



## Examining Key Macroeconomic Factors Influencing the Stock Market Performance: Evidence from Tanzania

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### Abstract

This study reflects on assessment of the micro economic factor hindering the growth of Dar es Salaam stock exchange market. The study intends to determine the factors influencing the development of Dar es Salaam stock exchange market. Four constructs based on the theory such as money supply exchange rate, inflation rate and interest rate were considered. The study followed the positivism approach where variables were analyzed quantitatively. The multiple regression model is used to relate variables and stock exchange performance at Dar es salaam stock market. Findings in this study revealed that, four investigated variables in this study, one which is interest rate is found to have the hypothesized negative relationship with Dar es Salaam stock exchange index. The inflation rate, exchange rate and money supply were statistically insignificant explaining the variability of Dar es salaam stock exchange market. Although the research recommended that, the government should manage well the micro economic policies in order to give confidence to our investors and attract new investors. Researchers can use the study findings and explore on more variables that were not used in this paper, such research can even use different modeling techniques to investigate the variables in the study.

### Key words

Exchange market, exchange rate, inflation rate

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### 1. Introduction

In effort of Tanzania government's Policy to transform its economy from public government dominant economy to private sector driven economy, it establishes Dar es Salaam Stock Exchange Market. The establishment of the Dar es Salaam Stock Exchange (DSE) marked an important milestone in the efforts toward the development of a functioning capital market for the mobilization and allocation of long-term capital to the private sector.

The DSE was incorporated in September, 1996 as a Company limited by guarantee without a share capital under the company's ordinance (cap.212). The DSE is therefore a non-profit making body created to facilitate the Government's implementation of the economic reforms and in future to encourage the wider share ownership of privatized companies in Tanzania and facilitate raising of medium and long-term capital.

The primary function of any stock market is to play the role of supporting the growth of the industry and economy of the nation and it is additionally the estimation device that gives the thought regarding the mechanical development and also the soundness of the economy with their execution. The rising file or reliable development in the record is the indication of developing economy and if the file and stock costs are on the falling side or their vacillations are on the higher side it gives the impression of un security in the economy exist in that nation.

Macroeconomic constructs have been assuming a large part in deciding the operation of the stock market and financial development of numerous nations in the world. Despite of such critical part in term of stock execution and monetary development, various investigations had indicated distinctive outcomes as per diverse conduct of the capital market and distinctive full scale financial factors they indicated (Aurangzeb, 2010). Therefore, this study is intends to examine at what extent the Dar es Salaam stock Exchange market will behave in respect to the fluctuation of the economic variable such as interest rate, Inflation rate, Exchange rate and money supply.

The objective of the study is to assess factors hindering the growth and development of DSE.

## 2. Literature review

Different theoretical frameworks have been employed by many researches to link changes in macroeconomic variables with stock market returns. There include the semi strong efficient market hypothesis developed by Fama (1970) and the Arbitrage Pricing Theory (APT). These theories are discussed in this section as they relate the macroeconomic variables to stock market return.

### 2.1. The Arbitrage Pricing Theory

Developed by Ross (1976), the Arbitrage Pricing Theory (ATP) is another way of linking macroeconomic variables to stock market return. It is an extension of the Capital Asset Pricing Model (CAPM) which is based on the mean variance framework by the assumption of the process generating Security. In other words, CAPM is based one factor meaning that there is only one independent variable which is the risk premium of the market. There are similar assumptions between CAPM and APT namely: the assumption of homogenous expectations, perfectly competitive markets and frictionless capital markets.

However, Ross (1976) proposes a multifactor approach to explaining asset pricing through the arbitrage pricing theory (APT). According to him, the primary influences on stock returns are some economic forces such as (1) unanticipated shifts in risk premiums; (2) changes in the expected level of industrial production; (3) unanticipated inflation and (4) unanticipated movements in the shape of the term structure of interest rate. These factors are denoted with factor specific coefficients that measure the sensitivity of the assets to each factor. APT is a different approach to determining asset prices and it derives its basis from the law of one price. As a matter of fact, in an efficient market, two items that are the same cannot sell at different prices; otherwise an arbitrage opportunity of indexes as shown in the following equation:

$$R_1 = \alpha + \beta_1 X_1 + \beta_2 X_2 \dots \beta_n X_n + \varepsilon \quad (1)$$

Where:

$\beta$  = Beta;

X = Risk factors;

$R_1$  = Expected level;

$\alpha$  = If return for stock (return on market portfolios);

$\varepsilon$  = Random error.

