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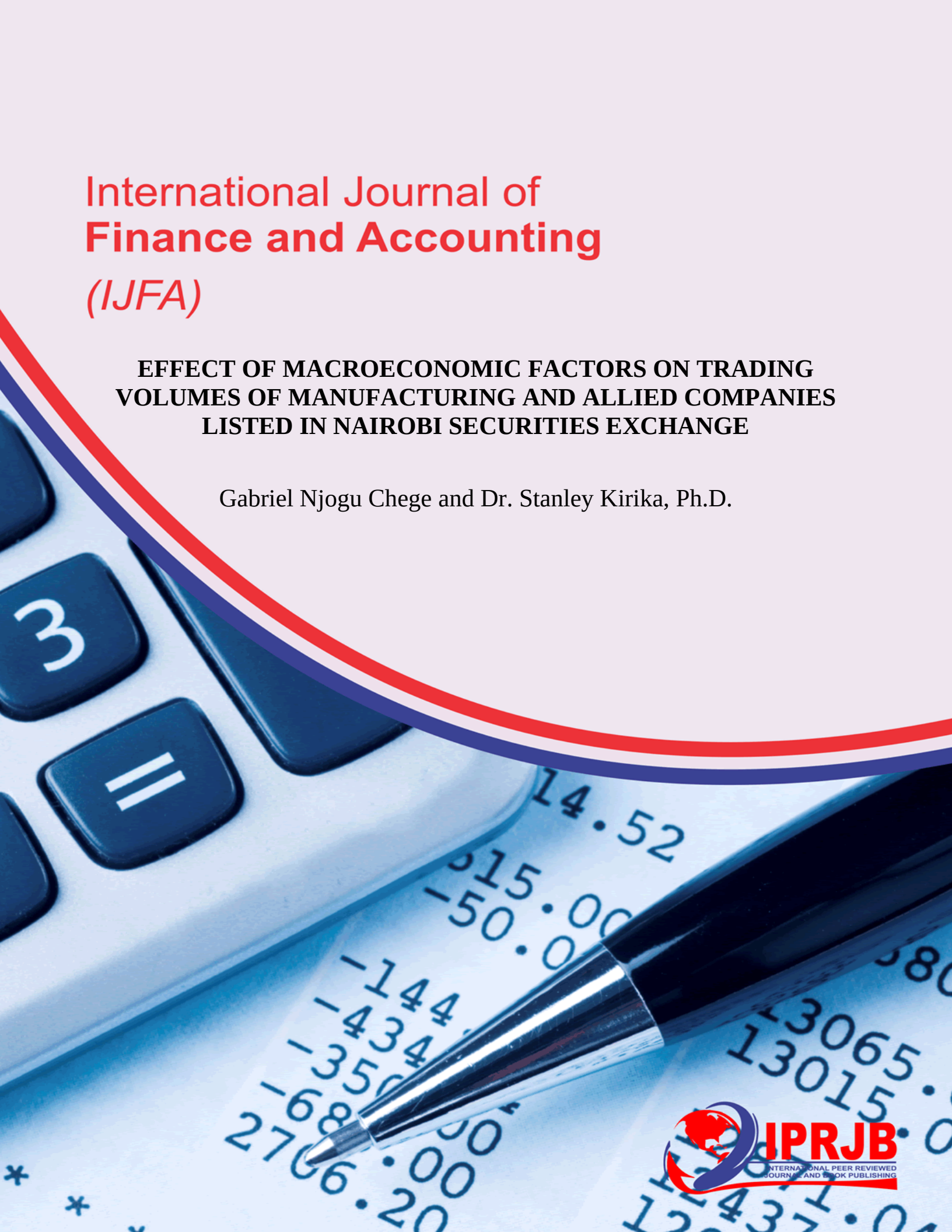
Gabriel Njogu Chege and Dr. Stanley Kirika, Ph.D.



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EFFECT OF MACROECONOMIC FACTORS ON TRADING VOLUMES OF MANUFACTURING AND ALLIED COMPANIES LISTED IN NAIROBI SECURITIES EXCHANGE

[1*] Gabriel Njogu Chege
[1]Post Graduate Student: Jomo Kenyatta University of Agriculture and Technology
*Corresponding Author's E-mail: gabriel.njogu@gmail.com

[2] Dr. Stanley Kirika, Ph.D.
Lecturer: Technical University of Kenya

Abstract

Purpose: The purpose of the study was to establish the effect of macroeconomic factors on stocks trading volumes of manufacturing and allied companies listed in Nairobi Securities Exchange.

Materials and Methods: The research adopted a quantitative descriptive design that focuses on nine manufacturing and allied companies listed in NSE and make up in the list of 25-share index companies. The nine manufacturing and allied companies were selected through purposive sampling techniques, where samples were selected based specific factors. The data used in the research was collected from Central Bank of Kenya, Nairobi Security Exchange and Kenya Bureau of Statistics. This research employed a panel data analysis using STATA software. Treasury bill rate was dropped from the model due to multicollinearity.

Results: The analysis found that there was a negative relationship between inflation on trading volume, exchange rate had a negative correlation with stock trading, lending rate had a negative correlation with stock trading volume of manufacturing and allied companies listed in the Nairobi Stock Exchange.

Unique contribution to theory, practice and policy: The study recommends the government should initiate policies that will lower the lending rate in Kenya as lower lending rate may translate to higher stock trading volumes. Further studies should research on other factors affecting stock trade volume which may include the value of the stocks and the information size in the market.

