Relationship between Trading Volume and Stock Returns at the Nairobi Securities Exchange (NSE)

[1]MR. HUSBORN O. KENYANYA, [2]MR. NZYUKO JOSEPH, [3]MR.OMWANSA DAVID

[1]Accounting and Finance Department, Kenyatta University, Kenya

[2]Accounting and Finance Department, Kenyatta University, Kenya

[3]Accounting, Banking and Finance Department, Machakos University, Kenya

Abstract: **This study examines the relationship between trading volume and stock returns at the NSE. The sample for the study comprises of all stocks in the NSE 20-share index traded at the Nairobi Securities Exchange (NSE) from the year 2014-2017. There are two objectives of conducting the analysis; To determine the relationship between stock return and trading volume at the NSE and, To determine the relationship between stock returns and past prices at the NSE. The results showed that the NSE exhibits a weak form efficiency market as the current returns of stocks at the NSE are positively related to the lagged returns of the stocks. It concludes that the current returns of traded stocks are significantly affected by past prices and have a positive relationship with the lagged returns. Highly traded volumes (liquid) have high stock returns than the low traded volumes (illiquid) at the NSE.**

*Keywords***: trading volume, stock returns, Nairobi Securities Exchange, Lagged returns.**

I.   INTRODUCTION

According to the efficient market hypothesis (EMH), a market is efficient where past information on stock prices and trading volume cannot be used in order to predicting future prices, hence no form of technical analysis by the chartists can utilized in predicting future prices (Sabri, 2007). Globally, all stock markets experienced a financial crisis in the year 2008. There have been growing interest in research to explain why stock returns and volumes traded are determined across the various world markets for securities (Hui-Ching, 2014). Traded volume is the number of shares that are transacted over a given period of time which can be hourly daily, monthly or on yearly basis. When many investors make trades, the volumes of trade also increase but the returns may also increase or decline.

Researchers have found out that the trading volumes contains a lot of information as it forms a good proxy for information level of investors regarding stocks at any given time hence affecting the reactions through selling and buying of stocks (Tauchen & Pitts, 1983). The Nairobi Securities Exchange (NSE) has been introducing new practices and making new technological changes which have greatly improved the investors trading practices at the NSE (Sabri, 2007). this include foreign ownership, use of internet trading platforms, increased cross border stock trading transactions hence facilitating the process of trading and transactions.

The NSE has been showing very high volumes of trade over the past few years yet the returns have been quite volatile making it difficult for new investors entering the market. Many of the previous researchers; Epps (1976) and Harris (1986) consider price change and volumes of trade to be correlated as individual stock price varies with the change in volume of transactions. However, other models have indicated that monopolist informed traders may try to camouflage their trading activities through their action of splitting one large trade so that it forms several small trades (Admati & Pfleiderer, 1988). Therefore, the trade size or volumes of trade may not really have significant conveyance of adverse

information. The existence of mixed findings across the globe including Kenya led to the current study in order to research more about the traded volume and establish whether they have a relationship with the stock returns.

The study has two objectives:

a. To determine the relationship between stock return and trading volume at the NSE.

b. To determine the relationship between stock returns and past prices at the NSE.

This paper is organized as follows.

In the next section II, this paper relates the returns and the trading volume as provided in the literature review. Afterwards, the data, hypotheses and the methods of determining the returns of both volumes and returns are shown in section III. In the section IV, the analysis of data is presented and finally a conclusion is made.

II. LITERATURE REVIEW

Previous studies on the stock markets have been focused on the correlation of stock return and events affecting the different markets across the world. However, in regard to the relationship between the trading volume and volatility of stock returns has been fascinating financial analysis and economists who have been carrying out empirical studies. According to Karpoff (1987), the study of stock prices and volume relationships is crucial in the making of prudent financial investment decisions.

