Do macroeconomic variables really matter in explaining stock market returns in Tanzanian Stock Exchange Market?

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Abstract
The behaviour of stock markets is characterized by volatility of macroeconomic fundamentals which cause stock prices to move upwards and downwards within a short period of time. Therefore, the current paper examines the effect of macroeconomic variables on stock market returns of firms listed at Dar es Salaam Stock Exchange market. This study used time series data of macroeconomic variables collected from Central Bank of Tanzania and National Bureau of Statistics from 2011 to 2021.The error correction model was used to check the strength of the relationship between the selected macroeconomic variables and stock market returns. The results show that the selected variables have significant effect on the stock market returns. Inflation, Broad Money Supply and Interest rate appear to have positive impact on stock market returns. However, exchange rate reports negative impact on the stock market returns. The findings of the study provide policy insights about the drivers of the stock market returns volatility to enable policy makers to design the effective macroeconomic policies that will help with predicting the pathways to economic growth.

Key words: Macroeconomic Variables, Error Correction Model, Dar es Salaam Stock Exchange Market, Stock Market Returns, Capital Markets.

Introduction
What triggers the changes of stock market returns has drawn much attention among academics, practitioners and scholars. Most researchers relate aggregate stock market returns volatility to macroeconomic variables (Fang et al, 2020, Olayode et al., 2021). Besides, macroeconomic indicators, financial market variables including past volatility are also considered in predicting stock market returns (Ghysels et al., 2006; Christiansen et al., 2012).

The study of macroeconomic variables and their effect on stock market returns has been a fascinating domain among academics, investors and stock market regulators since the 1970s (Mazuruse, 2014). The relationship which exists between macroeconomic variables and stock market returns affects the valuation of securities and risk management, thus any movement in stock prices directly affects the real economy because of the strong inter-dependence of the stock market and the real economy (Mazuruse, 2014). Moreover economic theory considers stock prices to be a key measure of changes in economic activities, this has led to several studies on how macroeconomic variables and stock market returns relate and extent of the relationship (Sigh et al, 2011; Kalam, 2020)

Stock market acts as a crucial tool to indicate performance and serve as a barometer of the country financial competitiveness, while providing guidelines for implementation of monetary policy (Talla, 2013). In addition, investor's investment decision on company viability in long term will depend with share prices of the company (Golam et al, 2017). The theoretical underpinnings of the connection between the stock market returns and the macroeconomic risk factors are based on the Efficient Market Hypothesis (EMH) and Arbitrage Pricing Theory (APT). The Efficient Market Hypothesis stipulates that stock market price usually incorporate the most relevant and current information; thus, past information is less predictive in the future stock prices and hence stock market returns. Based on that only relevant and new information is used to explain the volatility of the stock market returns (Fama, 1965). On the other hand, the Arbitrage Pricing theory stipulates that if the market

is efficient, then any change in the macroeconomic fundamentals will influence stock market returns, the expected cash flows of the firms, and their financing and investment decisions (Semmler, 2011; Chinzara, 2011; Fama and French, 2015)

Despite the fact that current and relevant information is quickly absorbed in the stock price as stipulated by EMH, companies listed at Dar es Salaam stock exchange are characterized with very low stock price volatility and hence insignificant stock market returns regardless on number of factors influencing stock market returns. The frequently change of macroeconomic variables with low reflection on listed firms' shares price bring controversial of whether the prevailing share price reflect the real value of the firm and its financial viability. In addition, the presence of frequent changes in macroeconomic variables has not been clearly reflected in the stock market returns since stock price exhibits low fluctuation and sometimes non which provide the controversial on the effect of macroeconomic variables on the stock market returns. Based on this controversy, thus, the current study explores whether the macroeconomic variables namely interest rates, exchange rates, inflation rate, and broad money supply can explain the stock market return of the firms listed at Dar es Salaam Stock Exchange Market.

The rest of the paper is organized as follows. Section 2 provides the literature review; section 3 provides the data and methodology. Section 4 provides results of the study and section 5 draws the conclusion and policy implications

Literature Review

Theoretical Review

The Efficient Market Hypothesis (EMH) proposed by Fama (1970) and Arbitrage Pricing Theory (APT), developed by Ross (1984) are foundational theories in financial research, providing frameworks for understanding market efficiency and asset returns.