Key words: *Macroeconomic Factors, Stocks Trading Volumes, Nairobi Securities Exchange.*

1.0 INTRODUCTION

The natural forces of demand and supply determine the volume traded in the market. Both buyers and sellers interact to determine what is demanded and what can be supplied to affect an equilibrium on the market. For instance, the more buyers and sellers of a particular product, the more liquid the market for the product will be (Long, Malitz & Ravid, 2014). High liquidity has a significant impact on how products can move from the seller to the buyer (McEachern, 2018). The stock market is relatively complicated and does not always operate as the commodity market; forces of demand and supply only affect stock trading volumes in the short run.

Factors that influence stock trading volumes in the long-run include exchange rates, inflation, lending rates and Treasury bill rates. Investors carry out numerous assessments on the prospects of the company while assigning different weights to the factors under consideration thereby assigning different values to the stock (Angel & McCabe, 2013). Therefore, inflation, exchange rates, lending rates and Treasury bill rate are factors that impact the trading volumes in the long run. These factors play a critical role in helping investors determining the level of demand which later controls the supply of stock on the market.

Stocks bearing higher returns have higher demand from the majority of investors because such stocks exhibit a greater intrinsic value, hence give more opportunities to trading. This is reflected by the difference in stock trading volumes that occur between stocks with high intrinsic values and those with a lower value (Kleintop, 2014). The thickly traded stocks have narrow spreads resulting in higher trading volumes with smoother movements. On the other hand, the thinly traded stocks have relatively wider spreads and tend to move in a kneejerk manner. A release of new significant information in an efficient market will lead to a one-time jump or drop in stock with high trading volumes followed by relatively smooth trading as the investors rapidly make impact assessment of the new information.

Information about inflation, exchange rates, lending rates and Treasury bill interest rate impact trading volumes in the market since studies show that these factors impact the stock values of particular stocks. The trading volume in itself is not affected by demand and supply on the stock market irrespective of the supply on the market, the demand of stock which translates into trading volumes is determined by the intrinsic value of the stock (Arthur, 2018). Majority of stock traders, for instance, would prefer thinly traded stocks taking caution of the heightened volatility involved before they buy. In the event the stock is highly volatile because of unstable trading factors in the market, traders tend to hold on the stock until its value stabilizes (Shleifer, 2015).

The relations between trading volume and inflation, exchange rates, lending rates, and Treasury bill interest rate provide insight into the structure of financial markets (Dahan, Kim, Lo, Poggio & Chan, 2017). These authors predicted that stock trading volumes depend on inflation, exchange rates, and interests in the economy. The correlation between inflation, exchange rates and lending rates, versus trading volume, might explain the movements of historical changes in

stock trading volumes (Preis, Moat & Stanley, 2013). However other scholars have contradicted this concept by holding that the efficient market hypothesis (EMH) does not hold in all the cases because past changes in trading volumes in a competitively traded stock market may not significantly be predicted by all the three factors under investigation. (Peress, 2015).

Despite their differing point of view, authors agreed that stock trading volumes are impacted by fluctuation in interest, inflation and exchange rates in the economy. They both reached an agreement that valuable information about the intrinsic value of the stock market would determine its future trading volumes on the market (Vlastakis & Markellos, 2014). For instances, the stock volume traded is higher when the value of the stocks are increasing than when the value is falling. Information size in the market and stock direction have an insignificant impact on stock conditional volatility (Vlastakis & Markellos, 2014). The authors also established that the persistence of volatility might decrease when the contemporaneous trading volumes are broken down into both expected and unexpected stock components.

Macroeconomic Factors

The discount factor is split into a risk-free component and an equity risk premium to derive the present value model (Hansen, Heaton & Li, 2018). The equity risk premium signals the degree of risk aversion which affects the stocks trading volume. Additionally, higher stock value reveals a rise in the discounted expected earnings thereby providing potentially useful information about future trading opportunities. Additionally, higher stock value provides an extra stimulus for households and firms that own stocks as well as boosting their confidence in the market.

The state of the security market is viewed as a general economic performance measure of most developed economies. The stock value affects the real economy via a confidence channel (Ehrmann, Fratzscher & Rigobon, 2016). An increase in the stock value reduces the level of uncertainty investors may have concerning their future capital while a fall in the stock intrinsic value lowers the confidence of the investors (Adam, 2017). Financial experts also posit that higher stock value increases the ratio between the value of the market, installed capital and the cost of replacing capital, also known as Tobin's Q, thereby encouraging the firms to invest more in capital (Hansen, Heaton & Li, 2018). From the literature, there are various factors which support the view that rises in stock volumes may anticipate economic growth.

Concept of Stock Trading Volume

Trading volume is a measure of the number of shares exchanging hands between buyers and sellers over a specified period. The number of daily volumes of a security fluctuates on daily basis depending on the companies' new information that reaches the market (Zacks, 2018). These may include information pertaining to the expiry of an option contract issued by a company or type of trading is either full or half day. The stock traders are watchful for any discrepancies that might occur in the stock market to decide on whether to buy, hold on, or sell their stock (O'Hara, 2015). Traders observe trading volumes to determine the direction of stock in the market. An indication of a rise in stock trading volumes is associated with a rising stock value attracting high trading volumes.