According to Chen and Ross (1986), individual stock depends on anticipated and unanticipated factors. They believe that most of the return realized by investors is the result of unanticipated events and these factors are related to the overall economic conditions. In fact, although asset returns can also be affected by influences that are not systematic to the economy, returns on large portfolios are mainly influenced by systematic risk because idiosyncratic returns on individual assets are cancelled out through the process of diversification. Review of Empirical studies.

Using VECM model and yearly time series data for the period 1985 – 2008. Onasanya and Ayoola (2012) found that the stock macroeconomic variables do not significantly influence the return at stock market. Interest rate, specifically was found to be negatively related and

Insignificant to stock returns in Nigeria. Owusu – Nantwi and Kuwornu (2011) explored the effect of loan fees on securities exchange restores; the variable demonstrated that the variable isn't critical for the

share trading system in Ghana. Loan fee as caught by 91-Treasury charge rate showed a negative association with money markets returns when authors utilized Ordinary Linear Spares technique with month to month information of 1992 – 2011. Ochieng and Oriwo (2012) studied the connection between large scale – financial aspects factors and securities exchange execution in Kenya.

Pal and Mittal (2011) examined the long run relationship between two Indian capital markets and some macroeconomic variables such as interest rates, inflation, and exchange rate and gross domestic savings. They use the quarterly data from January 1995 to December 2008 and with the help of unit root test, co integration and error correction mechanism they found out that the inflation rate have the significant impact on both capital markets whereas interest rate and foreign exchange rate have the impact on one capital market. The study can be made for longer period with some other macroeconomic variables gives us more comprehensive results.

Ibrahim and Aziz (2003) explore the relationship between four macroeconomic variables and Kuala Lumpur Composite Index (KLCL) through co integration and vector ant regression model. They used the monthly data of their variables which were real output, inflation rate, money supply and exchange rate from 1977 to August 1988 and their model suggest that there is short term relationship as well as long term relationship exist between the macroeconomic variables and the KLCL. They further explore that two variables which were exchange rate and money supply are negatively associated with the stock prices while the other two have positive impact on the index.

Stavarek (2004) examined the nature of casual relation between stock 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 country depending upon the availability. The monthly data from December 1969 to December 2003 is used for Austria, France, Germany, UK and USA while for Poland it is from December 1993 to December 2003 for Czech Republic December 1994 to December 2003. There are several tests are used like co integration analysis, vector error correction modeling standard Geranger casualty test to find out the linkage between exchange rate and stock prices and they conclude that there is no long run relationship exist 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 stock market and exchange rate development. Long run equilibrium does not exist in new EU members due to relative under development markets. Inflation, interest rate and exchange rate have the negative impact on stock prices. They recommended that the investors who want to invest in Chinese stock market they should invest for long term horizon because in start term the Chinese stock market is very volatile and risky.

