
Effect of Macro Economic Factors on the Performance of the Equity Market of Nairobi Securities Exchange

Antony Ndunda, Robert Kingori & Jared Ariemba

South Eastern Kenya University;

antondundah@gmail.com

ABSTRACT

This study examines the effect of macroeconomic factors on the equity market performance of Nairobi Securities Exchange. Panel data is collected for a 10year period, from 2005 to 2014 on the equity market capitalization as the dependent variable and the macro-economic variables of Average annual inflation rate, Average annual exchange rate, Average yearly monetary base (M3 and Average annual GDP growth rate as the independent variables. The regression analysis was used and the study found no evidence of significant influence of exchange rate on equity market capitalization. However the study concludes that there is a weak positive relationship between the selected macro-economic factors (Exchange rate, Inflation rate, money supply, and GDP) and Equity market performance.

Keywords: *Equity market, Macro-Economic Factors, Market capitalization*

1. INTRODUCTION

Equity Market is the market for the trading of equity instruments. The instruments traded on the equity markets are ordinary shares of companies, often listed on the stock exchange. Shares are units of ownership of companies. Ordinary Shares enable holders to have a claim in the assets of the company and any profit generated is shared by shareholders in relation to their shareholding (Mishkin 1998). Ordinary Shares entitle the holders with dividend income in the event that company generates profit from operations. In the event of loss, the same is shared among shareholders as well in relation to the shares held, usually determined as profit/loss per share (Osoro, 2013).

According to the World Bank (2012) world development indicators report, a macro-economic factor is one that is pertinent to a broad economy at the regional or national level and affects a large population rather than a few select individuals. Examples of such factors include economic output, unemployment, inflation, savings and investment among others. The Kenya National Bureau of Statistics normally provides data on various economic development indicators, like inflation, informal sector employment, national savings rate, GDP growth rate, GDP per capita among others (Ariemba, Kiweu and Riro, 2015).

Equity markets, as Olweny and Kimani (2011) observed, encourage investors with surplus funds to invest them in additional financial instruments that better matches their liquidity preferences and risk appetite. In that respect, better savings mobilizations increases the savings rate, thereby stimulating investments and subsequently earning investment income to the owners of those funds.

There are several measures of the performance of the equity market. Among the main measures of equity market performance include; stock market indexing, equity market capitalization and stock turnover. Stock market indexing is one of the most widely used measures of equity performance. The market index such as the NSE index is used to observe total returns for an aggregate market and these computed returns are to judge performance of individual portfolios. The assumption is that randomly selecting a large number of stocks from the total market should enable the investor to generate a rate of return comparable to the market (Simiyu, 1992).

Equity Market capitalization is another measure of equity market performance. This measure is used to measure market movements by measuring the total value of stock in a particular equity market by aggregating the market value of the quoted stocks (Maghyereh, 2002). Changes in equity market capitalization occur due to fluctuations in share prices or issuance of new share prices or issuance of new shares and bonus issues. Market turnover indicates inflows and outflows in the stock market and is based on the actively traded shares. A change occurs due to the actively traded shares and to fluctuations in share prices or number of shares traded in a given day (Opati, 2009).

Equity market in Kenya is regulated by Capital Markets Authority (CMA, 2011) which provides surveillance for regulatory compliance. The authority has continuously lobbied the government to create conducive policy framework to facilitate growth of the economy and the private sector to enhance growth of the stock market (Ngugi, 2005).

The Equity market is also supported by the Central Depository and Settlement Corporation (CDSC) which provides clearing, delivery and settlement services for securities traded at the markets Exchange. It oversees the conduct of Central Depository Agents comprised of stockbrokers and investments banks which are members of NSE and Custodians (CDSC, 2004). These regulatory

frameworks are aimed to sustain a robust stock market exchange that supports a cogent and efficient allocation of capital allowing price discovery to take place freely based on the market forces.

The remainder of this paper is organized as follows: Section two presents a review of related literature and the research questions. The research method adopted is outlined in section four. Section five presents the results followed by a summary, discussions and conclusions in the final section.

2. REVIEW OF LITERATURE

2.1 *Inflation Rate and Equity market performance*

Lee (2009) reevaluated whether the equity return and the inflation relates indeed due to inflation illusion by reexamining the hypothesis using longer sample period of the US and international data. The study observed the overpricing with high inflation in the pre-war period. This implies that although the mispricing component plays an important role in the equity market and inflation relation in both subsample periods. The observed relations in the pre-war and post-war periods are consistent with the relative importance of these shocks. Mohammad (2011) used Multivariate Regression Model computed on Standard OLS formula and Granger causality test to model the impact of changes in selected microeconomic and macroeconomic variables on equity market performance in Bangladesh. He examined monthly data for all the variables under study covering the period from July 2002 to December 2009. The study found a negative relationship between equity market performance and inflation as well as foreign remittance while market Price/Earnings and growth in equity market capitalization have a positive influence on equity market returns. However, no unidirectional Granger Causality is found between equity returns and any of the independent variables and the lack of Granger Causality reveals the evidence of an informally inefficient market.