This results to increase in demand as traders notice the increase in stock's intrinsic value leading to higher demand for the stock and creating an opportunity to trade. Low valued stocks have a tendency to trade less frequently and have less liquidity. This makes it relatively harder for an investor or trader to get into or out of the market and buy the volumes he wants because of high-risk exposure. The stock markets report the average stocks traded during the day which measures the average number of times that stock listed on the market exchanges hands (Zacks, 2018).

1.1 Statement of the Problem

Effect of inflation, exchange rates, lending rates and Treasury bill interest rate on stock trading volume continues to attract considerable attention among finance researchers. Stock trading volumes in a country's stock market is a general indicator of the country's stock market performance. This is because, inflation, exchange rates, lending rates and Treasury bill interest rate have an impact on the general performance of the stock market. Investors, therefore, use available information in the market to determine their demand for stocks on the global market.

As a result of inflation, stock volumes in Kenya dropped due to exchange rate volatility which was greatly contributed by the depreciation of Kenya shilling against the US dollar hence touching a low of Ksh. 107 against US dollar for the period 2007-2014, (NSE, 2011). Stock trading volumes are determined by inflation, exchange rates, and interest rates of the base country. Therefore, investors across the world rely on these factors to determine the stock volumes to trade in any particular period. Trends in the US Security market have indicated that Federal Reserve rates which determine the CBK lending rates also impact the supply of T-bills on the market (Pilinkus, 2016). Investors will, therefore, choose to either invest in T-bills or corporate stocks depended on Federal Reserve rates which are determined by inflation, exchange rates, Treasury bill interest rate and lending rates. Some of the factors that affect the Nigeria stock market, in the long run, include inflation and interest (Maku & Atanda, 2015).

The popularity in stock trading in the Kenyan Security Market has continued to grow as a result of the increasing number of companies that are offering their stocks to the public through the initial public offerings (IPOs). Some of the companies that have gone public in recent years include KenGen, Access Kenya, Safaricom, and Kurwitu Ventures, in 2006, 2007, 2008, and 2014 respectively. This has led to both positive and negative traded volumes coupled with fluctuations in the three market factors. Such phenomena contribute to a remarkable desire by the investors together with the management to understand the behavior of the stock market as far as stock volume traded is concerned. Thus, increased degrees of stock volumes fluctuations caused by fluctuations of lending rate, exchange rate and inflation in the stock market create confusion and fear to the risk-averse investors making them not to participate in the security market activities (Hirshleifer, 2014).

Various studies had been conducted on macroeconomic variables and stock; Kamuti (2013) assessed the dynamic relationship between stock price volatility and trading volume at the Nairobi Securities Exchange. The study found that there was a significant positive relationship between price and volume in the NSE, indicating that rising market goes with rising volume.

Muchiri, (2012) evaluated the impact of macroeconomic variables on the performance of the Nairobi securities exchange. The study also found that money supply and inflation rate had positive but insignificant effects on share prices while interest rate had a negative but insignificant effect on share prices. Further, exchange rate has a negative and significant effect on share prices. Kirui, Wawire and Onono (2014) looked into the effects of macroeconomic factors on the Nairobi security exchange stock returns. Day Treasury Bill rate, inflation variables negatively affected Nairobi Security Exchange returns. The reviewed studies focused on the stock performance, stock returns and stock prices leaving out the stock trading volumes. This therefore led to this study that aimed at bridging the gap by assessing the effect of macroeconomic factors on stocks trading volumes of manufacturing and allied companies listed in Nairobi Securities Exchange.

2.0 LITERATURE REVIEW

2.1 Theoretical Review

The Fisher Effect Theory

The Fisher effect theory proposed by Fisher (1930) explains the interaction between interest rates and inflation and how these affect trading activities on the stock market. The theory is based on interactions between inflation and interest rates and how these would impact the stock market by affecting money circulation (Miller, Jeffrey, & Mandelker, 1976). A stable inflation and interest rates would encourage savings and investments in the financial markets (Laichena & Obwogi, 2015). Investors have learnt to check the inflation levels and interest rates in the market to make their investment decisions. Stable inflation and interest rates would improve real and expected return on stocks and investors would increase their investment in the stock market whose economy is more stable (Kaldor, 1939). In the event there is high inflation and interest rates, most investors would be discouraged to trade in stocks since the expected returns would be lower. High inflations and interest rates, therefore, reduce stock trading volumes on the stock market.

The Fisher effect theory has been used by finance scholars to describe the effect of inflation on real and nominal interest rates. According to this theory, inflation is equal to real and nominal interest rates (Miller, Jeffrey & Mandelker, 1976). Inflation affects foreign exchange rates of currencies of different countries. This effect would equally be extended to the depended variables in this study. The research intends to establish the relationship that exists between inflation, exchange rates, interest rate and Treasury bill rate. Since inflation would have a direct impact on interest rates and exchange rates in the Kenyan market, it will equally have a significant impact on stock trading volumes in the NSE (Masila, 2010). Foreign investors in NSE, for instance, would strictly assess these factors prevailing in the entire economy to make investment decisions on whether to or not to purchase listed shares of manufacturing and allied companies in the NSE, thereby impacting trading volumes.