The Efficient Market Hypothesis (EMH) holds that asset prices accurately reflect all available information (Fama, 1970). According to Efficient Market Hypothesis (EMH), financial markets process and reflect pertinent information in asset prices in three forms: weak, semi-strong, and strong efficiency. These kinds of efficiency make distinct assumptions about the state of the market and how it affects investors (Fama, 1970).

On the other hand, to forecast asset returns, APT offers a complex model that takes into account a number of macroeconomic variables. APT acknowledges the intricate relationship between macroeconomic variables and stock market returns, departing from the Capital Asset Pricing Model's (CAPM) simplistic approach. The dynamic relationship between economic conditions and stock market behavior is highlighted by Alam, (2020), who also emphasizes the importance of macroeconomic variables in determining asset return risks. APT covers the complex dynamics that drive stock returns by factoring variables like the rate of inflation, industrial production, GDP, currency rate, lending rate and broad money supply. However, one drawback of APT is its incapacity to pinpoint exactly the macroeconomic factors that have the biggest impact on stock market returns. This work seeks to address this gap by identifying the major indicators which are broad money supply, inflation rate, lending rate, and currency rate as suggested by Kalam et al. (2020)

Empirical Literature Review

There has been a wide heterogeneous discussion of the influence of macroeconomic variables on the stock market around the globe, however there is a scant of literatures that have considered a set of macroeconomic factors to analyse the feedback reaction of stock market particularly in the developing economies.

Money supply and stock market returns.

The early works revealed that money supply and inflation are negatively related with the stock market return (Fama, 1981; Geske and Roll, 1983; Pearce and Roley, 1983)

Aremo (2020) used autoregressive distributed lag (ARDL) to examine how certain macroeconomic factors affected Nigeria's stock market performance. The study found that broad money had a large positive impact over time on Nigeria's stock market results. Furthermore, Lee et al. (2017) found that there was a positive short-term correlation between broad money supply and Thailand's stock market returns. These studies show the diverse effects of several variables on stock market dynamics and throw insight on the intricate relationship between macroeconomic factors and stock market returns. Therefore, the study makes the following hypothesis based on the literature review mentioned above.

H_1 Money supply has a significant positive effect on stock market returns in Tanzania

Inflation rate and stock market returns.

The results of the researches conducted by Lee et al. (2017), Ahmad (2017), and Al-Abdallah (2017) suggest that the relationship between macroeconomic

variables and stock market returns vary depending on the context. According to Al-Abdallah (2017), inflation has a greater impact on stock market returns in Jordan than foreign exchange rates do. Laichena and Tabitha (2015) found a positive significant relationship between inflation and stock market returns. On the other hand, Ahmad (2017), found a negative association between inflation and stock market returns, indicating that there is a distinct dynamic between these variables. As a result, these studies show how intricate the relationship is between macroeconomic variables and stock market returns and how the influence varies based on the particular economic environment. To resolve these differences and offer a more cohesive view of the dynamics affecting stock market review, more research is required. Therefore, the study makes the following hypothesis based on the literature review mentioned above.

H_2 Inflation rate has a significant impact on stock market returns in Tanzania

Exchange rate and stock market returns.

Exchange of foreign currencies is a major factor in determining economic activity within a nation. It has a significant and beneficial impact on investors' investment frameworks (Kalam, 2020).

Josiah (2019) investigated the relationship between macroeconomic variables and stock index returns in Nigeria using the Johansen multivariate co-integration test. The findings revealed a strong positive

relationship between foreign exchange rates and stock index returns. On the other hand, there was a marginally negative correlation between stock index returns and inflation. John (2019) conducted a

parallel analysis to examine the relationship between macroeconomic factors and the performance of Nigeria's stock index. The research revealed a positive but statistically insignificant correlation between the Nigerian All-Share Index and currency exchange rates. Therefore, the study makes the following hypothesis based on the literature review mentioned above.

H_3 Exchange rate has a significant impact on stock market returns in Tanzania

Interest rate and stock market returns

Macroeconomic variables such as interest rate has impact on the stock market returns. One of the early works on the literatures between the macroeconomic fundamentals and stock market returns is the work of Schwert (1989) who examined the relationship between multiple macroeconomic factors and the stock market. This study used monthly data from 1857 to 1987 in the US to examine the relation of stock market volatility with the volatility of real and nominal macroeconomics, real economic activity, financial leverage and trading volume. The study revealed that the interest rate and corporate bond return volatilities are correlated with the volatility of stock market returns. Gnahe (2021) found that regulators should keep interest rate relatively low to encourage economic business, improve external financing through rule-based exchange rate policy.

