EFFECTS OF MACROECONOMIC VARIABLES ON STOCK RETURNS IN THE EAST AFRICAN COMMUNITY STOCK EXCHANGE MARKET

Kaunyangi Eliud Laichena *[1]   Tabitha Nasieku Obwogi [2]

1. Department of Economics, Accounting and Finance. Jomo Kenyatta University of Agriculture and Technology. P.O. Box 62000-00200, Nairobi, Kenya. Email: eliuchenaza09@gmail.com
2. Department of Economics, Accounting and Finance. Jomo Kenyatta University of Agriculture and Technology. P.O. Box 62000-00200, Nairobi, Kenya.

Abstract

The stock market plays an integral role in raising capital for corporate entities and the government to finance growth projects. It is also the market place where the capital surplus and capital deficient parties interact for mutual benefits. Investors are lured into the stock market by the expectations of returns in terms on price appreciation and dividends. The East African stock market comprises of stock exchanges for all the member countries of the East African Community (EAC). There have been efforts towards integration of the EAC in numerous aspects including common currency. In the context of expected intensification of integration efforts, this study sought to determine the focus on the East African stock market. The general objective of the study was to determine the effects of macroeconomic variables on stock returns in East Africa. Specifically, the study sought to find out the effects of interest rates on stock returns in East Africa; to find out whether inflation rate impacts on stock returns in East Africa; to establish whether currency exchange rate affects stock returns in East Africa; and to assess whether GDP impacts on stock returns in East Africa. The study relied on fisher's theory of interest rates, the purchasing power parity theory, the classical theory of growth, and the arbitrage pricing theory (APT). A panel data of 3 East African countries, Kenya, Uganda and Tanzania, over 2005 to 2014 was used in the study. Descriptive analysis and panel data regression analysis were applied in the study. From the results, there was a significant relationship between the macroeconomic variables in the study and stock returns in East Africa. The study recommends that policymakers in East Africa should make efforts towards improving the macroeconomic conditions of the region to improve stock returns.

Key words: Stock Market, Interest rate, Exchange rate, Inflation Rate.

1.1 Introduction

There is a growing interest, globally, on the importance of macroeconomic variables on the returns of stocks in various exchanges. Indeed, numerous academics, practitioners and economists have delved into the study of the relation between macroeconomic variables and stock returns (Sharma & Wongbangpo, 2002; Rahman, Sidek & Tafri, 2009; Uddin & Alam, 2007; Osamuonyi & Evbayiro-Osagie, 2012; Owusu-Nantwi & Kuwornu, 2011 and Onasanya & Ayoola, 2012). There has been a widespread acceptance in research that the stock market prices are highly dependent on various fundamental macroeconomic variables such as interest rates, industrial production, money supply, inflation rate, industrial production and currency exchange rate (Sidek & Tafri, 2009; Uddin &

Alam, 2007 and Osamuonyi & Evbayiro-Osagie, 2012). The economic growth of countries in both the developed and developing markets is dependent on the stability of the stock market. The stock market provides a platform for pooling together long term capital by issuing stocks/ shares, bonds, commercial papers and other forms of equities as sources of finance for growth and development of industries in the economy. The overall development of economies of countries is linked to the efficient functioning of the stock market (Elly, & Oriwo, 2012; Owusu-Nantwi & Kuwornu, 2011 and Onasanya & Ayoola, 2012).

The stock market plays an important role in financial intermediation in developed and developing economies. That is because it provides a platform for surplus resources to be transferred to deficit areas. Growth and development of countries requires resources by organizations and the government. The stock market is an avenue where business organizations can raise capital by selling their shares to investors. Economies that are experiencing perceived sustainable growth have efficient stock markets. Developing countries lack efficient stock markets like those of the developed countries (Coleman, 2008). However, there have been progressive attempts towards ensuring that the desired outcome is achieved in the long term. The economy of a country is made up of microeconomic and macro-economic variables. Economic variables have significant effect on the stock market.

The nature of the existing stock market in a given geographical boundary is of concern to stakeholders such as investors and the government. Capital formation and allocation is a role that the stock market as an institution plays (Atje & Jovanovic, 1993). Therefore, the overall growth and development of the economy is hinged on the general functioning of the stock market. The economic growth of countries in the contemporary society depends on the growth of the stock market. The relationship between an efficient and effective stock market and economic growth cannot be ignored because macroeconomic variables have a significant influence on the stock market. Macroeconomic variables such as exchange rates, inflation, money supply, industrial production, oil prices and the existing lending rates determine the stock prices in the stock market. Studies have been conducted to establish the association between macroeconomic behavior and economic development in various countries (Rahman, Sidek & Tafri, 2009; Uddin & Alam, 2007; Osamuonyi & Evbayiro-Osagie, 2012; Owusu-Nantwi & Kuwornu, 2011 and Onasanya & Ayoola, 2012). Coleman, (2008) points out that in developed countries, the changes in stock prices experienced are linked to macroeconomic situations.