Gallagher and Taylor (2002), found evidence that equity returns are negatively affected by both expected and unexpected inflation. These studies tend to explain the negative linkage among equity market performance and inflation to be linked to money demand and the quantity theory of money. Hondroyiannis and Papapetrou, 2005 studied the relationship between real stock returns and inflation in Greece. They observed that Price changes affect equity market returns through two channels. In channel 1, an increase in inflation negatively affects economic growth since it adversely affects investment and production. This creates uncertainty in the economy with negative impact on real economic activity. The result is a negative relationship between market returns and inflation.

Ritter and Warr (2002) support the inflation illusion hypothesis as they found that the bull market starting in 1982 was due in part to undervaluation of levered equities caused by mistakes in the use of nominal and real capitalization rates. Campbell and Vuolteenaho (2004) used data from the period between 1927 and 2002 finding evidence of inflation-induced mispricing further supporting the inflation illusion hypothesis.

2.2 *Exchange rate and Equity market performance*

Stavarek (2004) examined the nature of casual relation between equity prices and exchange rate in four old EU countries (Austria, France, Germany and the UK) and the four new members (Czech Republic, Hungary, Poland and Slovakia) and in the USA. The data varies for each county depending upon the availability. There were several tests used like Co integration analysis, vector error correction modeling standard Granger casualty test to find out the linkage between exchange rate and equity market

performance and they concluded that there was no long run relationship existing in first analyzed period covering from 1970 to 1992. In the period from 1993 to 2003 much stronger casualty found out in old EU members and USA because of their strong equity market and exchange rate development. Long run equilibrium does not exist in new EU members due to relative under development markets.

Nyamute (1998) studied the relationship between equity prices and other financial variables like money supply, interest rates, inflation rates and exchange rates in Kenya. He found a positive relationship between equity prices and exchange rates. However, his research performed data analysis on non-stationary series which may adversely affect the validity of the results. Also, Sifunjo and Mwasaru (2012) analyzed the casual relationship between NSE equity prices and foreign exchange rate using monthly data from November 1993 to May 1999. Johansen consideration procedure and error correction model were used for analysis.

The empirical results indicate that in Kenya, the movements in exchange rates exert significant influence on stock price determination in Kenya.

2.3 Money Supply and Equity market performance

Eric Sorensen (1982) studied the impact of money on equity prices with special attention to anticipated and unanticipated changes in money supply. Sorensen (1982) found that unanticipated changes in money supply have a larger impact on the stock market than anticipated changes, supporting the efficient market hypothesis.

Hamzah (2004) did study on relationship between equity market performance and money supply and found a positive dependence between money supply change and equity price evolution on Singapore Securities exchange. The causality between the money supply and Equity markets on emerging markets was investigated also by Brahmasrene, Jiranyakul (2007), specifically in their analysis of the Thai Equity market between 1992 and 2003, where they found positive relations between money supply and equity prices. Cagli, Halac and Taskin (2010) dealt with the relationship between money supply and Equity returns on Turkish market. These authors did not confirm any co-integration between these variables.

The effects of the changes in macroeconomic factors (including the money supply) on the development of Equity returns were discussed also by Shaoping (2008), who confirmed a very strong effect of the money supply on the development of Equity returns in the period between 2005-2007. As stated, he found a long-term and stable relationship between Equity market performance and monetary aggregate. Similarly, Equity market performance and money supply had a positive co-integration. The positive co-integration has thus resulted that the growth of money supply results in the rising prices of equity shares.

The issues of efficiency of the Equity market in Malaysia and co-integration between money supply and Equity performance were discussed by Habibullah, Baharumshah (1996), who defined a weak efficiency and non-existent cointegration between the money supply and equity performance on this market. However, in a later study, Habibullah (1998), found a causal relationship between the money supply and Equity returns. The positive relationship between macroeconomic indicators (including the money supply) is also demonstrated by Hanousek, Filler (2000) who confirmed a positive relationship between the money supply and equity market performance in the conditions of Central Europe in 1993-1996.

2.4 Real Gross Domestic Product and Equity market performance

Wu *et al.* (2010) used the ratio of value of domestic shares listed on domestic exchanges to GDP to represent equity market capitalization and the value of the trade of domestic shares on domestic exchanges divided by the value of listed domestic shares as liquidity of stock market. His findings were that the short-run effect from Equity market development on real output was opposite to its long-run influence. According to their findings, liquidity of the equity market has a negative short-run effect on economic growth while Equity market capitalization and liquidity have positive long-run consequences on economic development.