Otieno (2017) used the Autoregressive

Fractionally Integrated Moving Average (ARFIMA) to investigate the stochastic properties of stock market returns, macroeconomic factors, and their cointegrating residuals. The findings showed a significant cointegration between

interest rates and stock market returns. Similar studies were done by Afful (2017), Okechukwu et al. (2019) and Iqmal *et al*, (2020). Both studies discovered a substantial relationship between interest rates and stock market returns, indicating that fluctuations in interest rates may have an impact on stock market returns. All of these results highlight how crucial it is to take interest rates into account when analyzing the factors that affect stock market returns. Therefore, the study makes the following hypothesis based on the literature review mentioned above.

H_4 Interest rates have a significant impact on stock market returns in Tanzania.

Despite the fact that such contradictions on the nexus between the stock market and macroeconomic variables have been addressed up to a large extent in previous literatures, much of the empirical work in literatures has focused on the developed economies (i.e. Kang, 2017; Camilleri et al., 2019; Wang et al., 2017; Guo et al., 2018; Abbas et al., 2018; Abbas et al., 2019, Kalam, 2020). The results in these studies provide inconsistent results, which motivates us to revisit this relationship between stock market and macroeconomic variables.

In addition, the previous studies such as Aremo (2020), Lee et al (2017), Talla (2013) and Aful (2017) did not include all macroeconomic variables used in this study. Therefore, using historical data and statistical techniques, the purpose of the study is to investigate the specific relationship between the selected macroeconomic variables namely money supply, interest rate, exchange rate, inflation, and stock market returns. This study aims to provide a deep knowledge of how macroeconomic factors influence stock market returns by connecting theoretical ideas from APT and EMH with real-world applications.

Data and Methodology

Data

This study used secondary data where quarterly time series data were collected from 1st Jan 2011 to 1st Jan 2021. DSE All Share Index was used to measure the dependent variable of stock market returns. This measure was used as statistical concept to predict the returns of DSE. The independent variables used are, money supply, interest rate, exchange rate and inflation rate as shown in Table 1. These variables were selected based on the fact that they are among of the important determinants of the stock market performance (Kalam, 2020)

Inflation data were collected from National Bureau of Statistics of Tanzania (NBS), broad money supply, exchange rate and interest rate data from Bank of Tanzania (BOT) whereas stock market returns were computed and collected from Dar es Salaam Stock Exchange Market**.**

Model Specification

The empirical linear model guided from the literatures to understand the relationship between the stock market returns and its determinants is given as follows

$$Ret_t = \beta_0 + \beta_1 MS_t + \beta_2 INF_t + \beta_3 ER_t + \beta_4 INT_t + \mu_t$$
(1)

In the above equation Ret represents stock market returns, MS represents broad money supply, INF represents inflation rate, ER represents exchange rate, INT represents interest rate, βs represents the parameters to be estimated, in the model, μ_t represents the error term.

The stock markets returns are computed by using share market index. The formula used in this case is shown below.

$$Ret_1 = \frac{(P_t - P_{t-1})}{(P_{t-1})} * 100$$
(2)

To ensure that the analysis is realistic and robust, it is necessary to acknowledge the possible flaws in Equation (1). Since real-world data frequently has limits, the formula shown below takes this into account and addresses any inconsistencies that can happen during the analysis process (Hair et al, 2019).

$$\Delta Ret_t = \beta_0 + \beta_1(\Delta MS_{t-i}) + \beta_2(\Delta INF_{t-i}) + \beta_3(\Delta ER_{t-i}) + \beta_4(\Delta INT_{t-i}) + \mu_t \quad (3)$$

where: Δ represents difference operator, β_i represents parameters that need to be estimated, $t - i$ represents unknown lags. The lag order, or the interval of time between the observation of independent variables and their possible influence on stock market returns, is indicated by the subscript i in Equation (3), since it enables us to take into consideration the dynamic interaction between variables over various time periods (Box et al, 2015). Including the lag order is essential in describing the temporal dynamics of our data with accuracy. This claim aids in laying the groundwork for a careful analysis of the dependability and validity of our model. The equation above may take into account the order of differencing as presented below.