1.2 Problem Statement

The East African community member countries have made important strides towards economic integration. The economic conditions of the member countries have gained importance hence making it necessary to understand the driving force behind economic growth and development. Each member country is making ambitious strides to try and achieve the desired outcome in terms of economic standing for the realization of the region's economic objectives. Sustainable economic growth and development will make the countries to become the destinations for potential investors. However, the stock market has to be highly involved particularly through attraction of foreign investment capital. Stock market provides a platform for listed corporations to be able to gain additional capital to finance their operations and meet the increasing demand in the region. Investors also have a platform to invest surplus resources and gain returns on their investments.

Studies on stock markets show the existence of a relationship between the performance of the stock market and macroeconomic variables. Maswere and Kaberuka, (2013) explore the determinants of stock market price in the Uganda securities exchange. Their study concluded that Elly and Oriwo, (2012) in their study investigate the relationship that exists between macroeconomic variables and the Nairobi Stock Exchange all share index (NASI). The macroeconomic variables that are applied in the study include the interest rates, the rate of government treasury bills and lending interest rates. The studies have concentrated on establishing the relationship between macroeconomic variables and the stock return in each individual East African countries but they have not established a basis of comparison. This study, therefore, sought to exploit the existing gap in terms of research on the relationship between macroeconomic variables and stock returns to provide the basis in terms of regional comparison. Bellalah, Levyne and Masood, (2013) argue that the manner in which the stock exchange moves indicates the health of the economy. This is regarded as an essential consideration by investors. The problem is that, as much as the importance of the stock market in economic growth has been explored, there are limited studies devoted towards the East Africa community.

1.3 Objectives
The general objective of this study was to determine the effects of macroeconomic variables on stock returns in East Africa.
1.   To find out the effects of interest rate on stock returns in East Africa.
2.   To find out whether inflation rate impacts on stock returns in East Africa.
3.   To establish whether currency Exchange rate affects stock returns in East Africa.
4.   To assess whether GDP impacts on stock returns in East Africa.

2.0 Review of Literature
2.1 Theoretical Review
2.2.1. Fisher's Theory of Interest Rates
Fisher's theory of interest rate is highly essential for the inflation-targeting framework. The theory is the basis for the idea that monetary policy should mainly focus on managing expectations of inflation in an attempt to keep real interest rate stable. This aims at promoting savings and investment. Indeed, post Keynesians such as Smithin (2003) or Cottrell (1994), have promoted fisher's theory. The concept of capital investment in Irving Fisher's theory can be traced to the introduction of the Nature of Capital and Income (1906) and interest rate (1907). The concept has been important in Fisher's theory of interest (1930). The assumption underlying Irving Fisher's theory is that all capital circulates in the economy and it is used up in the production process fully. Consequently, there is no stock of capital, K (Olweny and Omondi, 2011). Therefore, given the required real rate, any expected increase (or decrease) in the rate of inflation will lead to an increase (or decrease) in the nominal rate of interest via arbitrages between future and present aggregate incomes. Therefore, if in one period, t = 0, the economy is at a full employment equilibrium with no inflation expected, then, suddenly, in period, t= 1, the central bank is expected to increase the money supply in time 2 such that, through quantity theory of money, there is an expected inflation, the aggregate real income grows at a faster rate than the expected real amount of money that needs to be reimbursed.

2.2.2 The Purchasing Power Parity (PPP)
Purchasing power parity concept is an important theory used in the determination of exchange rate. The use of this theory is particularly relevant through the introduction of important assumptions relating to the behaviour of exporters and importers in response to the changes in the costs of national market baskets (Krugman, Obstfeld, & Melitz, 2011). Indeed, from the law of one price concept, differences in prices of an item from one country to another, individuals develop an incentive to seek arbitrage opportunities. This is often through the purchase of a product from the country where it is lowly priced and selling to the country where the same item is selling at higher prices. This is true for a market basket of many products of varying prices that cost different prices in different markets; profit seekers will want to enjoy arbitrage opportunities. Contrary to the one price theory which affects the price of the items in different markets, the purchasing power parity theory tends to affect the exchange rate. The purchasing power parity theory states that the exchange rate between one currency and another is in equilibrium when their domestic purchasing powers at that rate of exchange are equivalent. From purchasing power parity, price differentials between countries are not sustainable in the long run as market forces are not sustainable in the long run. This is because the market forces will equalize prices between countries and change exchange rates. Therefore, when there are price differentials between countries in the long run, arbitrage opportunities exist for individuals and businesses. The concept of purchasing power parity is essential in investments and particularly stocks as different investors from all over the world can invest in any exchange. This can have an effect on the stock returns.

