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## **Effect of Macro-Economic Variables on Stock Market Prices for the Companies Quoted on the Nairobi Securities Exchange in Kenya**

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### **Abstract**

Stock prices fluctuations for quoted companies occur daily due to both company specific variables like company earnings with corresponding dividend policies, and multiple macro-economic variables. This study sought evidence supporting the existence of influence of the selected macro-economic variables of: foreign exchange rate of hard currencies, interest rate and inflation rate on share prices fluctuations based on the weighted average monthly data from January 2008 to December 2012 for the companies listed on the Nairobi Securities Exchange in Kenya. The influence of selected macro-economic variables on stock exchange provide important implications for monetary policy, risk management practices, financial securities valuation and government policy towards financial markets. The study utilized secondary data that was obtained from: Central Bank of Kenya, Institute of statistical Kenya and Nairobi Securities Exchange. To investigate the effect of the selected macro-economic variables on share prices of the companies listed on the Nairobi Securities Exchange, simple and multi-variate regressions analysis was used. For all of the quoted companies it was desirable to find if the stock prices fluctuations are predominantly due to the selected macro-economic variables.

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The Nairobi Securities Exchange may derive great benefit through more *investors raising new capital in the share market when stocks are in great demand and more extensional investment* of companies by raising additional capital through stock splits or issuing more shares out of their authorized share capital. The study found that interest rate had a predominant effect on stock market price indices as compared to the other macro-economic variables. Interest rate, exchange rate for both the Euro and US Dollar had a negative effect on stock market indices for companies quoted on the Nairobi Securities Exchange. When the Kenya shilling depreciates the stock market indices gain in points. The inflation rate had a negative effect on stock market performance indicating that higher levels of inflation rate result in lower stock market indices in Kenya. Other macro-economic variables would also have impact on stock market indices for companies quoted on the Nairobi Securities Exchange since the predictor model did not account for all variables as it had a low  $R^2$  of 15.1 %.

**Keywords:** macro-economic; stock market; quoted companies

## **1. Introduction**

### **1.1 Background of the study**

The Nairobi Securities Exchange (NSE) began in 1954 as an overseas stock exchange while Kenya was still a British colony with permission of the London Stock Exchange. It is the principal stock exchange of Kenya. The NSE is a member of the African Stock Exchanges Association. Nairobi Securities Exchange is Africa's fourth largest stock exchange in terms of trading volumes, and fifth in terms of market capitalization as a percentage of Gross Domestic Product (GDP). The Exchange works in cooperation with the Uganda Securities Exchange and the Dar es Salaam Securities Exchange, including the cross listing of various equities.

Trading is done through the Electronic Trading System (ETS) which was commissioned in 2006. It has a Wide Area Network (WAN) platform that was implemented in 2007 to facilitate the conducting of business from the brokers' offices.

There are two main indices that are used to measure performance. The NSE 20-Share Index (in use since 1964) measures the performance of 20 blue-chip companies. Included in the Index determination are shares of: Mumias Sugar co. ltd., Express Kenya ltd., Rea Vipingo ltd., Sasini Tea co. ltd., CMC Holdings ltd, Kenya Airways, Safaricom ltd., Nation Media Group, Barclays Bank of Kenya ltd. ,Equity Bank ltd. , Kenya Commercial Bank ltd., Standard Chartered Bank ltd., Bamburi Cement co.ltd., British American Tobacco (K)ltd., Kengen ltd. , Centum Investment Company ltd., East African Breweries ltd., EA Cables ltd., Kenya Power & Lighting Company Ltd. and Athi River Mining co.ltd. This index primarily focuses on price changes for these 20 companies. In 2008, the Nairobi Securities Exchange All Share Index (NASI) was introduced as an alternative index to cover all listed companies on the Nairobi Securities Exchange. Its measure is an overall indicator of market performance. The Index incorporates all the traded shares of the day to give the overall market. There is however a third Index; the AIG 27 Index that compares price movements of 27 companies identified as relatively stable and primarily defined by the AIG company(a financial service company and part of the AIG Group).

The stock exchange is often the most important component of a stock market.

Supply and demand in stock markets are driven by various factors that, as in all free markets, affect the price of stocks. The prices of securities are determined by the forces of demand for and supply of shares in the stock market. As prices are generated by the demand and supply of market participants, an approach could be developed in terms of a microeconomic model of interacting agents.

The author in [2] showed that Geometric Brownian motion can indeed be justified as the rational expectations equilibrium in a stock market with homogeneous agents who all believe in this kind of stock price dynamics, and who instantaneously discount all available information into the present stock price; the same view was expressed by author in [16,3]. On the other hand, [1,20,40,37] among others, identified heterogeneity among traders as a key element affecting the dynamics of stock market price fluctuations. Heterogeneity in stock markets arises naturally from different expectations about the future movement of share prices or from access to diverse information sets. However, market participants are not isolated units: their decisions are often importantly influenced by their observations of the behavior of other individuals or the prevailing mood of the market.

Currently there is an increasing interest in agent-based models for stock markets which account for imitation and contagion effects in the formation of stock prices. [13,39,8] described stock market price processes in the context of deterministic dynamical systems. These authors studied situations in which two types of traders interact in the stock market. The first type, fundamentalists, believes that the price of shares is entirely determined by some underlying fundamental value. The second type, typically called trend chasers or chartists, tries to predict future stock prices through past observations. In their models endogenous switching between the different types of stock market participants can cause large and sudden stock price fluctuations. Stock fluctuations can also occur in response to general economic or industry trends. When the economy is depressed, stock prices drop. In an "efficient market", all stocks are fairly priced by the market.

### ***1.1.1 Macroeconomic Variables***

The concept of Macroeconomic Variables can be explained by answering the question, what is macroeconomics? This can be done from three perspectives: first it can be said is the study of the economy as a whole, and the variables that control the macro-economy, secondly it can be taken as the study of government policy meant to control and stabilize the economy over time, that is, to reduce fluctuations in the economy that can be brought by: inflation, fall in value of the local currency and high levels of unemployment in the country, and lastly it can be said to be the study of monetary policy, fiscal policy, and supply-side economics.

Thus Macroeconomic Variables impact on the economy of a country in aggregate terms by affecting all the sectors. In portfolio risk analysis, Macroeconomic Variables constitute the component of unsystematic risks since they are not firm specific; hence they cannot be diversified by combining a number of investment securities in a portfolio.

### ***1.1.2 The Nairobi Securities Exchange***

The Nairobi Securities Exchange (NSE) began in 1954 as an overseas stock exchange while Kenya was still a British colony with permission of the London Stock Exchange. The NSE is a member of the African Stock Exchanges Association. Nairobi Securities Exchange is Africa's fourth largest stock exchange in terms of trading volumes, and fifth in terms of market capitalization as a percentage of Gross Domestic Product (GDP). The stock exchange is often the most important component of a stock market. Trading is in the Nairobi Securities Exchange done through the Electronic Trading System (ETS) which was commissioned in 2006. It has a Wide Area Network (WAN) platform that was implemented in 2007 to facilitate the conducting of business from the brokers' offices.