Merikas and Merika (2006) try to re- examine hypothesis which suggest the stock market have negative impact on real economic activities in Germany. They collected the data of 41 years from 1960 to 2000 and build the VAR model. They used CPI as the measure of inflation while real rate of return of DAX stock index was used as stock market returns. They conclude that the stock prices are negatively related with the growth of employment in the country while the GDP growth rates have the positive relation with stock market. This study could be done with adding more variables into the model which generates more appropriate results. Flannery and Protopapadakis (2002) checked the impact of some macroeconomic factors on aggregate stock returns. They used 17 macroeconomics data announcements starting from 1980 to 1996 and applied GARCH model to find out the impact of these factors on realized returns as well as their volatility. After the analysis they found out that there are six variables in which three are nominal (CPI, PPI and Monetary Aggregate) and three are real (Employment Report, Balance of Trade, and Housing Starts) as strong candidates for risk factors. From three Report, Balance of Trade, and Housing Starts) as strong candidates for risk factors. From three nominal only money supply affect both the level of returns and the volatility the other two normal variables only affect the level of returns. On the other hand all three real macroeconomic variables only affect the volatility of the returns. Fang and Miller (2002) identifies the effect of volatility in Korean exchange market on Korean stock market with the GARCH-M model and the daily of those variables from 3<sup>rd</sup> of January 1997 to 21<sup>st</sup> of December, 2000 and they found out that the Korean foreign currency market impact in three different ways on the stock market. The first channel suggests that exchange rate negatively affect stock market returns. Secondly the depreciation volatility positively affects these returns and at last stock market return volatility responds to exchange rate

depreciation volatility. If they include some more macroeconomic variables such as money supply or interest rates their result would have much more considerable while taking the decision of investment.

Ahmed and Iman (2007) investigates the relationship between stock market and different macroeconomic variables such as money supply, They use analyze the Monthly data series for the period of July 1997 to June 2005 and they found that generally there exists no long run relationship between stock market index and macroeconomic variables but interest rate change or T-bill growth rate may have some influence on the market return.

### 3. Methodology of research

This study will use multiple regression technique to investigate whether interest rate, inflation rate, exchange rate and money supply, can explain the performance of DSE. It uses quantitative secondary data which will be collected from 12 companies on the DSE between 2006 and 2011, and also from BOT. The multiple linear regression technique is used because the variable is continuous in nature. Similar approach was used in other similar researchers such as (Aurangzeb, 2012, Coleman and Agyire, 2008; Ahmed and Imam, 2007, Talla, 2011). Also the multiple regression, analysis will be used in the assumptions of linearity, liability of measurement, normality and homoscedasticity (Obsorne and Waters, 2002).

#### 3.1. Methods of Data Collection

Secondary data, will be used to analyses the following variables namely, Interest rate, Inflation rate, Exchange rate, money supply and Stock performance. The data for stock Index will be obtained from DSE database on a sample of twelve companies listed at DSE. The data for Exchange rate, Inflation rate, interest rate and money supply will be obtained from the Bank of Tanzania, data base.

#### 3.2. Econometric modelling

To analyses the relation between; macroeconomic variable and stock exchange performance at DSE, multiple regression analysis will be used consistent with Aurangzeb (2010), and (Talla 2013).

$$Sm = B_0 + B_1IR + B_2IF + B_3ER + B_4MS + \varepsilon \quad (2)$$

IR: Interest rate will be measured by using Treasury bill: (Talla, 2013)

IF: Inflation will be measured by using consumer price Index. (Talla, 2013)

ER: Exchange rate will be measured by using Tanzania shilling per USD (Tala, 2013).

MS: Money Supply will be measured by using volume of Tanzania shilling in economy.

Bo: the intercept, and reflect the constant of the equation which measure mean value of SML, if all independent variable are omitted in the model.

Bi: regressive coefficient of each independent variable ( $i=1,2,3,4$ ), which measures sensitivity of dependent variable to a unit change in each independent variable.

$\varepsilon$  = the error term which is assumed to be normally distributed with mean value of 0 and Constant variance  $\sigma^2$ ;

Sm = stock market.

The hypothesis are tested using probability value (p values-displayed as sig in SPSS) on  $B_1$ - $B_4$  to establish statistical significance of respective variable coefficient of conventional confidence level (95% and if necessary at 99%). That means variable that have p-values above conventional level of significance have statically little impact on stock performance. The sign of the coefficient is also observed to see whether it comes out as hypothesized. To measure collective explanatory power of independent variable adjusted –  $R^2$  Result from regression result are used.