2.2 Empirical Review
2.3.1 Inflation Rate and stock returns
Choudhry (2001) explored the effect of inflation of stock returns. The researcher conducted the study in four countries in central Latin America that were perceived to experience high rates of inflation namely Chile, Mexico, Argentina, and Venezuela. The results of the empirical investigation suggested that all the series that were involved in the relationship were mean reverting in all levels. Linear regression was used to test the relationship between stock return and inflation and the results indicated that there was significant influence on the stock returns that was imposed by lags and not necessarily by leads in the levels of inflation. The results also suggested that under galloping inflation, there was a negative relationship between inflation and stock returns. Maswere and Kaberuka (2013) explored the determinants of stock market price in Uganda using macroeconomic variables from 2003 to 2011. Augmented Dickey Fuller and Phillip-Perron unit root tests were used to test the variables and the findings suggested that inflation was stagnant at first but the changes that were experienced later had a significant influence on the stock prices in the economy. On the other hand, a study by Shilinde (2013) explored the effect of macroeconomic variables in Tanzanian economy. The study used Vector Autoregressive (VAR) framework and Johansen co-integration test to test for existence of long run relationships between variables. The conclusion with regards to inflation was that high rates of inflation affect the stock returns in the Tanzanian economy. Kirui, Wawire and Onono (2014) conducted a study that sought to evaluate the relationship between gross domestic products, inflation rate, Treasury bill rate, exchange rate, and stock return in the Nairobi Stock Exchange Limited. Threshold Generalized Autoregressive Conditional Heteroscedasticity (TGARCH) model was used in the study to come up with the

leverage effect of the variables. The conclusion with regards to the relationship between inflation and the stock returns suggested that the relationship was significant.

2.3.2 Interest Rates and stock returns
Owusu-Nantwi and Kuwornu (2011) also carried out a similar research but using the case of Ghana. The researchers arrived at a similar conclusion that the impact of interest rates on stock returns on Ghanaian stock market was relatively insignificant. The interest rate in the country's stock market was captured through the 91-Treasury bill rate. The outcome was that there was a negative relationship between the interest rate and the stock return. That was achieved when Ordinary Linear Square method was applied in the research on monthly data collected between the time period of 1992 and 2008. The results that were achieved by the researchers were in conformity with several other studies that had been carried out on the contemporary society. Onasanya and Ayoola (2012) in their study used VECM model and data from a period between 1985 and 2008. The researchers in their study were exploring the relationship between macroeconomic variables and stock returns. They arrived at a conclusion that there was no significant influence that the macroeconomic variables had on stock returns. Specifically the research suggested that interest rates had a negative relationship with stock returns in Nigerian stock market. However, the negative relationship was cited as being insignificant. Maswere and Kaberuka (2013) conducted a study that explored the determinants of stock market in Uganda security exchange. The results of the study suggested that in the long run, there was a negative relationship between interest rates and stock process in the country while in the short run, there were no significant changes recorded in the relationship. Kirui, Wawire and Onono (2014) carried out a study that explored the relationship between macroeconomic variables and stock market returns in the Nairobi Security Exchange in Kenya. The study arrived at a conclusion that with regards to the interest rate, there was a negative relationship with the stock returns hence the need to control level of changes in interest rates in the country by government regulators. A similar conclusion was arrived at by Elly and Oriwo, (2012) when their research indicated that the relationship between 90-Day Treasury bill rates had a negative influence on the stock returns in Nairobi Security Exchange in Kenya.