$$\Delta^{K_0} Ret_t = \beta_0 + \beta_1(\Delta^{K_1} MS_{t-i}) + \beta_2(\Delta^{K_2} INF_{t-i}) + \beta_3(\Delta^{K_3} ER_{t-i}) + \beta_4(\Delta^{K_4} INT_{t-i}) + \mu_t \quad (4)$$

In this case: K characterizes the order of differencing, where as K_0 is not equal to K_1, K_2, K_3, and K_4. if K_0 appear to be equal to any of K_1, K_2, K_3, and K_4, the study will examine the occurrence of co-integration among the variables. If the residuals are stationary and a long run relationship is established, the parameters will be appropriately estimated by an error correction method (ECM). The ECM examines how equilibrium behavior drives short run dynamics. As a result, the rate of adjustment can be calculated. It should be noted that the presence of co-integration among variables leads to the convergence of equation above to the Error Correction Model (ECM), as shown below:

$$\Delta^{D_0} Ret_1 = \beta_0 + \beta_1(\Delta^{K_1} MS_{t-i}) + \beta_2(\Delta^{K_2} INF_{t-i}) + \beta_3(\Delta^{K_3} ER_{t-i}) + \beta_4(\Delta^{K_4} INT_{t-i}) + \beta_5(\Delta^{K_5} ECM_{t-i}) + \mu_t$$
(5)

Estimation Techniques

Co-integration and Error-Correction Modeling approaches were employed in this study. For this case, three steps were considered which are testing for order of integration, Co-integration test, and error correction estimation.

Unit root testing

The unit root test involves testing the order of integration of the series under consideration. Unit root tests were performed to examine whether time series variables are stationary or non-stationary.

The stochastic process is said to have no unit root if mean, covariance, and variance are not affected by fluctuation of time. The Augmented Dickey-Fuller (ADF) test and Phillips-Person (PP) test were used to test the order of integration. Augmented Dickey-Fuller (ADF relies on rejecting the

null hypothesis of unit root (variables are non-stationary) in favor the alternative hypothesis of stationarity. The test procedure for Augmented Dickey-Fuller (ADF) test is estimated as follows:

$$\Delta Y_t = \alpha_0 + \alpha_1 y_{yt-1} + \sum_{i=1}^{n} \alpha_i \Delta y_i + \mu_t$$
(6)

$$\Delta Y_t = \alpha_0 + \alpha_i y_{yt-1} + \sum_{i=1}^{n} \alpha_i \Delta y_i + \delta_i + \mu_t$$
(7)

In the above equations, Y_t is time series, t is a linear time trend, Δ represents the first difference operator, α_0 is a constant, n is the optimum number of lags in the stock market returns (dependent variable) and μ_t is error term.

Co-integration

The existence or absence of co-integration between series of the same order of integration is tested by constructing a co-integration equation. The underlying notion behind co-integration is that if two or more series move closely together in the long run, even if the series themselves are trended, the difference between them remains constant. Johnsen Co-integration test was used to show long term relationship between the variables. Johansen's approach considers its starting point in the vector autoregressive (VAR) of order P given as

$$Y_t = \mu + \Delta_1 y_{t-1} + .. + \Delta p y_{t-p} + \varepsilon_t$$
(8)

In this case Y_t represents vector of variables that are assumed to be integrated of order(I). Thus

$$\Delta y_t = \mu + \vartheta_{yt-1} + \sum_{i=1}^{p-1} \varphi_i \Delta y_{t-1} + \varepsilon_t$$
(9)

where,

$$\vartheta = \sum_{i=1}^{p} A_{i-1} \quad \text{and} \quad \varphi_i = - \sum_{j=i+1}^{p} A_j$$
(10)

Cointegration vectors were determined using two test statistics namely trace test and maximum eigenvalue test.

Error Correction Model

This can be done once co-integration has been proven to exist; it involves the development of an error correction technique to describe the dynamic relationship. The error correction model's objective is to indicate the rate of adjustment from the short-run equilibrium to the long-run equilibrium state. The bigger the parameter co-efficient, the faster the model may be adjusted from the short-run to the long-run. The error correction model can be stated as shown in equation 5

Table 1. Description of the variables

Variables	Description
Stock Market return	The growth rate of annual average stock market index
Interest rate	The rate paid by commercial or similar banks for demand, time or saving deposits
Inflation	The annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or charged at specified intervals as measured by consumer price index
Exchange rate	The value of one country's currency expressed in another country's currency and is determined by national authorities or the rate determined in the legally sanctioned exchange market
Broad Money Supply	The entire aggregate of money circulated in the economy including the narrow money, M2 =M1+saving deposit

Source: The World Bank Data, (2020) & Kalam, (2020)

Table 2: Descriptive statistics of the variables.