The current study is aimed at providing an understanding of the structure of financial markets, the behaviour of investors and prediction of stock returns base on the volumes traded at the NSE. Many of the previous researchers; Epps (1976) and Harris (1986) consider price change and volumes of trade to be correlated as individual stock price varies with the change in volume of transactions. This theoretical explanation results in the mixture of distribution hypothesis (MDH). According to the MDH, the relationship results from the mutual dependence of price and volume on the flow of information, which is the underlying common mixing variable. This means that a simultaneous response arises and thereby establishing new equilibrium.

According to Copeland (1976) and Jennings et al. (1981), there is an existence of a positive bi-directional causal relationship between absolute values of price and trading volume as explained by the sequential information arrival hypothesis (SIAH). The new information entering into the stock market may only affect one firm at a time, implying the existence a sequential transitional equilibria before final equilibrium is established. This is contrary to the MDH, thus, a lagged trading volume may determine the current absolute price and vice-versa.

Other studies on relationship between volatility and volume, argue that volume has a positive effect on conditional volatility (Lamoureux and Lastrapes, 1990). They established that when trading volume is included in the conditional volatility, the both ARCH and GARCH effects are removed. This means that volatility lags and residuals from the past have no much effect on the returns as long as there are trading volumes. They therefore imply that the GARCH effect depends on the speed at which trading volume, a proxy for information, is reflected in the market. In addition, studies of stock returns and trading volume found out a positive relationship between the traded volumes and stock returns ((Hui-Ching, (2014), Tauchen and Pitts (1983), and Attari et al. (2012), Chen et al. (2001).

Muheria, G. (2015) conducted a study on the NSE-All Share Index, which found no evidence to support the causal relationship that may have existed between the stock returns and trading volume at the NSE. According to the study, only four stocks had indicated that return causes volume, while one stock indicated bi-directional causation (Muheria, 2015)

Batista et al. (2016), carried out a study using descriptive research design. The target population consisted all companies listed on the NSE, and had previously done a rights issue. The study found out that there existed a negative relationship between volume of shares traded and the share price (Batista et al. 2016).

Due to mixed results from different empirical studies done so far as well as the methodologies used that included descriptive research design by Batista et al. (2016), the current study used daily returns to assess the response of any on the volumes traded against the returns of stocks. This is different as the current study is now using all the stocks not just the ones with rights issue. Previous studies have only examined trading volume to volatility and stock returns. The current study therefore seeks to examine the relationship between traded volumes to the firms listed in the NSE-20 Share Index

for the last 3 years on a daily basis. This shall facilitate the understanding of the effect of volume traded on the stock returns at the NSE

III.   DATA AND METHODOLOGY

3.1 Data:

The researcher collected secondary data from the NSE. The researcher collected all the 20 listed firms in the NSE 20 Share Index. The researcher collected the daily stock returns in order to examine relationship between stock return and the trading volume in the Nairobi Securities Exchange for the period of July 2014 to September 2017.

3.2 Methodology:

To examine the relationship between traded volume and returns, the study examined the changes in volume and returns then changes in the past volumes of trades and the future returns of stocks.

 The Changes in daily stock returns are computed as follows:

$R_{it} = \{(p_{i,t} - p_{it-1})/ p_{it-1}\} \times 100$

Where:

R_{it}= capital gain returns of security i at day t

$p_{i,t}$= Price is the price for security i at day t

$p_{i,t-1}$= Price is the price for security i at the end of previous day

The percentage change in daily trading volume shall be computed as follows:

$\mathbf{V\% = \{(V_{i,,t} - V_{it-1})/ V_{i,t-1}\} \times 100}$

Where:

$V_{i,t}$= Trading volume gain returns of security i at day t

$V_{i,t}$= Trading volume of security i at day t

$p_{i,t-1}$= Trading volume of security i at the end of previous day t

The study variables are the daily individual stock prices and the volumes traded.

The researcher grouped the stocks into portfolios based on average volumes traded over the 3 months period. The portfolios are High Trading Volume (PH) , Moderate Trading Volume (PMO), Low Trading Volume (PLO) and Very Low Trading Volume (PVLO).