2.3.3 Exchange Rates and stock returns
Rahman, Sidek and Tafri (2009) on the other hand in their study found conflicting outcomes. The authors carried out a study that explored the interaction between various macroeconomic variables and stock returns in the Kuala Lumpur Composite Index (KLCI) a proxy for the Malaysian stock market. Vector Autoregression (VAR) framework that used data from 1986 to 2008 was used in the analysis. The results of the research study suggested that the exchange rate negatively and significantly influenced the performance of the stock market that in turn influenced stock returns. Osamuonyi and Evbayiro-Osagie (2012) also arrived at a similar conclusion when they explored the existing relationship between macroeconomic variables and stock returns in Nigerian capital market index. The study applied the yearly data of exchange rates from 1975 to 2005 and applied the use of Vector Error Correction Model (VECM) in studying the short term dynamics and the long term relationship between exchange rate and stock return. Aurangzeb (2012) in his study also arrived at a similar conclusion in exploring the factors that influenced performance of stock market of countries in South Asia. The author used monthly data for the time period between 1997 and 2010 of India, Pakistan, and Sri Lanka; three South Asia countries. There was use of descriptive statistics method
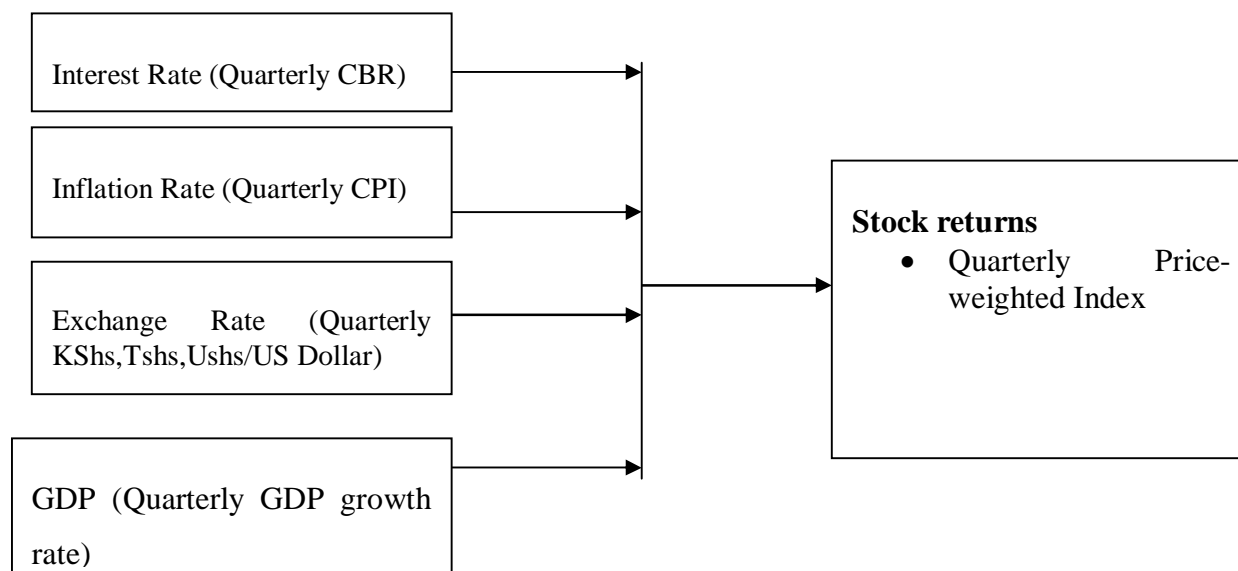
in the study for analysis. The results of the study suggested that in the three countries, the exchange rates had significant positive influence on the performance of stock markets. That means that there was a significant positive relationship between exchange rates and stock returns. Adarmola (2012) conducted a study that explored the exchange rate volatility and behavior of stock market in Nigeria. There was the application of Johansen's Co-integration Technique and Error correction mechanism in the study that arrived at similar findings as the other studies above. Quarterly data for the time period between 1985 and 2009 were used in the analysis. The results of the study suggested that the exchange rate introduced significant impact on the Nigerian stock market in both the short term and long term. According to the findings of the study, in the short run, the exchange rate had a positive impact on stock market performance or stock returns. On the other hand, the findings of the study also suggested that in the long run, the relationship between exchange rate and stock returns was significantly negative.

2.3.4 GDP and stock returns
There have been a number of studies carried out to explore the relationship between gross domestic product and stock return in the recent past. The main conclusion in majority of the studies is that the current levels of stock have a positive relationship to future levels of real economic activity measured as the gross domestic product (Geske & Roll, 1983; Chen et al., 1986; Sharma & Wongbangpo, 2002). The influence of gross domestic product on corporate profitability is what in turn influences stock returns in the economy. An increase in output leads to speculations on increased future cash and that in turn leads to raised stock prices. The opposite also applies when an economy is hit by recession. Tursoy, Gunsel and Rjoub (2008) carried out a study that used OLS technique to test 13 macroeconomic variables that included gross domestic product against 11 industrial portfolio. The study aimed at understanding the influence of the macroeconomic variables on Istanbul Stock Exchange. The findings of the study concluded that the relationship between gross domestic product and stock returns is not significant. That is because the relationship varies depending on different industries as sometimes it is positive while in other instances it is negative. Osamuonyi and Evbayiro-Osagie (2012) also arrived at a similar conclusion when they carried out a research that explored the relationship between macroeconomic variables and stock returns in Nigerian capital market index. The gross domestic product did not have significant influence on the stock returns in the Nigerian economy. Kirui, Wawire and Onono (2014), on the other hand, evaluated the relationship between macroeconomic variables and stock returns in Nairobi Security Exchange in Kenya. With regards to the relationship between gross domestic product and stock return, the findings of the study suggested that there was no significant relationship that existed.

2.4 Conceptual Framework
A conceptual framework is the diagrammatic presentation of variables, showing the relationship between the independent variable and dependent variables. In this study, the independent variables will be; inflation rate, interest rate, exchange rate and money supply. The study sought to understand how these independent variables determines the stock return among firms listed in East Africa. Stock return will be the dependent variables as measured relative change in stock prices between two periods. The relationship between the independent variables and dependent variable is presented schematically in the conceptual framework in Figure 2.1

Independent Variables   **Dependent Variable**

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┌─────────────────────────────┐
│  Interest Rate (Quarterly CBR) │───────────┐
└─────────────────────────────┘           │
                                           ▼
┌─────────────────────────────┐       ┌──────────────────────────────┐
│  Inflation Rate (Quarterly CPI) │───────▶│  Stock returns               │
└─────────────────────────────┘       │    • Quarterly     Price-    │
                                       │      weighted Index          │
┌─────────────────────────────┐       │                              │
│  Exchange   Rate   (Quarterly │──────▶│                              │
│  KShs,Tshs,Ushs/US Dollar)    │       └──────────────────────────────┘
└─────────────────────────────┘
┌─────────────────────────────┐
│  GDP  (Quarterly  GDP  growth │──────▶
│  rate)                        │
└─────────────────────────────┘
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Figure 2.1 Conceptual Framework

3.0 Research Methodology
3.1 Research Design
Research design refers to the schematic guideline that shows a step-to-step guide on how a given study is undertaken (Kombo and Tromp, 2006). Research design is also defined as the blueprint through which a study is conducted while ensuring maximum control over the factors that may have influence on the validity of the findings (Burns and Grove, 2003). Research design also refers to a plan describing the how, when and where associated with data collection and analysis. This current study utilized times series data from Kenya, Uganda and Tanzania to assess the relationship between the dependent and independent variables under study. Quantitative non-experimental research design was used in this study in assessing the relationships among the study variables.