Variables	Obs	Mean	Std Dev	Min	Max	Skew	Kurt
Money supply	40	1.37E+07	4170000	6840000	2.06E+07	-0.018	1.751
Exchange rate	40	1888.599	358.023	1326.623	2463.844	0.112	1.402
Interest rate	40	7.581	1.003	5.463	9.923	0.046	2.55
Inflation rate	40	7.707	4.607	3.033	19.367	1.219	3.355
Stock market return	40	2254.847	341.98	1511.386	2746.667	-0.701	2.671
Ln(Money supply)	40	16.383	0.327	15.738	16.843	-0.385	1.934
Ln(exchange rate)	40	7.526	0.191	7.19	7.809	-0.006	1.444
Ln(interest rate)	40	2.017	0.134	1.698	2.295	-0.258	2.604
Ln(Inflation rate)	40	1.894	0.532	1.11	2.964	0.541	2.242
Ln(Stock market return)	40	7.708	0.164	7.321	7.918	-0.98	3.095

Table 2 shows the summarized descriptive statistics on the series of money supply, exchange rate, interest rate, inflation rate and stock market return. It should be noted that mean values are positive in each case implying that the variables show an increasing tendency throughout the period under study. Thus, there is statistical evidence that money supply, exchange rate, interest rate, inflation rate and stock market return have been increasing during the period. Natural logarithm of Money supply has a minimum value of 15.738 and a maximum value of 16.843 with a standard deviation of 0.327. This implies that money supply is one of the most volatile variables together with inflation. As a consequence of the results of both non-transformed and transformed data, it was determined that there is little variance in the values of Natural logarithm of Stock market returns, Natural logarithm of Money supply, Natural Logarithm of Inflation rate, Natural Logarithm of Exchange rate, and Natural Logarithm of Interest rate over time. The scale of skewness with respect to Natural Logarithm of Money supply, Natural Logarithm of exchange rate,

Natural Logarithm of interest rate, and Natural Logarithm of Stock market return are -0.385, -0.006, -0.258 and -0.98 respectively, showing that the variables are negatively skewed which implies that they exhibit large values over the period, whereas Natural Logarithm of Inflation rate is positive of 0.541, suggesting that the right tails are excessive and have large values over a shorter period..

Pre-estimation Test

In analyzing the underlying properties of data collected on the selected variables, there are mixed outcomes in terms of the skewness and kurtosis features of the variables. However, in order to confirm the potential of fitting the data into an error correction model for estimating purposes, the unit root test was carried out using Augmented Dickey-Fuller (ADF) test and Philip-Peron (PP) technique for stationarity and correlation analysis for perfect collinearity. Table 3 summarizes the stationarity test results, whereas table 4 shows the correlation matrix for the multi-collinearity test.

Table 3: Unit Root Test

ADF Test

Variable	Level		First difference		order of integration
	Test statistics	**Critical value**	**Test statistics**	**Critical value**	
Ln(Money supply)	-2.951	-3.682	-4.863**	-3.668	I(1)
Ln(Exchange rate)	-0.365	-3.668	-4.419**	-3.682	I(1)
Ln(Interest rate)	-1.856	-3.662	-5.364 **	-3.668	I(1)
Ln(Inflation rate)	-1.675	-3.662	-4.029**	-3.668	I(1)
Ln(Stock market return)	-2.731	-3.668	-3.317**	-2.969	I(1)

Table 3 Continued

The PP Test

Variable	Level		First difference		order of integration
	Test statistics	**Critical value**	**Test statistics**	**Critical value**	
Ln(Money supply)	-3.345	-3.655	-5.881**	-3.662	I(1)
Ln(Exchange rate)	-0.967	-3.655	-7.060 **	-3.668	I(1)
Ln(Interest rate)	-2.200	-3.655	-6.915**	-3.662	I(1)
Ln(Inflation rate)	-1.704	-3.655	-5.121**	-3.662	I(1)
Ln(Stock market return)	-2.480	-3.655	-4.190**	-3.662	I(1)

The results of the ADF and PP tests in Table 3 show that all variables were not stationary at their levels, as evidenced by their test statistics being greater than their respective critical values at 1% levels of significance. Nonetheless, after acquiring their first differences, all variables became stationary, as demonstrated by test statistics that were less than their respective critical values at 1% significance levels. As a result, the null hypothesis of non-constant variance and mean across time (i.e. unit root or non-stationary) was rejected at 0.01 levels of significance, suggesting that all variables are integrated of order one 1(1). Based on this fact, the appropriate estimation methodology is the Johansen co-integration method, which is used in the estimation section.