### ***1.2 Statement of the problem***

The dynamic interactions among various macro-economic variables and the stock market prices for companies quoted on the Nairobi Securities Exchange have consequential effects on both market capitalization and companies valuations, which makes investors skeptical about the future performance of companies. As a result, the stock prices may drop in the short run as well as the long run. Therefore Investors in the Nairobi Securities Exchange need information on the influence of macro-economic variables foreign exchange, interest rates and inflation rate on the stock market prices for companies quoted at Nairobi Securities Exchange.

There are several related studies that addressed the casual relationships between stock market prices and various macro-economic variables among them interest rate, exchange rates and inflation rate in foreign countries.[3] studied the impact of macroeconomic variables on stock prices in Ghana. They used the Databank stock index to represent the stock market and inward foreign direct investments, the treasury bill rate (as a measure of interest rates), the consumer price index (as a measure of inflation), average crude oil prices, and the exchange rate as macroeconomic variables. They analyzed quarterly data for the above variables from 1991 to 2007 using co integration test, vector error correction models (VECM).In Kenya the related studies dwelt on the again on causality and co integration approaches.

This study was designed to investigate the influence of the macro-economic variables of: exchange rate of hard currencies, inflation rate, interest rate, on the stock market prices for the period 2008 to 2012 for the case of Nairobi Securities Exchange in Kenya. The research mainly addressed the combined effect of the independent variables on stock market indices. The study poses the question: what is the influence of macroeconomic variables of foreign exchange rates, interest rate and inflation rate on stock markets prices in Kenya?

### ***1.3 Objectives of the study***

The main objective of the study was to determine the effect of macro-economic variables on stock market prices for the companies quoted on the Nairobi Securities Exchange in Kenya. The specific objectives were to:

- i) Determine the effect the of foreign exchange rates on stock market prices for the companies quoted on the Nairobi Securities Exchange.

- ii) Find out the effect of interest rates fluctuations on stock market prices for the companies quoted on the Nairobi Securities Exchange.
- iii) Investigate how inflation rate affects stock market prices for the companies quoted on the Nairobi Securities Exchange.

#### **1.4 Research Questions**

The research questions to be answered by the project were:

- i) What is the effect the of foreign exchange rates on stock market prices for the companies quoted on the Nairobi Securities Exchange?
- ii) What is the effect of interest rates fluctuations on stock market prices for the companies quoted on the Nairobi Securities Exchange?
- iii) How does inflation rate affect stock market prices for the companies quoted on the Nairobi Securities Exchange?

#### **1.5 Justification for the Study**

The dynamic interactions among various macro-economic variables and the stock prices for companies quoted on the Nairobi Securities Exchange have consequential effects on both market capitalization and companies valuations in the short run as well as the long run. The selected macroeconomic variables to be considered include: foreign exchange rates of hard currencies, inflation rate and interest rate. These macro-economic variables are of great importance to economic policy regulatory frameworks established by the state in maintaining the stability of the Kenya shilling, promoting economic growth and international trade. The present analysis focused on determining the impact of macroeconomic factors on stock prices for companies quoted on the Nairobi Securities Exchange in Kenya which might be considerably controlled to enhance economic growth.

#### **1.6 Scope of the Study**

The study covered companies quoted on the Nairobi Securities Exchange in Kenya for the period 2008 to 2012. This was period for Medium Term Plan for the vision 2030 in Kenya. The selected macroeconomic variables considered included: foreign exchange rates of hard currencies (US Dollar and Euro), inflation rate and interest rate. The study considered their effect on stock prices movements for the companies quoted on the Nairobi Securities Exchange. The study was completed by the end of March, 2014.

## **2. Literature review**

### **2.1 Introduction**

The period January 2008 to December 2012, witnessed minimal fluctuations in stock market in Kenya. During the same period, both the US Dollar and Euro gradually kept appreciating against the Kenya shilling. Researchers in Kenya in the past investigated whether the exchange rate affects the stock market or not. In this

project, it is desired to investigate if there is a link between the stock market and exchange rates of the US Dollar and Euro to the Kenya shilling that might explain fluctuations specifically of stock market prices. In the short run, it is presumed that a weak currency may cause decline in the stock market prices. Multivariate, open-economy, short-run model that allows for simultaneous equilibrium in the goods, money, foreign exchange and stock markets in Kenya, could be used to test this hypothesis. Most importantly, focus will be on the effect of the US Dollar and Euro exchange rates to the Kenya shilling on the stock market over the period January 2008 to December 2012. This period coincides with the Medium Term Plan for the Vision 2030 which aims at making Kenya a medium income economy by the year 2030 through industrialization.

Establishing the relationship between stock market prices and exchange rates is important for a few reasons. First, it may affect decisions about monetary and fiscal policy. Reference [21] shows that a booming stock market has a positive effect on aggregate demand. If this is large enough, expansionary monetary or contractionary fiscal policies that target the interest rate and the real exchange rate will be neutralized. Sometimes policy-makers advocate less expensive currency in order to boost the export sector. They should be aware whether such a policy might depress the stock market or not. Second, the link between the two markets may be used to predict the path of the exchange rate. This will benefit multinational corporations in managing their exposure to foreign contracts and exchange rate risk stabilizing their earnings. Third, currency is more often being included as an asset in investment funds' portfolios. Knowledge about the link between currency rates and other assets in a portfolio is vital for the performance of the fund.

The Mean-Variance approach to portfolio analysis suggests that the expected return is implied by the variance of the portfolio. Therefore, an accurate estimate of the variability of a given portfolio was needed. This required an estimate of the correlation between stock market prices and exchange rates. It was also important to find out the degree of correlation between the exchange rate and the other macro-economic variables of inflation and interest rates.

Last, the understanding of the stock price-exchange rate relationship may prove helpful to foresee a crisis. [36] as well as [31] among others, claim that the link between the stock and currency markets helped propagate the Asian Financial Crisis in 1997. Awareness about such a relationship between the two markets would elicit preventive action before the spread of a crisis.

According to [11], the relationship between stock market prices and inflation is of great relevance from the policy point of view to manage any country's economy. Whether monetary policy can be effective by impacting on the real variables is an age old question in the macroeconomics literature. The adaptive expectation school points to the possibility of trade-offs between inflation and unemployment rate in the short run. The rational expectation school rules out any positive impact of price rise on production and employment. However, if we bring in the stock market prices the relationship between price and quantity turns out to be more complex.

The stock market prices may be related to the domestic inflation and even if domestic inflation may not affect quantity produced directly there can be substantial impact of stock market prices on output of goods. In the developed world the stock market controls the real sector hugely if it is controlled by only a few players.

However, over time the government intervention tries to rule out such “bull effect” and makes stock market more competitive which in return is expected to make both the stock market and other macro-economic variables to be sensitive to each other. Bank interest rate exercises a powerful influence on security price. If the interest rate on the short term loans falls, the speculators borrow money and purchase the securities which leads to the rise in the price of shares. When the interest rate goes up drastically, there is a fall in the prices of securities.