3.2 Sampling Procedure and Sample Size
The most important reason for undertaking sampling is to select a number of study units from a defined study population. Sampling, therefore, aims at selecting a subset of the wider target population in order to use it in the study as a true representative (Oso and Onen, 2009). The current study utilized non-probabilistic sampling technique in selecting three member countries of the East African Community which have been members before the year 2000. As posited by Mugenda and Mugenda (2008), non-probabilistic sampling provides a researcher with an opportunity to determine the minimum inclusion criteria for the individuals to be used in the study. In this study, through convenient sampling, Kenya, Uganda and Tanzania were selected for the study due to the fact that they have been members of the East African community before the year 2000. The choice of the three countries was also based on the fact that their respective stock market exchange have been operational earlier that the year 2000.

3.3 Data Collection Instruments

Prior to undertaking a research, it is imperative that the researcher comes up with a data collection instrument. The data collection instrument helps in measuring, quantifying and observing the specified variables under the study (Creswell, 2008). This study used secondary data for the analysis. The data used in this study included four important macroeconomic variables under the review mainly: interest rates, inflation rates, exchange rates and GDP. Monthly data series for the period from January 2004 to December 2013 (40 quarterly observations) were considered. The secondary data was obtained from periodical reports and websites of the respective sources. In the Kenyan context, interest rate and currency exchange rate data was obtained from the Central Bank of Kenya (CBK), data on GDP and inflation rate was obtained from the Kenya National Bureau of Statistics (KNBS). The prices and number of shares data was obtained from NSE. In Uganda, data on interest rates and currency exchange rates was obtained from the Bank of Uganda (BoU) while GDP and inflation rate data was obtained from Uganda Bureau of Statistics (UBoS). The data on stock prices and number were obtained from the Uganda Stock Exchange (USE). In Tanzania, data on interest rates and currency exchange rates was obtained from the Bank of Tanzania (BOT) while data on GDP and inflation rates was obtained from National Bureau of Statistics (NBS). The share prices and volume was obtained from the Dar es Salaam Stock Exchange. The main objective of this study was to determine the effects of macroeconomic variables on stock returns in East African stock exchanges. The study only considered three stock exchanges namely Nairobi Stock Exchange (NSE), Dar es Salaam Stock Exchange (DSE) and Uganda Stock Exchange (USE). The study considered data from January 2004 to December 2013. A time range of 10 years was used.

3.4 Data Analysis

The main objective of this study is to determine the effects of macroeconomic variables on stock returns in East Africa. Nevertheless, since some of the countries in EAC have not had active stock market since 2003, three countries namely Kenya, Uganda and Tanzania are used in this study. Therefore, data on interest rate, inflation rate, exchange rate and GDP were obtained for each of the countries and operationally define as shown in section 3.6.1 involving the operationalization of variables. The variables for this study were: Interest rates, inflation rates, exchange rates and GDP. The data obtained was used in testing the relationship between macroeconomic variables and stock returns. The analysis of the data was done through the use of E-Views version 7.

3.4.1 Measurement of Variables

This section is devoted to display the chosen macroeconomic variables. The first independent variable was interest rate and was measured through quarterly Central Bank Interest rates. The second independent variable was inflation rate and was measured through quarterly Consumer price index. The third independent variable was exchange rate and was measured through quarterly currency exchange rate against the U.S dollar. The forth independent variable was GDP and was measured through quarterly GDP growth rates. The dependent variable, stock return, was measured using weighted average price index.

Table 3.2 Operationalization of Variables

	Variable	**Measures**
Y	Stock Return	Quarterly Price-weighted index = sum of members' stock prices divided by the number of members
X_1	Interest Rate	Quarterly Central Bank interest Rate
X_2	Inflation	Quarterly percentage change in Consumer Price Index
X_3	Exchange rate	Quarterly currency change against the U.S Dollar
X_4	GDP	Quarterly percentage GDP growth rate

3.4.2 The Model

Cross sectional time series data was used in this study, hence a panel data. The use of panel data in this study was informed by the fact that N-cross sections were used in the study. Through the use of panel data analysis, it was possible to investigate the impacts of the macroeconomic variables on stick returns in the East African stock market. The study employed a multiple regression model in undertaking the panel analysis as follows:

$$Y_{i,t} = \alpha + \beta_1 X_{1i,t} + \beta_2 X_{2i,t} + \beta_3 X_{3i,t} + \beta_4 X_{4i,t} + \acute{\varepsilon}_{i,t}$$

Y= Stock return, X_1= interest rate, X_2= Inflation rate X_3= Exchange rate, X_4= GDP, $\acute{\varepsilon}_{i,t}$= error term. Hausman test was used in this study to test the right model between random and fixed effect models. Random model is based on the assumption that data follow a random effect while fixed effect model assumes that data follow a fixed effect (Hausman, 1978).