### 4. Results and discussions

#### 4.1. Description of sample

Table 1 presents some descriptive statistics of variable used in this study. It shows total number of observation minimum value, maximum value, mean value and standard deviation of all the variables. The

dependent variable which is DSE index, shows the lowest value of 450 and to the highest value of 1,400 during last 288 weeks, mean value of dependent variable is 939:80 and the standard deviation of 209.173. The minimum value of CPI, i.e inflation rate is 4.00 and maximum of 15:00 which were observed in 2009 and 2010 respectively. The standard deviation of this variable is 2.89, and means rate is 3.00. The minimum value of exchange rate is 900 and maximum value is 1699 which were obtained in 2007 and 2010 respectively. The minimum value of interest rate is 10, 00 and maximum value is 14:00 which were observed is 2006 and 2011. The minimum value of money supply was 4,390 and maximum value 9.513.05 which was observed in 7007 and 2008 respectably.

Table 1. Determinant of DSE index

Descriptive	N	Min	Max	Mean	SD
Interest rate	228	10.00	15.60	14.00	6.013
Exchange rate	228	900	1,699	1,311.34	165.93
Money supply (Billion)	228	40,000	90,000	65.000	68,000
Inflation rate	228	4:00	15.00	8,9554	2,891

Source: Field data

### 4.3. Determinant of DSE index

Table 4.3 presents regression results of the study where overall, the model explains 69 % the variability of DSE index as shown by adjusted R<sup>2</sup>. This means there other variables not captured by our model which explain the 40% variability on the first year. Which was 2006 Adjusted R<sup>2</sup> stood at 51% and on the second jumped to 73 before falling to 54% jumped on the third year: On the fourth year stood at 48% fifth year jumped to 70% and in the sixth year stood at 65 %. The F – statistic which measure whether independent variable are jointly affecting the dependent variable is statistically significant at 5 % level only at the first year which is 2006. In other periods F – statistic is insignificant. It tells us therefore that the model is no robust enough to explain the linear relationship between DSE index and the four variable used in this study.

Regression results show that, Interest is negatively related to DSE index in this study in line with the hypothesis. The findings are in line with Aurangzeb (2012) and Talla (2013) whose study found interest rate to be negatively related to their stock exchange market index. The findings in this study imply that as interest rate increases DSE index decreases; since the interest rate gives the opportunity to the investors, to move their investment from DSE market to the Bank deposit and gain maximized return. A similar but opposite behavior it can be witnessed in case the interest rate decreased, people will find more worth to invest their money at DSE.

Exchange rate exhibited positive coefficient differently from the hypothesized. Increase in exchange rate was also increasing the purchasing power of foreign dealers because they invest the same amount in their local currently but after the conversion the amount will increase and they can purchase more stocks that earlier so ultimately it gives the more liquidity in the DSE: The other reason of this positive impact is that whenever the foreign exchange rate increases, investors were shift their investment from the foreign exchange market to other market due to increase of risk in foreign market. The result are consistent those reported in Aurungeb (2012 and Talla (2013). The money supply which was negatively hypothesized is positively related to the DSE index in this study.

The finding in this study imply that, money supply gives liquidity to the market and the market will turn into bullish mode and local investors also invest at that time as a the market increases and whenever the liquidity in the DSE increases it will help the DSE stock The result are consistent with those report in Talla (2013).

Inflation rate which was negatively hypothesized is positively related to ESD index in this study: The finding in this study imply that, the inflation was expected, as it stimulates more supply. Expected inflation happen when demand exceeds supply. Since this is expected, by Firm increases in prices would also increase earning, which would lead them paying more dividend and hence increase the price of their stock as well. The findings are consistent with those reported with Talla (2013).