## ***2.2 Theoretical Review***

The macro-economic variables which affect the demand for and supply of securities resulting in their price fluctuation and which have been selected for this study are reviewed as follows:

### ***2.2.1 Exchange rate***

In this study, the evaluation of the dynamic interactions between Exchange rate as macroeconomic variable and the stock price fluctuations for the case of companies quoted on the Nairobi Securities Exchange in Kenya is undertaken. The selected exchange rates between the Kenya shilling and the hard currencies of the US Dollar and Euro in the analysis is justified by the fact that Kenya is highly dependent on international trade for capital goods as well as borrowing heavily from the Bretton wood institutions.

There are several theories that link exchange rates and stock prices.

#### ***2.2.1.1 The Traditional Approach Theory***

It is argued that currency depreciation will result in higher exports and therefore corporate profits resulting in higher stock prices in the short run. This relationship is attributed to [50]. He argued that a real currency appreciation will reduce a company’s competitive ability to export, while a real depreciation enhances its ability to export in the short run.

#### ***2.2.1.2 Portfolio Adjustment Theory***

According to [14], portfolio adjustments occur whenever there is a change in the stock prices. If stock prices are on the increase, they will attract more foreign capital. However, a decline in the stock prices will result in deterioration of shareholders wealth leading to the reduction in the country’s wealth. This may lead to a fall in the demand for money and monetary authorities reduce the interest rates to mitigate this situation. When interest rates are lower, capital may flow out of the country to take advantage of higher interest rates in other part of the world resulting in currency depreciation. The impact of higher interest rates is mitigated, however, if inflation in the country is much higher than in others, or if additional factors serve to drive the currency down. Therefore, according to this theory, lower stock market prices may lead to currency depreciation. The opposite relationship exists for decreasing interest rates - that is, lower interest rates tend to decrease exchange rates [5].

### ***2.2.1.3 The International Capital Flows Theory***

There are four types of episodes that have been identified with this theory: surges which mean a sharp increase in gross capital inflows; stops which means a sharp decrease in gross capital inflows; flight which means a sharp increase in gross capital outflows; and retrenchment which means a sharp decrease in gross capital outflows. The first two types of episodes—surges and stops—are driven by foreigners while the last two—flight and retrenchment—are driven by domestic investors. There has also been a surge and collapse in international capital flows into developing countries in the recent decades. According to [2] sudden outflow of capital is another major concern when it can drastically affect exchange rates as were witnessed during several financial crises of Brazil, East Asia, and Mexico. These capital outflows affect domestic output, real exchange rates, capital and current account balances for years after the crises. Overall, the effect of exchange rates on stock prices is quite inconclusive as there is some support for both a positive and a negative relationship. Theoretically it is justified to assume a positive link between stock prices and exchange rates by arguing that an increase in stock prices causes an increase in output through an increase in wealth and investment. There is also theoretical support for the negative impact of exchange rates on stock market prices. Increase in stock prices is followed by currency depreciation in the same country.

### ***2.2.1.4 The Deterministic Stock Valuation Model***

The stock price represents the discounted present value of the firm's future cash flows. This means that any change in such economic variables as real output, money supply, exchange rates and others may affect stock prices through their influences on firms' cash flows and discount factors. At the same time, changes in stock prices may also influence variations in economic activities and act as a channel of monetary transmission mechanisms. In particular, reflecting real economic activities, changes in stock prices leading to an increase in the demand for real money and the interest rate. Subsequently, the value of domestic currency decreases. Moreover, the increase in domestic stock prices means that domestic financial assets have become more attractive. As a result, individual investors or firms will adjust their domestic and foreign portfolios by demanding more domestic assets. Reference [2] noted the importance for understanding the interactions between equity and currency prices especially for emerging markets that need to develop their financial markets and, in the wave of globalization.

### ***2.2.2 Interest Rates***

Interest rates, inflation and exchange rates are all highly correlated. By manipulating interest rates, central banks exert influence over both inflation and exchange rates, and changing interest rates impact inflation and currency values. Higher interest rates offer lenders in an economy a higher return relative to other countries. Therefore, higher interest rates attract foreign capital and cause the exchange rate to rise. The impact of higher interest rates is mitigated, however, if inflation in the country is much higher than in others, or if additional factors serve to drive the currency down. The opposite relationship exists for decreasing interest rates - that is, lower interest rates tend to decrease exchange rates [5].



There are several theories that link interest rates, exchange rate, inflation and stock market prices.

### **2.2.2.1 Efficient Market Theory**

The efficient market theory states that the stock market reacts very quickly to new information, so at any given time the market contains the sum of all investors' views of the market. It is an investment theory that states it is impossible to "beat the market" because stock market efficiency causes existing share prices to always incorporate and reflect all relevant information. According to the efficient market theory, stocks always trade at their fair value on stock exchanges, making it impossible for investors to either purchase undervalued stocks or sell stocks for inflated prices. As such, it should be impossible to outperform the overall market through expert stock selection or market timing, and that the only way an investor can possibly obtain higher returns is by purchasing riskier investments.

Time after time, the market will overreact to bad news. Then Mean Reversion, is a process by which stocks that have moved up or down an unusual amount relative to a time frame, tend to reverse direction and move back to the averages. Mean Reversion is also a type of stock trading strategy that is based on the idea that the market is not 100% efficient. In a mean reversion trading strategy, once players are able to identify a stock or stocks that have moved an unusual amount, they take the trade in the opposite direction of the momentum. Efficient markets theory argues for a stable and predictable monetary policy.

There are three major versions of the hypothesis: weak, semi-strong, and strong. The weak form of the EMH claims that prices on traded assets (*e.g.*, stocks, bonds, or property) already reflect all past publicly available information. The semi-strong form of the EMH claims both that prices reflect all publicly available information and that prices instantly change to reflect new public information. The strong form of the EMH additionally claims that prices instantly reflect even hidden or insider information.

Meanwhile, while academics point to a large body of evidence in support of EMH, an equal amount of dissension also exists. For example, investors, such as Warren Buffett have consistently beaten the market over long periods of time, which by definition is impossible according to the EMH.

Detractors of the EMH also point to events, such as the 1987 stock market crash when the Dow Jones Industrial Average (DJIA) fell by over 20% in a single day, as evidence that stock prices can seriously deviate from their fair values.

Interest rate is one of the most important macroeconomic variables, which is directly related to economic growth. Generally, interest rate is considered as the cost of capital, means the price paid for the use of money for a period of time. Good investors always look for investing in an efficient market. In an inefficient market few people are able to generate extra ordinary profit causes of confidence losses of general people about the market. In such cases, if the rate of interest paid by banks to depositors increases, people switch their capital from share market to bank. This will lead to decrease in the demand for shares thereby decreasing the price of shares. On the other hand, when the rate of interest paid by banks to depositor's increases, the lending interest rate also

increases leading to a decrease in the investments in the economy which is also another reason for decrease in share price. So, theoretically there is inverse relationship between share price and interest rate.

#### **2.2.2.2 Dividend Irrelevance Theory**

If the company enjoys a reputation of distributing dividend regularly, the share prices of that company rise up. [42] showed algebraically that dividend policy did not matter. As long as the firm was realizing the returns expected by the market, it did not matter whether the shareholders got dividends now, or reinvested for price appreciation.