4.0 Results and Discussion
4.1 Descriptive Statistical Analysis

The results from the descriptive statistics showed the average return for the period was 0.16 while the standard deviation was 0.10 meaning that there was a small dispersion of the returns around the mean. The highest return for the period was 0.63 while the lowest return was 0.01. The return of 0.63 was an indication that the highest stock attained a return of 0.63 in the three countries during period of the study. The interest rates analysis showed that there was an average rate of 9.5%. There was a minimal dispersion of the interest rate from the mean at 2.97 with the highest rate being 19.35% while the lowest rate was 1.82%. The implication here was that the East African countries attempted to keep interest rates at favourable levels to ensure effective monetary policies. The

average inflation rate for the period was 5.83%. The highest rate was 13.73% while the highest rate was 0.47%. There was a small dispersion of inflation rate from the mean with a standard deviation of 2.52. The implication of this is that the East African countries had favourable inflation rates during the period of the study and that there was evidence of attempts by the member countries to keep the inflation rates below double digits. The average exchange rate for the shilling against the dollar was 103.22 shillings for one U.S. dollar. The highest value was 153.94 while the lowest value was 62.65. There was dispersion around the mean of 26.49. The implication was that the East African countries attempted to keep their currency strong against the U.S dollar. However, the attempts failed in some instances as evident through the high dispersion level. The average GDP growth for East Africa was 5.82 %. The highest growth recorded was 13.73% while the lowest rate was 0.50%. The GDP growth by an average 5.82% represented a very good trend for the region given the current efforts towards the integration of the region. The study also tested for data normality using Jaque Bera normality test. The data for the study was found to be normally distributed since the p values for Jarque Bera test were greater than 0.05 for all the variables. This was further confirmed that there was normal distribution of the data. All the variables depicted a normal distribution.

Table 4.1 Descriptive Statistics

	Stock return	**Interest rate**	**Inflation rate**	**Exchange rate**	**GDP**
Mean	0.16	9.50	5.83	103.22	5.82
Median	0.14	9.10	6.14	92.93	6.22
Maximum	0.63	19.35	13.73	153.94	13.73
Minimum	0.01	1.82	0.47	62.65	0.50
Std. Dev.	0.10	2.97	2.52	26.49	1.90
Skewness	1.00	0.30	0.50	0.43	-0.08
Kurtosis	2.41	2.65	1.27	1.63	1.92
Jarque-Bera	3.89	3.90	2.38	1.07	1.49
Probability	0.15	0.14	0.17	0.15	0.12
Sum	19.23	1140.60	700.10	12385.89	698.83
Sum Sq. Dev.	1.20	1047.66	754.29	83486.49	429.48

4.3 Correlation Analysis

The study also employed correlation analysis to investigate the sensitivity that data outliers portrayed as well as Multicollinearity. The study found out that there was an inverse significant relationship between stock return and interest rate (rho = -0.055, $p<0.05$). The study also found that there was a negative significant relationship between stock return and inflation rate (rho = -0.354, $p<0.05$). In addition, the exchange rate was found to have a significant inverse relationship with stock returns (rho -0.593, $p<0.05$). Moreover, GDP was found to have a significant positive relationship with stock return (rho = 0.464759, $p<0.05$).

Table 4.2 Correlation Analysis

	Stock return	**Interest rate**	**Inflation rate**	**Exchange rate**	**GDP**
Stock return	1				
Interest rate	-0.055	1			
	0.000	-----			
Inflation rate	-0.077	-0.354	1		
	0.000	0.000	-----		
Exchange rate	-0.058	0.476	-0.593	1	
	0.000	0.000	0.000	-----	
GDP	-0.208	0.048	-0.234	0.464759	1
	0.000	0.606	0.01	0.000	-----

4.4 Diagnostic Test for Panel Data Analysis

The diagnostic analysis of this study was done based on panel data diagnostics, serial correlation, heteroskedasticity as well as time fixed effects. The test for appropriate model was based on Breusch Pagan LM test in order to assess pooled effects regression and random effects regression model. The results showed that the p value was less than 0.05; an implication that there was a significant relationship between stock return and in the east African stock market. The conclusion was that the study could not use pooled effects regression modelling; fixed effects regression modelling was appropriate.

Table 4.3 Chi-Square values for the Breusch-Pagan LM Test

Model	Dependent variable	χ^2-value	p-value
1	Stock return	22.15	0.0000

There also a need to test time fixed effects in order to determine whether dummy variables were needed. However, it was evident that no significant effects existed; ruling out the need for such variables.