2.2 Conceptual Framework

Figure 1 below demonstrates how the dependent and independent variables interact to show the effect that exists between them. In this study, the independent variables have been identified as inflation measured based on consumer price index (CPI), lending rates determined based on average lending rates proposed by the Central Bank of Kenya (CBK) and foreign exchange rates determined based on Central Bank of Kenya conversion rate between Kenya Shillings, United States of America Dollar and Chinese Yuan. Treasury bill interest rates measured with 91-day Treasury bill rate. The dependent variable in this study is the stock trading volumes determined by the market capitalization of select manufacturing and allied companies listed in the NSE. (Gay, 2016).

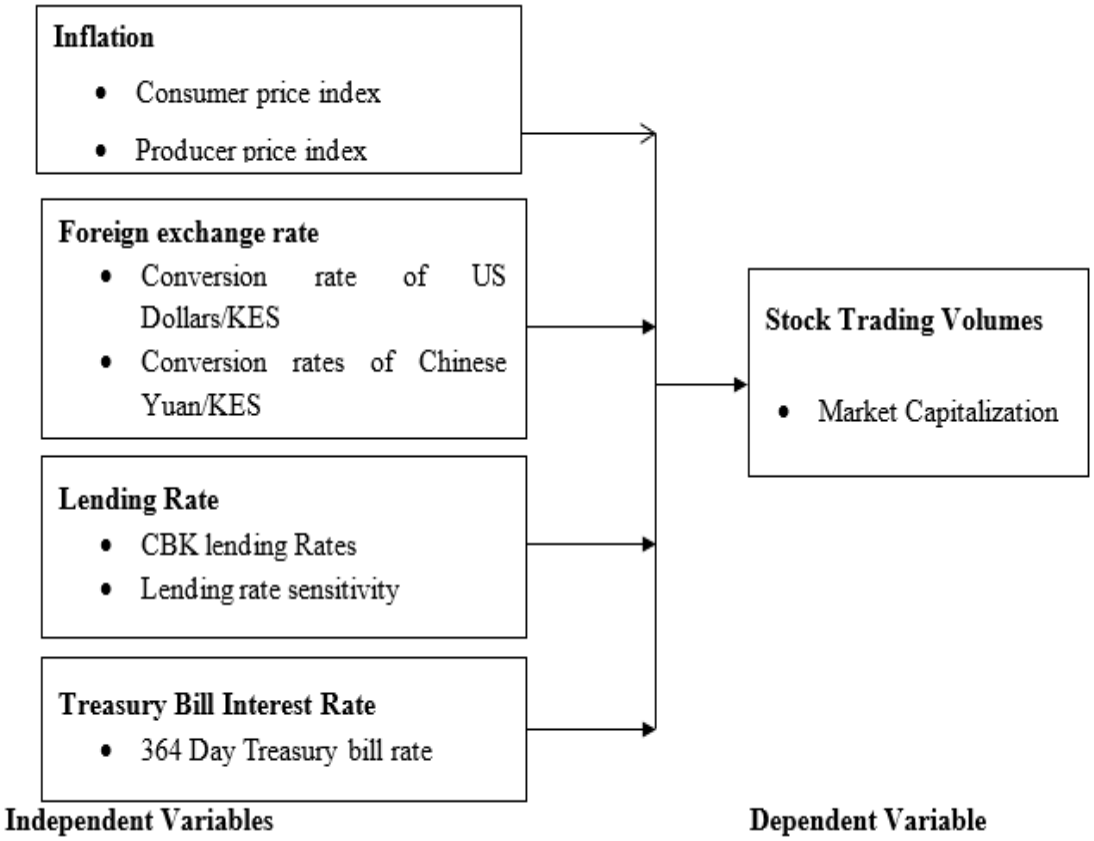

Figure 1: Conceptual Framework

2.3 Empirical Review

A study was conducted in Malaysian listed companies to investigate the consequences of macroeconomic factors on stock trading volumes in the country's leading stock markets. The study focused on the listed companies' stock trading volumes for a period spanning 20 years from 1998 to 2008 (Azemi, 2018). The researcher divided the period into ten year periods and investigated how changes in each of these factors affected stock trading volumes on the market during each of the ten years. In this study, the independent variable was the stock intrinsic value which was being investigated against changes in stock trading volumes in the market.

A study was also conducted in India between the year 2000 and 2005 to investigate the impact of macroeconomic variables on stock trading volume. Financial performance of companies can determine Stock trading volumes in the market. (Mohanasundaram, Karthikeya & Shanti, 2017). The researchers in this study investigated the impact of leverage, liquidity, export intensity, and firm size on its profitability. The dependent variable in this study comprised of the country's GDP, foreign exchange rates, stock trading volume and balance of payment. The researchers investigated each of the independent variables and came up with different findings for each. The leverage ratio of the companies, for instance, showed a significant negative impact on both short and long-term profitability of the companies. Liquidity ratio and export intensity, on the other hand, showed a positive effect between the variables being investigated in the long run. However, the majority of the factors being investigated did not affect the profitability of the firm over the short period under investigation.

Kusa and Ongere (2013) investigated the effect of inflation, political volatility, and lending rates on stock trading volumes in the banking industry in Kenya. The findings from this research established that GDP patterns influenced the demand for bank assets such as bank loans, and fixed deposit savings. A decline in the country's GDP resulted into a lower appetite for bank credit ultimately resulting in a dismal performance in the banking industry. The researchers established that GDP was directly impacted by inflation, political volatility, and interest levels. Each of this factors did not have a direct impact on the profitability of the bank. They established that inflation alone, for instance, did not directly impact the profitability of banks. The three factors, therefore, had to be in effect at the same time to cause a significant impact on the actual performance of listed banks stocks on the market.