Table 2. Determinant of DSE index

Description	Year <sub>1</sub>	Year <sub>2</sub>	Year <sub>3</sub>	Year <sub>4</sub>	Year <sub>5</sub>	Year <sub>6</sub>
Constant	280.495 (0.353)	1304.169 (0.045)	701.392 (0.643)	981.266 (0.087)	2,427 (0.398)	935.826 (0.028)
Exchange Rate	0.151 (0.286)	0.078 (0.596)	0.064 (0.643)	0.228 (0.087)	0.141 (0.398)	0.148 (0.381)
Money Supply	0.029 (0.838)	0.086 (0.0573)	0.419 (0.005)	0.191 (0.150)	0.039 (0.789)	0.143 (0.341)
Inflation rate	0.163 (0.248)	0.332 (0.038)	0.381 (0.011)	0.381 (0.013)	0.003 (0.984)	0.263 (0.104)
Interest rate	-0.379 (0.010)	-0.018 (0.908)	-0.024 (0.859)	-0.064 (0.664)	-0.280 (0.088)	-0.075 (0.669)
F	2.557 (0.053)	1.367 (0.262)	3.206 (0.022)	3.620 (0.012)	0.835 (0.047)	1.631 (0.025)
Adjusted R <sup>2</sup>	0.51	0.73	0.54	0.48	0.70	0.65

#### 4.4. Hypothesis testing

*On testing hypothesis number one:* interest rate has no significant relationship on stock market performance (DSE) is accepted and concluded that interest rate, has no significant impact on stock performance of DSE. As shown in Table 3(P<0.05).

*On testing Hypothesis number two:* Inflation rate has no significant impact on stock market performance. DSE is rejected as shown on Table 3 (P<0.05). The study accepted the alternative hypotheses that inflation has significant impact on stock market performance.

*Hypothesis number three.* Exchange rate has no significant impact on stock – market performance of DSE is rejected as shown on Table3 (P<0.05). The study accepted the alternative hypothesis and conducted that Exchange rate is an important determinant of stock market growth.

*Hypothesis number four:* Money supply has no significant impact on stock Exchange Market performance (DSE): is rejected. The study accepted the alternative hypotheses and conclude that money supply is an important determinant of the Growth of DSE as show on Table 3 (P<0.05).

Table 3. Summary of Result of Test of Hypotheses

Hypothesis	Results	Remark on Hypothesis
H <sub>1</sub> : Interest rate has significant impact on stock market performance of (DSE)	P= - 0.936 less than 0.05	Accepted
H <sub>2</sub> : Inflation rate has no significant impact on stock market performance of (DSE)	P = 1.707 greater than 0.05d	Rejected
H <sub>3</sub> : Exchange rate has no significant impact on stock market performance	P = 0.928 greater than 0.05	Rejected
H <sub>4</sub> : Money supply has no significant impact on stock performance	P = 1.007 greater than 0.05	Rejected

#### 5. Conclusions, Implications and recommendations

In a multiple regression (OLS) interest rate, Exchange rate inflation rate and money supply were joint able to explain – their between on DSE index – were explained us 2006 - 51%; 2007 – 60%; 2008- 54%; 2009- 48%; 2010 - 70% and 2011- 65%. The four variables were hypothesized to exhibited negative relationship with DSE index. The result was in relation with the study except for inflation rate, Exchange rate and money supply, which exhibited positive relationship with DSE index. Over the data in the Dar es Salaam stock Exchange for the period 2006 to 2011.

##### 5.1. Conclusions

Of the four variable investigated in this study one which is interest rate is found to have the hypothesized negative relationship with DSE index. Inflation rate, Exchange rate, money supply exhibited positive relationship contrary to the hypothesis. Thus inflation rate, Exchange rate and money supply were

statistically insignificant explaining variability of DSE. While Interest rate has statistically influence on DSE index. The rest variables can be explained by inflation rate, Exchange rate, and money supply as for about 60%: It appears there are still about 40% of the variables not captured in the model used in this study explaining the rest of the variability.

### **5.2. Recommendations**

This paper recommends that more information should be widely and transparently distributed to reduce information asymmetry. Also it is recommended, that there is a need of well managed macro – economic policies in order to obtain the benefit from DSE. In order to take the full advantage of DSE and carry on with the international market well managed macro – economic policies are so necessary in which interest is thoroughly monited and try to reduce the value as much as possible. It gives the confidence to the investors as well as the industries. It is also recommended that sum extra benefit was given to foreign investors.

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