Table 4: Correlation Test

Variables	(1)	(2)	(3)	(4)	(5)
(1) Ln(Stock market returns)	1.000				
(2) Ln(Exchange rate)	0.914	1.000			
	(0.000)				
(3) Ln(Interest rate)	-0.499	-0.402	1.000		
	(0.001)	(0.010)			
(4) Ln(Inflation rate)	-0.830	-0.776	0.425	1.000	
	(0.000)	(0.000)	(0.006)		
(5) Ln(Money supply)	0.546	0.368	-0.607	-0.307	1.000
	(0.000)	(0.020)	(0.000)	(0.054)	

The first column of table 4 shows the correlation coefficients in-between each pair of the variables-Stock market returns, exchange rate, interest rate, inflation rate and money supply. The first pair has the correlation coefficient of 0.914, the second has -0.499, the third has -0.830 and the fourth has 0.546. This means stock market returns, exchange rate and money supply move on the same direction, while stock market returns move on opposite directions with interest rate and inflation rate. The second column shows the correlation between exchange rate and interest rate, and between exchange rate and inflation rate, and between exchange rate and money supply. The first pair has the correlation coefficient of -0.402, the second has -0.776 and the third pair has 0.368. In the first pair and second pair, the exchange rate moves in the opposite direction with interest rate and inflation rate but it moves in same direction with money supply. In the third column, the correlation between interest rate and inflation rate and between interest rate and money supply where by, at the first pair indicates 0.425 and second pair shows -0.607. This implies that interest rate moves on the same direction with inflation rate

while opposite direction with money supply. The fourth column shows correlation between inflation rate and money supply in which -0.307 implies that inflation rate and money supply moves in opposite direction. As a result, there is evidence of weak correlation coefficients, implying that each peer variable is not perfectly associated, and thus the concept of multi-collinearity or perfect collinearity is contradicted, moreover, all of the correlation coefficients between macroeconomic variables were less than 0.95. This means that there is no multicollinearity issue for the model that includes all macroeconomic variables as independent variables that affect stock market return. Since the study demonstrated that all of the variables are I (1) and that there is no multi-collinearity, then the estimation tests can be conducted.

Estimation test

The research investigated on the effect of macroeconomic variables on stock market returns. Long run co-integration analysis using the Johansen method, and error correction model are used to investigate the relationship between macroeconomic variables and stock market returns.

Table 5: Johnsen Co-integration results

Null Hypotheses	Trace Statistics	Critical Value	Max-Eigen Statistics	Critical Value
$r = 0$	97.0819	68.52	34.8645	33.46
$r \leq 1$	62.2174	47.21	27.3704	27.07
$r \leq 2$	34.847	29.68	17.2572	20.97
$r \leq 3$	17.5898	15.41	15.0976	14.07
$r \leq 4$	2.4923	3.76	2.4923	3.76

Table 5 shows that the trace and max tests rejected the null hypothesis of no co-integration ($r = 0$) in favor of the alternative, showing a long run relationship, as indicated by test statistics greater than

critical values at 5% significance levels. Furthermore, the Johansen test shows that each model has many co-integrating vectors (relationships). While trace statistics indicate that there are at most four $r \leq 4$

and three $r \leq 3$ vectors in 3(a) and 3(b), respectively. The max statistics in 3(a) and 3(b) imply that there are at most three $r \leq 3$ vectors and at most two $r \leq 2$ vectors. Because trace is stronger than max, there are only four and three co-integrating vectors in models 3(a) and 3(b), respectively. Thus, there is evidence of co-integration and a long-term association between macroeconomic variables and stock market returns in Tanzania based on the trace and Eigen test. The next critical question is, what is the nature of this long-term and short-term relationship? The answer to this question is illustrated in table 6.