Table 1: Portfolios

PORTFOLIO	PH	PMO	PLO	PVLO
3-MONTH AVERAGE VOLUME	Over 1 Million	Between 500,000-999,999	Between 100,000-499,999	Less than 100,000

Average Returns of Portfolio

H_0: There is no difference between the average returns of **PH** and **PLO** portfolios

H_1: There is a difference between the average returns of **PH** and **PLO** portfolios

Testing was at 5% level of significance and a paired sample t-test was applied.

Relationship between the returns of stocks and the volumes traded

Further, the researcher tested the relationship between the returns of stocks and the volumes traded at the NSE

H_0: There is no significant relationship between the returns of stocks and the volumes traded at the NSE.

H_1: There is a significant relationship between the returns of stocks and the volumes traded at the NSE.

IV. RESULTS

4.1 Average Returns of Portfolio:

Table 2: Paired Sample T-Test for the Average Returns of Portfolio

```
Paired t test
```

Variable	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf. Interval]	
rph	796	.0227613	.0420019	1.18502	-.0596865	.1052091
rplo	796	-.0316407	.0414561	1.169621	-.1130171	.0497357
diff	796	.054402	.054174	1.528436	-.051939	.160743

```
    mean(diff) = mean(rph - rplo)                               t =   1.0042
Ho: mean(diff) = 0                          degrees of freedom =      795

Ha: mean(diff) < 0            Ha: mean(diff) != 0            Ha: mean(diff) > 0
Pr(T < t) = 0.8422         Pr(|T| > |t|) = 0.3156         Pr(T > t) = 0.1578
```

From the Table 2, the null hypothesis is rejected ($p<0.05$), and therefore, there is a difference in the average returns of Portfolio of low volumes (PLO) of trade and the Portfolios of high volume of trade (PH). The average returns of the highly volume trade portfolios (More Liquid stocks) are higher than the low volume trade portfolios (Illiquid) as shown above; Means 0.0227 and -0.0316 respectively. This contrary to the findings of Batista et al. (2016) that there existed a negative relationship between volume of shares traded and the share price.

Relationship between the returns of stocks and the volumes traded at the NSE.

Table 3: Regression result for Very Low Volume Portfolios

$R_t = \beta_0 + \beta_1 V_t + \beta_2 V_{t-1} + \beta_3 R_{t-1} + \varepsilon t$

Source	SS	df	MS			
Model	14.5653012	3	4.85510041	Number of obs =	796	
Residual	726.898979	792	.917801742	F(3, 792) =	5.29	
				Prob > F =	0.0013	
				R-squared =	0.0196	
				Adj R-squared =	0.0159	
Total	741.464281	795	.932659473	Root MSE =	.95802	

rpvlo	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
vpvlo	6.12e-07	3.00e-06	0.20	0.839	-5.28e-06	6.50e-06
vpvlop	1.06e-06	3.00e-06	0.35	0.725	-4.83e-06	6.95e-06
rpvlop	-.1396368	.0352167	-3.97	0.000	-.2087658	-.0705077
_cons	-.0003048	.0365101	-0.01	0.993	-.0719728	.0713631

Table 3 above shows an evidence of relationship that exists between the current stock returns (R_t) and the current trading volume (V_t) as illustrated by Equation (2). The positive coefficient of 6.12 which is not significant at 5% level ($p>0.05$) indicating that returns from the stocks has a positive relationship with trading volume.

F-test is significant and reliable as $p<0.05$, hence model fits the data. However, adjusted R-square is very small at 1.6% meaning that there are far more other factors other than the ones in the model that predict the stock returns.

Similarly, the current stock returns (R_t) have a positive coefficient (1.06) with lagged trading volume (V_{t-1}) which is not significant at 5% level ($p>0.05$). However, the current stock returns have a negative coefficients with lagged stock return (R_{t-1}) which is significant at 5% level ($p<0.05$).