Diebold and Yilmaz (2008) found a unidirectional influence from GDP volatility to Equity market volatility. Caporale and Spagnolo (2003) captured a positive influence on output growth volatility from the equity market volatility. In contrast, others have reported empirical evidence of a bidirectional relationship between equity market volatility and the volatility of GDP growth. For example, Leon and Filis (2008) used spectral analysis using GDP, investments and the stock market quarterly data from Greece, Leon and Filis (2008) posit that GDP shocks offset equity market volatilities; however, equity market volatility may give a rise to GDP volatilities.

3. RESEARCH QUESTIONS

Based on the above literature, this paper answers the following questions:

- i. What is the effect of Inflation on the performance of equity market of Nairobi Securities Exchange?
- ii. What is the effect of exchange rate on the performance of equity market of Nairobi securities Exchange?
- iii. What is the effect of money supply on the performance of equity market of Nairobi securities Exchange?
- iv. What is the effect of real GDP on the performance of equity market of Nairobi Securities Exchange?

4. METHODOLOGY

Multiple regression was applied to the data on the effect of macroeconomic factors on the Equity market of Nairobi Security Exchange. This is a set of techniques for generating a predicted scores for one variable, in this case the dependent variable, from four predictor variables, in this case independent variables.

4.1 Model specification

The study adopted a model similar to that used by previous researchers in the area of macroeconomic factors affecting Equity market performance (Osoro, 2013; Aduda, 2012; Nyamute, 2012). The regression model was modified as follows and used for the analysis:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon$$

Where; Y – Average Annual Nairobi Securities Exchange Equity market capitalization

a - Is a constant, intercept of the equation.

$\beta_1 - \beta_4$ is the regression coefficient of the independent variables

X₁- Inflation rate, measured as average annual inflation rate

X₂- Exchange rate, measured as average annual exchange rate.

X₃ -Money Supply, measured as average yearly monetary base (M3); the sum of currency in circulation, and reserve balances.

X₄ - Real GDP, measured as average annual GDP growth rate.

β – Determines the relationship between the independent variable X and the dependent or Gradient/Slope of the regression measuring the amount of the change in Y associated with a unit change in X.

While ϵ – is the error term normally distributed about a mean of zero. For computation purposes it is assumed to be 0.

4.2. The Data

Secondary data will be obtained for a period of 10 years, spanning between years 2005 – 2014. Secondary data refers to the information that has been collected by other individuals (Cooper and Schindler, 2006). The researcher obtained data to study the variables which included Inflation rate, Exchange rate, money supply and real output. For the purpose of the study, the secondary data was obtained from Kenya National Bureau of Statistics (KNBS) website, Central Bank of Kenya (money supply M3), International Monetary Fund IMF website (Kenyan GDP Growth rate), and the Nairobi Securities Exchange (Equity market capitalization).The study used the Equity market capitalization as the dependent variable to measure the equity market performance.

5. FINDINGS

5.1. Descriptive statistics

The descriptive statistics for the both dependent variable (Equity market capitalization) and the four independent variables show the results indicated in the summarized table below;

Table 5.1 Descriptive Statistics

	Equity market capitalization	Inflation rate	Exchange rate	Money supply M3	GDP growth rate %
Mean	1028.431	11.000	78.8525	1220880.70	4.4480
Median	1212.5050	9.6000	79.7000	1,110,919.00	5.0300
Std. Dev.	377.29967	6.2709	7.83368	535,490.297	2.5398
Variance	142355.00	39.324	61.449	2.867E+11	6.4510
Range	1131.3500	22.2	21.52	1392002.00	8.0000

The study results revealed that money supply varied mostly followed by Equity market capitalization, followed by Exchange rate, Followed by real GDP, followed by inflation rate, as shown by their corresponding standard deviations in table 5.1 above. Also, the data was not exactly normally distributed since their respective mean and median was not exactly the same, but the data was sufficiently appropriate for the purpose of the study.

5.2 Correlation Analysis

The study analysis conducted correlation analysis. Table 5.2 shows the correlation relationship between the study variables.

Table 5.2: Correlation Analysis

		Correlations				
		EMC	IR	GDP	ECH Ksh/US\$	M3
EMC	Pearson Correlation	1	.052	-.101	.563*	.700*
	Sig. (1-tailed)		.443	.391	.045	.012
	N	10	10	10	10	10
IR	Pearson Correlation	.052	1	-.573*	-.464	-.444
	Sig. (1-tailed)	.443		.042	.088	.099
	N	10	10	10	10	10
GDP	Pearson Correlation	-.101	-.573*	1	.047	-.065
	Sig. (1-tailed)	.391	.042		.449	.429
	N	10	10	10	10	10
ECH Ksh/U SS\$	Pearson Correlation	.563*	-.464	.047	1	.882**
	Sig. (1-tailed)	.045	.088	.449		.000
	N	10	10	10	10	10
M3	Pearson Correlation	.700*	-.444	-.065	.882**	1
	Sig. (1-tailed)	.012	.099	.429	.000	
	N	10	10	10	10	10

*. Correlation is significant at the 0.05 level (1-tailed).

