inflation rate

Table 5 shows that the F statistics value of 9.44956 was significant as indicated by the P value of 0.0008<0.05. This is an indication that regression model was fit and also acted as a good predictor of the correlation of the research variables.

Coefficient of Correlation

Multiple regression analysis was conducted as to determine the relationship between the Share price Volatility and the four variables.

Table 4: Coefficient of Correlation

	Un-standardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	3.77	0.451		8.359202	0.004
Tax incentives	0.782	0.121	0.146	6.46281	0.003
Money supply	0.463	0.079	0.126	5.860759	0.001
CBK lending rate	-0.473	0.073	0.045	-6.479452	0.005
Inflation rate	-0.532	0.073	0.142	-7.287671	0.004

a. Dependent Variable: Share price Volatility

Share price Volatility= 3.77 + 0.782*Tax incentives + 0.463*Money supply + 0.473*CBK lending rate + 0.532*Inflation rate

From the finding in Table 6, the study found that holding tax incentives, Money supply, CBK lending rate, and Inflation rate, at zero Share price Volatility will be 3.77. It was established that a unit increase in tax incentives, while holding other factors (Money supply, CBK lending rate, and Inflation rate) constant, will lead to an increase in Share price Volatility by 0.782 (p = 0.003). Further, unit increase in Money supply, while holding other factors (tax incentives, CBK lending rate, and Inflation rate) constant, will lead to an increase in Share price Volatility by 0.463 (p = 0.001). A unit increase in CBK lending rate, while holding other factors (tax incentives, Money supply, and Inflation rate) constant, will lead to a decrease in Share price Volatility by 0.473 (p =0.005).

Moreover, unit increase in Inflation rate, while holding other factors (Tax incentives, Money supply, CBK lending rate) constant, will lead to an decrease in Share price Volatility by 0.532 (p = 0.004). This infers that Money supply contribute most to the Share price Volatility followed by Tax incentives. At 5% level of significance and 95% level of confidence, Money supply, Tax incentives, and Inflation rate are significant in Share price Volatility.

Interpretation of Findings and Discussions

The study revealed that the average stock return for the period of study was -0.0073 with a small standard deviation around the mean of 0.05810. The lowest return for the period was -0.10 while the highest was 0.07. The study established an upward trend of tax incentives and broad money supply in the Country throughout the study period. The CBK lending rate started with a minimum of 6.4% in year 2010 increasing to a higher rate of 15.8% in 2010 to 2012. It later dropped up to 8.5% in 2015 when it stabilized before it increased by 1.6%. The inflation rate had a minimum of 3.97 and a maximum of 6.27 as indicated in the figure above.

Results of the Pearson's correlation coefficient depicts that there is a significant positive relationship between Share price Volatility and Tax incentives (rho=0.773, p-value <0.05). Therefore, it can be implied that an increase in tax incentives is associated with increased Share price Volatility. Secondary, the showed that there is a weak significant relationship between Share price Volatility and Money supply (rho=0.463, p-value <0.05). Thirdly, the findings showed that there is a strong negativde significant relationship between CBK lending rate and Share price Volatility (rho=-0.618, p-value <0.05). Finally, there was a significant negative relationship between Inflation rate and Share price Volatility (rho=-0.652, p-value <0.05 The findings indicated that for the period of study the selected macroeconomic variables i.e tax incentives, money supply, Inflation rate and CBK lending rate had a strong effect of 84.5% on the share price volatility for the period 2007 and 2016 indicated by the R squared. This finding

concurred with the study by Ilahi, Ali and Jamil (2015) study that indicated that there was a weak connection between macroeconomic variables and stock market returns in Pakistan.

There was a positive effect on the stock returns as a result of the money supply at the NSE. This was in tandem with the findings by Osamuonyi and Evbayiro-Osagie (2012) who found a significant but negative association between money supply and Stock Market Index at the Nigerian capital market index. The Inflation rate had an effect that was found to be negative on the stock returns at the NSE. This was similar to the findings by Ouma and Muriu (2014), who found a negative correlation between Inflation rate and stock prices at the NSE. The CBK lending rate was found to have a positive weak effect on the stock return. This study contradicts the study by Ochieng and Adhiambo (2012) that had concluded that 91 – day T bill rate (which had been correlated to the lending rate) had a negative relationship with the NASI.

CONCLUSIONS

The study concluded that the selected macro-economic variables had a weak positive effect of 84.5% on the Share price volatility for the period of study 2007 to 2016. The effect was varying for the variables as money supply was found to have a positive effect on the Share price volatility, the Inflation rate had a negative effect on Share price volatility and the CBK lending rate was found to have a negative effect on the Share price volatility. The Tax incentives had a positive effect on the Share price volatility.

The Inflation rate was found to have a substantial effect on the Share price volatility as its P value was less than 0.05. Tax incentives, Money supply and CBK lending rate were also found to have a significant effect on the Share price volatility. The study concluded that an increase in Inflation rate and CBK lending rate would lead to a decrease in the stock return but an increase in money supply and the tax incentives would increase Share price volatility.

RECOMMENDATIONS

The study recommends that the Central Bank of Kenya (CBK) should increase its regulation on money supply, the Inflation rate and its lending rate as it has an effect on the Share price volatility. The money supply should be too much as it leads to increase in the Share price volatility. The Inflation rate should also be minimized as it has a significant effect on the Share price volatility earned. If the Inflation rate is higher, the Share price volatility would be lowered. However the CBK lending rate should be maintained at an affordable rate as it leads to increase in the Share price volatility as well as curbing the money in circulation and reducing the Inflation rate.

The NSE should also ensure that it ensures there is free flow of information so that the stocks are not excessively affected by changes in the macroeconomic environment. This is in line with the efficient market hypothesis, so that that information is received in time to avoid effects on the Share price volatility. Higher returns at the NSE will attract more investors which is basis of economic development of the country. The government through the Capital Markets Authority should ensure that it puts down policies that promote investment at the NSE

SCOPE FOR FURTHER STUDIES

Further studies should be done to incorporate other variables such GDP and unemployment rate, so as to ascertain the effect of such in the Share price volatility. This is considering the study only focused on four macroeconomic variables being tax incentives, CBK lending rate, the Inflation rate and the money supply. Investors are also affected by theirbehaviors on making investment decisions. Further studies could also incorporate the behaviors in ascertaining their effect on Share price volatility.

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