Table 4: Regression result for Low Volume Portfolios

$R_t = \beta_0 + \beta_1 V_t + \beta_2 V_{t-1} + \beta_3 R_{t-1} + \varepsilon t$

Source	SS	df	MS			
				Number of obs =		796
				F(3, 792) =		7.22
Model	28.9604467	3	9.65348223	Prob > F	=	0.0001
Residual	1058.60999	792	1.33662878	R-squared	=	0.0266
				Adj R-squared =		0.0229
Total	1087.57044	795	1.36801313	Root MSE	=	1.1561

rplo	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
vplo	-1.32e-06	2.16e-06	-0.61	0.541	-5.56e-06	2.92e-06
vplop	-1.94e-06	2.13e-06	-0.91	0.363	-6.11e-06	2.24e-06
rplop	.1628314	.0356704	4.56	0.000	.0928118	.232851
_cons	-.0182244	.0416576	-0.44	0.662	-.0999967	.0635479

Table 4 above shows an evidence of relationship that exists between the current stock returns (Rt) and the current trading volume (V_t) as illustrated by Equation (2). The negative coefficient of -1.32 which is not significant at 5% level (p>0.05) indicating that the return of the stocks has a negative relationship with current trading volume. Similarly, the current stock returns (R_t) have a negative coefficient of -1.9\4 with lagged trading volume (V_{t-1}) which is significant at 5% level (p<0.05).

However, the current stock returns have a positive coefficient with lagged stock return (Rt−1) which is significant at 5% level (p<0.05) indicating that the return of the stocks has a positive relationship with the lagged stock returns. F-test is significant and reliable as p<0.05, hence model fits the data. However, adjusted R-square is very small at 2.29% meaning that there are other factors other than the ones in the model that predict the stock returns.

Table 5: Regression result for Moderate Volume Portfolios

$R_t = \beta_0 + \beta_1 V_t + \beta_2 V_{t-1} + \beta_3 R_{t-1} + \varepsilon t$

Source	SS	df	MS			
				Number of obs =		796
				F(3, 792) =		1.83
Model	5.7420598	3	1.91401993	Prob > F	=	0.1399
Residual	827.655786	792	1.04501993	R-squared	=	0.0069
				Adj R-squared =		0.0031
Total	833.397846	795	1.04829918	Root MSE	=	1.0223

rpmo	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
vpmo	1.17e-06	3.21e-06	0.37	0.715	-5.13e-06	7.48e-06
vpmop	1.17e-06	3.21e-06	0.37	0.715	-5.13e-06	7.48e-06
rpmop	.0807477	.0356188	2.27	0.024	.0108293	.1506661
_cons	-.0706816	.037342	-1.89	0.059	-.1439826	.0026195

Table 5 above shows an evidence of relationship that exists between the current stock returns (Rt) and the current trading volume (Vt) as illustrated by Equation (2). The positive coefficients of 1.17 for both current and lagged trading volumes is not significant at 5% level (p>0.05) indicating that the return of the stocks has a positive relationship with both current and lagged trading volume. Similarly, the current stock returns (Rt) have a positive coefficient of -1.94 with lagged trading volume (Vt−1) which is significant at 5% level (p<0.05). Similarly, the current stock returns have a positive coefficient with lagged stock return (Rt−1) which is significant at 5% level (p<0.05) indicating that the return of the stocks has a positive relationship with the lagged stock returns. Adjusted R-square is very small at 0.03% meaning that there are other factors other than the ones in the model that predict the stock returns.