**. Correlation is significant at the 0.01 level (1-tailed).

The correlation analysis revealed that the data sets were highly correlated with each other. For example, equity market capitalization was found to correlate much more with Money Supply as compared with the rest of the variables at 0.05 level of confidence. Also notable was that Equity market capitalization was highly correlated with both Average annual inflation, and real GDP. Also, Inflation was highly correlated with annual monetary base (M3), and average annual exchange rate. In general, the

data sets were highly correlated meaning a change of one of the variable would result to a substantial change on the other variables which is expected for such macro-economic variables.

5.3. Model Summary Statistics

The study sought to establish the nature of the relationship (strength and the direction of the relationship) that exists between the study variables. The regression analysis results were as shown in table 5.3 below.

Table 5.3: Model Summary Statistics

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.865 ^a	.748	.547	253.99379

a. Predictors: (Constant), Annual monetary base (M3), Average annual GDP Growth rate, Average annual inflation rate, Annual Exchange rate Ksh/US\$.

The study results revealed that there is a positive relationship between the selected macro-economic variables and the Equity market capitalization as depicted by coefficient of determination (R) of 0.865, and Correlation Coefficient (R- Square) of 0.748. Therefore, the selected macroeconomic variables Inflation rate, Exchange rate, Money Supply (M3), and real GDP growth rate do command an influence equivalent to 74.8% only of the changes in the Equity market of the Nairobi Securities Exchange meaning that other variables apart from the above mentioned do influence Equity market capitalization.

5.4.1 Statistical Significance of the model

The study sought to establish the significance of the model established through the regression analysis. The regression analysis produced the statistics as shown in table 5.4 below.

Table 5.4: Analysis of Variance

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	958631.172	4	239657.793	3.715	.0961 ^b
	Residual	322564.220	5	64512.844		
	Total	1281195.391	9			

a. Dependent Variable: Equity market capitalization US Dollar

b. Predictors: (Constant), Annual monetary base (M3), Average annual GDP Growth rate, Average annual inflation rate, Annual Exchange rate Ksh/US\$.

The regression analysis obtained P-value test for significance equal to 0.0961 (which is greater than 0.05) depicting that a possible model between the Equity market capitalization and the selected predictor variables is statistically insignificant.

5.4.2 Estimated Model Coefficients

The results of the analysis obtained the model coefficients and corresponding statistics as shown in table 5.5 below.

Table 5.5: Model Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients Beta	t	Sig.	95.0% Confidence Interval for B	
	B	Std. Error				Lower Bound	Upper Bound
(Constant)	68.439	1572.453		.044	.967	-4110.557	3973.679
Inflation	44.974	20.411	.747	2.203	.079	-7.493	97.442
1 Exchange	-9.253	23.589	-.192	-.392	.711	-69.890	51.384
M3	.001	.000	1.228	2.395	.062	.000	.002
GDP	61.832	45.701	.416	1.353	.234	-55.645	179.309

a. Dependent Variable: Equity market capitalization

The results of the analysis established that the relationship between Equity market capitalization and the predictor variables; inflation rate, Money Supply (M3), and Real GDP can be expressed using the following regression model;

$$Y = 68.439 + 44.974X_1 - 9.253X_2 + 0.001X_3 + 61.832X_4 + \varepsilon.$$

Where; Y is the Equity market capitalization, X_1 is the Inflation rate, X_2 is the Exchange rate, X_3 is the Money supply M_3 , and X_4 is the real GDP. From the regression model obtained above, holding all the other factors constant, Equity market capitalization would be 68.439. A unit change in each of the predictor variables would cause a change in Equity market capitalization by the rate corresponding to the coefficient related with each variable as indicated in the model above.

Also, there exists a weak insignificant relationship between each of the predictor variables and Equity market capitalization as the corresponding P-Values for each of the variables were larger than 0.05 as shown in the table above.

6. CONCLUSIONS

This study concludes that there is a weak positive relationship between the selected macro-economic variables (inflation, Exchange rate, money supply, and GDP growth rate) and Equity market performance. Also, this study concludes that the relationship between Exchange rate and Equity market performance is inverse but insignificant. Further, the study concludes that the inflation, Money Supply and GDP have a positive but weak and insignificant relationship with performance of Equity market of NSE.

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