#### **2.2.3 Inflation rate**

Inflation is seen as negative news by the stock market, because it tends to curb consumer spending and therefore company earnings. When the prices are rising in the country, the industrialist makes profit. The prices of the shares go up. The control of inflation has become one of the dominant objectives of government economic policy in many countries. Effective policies to control inflation need to focus on the underlying causes of inflation in the economy.

The control of inflation through higher interest rates reduces aggregate demand by discouraging borrowing by both households and companies. Money supply is thus reduced and inflation rate lowered.

The control of inflation through Fiscal Policy is achieved by higher direct taxes (causing a fall in disposable income), lower Government spending and a reduction in the amount the Government borrows each year. These fiscal policies increase the rate of leakages from the circular flow and reduce injections into the circular flow of income and will reduce demand pull inflation at the cost of slower growth and unemployment. There are several theories that link inflation rate to investments and hence stock market prices.

##### **2.2.3.1 The Cost-push Theory of Inflation**

In the cost-push theory of inflation, rising wages in turn can help fuel inflation. Incomes policies (or direct wage controls) set limits on the rate of growth of wages and have the potential to reduce cost inflation. Wage inflation normally falls when the economy is heading into recession and unemployment starts to rise.

##### **2.2.3.2 New Keynesian Q (NKQ) Theory**

The New Keynesian Q (NKQ) theory links investment, stock prices, and inflation, providing a rational explanation for a co movement between expected inflation and stock prices. [37] set the NKQ equation that contains a specification error. Estimating and testing the NKQ theory is by matching the return-forecasting ability of predicted and actual stock prices; this strategy provides orthogonality conditions that bypass the specification error. Investment accounts for a portion of the component of stock prices that forecasts excess returns; inflation accounts for the component of stock prices that forecasts the risk-free rate.

### **2.2.3.3 The Quantity Theory of Money**

The quantity theory of money states that money supply has a direct, proportional relationship with the price level. The main cause of inflation is an excess supply of money in an economy. The Quantity Theory was first developed by Irving Fisher in the inter-war years, and is a basic theoretical explanation for the link between money and the general price level. The theory rests on what is sometimes known as the Fisher identity or the equation of exchange. This is an identity which relates total aggregate demand to the total value of output (GDP) as follows:

$$M \times V = P \times Y$$

Where

M is the money supply

V is the velocity of circulation of money

P is the general price level

Y is the real value of national output (i.e. real GDP)

Money supply (M) multiplied by the velocity of circulation (V) = the value of national output (price level (P) x volume of transactions (Y)). Velocity of circulation represents the number of times that a unit of currency (e.g. a Ksh.100 note) is used in a given period of time when used as a medium of exchange to buy goods and services. It can be calculated by dividing the money value of national output by the money supply.

In the basic theory of monetarism expressed using the equation of exchange, it is assumed that the velocity of circulation of money is predictable and therefore treated as a constant. It is also make an assumption that the real value of GDP is not influenced by monetary variables.

The growth of a country's productive capacity might be determined by the rate of productivity growth or an increase in the capital stock. Then it is justifiable, therefore to treat Y (real GDP) as a constant too. If V and Y are treated as constants, then changes in the rate of growth of the money supply will equate to changes in the general price level. The most important variable that mediates the effects of changes in the money supply is the velocity of money. Monetarists believe that the direction of causation is from money to prices.

The growth of the money supply as a result of the velocity of circulation is not always predictable – indeed it can suddenly change as a result of changes to people's behaviour in their handling of money. The direct and predictable links between the growth of the money supply and the rate of inflation sometimes breaks down. This may eventually cause central banks in different countries to place less importance on the money supply as a target of monetary policy. Instead they switch to having exchange rate targets, and latterly become more devoted to inflation targets as an anchor for the direction of monetary policy.

## 2.3 Empirical Literature

### 2.3.1 Exchange rates

The stock market and the foreign exchange rate market are the two most important financial markets in an economy. The short-run as well as the long-run feedback relations between the two financial markets has generated great academic interest. The financial markets in an economy facilitate the flow of equity funds and foreign exchange. [4] researched on the dynamic relation between Stock Prices and Exchange Rates for a sample of eight advanced economies. Specifically, their results showed that an increase in aggregate domestic stock price has a negative short-run effect on domestic currency value.

They observed that in the long run, however, increases in stock prices have a positive effect on domestic currency value. On the other hand, currency depreciation has a negative short-run and long-run effect on the stock market. The findings of [4] and [22] support [43] hypothesis that stock prices and exchange rates are jointly determined. [12] looked into the relationship between foreign exchange rate and stock markets to determine whether the movement in exchange rates have an effect on the stock prices. Using the EGARCH (Exponential Generalized Autoregressive Conditional Heteroskedasticity) model, they established that there is negative relationship between exchange rate volatility and stock market returns on the long run and a positive relationship in the short run. [24] looked at the long-run relationships among the stock price, money supply and real output, ignoring the role of the foreign exchange rate. [28] focused on the interactions among the stock price, exchange rate, money supply and official reserves.

[4] examined the short run relationship between stock and currency markets in the U.S. and U.K., which were the countries of interest in their study. They concluded that first, a depreciating currency causes a decline in stock prices because of expectations of inflation. The corresponding equation is shown below:

$$\text{RER} = \frac{\text{E} \times \text{P}^*}{\text{P}}$$

Where RER is the real exchange rate, E is the exchange rate and P\*/P price ratio. Higher nominal exchange rate in the short run is consistent with a decrease in the price ratio P\*/P towards a long run equilibrium level, where the real exchange rate equals unity. A lower P\*/P ratio implies relatively higher domestic prices. Therefore, a depreciation of the nominal exchange rate creates expectations of inflation for the future.

Second, foreign investors will be unwilling to hold assets in currency that depreciates as that would erode the return on their investment. In a case of US Dollar depreciation, investors will refrain from holding assets in the US, including stocks. If foreign investors sell their holdings of US stocks, share prices ought to drop.

Third, the effect of exchange rate depreciation will be different for each company depending on whether it imports or exports more, whether it owns foreign units, and whether it hedges against exchange rate fluctuation. Heavy importers will suffer from higher costs due to weaker domestic currency and will have lower earnings, thus lower share prices. Multinational corporations based in the US will have higher income when the US

currency depreciates. The income realized by the foreign subsidiary is converted into dollars at the higher exchange rate. Companies that have hedged adequately will have their earnings and stock price unaffected by a fluctuating currency. The stock market, which is a collection of a variety of companies, will tend to react ambiguously to currency depreciation.

Last, on a macroeconomic level, a depreciated dollar will boost the export industry and depress the import industry. The impact on domestic output will be positive. Increasing output is seen as an indicator of a booming economy by investors and tends to boost share prices. Reference [23] work further illustrates that the foreign exchange market and the stock market can jointly affect each other. Reference [4] investigated the short-and long- run relationship between stock prices and exchange rates in eight advanced economies. They found that the currency effect on the stock market is that currency depreciation leads to a decline in stock prices in the short run.