Ololchike (2013) conducted a study on the effect of treasury bills rate on stock trading volume for companies listed at the Nairobi securities exchange. The study used causal research design to meet the objectives of the study. The population of this study was listed companies at the NSE that had issued commercial paper between January 2007 and December 2011. Convenience sampling was used while data collected for this research was quantitative and secondary in nature. Descriptive and inferential analysis was used in data analysis and presentation. These results vindicate the existence of a relationship between Treasury bill rates and stock trading volume for NSE listed companies. The study also found that 14 firms had a significant performance index as shown by the overall evaluation index closest to 5 in the Likert rating scale and that yearly performance improved significantly from 2007- 2011 progressively.

3.0 METHODOLOGY

The research adopted a quantitative descriptive design. This study targeted the 9 manufacturing and allied firms listed in the Nairobi and make up in the list of 25-share index companies. The nine manufacturing and allied companies were selected through purposive sampling techniques, where samples were selected based specific factors. The data used in the research was collected from Central Bank of Kenya, Nairobi Security Exchange and Kenya Bureau of Statistics. Analysis of variance (ANOVA) was used to test the significance of the model at 95% confidence interval. This research employed a panel data analysis using STATA software..

4.0 RESULTS

4.1 Descriptive statistics

Table 1: Descriptive statistics

Year	Variable	N	Minimum	Maximum	Mean	Std. Deviation
2009	Inflation	9	14.11	14.11	14.1100	.00000
	Foreign exchange rate	9	77.35	77.35	77.3520	.00000
	Lending rate	9	7.88	7.88	7.8750	.00000
	TB rate	9	9.00	9.00	9.0000	.00000
	Stock trading volume	9	.11	168.30	22.6268	55.06755
2010	Inflation	9	5.62	5.62	5.6150	.00000
	Foreign exchange rate	9	79.23	79.23	79.2333	.00000
	Lending rate	9	6.42	6.42	6.4175	.00000
	TB rate	9	7.00	7.00	7.0000	.00000
	Stock trading volume	9	.12	173.00	24.8502	56.22119
2011	Inflation	9	7.99	7.99	7.9925	.00000
	Foreign exchange rate	9	88.81	88.81	88.8110	.00000
	Lending rate	9	8.40	8.40	8.3950	.00000
	TB rate	9	6.00	6.00	6.0000	.00000
	Stock trading volume	9	.19	154.20	21.9129	50.24488
2012	Inflation	9	14.28	14.28	14.2800	.00000
	Foreign exchange rate	9	84.53	84.53	84.5283	.00000
	Lending rate	9	15.75	15.75	15.7500	.00000
	TB rate	9	18.00	18.00	18.0000	.00000
	Stock trading volume	9	.42	176.34	27.6873	57.84376
2013	Inflation	9	5.56	5.56	5.5625	.00000
	Foreign exchange rate	9	86.12	86.12	86.1228	.00000

	Lending rate	9	8.83	8.83	8.8325	.00000
	TB rate	9	9.50	9.50	9.5000	.00000
	Stock trading volume	9	.16	253.05	36.7279	83.29866
2014	Inflation	9	6.81	6.81	6.8125	.00000
	Foreign exchange rate	9	87.92	87.92	87.9225	.00000
	Lending rate	9	8.50	8.50	8.5000	.00000
	TB rate	9	8.50	8.50	8.5000	.00000
	Stock trading volume	9	.77	288.53	44.1023	96.11853
2015	Inflation	9	6.54	6.54	6.5400	.00000
	Foreign exchange rate	9	98.18	98.18	98.1793	.00000
	Lending rate	9	10.13	10.13	10.1250	.00000
	TB rate	9	8.50	8.50	8.5000	.00000
	Stock trading volume	9	.64	288.53	42.6381	95.59246
2016	Inflation	9	7.13	7.13	7.1300	.00000
	Foreign exchange rate	9	101.50	101.50	101.5040	.00000
	Lending rate	9	10.54	10.54	10.5425	.00000
	TB rate	9	11.50	11.50	11.5000	.00000
	Stock trading volume	9	.41	240.40	38.2816	81.31613
2017	Inflation	9	6.15	6.15	6.1525	.00000
	Foreign exchange rate	9	103.41	103.41	103.4110	.00000
	Lending rate	9	10.90	10.90	10.9025	.00000
	TB rate	9	10.00	10.00	10.0000	.00000
	Stock trading volume	9	.48	219.84	34.1704	73.84048
2018	Inflation	9	4.97	4.97	4.9675	.00000
	Foreign exchange rate	9	101.35	101.35	101.3525	.00000
	Lending rate	9	10.78	10.78	10.7800	.00000
	TB rate	9	10.00	10.00	10.0000	.00000
	Stock trading volume	9	.49	223.42	34.7869	75.06229

In 2009, the mean of inflation was 14.11, mean of foreign exchange was 77.352, mean of lending rate was 7.875, TB rate was 9 and the mean of stock trading volume was 22.6268. In 2010 the mean of inflation was 5.6150, the mean of foreign exchange rate was 79.2333, the mean of lending rate 6.4175, the mean of TB rate was 7 and the mean of stock trading volume was 24.8502. In 2011 the mean of inflation was 7.9925, the mean of foreign exchange rate was

88.811, the mean of lending rate was 8.3950, the mean of TB rate was 6 and the mean of stock trading volume was 21.9129.