						Number of obs =37	
						R-squared = 0.2841	
						Adj R-squared= 0.1687	
Log likelihood = 60.51628						Root MSE=0.0515	
	D. Ln (Stock market return)	Coef.	Std. Err.	t	P>t	[95% Conf.	Interval]
ADJ							
	Ln(Stock market return)						
	L1.	-0.13428	0.019015	-7.06	0.000	-0.377013	0.1084509
LR							
	Ln(Money supply)	0.253209	0.007946	31.9	0.000	-1.986067	2.492486
	Ln(Exchange rate)	-0.34592	0.116968	-2.96	0.014	-3.23585	2.544002
	Ln(Interest rate)	0.282443	0.049654	5.69	0.004	-1.450439	2.015324
	Ln(Inflation rate)	0.261094	0.040756	6.41	0.002	-0.2299317	0.7521196
SR							
	_cons	0.69808	0.050194	13.9	0.000	-1.443805	2.839965

The long run coefficient with respect to money supply is 0.253209 and the associated p-value 0.000. This means in the long run money supply will increase significantly with increase in stock market returns. Furthermore, there is statistically significant association between money supply and stock market returns in the short run. The results are supported by the Efficient Market Hypothesis, which suggests that in an efficient market, all relevant information is quickly incorporated into prices (Fama, 1970). In this situation, an increase in the money supply as a result of an expansionary monetary policy may portend future economic growth and enhancement of stock market returns (Ndlovu, 2018).

Moreover, the long run coefficient of inflation rate is 0.261094 with associated p-statistic value of 0.002. This implies that in the long run the inflation rate has a positive and significant impact on the stock market returns. Because it has a positive coefficient, the inflation rate has a considerable positive link with stock market returns in the short run. APT theory states that changes in the risk premiums that investors seek have an impact on asset values due to a variety of macroeconomic circumstances, including inflation (Ross, 1976). Therefore, increased economic activity and growth prospects may be indicated by rising inflation rates, which could increase stock market returns. The current conclusions are empirically supported by the study of Kalam (2020), which showed a positive relationship between inflation and stock market returns.

However, the coefficient of exchange rate is -0.34692 with an associated p-value of 0.014 and this reveals that exchange rate has negative and significant impact on stock market returns in the long run. In short run relationship there is significant positive relationship between exchange rate and stock market returns. This implies that the increase in currency value will probably decline the stock market returns of the Tanzanian Stock Market.

In addition, the coefficient of interest rate is 0.282443 and the associated p-statistic value is 0.004 and this implies that interest rate is positive and significant impact on stock market returns in Tanzania. But also, there is statistically significance between interest rate and stock market returns in short run relationship. Interest rate fluctuations are a reflection of shifts in the risk that investors are willing to pay, and this has an impact on stock prices and stock returns (Linck, 2016).

On the other hand, the error correction model coefficient of -0.13428 suggests that any disequilibrium can be corrected at a rate of 13.428 percent, this is an indication that there is a long run dynamic influence running from macroeconomic variables to stock market returns in Tanzania

Conclusion

Macroeconomic variables have various effects in the stock market. This paper examined the effects of macroeconomic variables on stock market returns of the firms listed at Dar es Salaam Stock Exchange from 2011-2021. The pre estimation test was conducted using Augmented Dickey-Fuller (ADF) test and Philip-Peron (PP) technique for stationarity and correlation analysis for perfect collinearity. The results indicate that all the variables are stationary at first difference. In addition, there is evidence of cointegration and long run relationship between macroeconomic variables and stock market returns in Tanzania

The results show a significant relationships between macroeconomic factors and stock market returns. A long-term increase in the money supply and inflation rate is linked to higher returns on the stock market, putting an emphasis on the role that monetary policy plays in determining market performance. Exchange rate fluctuations, however, show a negative relationship with stock returns, indicating the importance of external economic variables in influencing the stock market dynamics.

The impact of interest rate fluctuations on asset price is further demonstrated by the relationship between higher interest rates and higher stock market returns. This implies that an increase in Tanzania's government Treasury (T)-Bill rates led to the rise of aggregate stock values.

These results offer policymakers useful information by indicating that exchange rate management and monetary policy choices may have a big impact on the performance of the stock market. A favorable investment atmosphere and sustained stock market growth in Tanzania may be fostered by implementing policy measures targeted at controlling inflation, containing exchange rate volatility, and guaranteeing a favorable interest rate environment.

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