Reference [4] explained the negative relationship as follows: exchange rate depreciation suggests higher inflation in the future, which makes investors skeptical about the future performance of companies. As a result, the stock prices drop. This hypothesis was supported by data from the U.K. markets according to studies by [43]. But of interest to [43] were the results on short-run effects in both the U.S. and U.K. markets. . In his study [43], he assumed it reasonable that in a period of one to three months, trade flows also play a role in determining the demand for currency. Stock prices are expected to react ambiguously to exchange rates. Reference [4] explains this with the effect of currency changes on the balance sheets of multinational companies. The value of a company could either be raised or lowered by currency depreciation, depending on whether the company mainly imports or mainly exports.

Reference [4] had the hypothesis that the currency will depreciate if the stock market declines. This is explained as follows: in markets with high capital mobility, it is the capital flows, and not the trade flows that determine the daily demand for currency. A decline in stock prices makes foreign investors sell the financial assets they hold in the respective currency. This leads to currency depreciation. Therefore, the result observed by the study of [4] was contrary to what [43] expected because of the different time frame assumptions.

Reference [23] researched on one part to find if declining stock prices led to depreciating currencies during the Asian Crisis of 1997. Seven of the countries examined by [23] showed a strong relationship between the stock prices and exchange rates—causality was unidirectional in some cases and bi-directional in others.

There are numerous Kenyan studies on exchange rate, interest and inflation but two studies will be cited. Reference [41] researched on inflation rate, treasury bills rate and exchange rates. His findings were that, a positive relationship exists between stock prices and exchange rates.

Reference [49] studied the causal relationship between exchange rates and stock prices in Kenya. He examined the causal relationship between foreign exchange rates and stock prices in Kenya from November 1993 to May 1999. The empirical results showed that foreign exchange rates and stock prices are non-stationary both in first differences and level forms, and the two variables are integrated of order one, in Kenya. Secondly, they tested

for co-integration between exchange rates and stock prices. The results showed that the two variables are co-integrated.

Thirdly, they used error-correction models instead of the classical Granger-causality tests since the two variables are co-integrated. The empirical results indicated that exchange rates Granger-causes stock prices in Kenya.

### ***2.3.2 Interest rate fluctuations***

The relationship between stock prices and interest rates has received considerable attention in economics literature. Rather than using either short-term or long-term interest rates, [10] analyzed the relationship between the yield spread and stock market returns. He argued that the same variables that have been used to predict excess returns in the term structure also predicts excess stock returns, deducing that a simultaneous analysis of the returns on bills, bonds and stock should be beneficial. His results support the effectiveness of the term structure of interest rates in predicting excess returns on the US stock market.

Reference [55] also studied the relationship between interest rates and stock prices using regression analysis. He found that interest rates have an important impact on stock returns, especially on long horizons, but he rejected the hypothesis that expected stock returns move one-for-one with ex ante interest rates.

In addition, his results show that long-term interest rate explain a major part of the variation in price-dividend ratios and suggests that the high volatility of the stock market is related to the high volatility of long-term bond yields and may be accounted for by changing forecasts of discount rates. Reference [53] found that unexpected current account deficit is associated with exchange rate depreciation, and a rise in interest rates. Evidence is found that current account deficits diminishes domestic wealth, and may lead to overshooting of exchange rates. A fall in the real value of currency due to rise in interest rates was also reported by [45,16,14].

Reference [54] examines the linear relationship between share price and interest rate, on Dhaka Stock Exchange (DSE) using data from both developed and developing countries. For all of the cases, it was found that Interest Rate has significant negative relationship with Share Price. The study examined the effect of interest rate on share price and changes of interest rate on changes of share price. In overall, the theoretical argument of negative relationship between stock price and prevailing interest rate was not rejected. Individual country results were mixed for both developed and developing countries. Eight countries like, Australia, Canada, Chile, Germany, Jamaica, Mexico, Spain, and Venezuela had significant negative relationship between Interest Rates and Share price. Except Philippine all other countries showed significant negative relationship between Interest Rates and Share price fluctuations. Reference [48] used three-year rolling regressions to analyze the relationship between the stock market and the short-term interest rate. He tried to forecast excess returns (i.e. the differential between stock market returns and the risk-free short-run interest rate) on the Standard and Poor 500 index with the short-term interest rate, but found that the relationship is not stable over time. It gradually changes from a significantly negative to no relationship, or even a positive although insignificant relationship.

Reference [21] worked on South Africa, Botswana and Zimbabwe stock market, where higher interest rates are hypothesized to depress stock prices through the substitution effect (interest-bearing assets become more attractive relative to shares), an increase in the discount rate (and hence a reduced present value of future expected returns), or a depressing effect on investment and hence on expected future profits.

Reference [25] worked on 17 developed countries and showed that stock prices are co integrated with earnings (a proxy for dividends) and the long term interest rate in each country (except the Italian market for which the short-term interest rate was used). Reference [1] found that some evidence of the nonlinear and inverse relationship between the share prices on the Bogota stock market and the interest rate as measured by the inter bank loan interest rate, which is to some extent affected by monetary policy.

### ***2.3.3 Inflation rate***

The wave of buying pressure may, sometimes, cause the price to rise [1]. Thus just before an upswing occurs the increased stock price and a modest inflation can coincide and similarly just before the downswing starts a depressed stock price accompanied by a high inflation may co-exist. Price stability should be the main goal of the monetary policy because it is only slow and stable inflation which is conducive to growth. As [30] point out, monetary policy influences stock returns by influencing the discount rate (the weighted average cost of capital) and the future stream of cash flows.

Tightening of the monetary policy raises the rate of interest and thus reduces net profits. It also reduces supply of bank loans. Hence, it may be inferred that tightening of monetary policy reduces the inflation rate and also stock prices as it leaves less money in the hands of the individuals to demand goods or to buy stocks. Inflation and stock prices may move in the similar direction. Reference [18] argues that expected inflation is negatively correlated with anticipated real activity, which in turn is positively related to returns on the stock market. Therefore, stock market returns should be negatively correlated with expected inflation. These studies suggesting a negative relationship between stock prices and inflation. Reference [18] envisages that high inflation predicts an economic downturn and keeping in view this the firms start selling off their stock. An increase in the supply of stock then reduces the stock prices. Since stocks reflect firms' future earning potential an expected economic downturn prompts firms to sell off the financial stocks and thus high inflation and low stock prices tend to go together.

Reference [35,30] held that on the other hand, a positive relationship is also possible between inflation and stock prices as unexpected inflation raises the firms' equity value if they are net debtor. [34] studied the relationship between expected inflation and the stock market. Instead of using the short-term interest rate as a proxy for expected inflation, [34] explicitly models the relationship between expected inflation and stock market returns.

Reference [51] also studied the relationship between inflation and stock returns but for the emerging economy of Greece. He found that inflation and stock returns are negatively related, but only up to 1995 after which the relationship became insignificant.

#### ***2.3.4 Political condition***

The price of shares is directly affected by the political developments taking place both at home and abroad [17] found a significant relationship between equity market volatility and political risk.[ 32] observed increase market volatility during political election and transition periods. Their results suggest that political uncertainty could be a major contributing factor to financial crisis.

Thus, politics does matter in emerging markets. If there is political stability at home and abroad the price of shares moves up [6], his study shows that political risk increases market volatility and reduces investment and real output. Reference [26] found that policy change such as stock market liberalization tends to move stock market prices. Reference [8] also discovered that the cost of capital always decreases after capital market liberalization which also affects the stock market index.