In 2012 the mean of inflation was 14.28, Foreign exchange rate was 84.5283, Lending rate was 15.7500, TB rate was 18.0000 and the mean of stock trading volume was 27.6873. In 2013 the mean of; inflation was 5.5625, the mean of foreign exchange rate was 86.1228, the mean of lending rate was 8.8325, TB rate was 9.5 and the mean of stock trading volume was 36.7279. In 2014 the mean of inflation was 6.8125, mean of foreign exchange rate was 87.9225, mean of lending rate was 8.5000, mean of TB rate was 8.5 and the mean of stock trading volume was 44.1023.

In 2015 the mean of inflation was 6.54, mean of foreign exchange rate was 98.1793, mean of lending rate was 10.125, mean of TB rate was 8.5 and the mean of stock trading volume was 42.6381. In 2016 the mean of inflation was 7.13, mean of foreign exchange rate was 101.504 mean of lending rate was 10.5425, mean of TB rate was 11.5 and the mean of stock trading volume was 38.2816. In 2017 the mean of inflation was 6.1525, the mean of foreign exchange rate 103.4110, the mean of lending rate was10.9025, the mean of TB rate was 10 and the mean of stock trading volume was 219.84. In 2018 the mean of inflation was 4.9675, the mean of foreign exchange rate was 101.3525, the mean of lending rate was 10.78, TB rate was 10 and the mean of stock trading volume was 34.7869.

4.2Test for Panel data fixed or random model

Hausman Test

Table 2: Hausman Test

```
. hausman fixed .

                ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |     fixed        random       Difference          S.E.
-------------+------------------------------------------------------------
          X1 |  -0.4778029     -0.2734607     -0.2043422        .86253
          X2 |   2.108981      -1.978584      -0.130397       1.4538
          X3 |  -4.192089      -4.36473         .172641        .67143
          X4 |   1.537098        .684342        .852756        .67746
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(4) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =  0.03
                Prob>chi2 =  0.875
```

To decide between fixed or random effects a Hausman test was conducted where the null hypothesis was that the preferred model is random effects, that is if the Prob>chi^2 value was greater than 0.05. The alternative the fixed effects if the Prob>chi^2 value was less than 0.05. It basically tested whether the unique errors (ui) are correlated with the regressors. Since the Prob>chi^2 value (0.875) was greater than 0.05. The null hypothesis for the test is that the random effect model is preferred to fixed effect model and is to be rejected if the p value is less than 5%. This imply that fixed model is preferred.

4.3 Diagnostic Tests

4.3.1 Test for Heteroscedasticity

Table 3: Test for Heteroscedasticity

```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of Y

         chi2(1)      =    0.0061
         Prob > chi2  =    0.1063
```

The presence of heteroscedasticity doesn't have an impact on the unbiasedness and linearity of the regression coefficient. Heteroscedasticity (the violation of homoscedasticity) is present when the size of the error term differs across values of an independent variable. Heteroscedasticity only affects the best property of OLS, which renders the conclusion made when testing

hypothesis invalid. The study therefore, carried out Breusch-Pagan test to check the presence of heteroscedasticity (Gujarati, 2004).

The impact of violating the assumption of homoscedasticity is a matter of degree, increasing as heteroscedasticity increases. From the findings, the chi-square value was low, indicating heteroscedasticity was not a problem. Also, it was revealed that the p value of 0.1063 was more than 0.05 significant level implying that the study did not reject the null hypothesis of homoscedasticity and thus there was no heteroscedasticity which means the variance between variables was not homogenous.

4.2.2 Testing for Normality

Table 4: Shapiro-wilk normality test

Variable	Obs	W	V	z	Prob>z
Y	90	0.51806	36.454	7.931	0.00000
X1	90	0.73973	19.687	6.572	0.00000
X2	90	0.92227	5.880	3.907	0.00005
X3	90	0.86970	9.856	5.046	0.00000
X4	90	0.80907	14.442	5.889	0.00000

The classical linear regression model assume that the error term must be normally distributed with zero mean and a constant variance denoted as μ (0, σ 2). The error term is used to capture all other factors which affect dependent variable but are not considered in the model. However, it is assumed that the omitted factors have a small impact and at best random. For OLS to be applied, the error term must be normal (Gujarati, 2004). Non-normally distributed variables can distort relationships and significance tests. In this study normal distribution of data was tested by use of Shapiro Wilk Test. The Shapiro–Wilk test is a test of normality in frequentist statistics.

The null-hypothesis of this test was that the population is normally distributed. Thus, if the p-value is less than the chosen alpha level, then the null hypothesis is rejected and there is evidence that the data tested are not from a normally distributed population. In other words, the data are not normal. On the contrary, if the p-value is greater than the chosen alpha level, then the null hypothesis that the data came from a normally distributed population cannot be rejected. The findings show that the stock trading volume had (p-value=0.00000), Inflation rate had (p-value=0), Exchange rate (p-value=0.00005), lending rate (p-value=0) while Treasury bill interest rate had (p-value=0). This is an indication that all the variables had a p value of < 0.05 and hence we reject the null hypothesis and thus there is evidence that the data tested were not from a normally distributed population.