Table 4.4 Tests for Time Fixed Effects

Model	Dependent variable	F- value	p-value
1	Stock return	2.333	0.000

In testing for heteroskedasticity, modified Wald was used in this study. The test confirmed the absence of heteroskedasticity. In addition, Wooldridge Drukker test was employed in testing for serial correlation. The outcome was that no serial correlation existed among the panels with the p value being greater than 0.05.

Table 4.5 Tests for Heteroskedasticity and Serial Correlation

Model	Dependent variable	Test for heteroskedasticity		Serial Correlation	
		χ^2-value	p-value	F-value	p-value
1	Stock return	0.29	0.7757	1.124	0.612

4.5 Fixed versus Random Effects Tests

To test for fixed and random effects, the study utilized a restricted model, Hausman test. The use of Hausman test was to determine random effects of fixed effects model is the right one for use. The p value was more than 0.05; hence, the choice of cross-sectional random effects. Therefore, random effects regression model was used in testing the relationship between stock return in East Africa. The independent variables were interest rate, inflation rate, exchange rate and GDP.

Table 4.6 Hausman Test for cross-Sections Random Effects

Test Summary	Chi-Sq. Statistic		Chi-Sq. d.f.	Prob.
Cross-section random	15.24		3	0.068
Cross-section random effects test comparisons:				
Variable	**Fixed**	**Random**	**Variable (Diff.)**	**Prob.**
Interest rate	-0.0028		0.000	0.364
Inflation rate	0.0041		0.000	0.234
Exchange rate	-0.0013		0.000	0.798
GDP	-0.0142		0.000	0.687

4.8.5. Panel Multiple Regression Analysis

The study sought to establish the extent to which the independent variables explained the variation of stock returns through coefficient of determination calculations. From the results, the coefficient of determination was 51.1% implying that interest rate, inflation rate, exchange rate and GDP explained 51.1% of the variance in stock returns in East Africa. Therefore, 48.9% of the variance in stock returns in East Africa was explained by other factors that were not part of the model. The use of F-statistic to determine the joint significance of the slope coefficients was based on the p value for F-statistics. From the study, the F-statistic was 2.347 and the p value was less than 0.05. The implication there was that at least one slope coefficient was non-zero.

In consideration of the first hypothesis; that there was no significant relationship between interest rate and stock returns in East Africa, the regression analysis was important in assessing this hypothesis. The results of the study indicated that there was a negative significant relationship between interest rate and stock return (β =-0.0028, p value <0.05). Therefore, the null hypothesis was rejected. The results were consistent with previous studies. For instance, Uddin and Alam, (2007) found a significant inverse relationship between interest rates and stock prices in Bangladesh. Maswere and Kaberuka (2013) also found a long run significant inverse relationship between interest rates and stock returns in Uganda; but no significance was found in the short term. Similalrly, Kirui, Wawire and Onono (2014) found a negative significant relationship between interest rates and stock returns in NSE. Furthermore, Shilinde (2013) found a significant inverse relationship between interest rates and stock returns in Tanzania.

The second hypothesis of the study was that there was no significant relationship between inflation rate and stock returns in East Africa. The result obtained revealed that there was a positive significant relationship between inflation and stock returns (β =0.0041, p value <0.05). The null hypothesis was, therefore, rejected. This result was in agreement with Fisher's theory of interest rate which argues that if the economy was at full employment in one period with no inflation expected, then, the central bank suddenly increased money supply such that based on quantity theory of

money, inflation increased; there was a growth of aggregate real income. Furthermore, past studies found significant relationship between inflation rate and stock returns. For instance, Choundhry, (2001) found a significant positive relationship between inflation rate and stock returns in four Latin America countries: Mexico, Chile, Argentina and Venezuela. Similarly, Maswere and Kaberuka, (2013) found out a significant positive relationship between inflation and stock returns in Uganda. A similar result was obtained by Shilinde in Tanzania.

The third hypothesis of the study was that there no significant relationship between exchange rate and stock returns. The results of the analysis revealed that there an inverse significant relationship between exchange rate and stock returns (β =-0.0013, p value <0.05). Therefore, the null hypothesis was rejected. This result was similar to a study by Naik, (2013) who used Johansen's Co-integration and Vector error correction model in his study of the relationship between five macroeconomic variables: Industrial production, money supply, exchange rates, and wholesale price index and Treasury bill rates in Indian stock market index. He found a significant inverse relationship between exchange rate and stock market index. A similar significant negative relationship between exchange rates and stock market returns was found by Osamuonyi and Evbayiro-Osagie (2012) in the Nigerian stock market index.

The last hypothesis of the study stated that there was no significant relationship between GDP and stock returns in East Africa. The results obtained showed that there was a positive significant relationship between GDP and stock return (β =0.0142, p value <0.05). This led to the rejection of the null hypothesis. This result was inconsistent with a study by Tursoy, Gunsel and Rjoub, (2008) that involving 13 macroeconomic variables, including GDP, on Instabul stock exchange. It found an insignificant relationship between GDP and stock returns. Other studies in Kenya (Kirui and Onono, 2014) and Nigeria (Osamuonyi and Evbayiro-Osagie, 2012) found no significant relationship between GDP and stock returns.