#### ***2.3.5 Business climate in the country***

Political stability brings economic stability in the country. If a government carries on economic policies in the planned framework, it then establishes strong Industrial base in the country, the price of shares tend to move up. In case there are rapid changes in economic policies and budgets are announced and revised time and again the price of securities go down. Reference [3] suggests introducing enabling stock market governance in order to achieve healthy and efficient stock market system.

In Kenya the Government created institutional and informational framework through the Capital Markets Authority that ensures stock market discipline. [40] show that legislative system that obliges information disclosure, and therefore more private monitoring of financial system leads to stable stock market development.

#### ***2.3.6 Nationalization of industries***

If a government adopts a policy of nationalization of industries, the investment on the part of the private sector there is total discouragement. The prices of the securities are bound to go down. In case the private sector and foreign investors are encouraged for investment by wooing them due to concessions, the prices of the securities shoot up. Blair (1997) explores the history of the British Steel since the Second World War to evaluate the impact of government intervention in a market economy.

According to [5] British Steel faced serious problems at the time of its formation, including obsolescent plants; plants operating under capacity and thus at low efficiency; outdated technology; price controls that reduced marketing flexibility; soaring coal and oil costs; lack of capital investment funds; and increasing competition on the world market. British Steel was privatised in 1988 by the Conservative government of Margaret Thatcher.

#### ***2.3.7 The presence of active dealers in the stock exchange***

The stock exchange which consists of Bulls, Bear and Stags (speculators) also influence the security prices. When the speculators run for the purchase of securities, the prices of the stocks move up and vice versa.



Reference [15] did show that even in markets with many dealers who do not cooperate, spreads relating to stock market prices can be larger than those of competitive equilibrium markets and no market maker will have an incentive to deviate. Reference [33] questioned the competitiveness of dealer pricing on the Nasdaq. Reference [52] in his theory of immediacy in relation to supply of dealers services in securities concluded that dealers facilitate trading by stock market investors because they are willing to trade for their own account as principals thus proving immediate trading or immediacy in securities markets.

### ***2.3.8 Market psychology***

The price of securities sometime also fluctuates without any valid reason. The people who deal in securities receive news that may cause short-term effects on share prices, but this is only because of its psychological effect. The news need not be true or accurate. The point is that it is not so much the news that matters, but its effect on investors. Reference [15] predicted a decreasing spread for times of large trading volume basing on psychological perceptions or random liquidity event. Reference [23] compared the impact of anticipated and unanticipated dividend announcements and concluded that any rise in stock market prices for the firms making the information available is purely psychological.

### ***2.4 Literature overview and Research gaps***

The study attempted to evaluate the dynamic interactions among three selected macroeconomic variables of foreign exchange of hard currencies, inflation rate and interest rate, and the stock market price for the case of Nairobi Securities Exchange in Kenya. Previous studies that were reviewed included those by [24]. These analyses, however, are incomplete in at least two respects. Reference [24] only looked at the long-run relationships among the stock price, money supply and real output, ignoring the role of the foreign exchange rate. [29] focused on the interactions among the stock price, exchange rate, money supply and official reserves.

Although [29] covered a wider range of macroeconomic variables, he mainly concentrated on bivariate interactions between the stock price, on the one hand, and a macroeconomic variable of interest, on the other. Secondly, the existing studies normally end at reporting co integration and Granger causality test results as a way of describing the strength of the interactions.

Reference [36] examined the exchange rates and stock price relationships for Pakistan, India, Bangladesh and Sri Lanka using monthly data for the period between 1994 and 2000. The empirical results showed a bidirectional long-run causality in Bangladesh and Sri Lanka. No significant relationship was found for Pakistan and India.

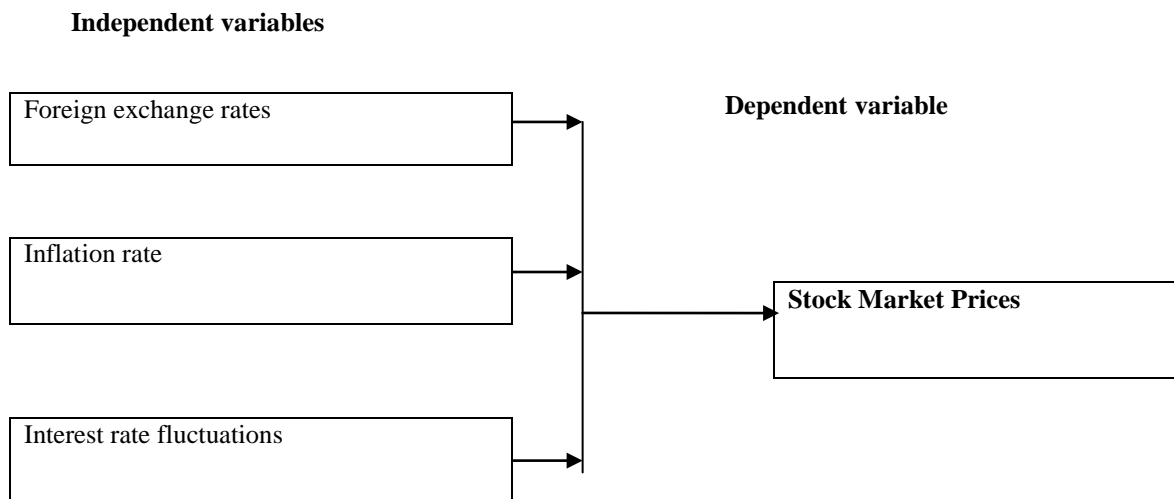
While empirical studies investigating the issue on developed markets are abundant, empirical analyses for emerging stock markets such as Nairobi Securities Exchange in Kenya are rather limited. Past research by [48] considered only two variables; exchange rates and share prices. In addition, the study considered only the exchange rates between Kenya shilling and the US dollar. Reference [49] investigated the causal relationship between exchange rates and share prices in Kenya. The empirical results obtained over the period November

1993 to May 1999 indicated that the exchange rates Granger causes stock prices in Kenya with a unidirectional causality from exchange rates to stock prices.

Reference [3] studied the impact of macroeconomic variables on stock prices in Ghana. They used the Databank stock index to represent the stock market and inward foreign direct investments, the treasury bill rate (as a measure of interest rates), the consumer price index (as a measure of inflation), average crude oil prices, and the exchange rate as macroeconomic variables for the period 1999 to 2007.

Thus it was sufficient to conclude here that no study exists on the direct impact of macroeconomic variables like: foreign exchange rates, inflation rate and interest rate on stock market prices fluctuations for the companies listed on the Nairobi Securities Exchange in Kenya. This is the gap the present study sought to bridge. The study investigated the direct impact of macroeconomic variables like: foreign exchange rates, inflation rate and interest rate on stock market prices fluctuations in Kenya in the period 2008 to 2012. The foreign exchange rates considered were the US Dollar and Euro. They were justified in the analysis by the fact that Kenya is highly dependent on international trade and borrows heavily from the Breton wood institutions.