4.2.3 Test for Multicollinearity

Table 5: Test for Multicollinearity

Variable	VIF	1/VIF
X3	12.71	0.078683
X4	10.15	0.098477
X2	3.50	0.286084
X1	2.86	0.349481
Mean VIF	7.31	

When there is a perfect linear relationship among the predictors, the estimates for a regression model cannot be uniquely computed. The term collinearity implies that two variables are near perfect linear combinations of one another. When more than two variables are involved, it is often called multicollinearity, although the two terms are often used interchangeably. The variance inflation factor (VIF) was employed in testing the data's multicollinearity. Collinearity or multicollinearity seeks to deduce how perfect a linear combination of a variable is to another variable. In case the VIF value is higher than 10 or incase the tolerance is deduced to be greater than 0.2 then the model has signs of multicollinearity. Tolerance levels are gotten by dividing 1 with the VIF value and the t statistic equation is arrived at by dividing the coefficient by the standard error. In all the occasions, the p value and the T static values must be inverse.

The investigation shows signs of multicollinearity in spite of the fact that they are low levels. The results show that the overall VIF is 7.31 which is less than 10 suggesting that the study information did not show multicollinearity issue as prescribed by (Field, 2009). Hence, all the factors based on the VIF pointers have no serious multicollinearity issue (Field, 2009).

The findings show that there is multicollinearity between interest rate and treasury bill. Therefore, the treasury bill rate was dropped from the model. The resultant test findings as in Table 6.

Table 6: Test for Multicollinearity after dropping Treasury bill rate

Variable	VIF	1/VIF
X1	2.86	0.349557
X2	2.70	0.370479
X3	2.34	0.427535
Mean VIF	2.63	

After dropping Treasury bill rate, the results show that the overall VIF is 2.31, which is less than 10 suggesting that the study information did not show multicollinearity. Figure 2 below shows a revised conceptual framework after dropping treasuring bill rates due to multicollinearity.

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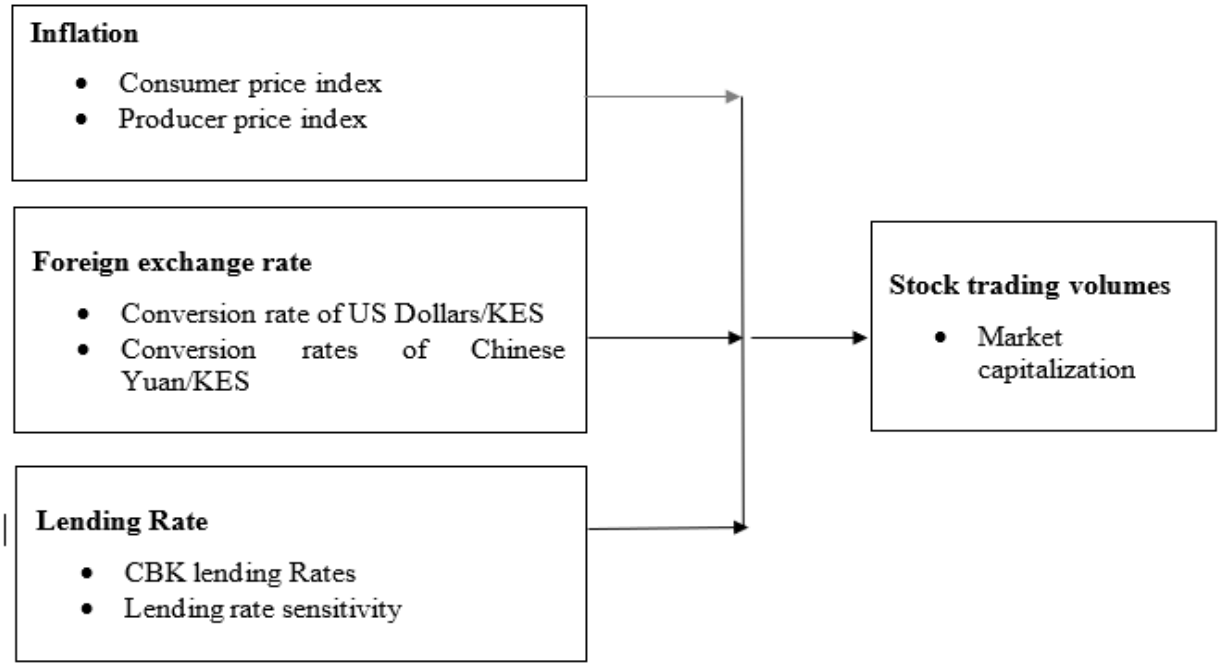

Figure 2: Updated Conceptual Framework

4.4 Correlations Analysis

Table 7: Correlations Analysis

	Y	*X1*	*X2*	*X3*
y	1			
X1	-0.5084	1		
X2	0.326664	0.430509	1	
X3	0.058914	0.563195	0.914987	1

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The correlation matrix results show that the study exhibited moderate negative correlation coefficient between inflation rate and stock trading volume, as can be seen from the correlation coefficient of -0.5084. The findings were inconsistent to those of Elly and Oriwo (2013) who established a weak positive relationship between inflation and stock trading volume. The study revealed that there was a weak positive correlation between exchange rate and stock trading volume as shown by a value of 0.32664. The findings were inconsistent to Njau (2013) who revealed that foreign exchange rates negatively affect the stock trading volumes of listed companies. The study found a weak positive correlation between lending rate and stock trading volume as shown by correlation coefficient of 0.058914. Similar to the findings of the current study Kitatia, Zablonb and Maithya (2015) revealed that lending rates were positively correlated to stock trading volumes.