The panel regression model was as follows:

Stock return (Price-Weighted) = 0.4267 - 0.0028(interest rate) + 0.0041(inflation rate) – 0.0013(exchange rate) + 0.0142(GDP growth rate).

Table 4.7 Panel Multiple Regression Modelling

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.4267	0.1185	3.6013	0.000
Interest rate	-0.0028	0.0006	-4.8034	0.000
Inflation rate	0.0041	0.0011	-3.8540	0.000
Exchange rate	-0.0013	0.0001	-2.2232	0.000
GDP growth rate	0.0142	0.0060	2.2992	0.000
R-squared	0.511	Mean dependent variable		0.160
Adjusted R-squared	0.491	S.D. dependent variable		0.100
S.E. of regression	0.097	Akaike info criterion		-1.767
Sum squared residue	1.068	Schwarz criterion		-1.605
Log likelihood	113.031	Hannan-Quinn criterion.		-1.701
F-statistic	22.347	Durbin-Watson stat		1.635
Prob (F-statistic)	0.000			

5.0 Discussion, Conclusion and Recommendations

The findings from the study showed that there was a significant relationship between macroeconomic variables and stock returns in East Africa. In consideration of the first independent variable, interest rate, the study found a significant inverse relationship between interest rate and stock return in East Africa. The implication was that increase in interest rate affected stock returns negatively. The findings were consistent with the earlier studies. For instance, Uddin and Alam, (2007) found a significant inverse relationship between interest rates and stock prices in Bangladesh. The result was also consistent with fisher's theory of interest rate that argues that investment is inversely proportional to interest rates.

The study also found that there is a positive significant relationship between inflation rate and stock returns. This means that increase in inflation resulted in increase in stock return. This finding was also in agreement with Fisher's theory of interest rate that if the economy was at full employment in one period and no inflation was expected, then, the central bank increased money supply suddenly; the aggregate income would grow leading to increased investment. Earlier studies also confirmed the positive significant relationship between inflation and stock return. Examples include Choundhry, (2001) who found a significant positive relationship between inflation rate and stock returns in four Latin America countries: Mexico, Chile, Argentina and Venezuela and Maswere and Kaberuka, (2013) who found a significant positive relationship between inflation and stock returns in Uganda.

The study also found an inverse significant relationship between exchange rate and stock return. Therefore, an increase in exchange rate led to a decrease in stock return. The findings were in agreement with past studies such as Naik, (2013) who used Johansen's Co-integration and Vector error correction model in his study of the relationship between five macroeconomic variables: Industrial production, money supply, exchange rates, and wholesale price index and Treasury bill rates in Indian stock market index. He found a significant inverse relationship between exchange rate and stock market index. A similar significant negative relationship between exchange rates and stock market returns was found by Osamuonyi and Evbayiro-Osagie (2012) in the Nigerian stock market index.

The study also found a positive significant relationship between GDP and stock return. The findings were in disagreement with past studies. For instance, a study by Tursoy, Gunsel and Rjoub, (2008) involving 13 macroeconomic variables, including GDP, on Instabul stock exchange found an insignificant relationship between GDP and stock returns. Other studies in Kenya (Kirui and Onono, 2014) and Nigeria (Osamuonyi and Evbayiro-Osagie, 2012) found no significant relationship between GDP and stock returns.

5.2 Conclusion

The findings of the study were effective in attaining the main objective of determining the effects of macroeconomic variables on stock returns in East African stock market. The findings relating to interest rate revealed that increase in interest rates had a negative impact on stock returns in East African stock market. This was an important realization as it established the negative effects increase in interest rates have on stock returns. The study also found that there was a positive significant relationship between inflation rate and stock returns in East Africa stock market. Inflationary pressure, however, is associated with increase in money supply hence increased investment levels. In terms of exchange rate, the study established that there was an inverse

significant relationship with sock returns. Therefore, an increase in exchange rate, which represented an appreciation of the US dollar, decreased the stock returns in East African stock market. Finally, the study found that there was a positive significant relationship between GDP and stock returns in East Africa stock market.

5.3 Recommendations

As it has been found that interest rates decrease stock returns in East African stock market, it is recommended that monetary policies geared towards keeping interest rates at the lowest possible levels are undertaken. This will reduce the cost of capital for the firms trading in the stock market hence increased profitability leading to increased stock returns.

Inflation has been found to increase stock returns in East Africa stock market. However, monetary policies need to be implemented to maintain an optimal level of inflation rates that may lead to other negative outcomes in the region. Indeed, it evident that reasonable level of inflation rate is healthy for the stock market.

Since increase in exchange rate has a negative impact on the stock return in East Africa stock market, the study recommends that the member countries adopt relevant trade and fiscal policy measures that aim at improving the balance of payments for the region. The member countries should adopt policies that reduce import budget while increasing exports to increase flow foreign capital into the region.

Since the study established that increase in GDP led to increase in stock return, it is recommended that fiscal and monetary policies that enhance GDP growth are adopted in the East African region by member countries. This would be important in increasing the stock returns for the regional stock market.

6.0 References

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