The study was carried out by performing analyses with linear regression on secondary monthly data obtained from the Nairobi Securities Exchange, Institute of statistical Kenya and Central Bank of Kenya. The study covered the period 2008-2012. The first 5-year Vision 2030 Medium Term Plan (MTP 1) covering 2008 to 2012 was developed taking into account the success achieved under the Economic Recovery Strategy (ERS), 2003-2007. It, therefore, assumed continued strong broad based economic growth and development consistent with Vision 2030 objectives.



**Figure 2.1:** Conceptual Framework: macro-economic variables cause stock market price changes

Source: Author, 2014

### **3. Research methodology**

#### **3.1 Introduction**

The researcher would personally obtain the secondary data from the following sources: Nairobi Securities Exchange, Institute of statistical Kenya and Central Bank of Kenya. The data would be on stock market indices, weighted interest rate and inflation rate.

#### **3.2 Research Design**

This research study adopted a descriptive case-based study design that allowed quantitative approach to data analysis. The population comprising the companies quoted on Nairobi Securities Exchange was selected for the study. Reference [47] used Theoretical modeling to investigate the effect of the determinants of exchange rate on the performance of commercial banks in Kenya.

The Theoretical model helps the researcher to logically isolate and sort out complicated chains of cause and effect and influence between the numerous interacting elements in an economy or any other phenomenon. Through the use of a model, the economists and other researchers in social sciences can experiment, at least logically, producing different scenarios, attempting to evaluate the effect of alternative policy options, or testing various hypotheses.

The Theoretical Model is set below:

$$Y = a + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + \dot{\epsilon}$$

Where:

Y measures the variability of stock price index, the data set will consist of monthly observations of the average stock price index for the Nairobi Securities Exchange (NSE ALL SHARE INDEX).

X<sub>1</sub> is exchange rate of the US Dollar defined as the average monthly exchange rate for this hard currency.

X<sub>2</sub> is exchange rate of the Euro defined as the average monthly exchange rate for this hard currency.

X<sub>3</sub> is the interest rate defined as the average annual lending interest rate.

X<sub>4</sub> is the inflation rate defined as the annual inflation rate. This is expected to have a negative effect on stock price. a is the constant or intercept and  $\dot{\epsilon}$  is the error correction term.

The data was entered into the Statistical Package for Social Sciences (SPSS) and analysed using descriptive, correlation and regression analyses.

The regressions were performed to show the effect (whether positive or negative) of the independent variables, separately first and jointly thereafter on the dependent variable.

### ***3.3 Target population***

The population comprised all the companies listed on the Nairobi Securities Exchange in Kenya numbering 62 grouped into 11 segments.

### ***3.4 Sample size and sampling Technique***

Since there only 62 companies listed on the Nairobi Securities Exchange in Kenya, the study went for a complete census and the purposeful sampling technique was used since out of all the 62 listed companies some did not exist at the start of the research period and others existed before the projected was completed, hence absence some useful data.

### ***3.5 Data collection procedure***

Data for exchange rates, inflation rate and interest rate changes was obtained from Institute of statistical Kenya and Central Bank of Kenya, respectively. The stock market statistics were obtained from the Nairobi Securities Exchange.

### ***3.6 Data Processing and analysis***

Simple regression and Multi-variate regression analyses were performed on the data basing on the following General Linear Model:

$$Y = a + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + \hat{\epsilon}$$

It was assumed that the monthly Stock market prices variability(Y) could be estimated by the combined effect of the four explanatory variables of : exchange rate of the US Dollar(  $X_1$ ), exchange rate of the Euro (  $X_2$ ), interest rate(  $X_3$ ) and inflation rate(  $X_4$ ) plus an error term,  $\hat{\epsilon}$ . The model was theoretically expected to be linear since no independent variable term would had a degree higher than unity. The data was entered into the Statistical Package for Social Sciences (SPSS) and analysed using descriptive, correlation and regression analyses. The correlation coefficients showed the relationship (whether positive or negative) between the independent variables, the regression run would gave the quantities for the predictor equation that relates the dependent variable to the independent variables. The t-test was used to show the significance of the relationship between the selected macro-economic variables and stock prices.

## **4. Findings and discussions**

### ***4.1 Introduction***

The analysis of data is done here with brief discussion on the findings. The main purpose for the study was to determine the impact of macro-economic variables on stock market prices for the companies quoted on the Nairobi Securities Exchange for period 2008 to 2012. Three key macro-economic variables of: foreign exchange, interest rate and inflation rate were specifically selected for data collection and analysis. The secondary data was obtained from three sources: the Central Bank of Kenya official website provided data on weighted average monthly lending interest rates, the institute of statistical Kenya has published data for the average monthly inflation rates, and the Nairobi Securities Exchange gave the stock market indices for the quoted firms. The correlation between the independent variables was done to determine if there was serial correlation between the variables.

Reference [47] in his study on the effect of the determinants of exchange rate on the performance of commercial banks in Kenya had to test for serial correlation before using the time series data. This procedure was carried out in this study data analysis.

**Table 4.1:** Correlations between the independent variables output

Control Variables			exchange rate in Euro	exchange rate in USD	Interest rate	Inflation rate
Stock market indices	exchange rate in Euro	Correlation	1.000	.716	-.039	.022
		Significance (2-tailed)	.	.000	.767	.870
		df	0	57	57	57
	exchange rate in USD	Correlation	.716	1.000	.329	-.359
		Significance (2-tailed)	.000	.	.011	.005
		df	57	0	57	57
	Interest rate	Correlation	-.039	.329	1.000	-.140
		Significance (2-tailed)	.767	.011	.	.290
		df	57	57	0	57
	Inflation rate	Correlation	.022	-.359	-.140	1.000
		Significance (2-tailed)	.870	.005	.290	.
		df	57	57	57	0

The correlation run showed there was low correlation between the interest rate, inflation and foreign exchange rates and hence no serial correlation was present. [47] had found similar results.

However there was high correlation of 71.6% between the two selected currencies of Euro and US Dollar. This is expected since the exchange rate of these currencies was identified as a composite macro-economic variable

that could affect the dependent variable jointly in same direction. This discussion on the research output is based on Table 4.1 .[54] had established non-stationary condition between exchange rates and stock market prices as well as co-integration of order one in Kenya for these macro-economic variables. This study did not engage in the use of error correction models or the classical Granger-causality tests as the primary aim was to investigate the influence of macro-economic variables of foreign exchange, inflation rate and interest rate on stock market prices individually as well as their combined effect on the dependent variable. The employment of simple regression analysis was considered adequate for verifying the effect of each independent variable on the dependent variable and finally their combined effect was tested through multivariate analysis.

**4.1.1 The effect of foreign exchange rates on stock market prices for companies quoted on the Nairobi Securities Exchange.**

The two selected currencies were the Euro and the Us Dollars since Kenya borrows or gets grants denominated in these currencies. Other international transactions are also exchanged mainly in the form of these hard currencies. Reference [4] researched on the dynamic relation between Stock market Prices and Exchange Rates for a sample of eight advanced economies. Specifically, their results showed that an increase in aggregate domestic stock price has a negative short-run effect on domestic currency value. They observed that in the long run, however, increases in stock prices have a positive effect on domestic currency value.