4.5 Panel Data Regression Analysis

The study adopted the fixed effect model.

Table 8: Panel Data Regression Analysis

```
Fixed-effects (within) regression               Number of obs      =        90
Group variable: NUMBER                          Number of groups   =         9

R-sq:  within  = 0.867                          Obs per group: min =        10
       between = 0.767                                         avg =      10.0
       overall = 0.734                                         max =        10

                                                F(3,78)            =      5.77
corr(u_i, Xb)  = 0.1586                         Prob > F           =    0.0028

------------------------------------------------------------------------------
           Y |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
          X1 |   -0.08065   0.238289    -0.34   0.002    -3.13393    0.957799
          X2 |   -0.03486   0.162963    -0.21   0.041    -0.41304    1.199741
          X3 |   -0.056492  0.25129     -0.22   0.046    -7.52111    4.096668
       _cons |    4.078738  33.21015     0.12   0.003   -62.05112   70.208590
-------------+----------------------------------------------------------------
```

$Y_{it} = \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3$

$Y_{it} = -0.08065X_1 - 0.03486X_2 - 0.05649\ X_3$

The outcome reveals that adjusted R^2, which is the coefficient of determination, showed that 86.7% of the variations within the stock trading volume were explained by the independent factors. Preis, Moat and Stanley, (2013) revealed that inflation, exchange rates and lending rates might explain the movements of historical changes in stock trading volumes. Other predictors not included in the model account for 13.3% of the variations in stock trading volume. The table

showed that the population parameters significance level was at 0.05 revealing that the data can be used to make inferences as the p value was 0.05. Basing on (if your calculated F value in a test is larger than your F critical value, you can reject the null hypothesis.), the overall model relationship was considered significant since F calculated (5.77) was higher than the F critical (value = 2.7218) at 5% level of significance.

On the regression model it was noted that when all independent variables were held to constant zero, stock trading volume would be at 4.078738. A unit increase in inflation rate would reduce stock trading volume with 0.081 units. Consistently Kamau (2015) found that an increase in inflation rate would reduce the stock trading volume. Inconsistent to the findings, the study by Elly and Oriwo (2013) found that inflation had a weak positive relationship with the stock trading volume. A unit increase in exchange rate would lead to 0.035 units decrease in stock trading volume. The findings show that a unit increase in lending rate would lead to a reduction in stock trading volume by 0.056 units. Dependably Mohanasundaram, Karthikeya and Shanti, 2017 established that rise in exchange rate would reduce the stock traded in a stock market.

5.0 SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary

Effect of Inflation on Trading Volume of Stocks

The first objective was to establish the effect of inflation on trading volume of stocks offered by manufacturing and allied companies listed in the Nairobi Security Market. The correlation analysis results revealed that there existed a weak negative correlation coefficient between inflation rate and stock trading volume. Furthermore, the regression analysis established that a unit increase in inflation rate would reduce stock trading volume. The relationship was found to be significant

Effect of Exchange Rates on Trading Volume of Stocks

Secondly the study sought to establish the effect of exchange rates on trading volume of stocks offered by manufacturing and allied companies listed in the Nairobi Security Market. The correlation analysis established that there was a weak negative correlation between exchange rate and stock trading volume. The findings from the regression analysis determined that a unit increase in exchange rate would lead to a significant decrease in stock trading volume.

Effect of Lending Rates on Stocks Volume

Thirdly the exploration sought to establish effect of lending rates on stocks volume of manufacturing and allied companies listed on Nairobi Security Exchange. The correlation analysis determined that there was weak negative correlation between lending rate and stock trading volume as was demonstrated by a correlation analysis table 4.8. The regression analysis findings revealed that a unit increase in lending rate would lead to a significant reduction in stock trading volume.

5.2 Conclusion

From the presentation of the analysis and summary of the findings, this study makes a number of conclusions. The exploration concludes that there was a negative relationship between inflation on trading volume of stocks offered by manufacturing and allied companies listed in the Nairobi Security Market. The study concludes that exchange rate had a negative correlated with stock trading volume of stock offered by manufacturing and allied companies listed in the Nairobi Security Market. The study concludes that lending rate had a negative correlation with stock trading volume of stock offered by manufacturing and allied companies listed on Nairobi Security Exchange.

5.3 Recommendations

The government should put various measures in place to help contain the inflationary expectations in the economy. It should therefore be very careful when applying both the monetary and the fiscal policies to avoid building inflationary expectations which end up hurting the investors as the overall stock prices react to them affecting the trading volume at the end. The government through Central Bank of Kenya (CBK) should come up with monetary policy that will have an impact on foreign exchange rate, thus making CBK intervention significant in stabilizing and predicting the movement of foreign exchange rate. A strategy preventing the inflation rate will reduce the exchange rate which will positively impact on the stock trading volume. The study also recommends that there is need for the government to initiate policies that will lower the lending rates in Kenya as lower lending rates may translate to higher stock trading volumes. The lower lending rates help improve the liquidity in the market and therefore lead to more investment. The central bank should formulate monetary and fiscal policies that will ensure stable lending rate and inflation rate to avoid surprising the economy.

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