**Table 4.2:** Regression between Euro, US Dollar and stock market prices

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	134.208	21.549		6.228	.000
	exchange rate in Euro	-.014	.285	-.009	-.048	.962
	exchange rate in USD	-.614	.336	-.337	-1.825	.073

The regression between these two currencies and stock market prices indicates that Euro is less dominant as the two hard currencies affect the stock market prices in Kenya as confirmed by an absolute value of 1.4% against 61.4% for the US Dollar. The model that is depicted by the regression so far is:  $Y = 134.21 - 0.01X_1 - 0.61X_2 + \epsilon$ . This indicates that other macro-economic variables are responsible for stock market price fluctuations as well.

The t-value of -.048 and -1.825 for the Euro and US Dollar respectively, are not significant at 95% confidence level. The exchange rates fluctuate downwards and the stock market indices move in the opposite direction.

The regression analysis confirms the relationship that as the Kenyan shilling depreciates against these currencies, the stock indices move up.

**4.1.2 The effect of interest rates fluctuations on stock market prices for the companies quoted on the Nairobi Securities Exchange**

The effect was found to move on the opposite direction. Thus as interest rates move down the stock market prices move up. [53] examined the linear relationship between share price and interest rate, on Dhaka Stock Exchange (DSE) using data from both developed and developing countries. For all of the cases, it was found that interest rate has significant negative relationship with Share Price.

**Table 4.3:** Regression between Interest rate and stock market prices

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	108.798	12.407		8.769	.000
	Interest rate	-1.616	.787	-.260	-2.052	.045

The regression analysis confirms the relationship that as the interest rate rises, the stock indices down up.

The t-value of -2.052 is significant at 95% confidence level. The model that is depicted by the regression so far for interest rate impact on stock market indices is:  $Y = 108.80 - 1.62X_3 + \hat{\epsilon}$ . The effect of Interest rate on stock market prices is the most dominant.

**4.1.3 The investigation on how Inflation rate affects stock market prices for the companies quoted on the Nairobi Securities Exchange**

When inflation rate raises the stock market indices appears to change slightly due to the minimal net effect inflation rate singly has on the stock market prices changes.

**Table 4.4:** Regression between Inflation rate and stock market prices

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	83.541	3.373		24.769	.000
	Inflation rate	.006	.220	.003	.025	.980

The study revealed that as inflation rate rises the stock market indices may not change much due to the minimal net effect inflation rate singly has on the stock market prices changes. Reference [51] studied the relationship between inflation and stock returns for the emerging economy of Greece. He found that inflation and stock returns are negatively related. This study established that there is negligible positive relationship between inflation rate and the stock market indices when inflation rate is considered the independent variable influencing stock market as the dependent variable. The position changed when the influence of inflation rate on stock

market prices was considered along the macro-economic variables of exchange rate and interest rate, a negative relationship emerged. The model that is depicted by the regression so far is:  $Y = 83.54 + 0.006X_4 + \hat{\epsilon}$ . This indicates inflation rate impact gives very low stock market indices. The t-value of 0.025 indicates that the model is not significant at 95% confidence level.

The study had main objective of investigating the combined impact of the macro-economic variables of: foreign exchange for Euro and US Dollar, interest rates and inflation rates on the stock market prices fluctuations for companies quoted at Nairobi Securities Exchange. The employment of multivariate regression analysis was considered appropriate for investigating the combined effect of the independent variables on the dependent variable. This was necessary so as to determine a useful predictor model that incorporates all the independent variables for the study.

**Table 4.5:** Regression between Euro, US Dollar, Interest rate, Inflation rate and stock market prices

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	150.193	24.369		6.163	.000
	exchange rate in USD	-.553	.475	-.303	-1.163	.250
	exchange rate in Euro	-.041	.353	-.026	-.116	.908
	Interest rate	-.983	.938	-.158	-1.048	.299
	Inflation rate	-.201	.249	-.120	-.807	.423

The macro-economic variables of: foreign exchange for Euro and US Dollar, interest rate and inflation rate, all have negative impact on the stock market prices fluctuations. The predictor model is  $Y = 150.2 - 55X_1 - 0.04X_2 - 0.98X_3 - 0.20X_4 + \hat{\epsilon}$ .

**Table 4.6:** Model summary:

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.389 <sup>a</sup>	.151	.090	13.75755

Reference [47] obtained similar model in his study on the effect of the determinants of exchange rate on the performance of commercial banks in Kenya. The t-values indicate that the model is not significant at 95% confidence level. The interest rate has greatest impact, followed by foreign exchange rate for the US Dollar. The exchange rate of the Euro has the least impact followed by inflation rate as given by the predictor equation.



The table 4.6 shows  $R^2$  of 0.15 is reasonable as the main objective of the research was to find out how the selected macro-economic variables impact on stock market prices for the companies quoted at the Nairobi Securities Exchange.

## **5. Summary, conclusions and recommendations**

### **5.1 Introduction**

The study sought to investigate the effect of three key macro-economic variables of : foreign exchange, interest rates and inflation on the stock market indices as proxy to the true market prices for companies quoted on the Nairobi Securities Exchange in Kenya for the period 2008 to 2012. The base year for the stock market indices was 2008=100. The end month index for each month was selected as the data to be entered in the analysis and all the months in each year were picked.

### **5.2 Summary of findings**

There was low correlation between the independent variables except that between the exchange rate for the Euro and the US Dollar to the Kenya shilling. The predictor models for the four separate regressions gave varying values for the constant. The foreign exchange rates had 134.21, interest rates gave a value of 108.80 and inflation rate had the lowest value for the constant of 83.54. The all independent variables combined regression on the dependent variable gave a value of 150.20 for the constant.

### **5.3 Conclusions**

The study found that exchange rate for both the Euro and US Dollar had a negative effect on stock market indices for companies quoted on the Nairobi Securities Exchange. The study therefore concludes that as the Kenya shilling depreciates the stock market indices gain in points. The study found that interest rate has a negative effect on stock market indices for companies quoted on the Nairobi Securities Exchange. The study therefore concludes that when interest rates rise the stock market indices lose in points in Kenya. The study found that inflation rate had a negative effect on stock market indices for companies quoted on the Nairobi Securities Exchange. It is therefore concluded that higher levels of inflation rate result in lower stock market indices in Kenya.

### **5.4 Recommendations**

The study recommends that the Government should strictly enforce the stringent monetary policies put in place to strengthen the Kenya shilling and provide incentives to boost the country's exports so as to increase the flow of foreign exchange. Secondly, the study recommends that the Central Bank of Kenya should set the base rate and specify the margin that commercial banks should fix for their own lending rates to be less punitive to the borrowers thereby expanding the credit market in Kenya in order to develop the economy as well as the stock market performance. The study recommends that the Government of Kenya should contain inflation rate through sound fiscal and monetary policy measures such as balanced National Budgets that are fully financed

through taxation, restrict internal borrowing by the Treasury and regulate lending to specific sectors of the economy.

The study covered a 5-years period from 2008 to 2012. Future studies may address a longer period say 10-years period to 15-years period so as to investigate the influence of macro-economic variables on stock market prices in the short run as well as the long run for the case of the securities exchanges in East Africa.

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