Table 6: Regression result for High Volume Portfolios

$R_t = \beta_0 + \beta_1 V_t + \beta_2 V_{t-1} + \beta_3 R_{t-1} + \varepsilon t$

Source	SS	df	MS			
Model	15.3391114	3	5.11303715	Number of obs =		795
Residual	1100.67808	791	1.391502	F(3, 791) =		3.67
				Prob > F	=	0.0120
				R-squared	=	0.0137
				Adj R-squared =		0.0100
Total	1116.01719	794	1.40556322	Root MSE	=	1.1796

rph	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
vph	4.54e-08	4.12e-06	0.01	0.991	-8.05e-06	8.14e-06
vphp	-2.10e-06	4.12e-06	-0.51	0.610	-.0000102	5.99e-06
rphp	.1158079	.0353269	3.28	0.001	.0464622	.1851535
_cons	.0211448	.0422074	0.50	0.617	-.061707	.1039966

Table 6 above shows an evidence of relationship that exists between the current stock returns (Rt) and the current trading volume (Vt) as illustrated by Equation (2). The positive coefficients of 4.54 for the current trading volumes is not significant at 5% level (p>0.05) indicating that the return of the stocks has a positive relationship with current trading volume. However, the current stock returns (Rt) have a negative coefficient of -2.10 with lagged trading volume (Vt−1) which is not significant at 5% level (p>0.05). The current stock returns have a positive coefficient with lagged stock return (Rt−1) which is significant at 5% level (p<0.05) indicating that the return of the stocks has a positive relationship with the lagged stock returns. F-test is significant and reliable as p<0.05, hence model fits the data. However, adjusted R-square is very small at 1% meaning that there are other factors other than the ones in the model that predict the stock returns.

Table 7: Summary of Current Returns of the Portfolios

Volumes of Trade	Current Volume V_t	Lagged Volume V_{t-1}	Lagged Returns R_{t-1}
Very Low	Positive	Positive	Negative[*]
Low	Negative	Negative[*]	Positive[*]
Moderate	Positive	Positive	Positive[*]
High	Positive	Negative	Positive[*]

V. CONCLUSION

With regard to the Low Volumes, there are mixed results with regard to the relationship between the current stock returns and lagged volumes and lagged stock returns. All portfolios had a positive relationship between the stock returns and current volumes except for the low volume portfolio. Similarly, all portfolios showed a positive relationship between the current stock returns and the lagged stock returns except for very low volume portfolio.

The current study finds that the previous stock prices have a significant effect on the current returns of stocks at the NSE, hence exhibiting a weak form efficiency market. News about the stock returns have a significant effect on the future stock returns as shown in the current study. Therefore, an increase in price of stock predicts future increase in prices which is expected in the short run. This is because the study used daily prices hence, the researcher concludes that the price increase is expected to continue in the following days. However, this may not apply for the very lowly traded volume stocks. In addition, the current stock returns have a positive relationship with the volume traded for high volume portfolio. However, the relation between current stock return and past period trading volume is not significant though for high trade volume portfolios, a decrease in trading volume is usually associated by a rise in stock price/return. This concurs with the results obtained by Pathirawasam (2011) as well as Ying (1966).

According to Dater et al. (1998), a negative relationship between stock return and trading volume is a confirmation that illiquid (Low Volume) stocks do offer a relatively higher average returns than liquid (High Volume) stocks. However, the

study found contrary results as it confirmed that illiquid (Low Volume) stocks do offer a relatively lower average returns than liquid (High Volume) stocks.

Future studies should be done for the NSE-25 Share Index and the Nairobi-All Share Index to find out the relationship between the volumes and stock returns as well as volatility of stock prices.

REFERENCES

[1] Admati, A.R. and Pfleiderer, P. (1988). A theory of intraday patterns volume and price variability. *Review of Financial Studies, 1,* 3-40.

[2] Attari, M.J., Rafiq, S., Awan, H.M. (2012). The dynamic relationship between stock volatility and trading volume. *Asian Economic Financial Review, 2(8),* 1085-1097.

[3] Chen, C., Zhou, Z.G. (2001), Stock returns, volatility, and trading volume: Evidence from the Chinese stock markets. *International Journal of Business, 6(2),* 68-85.

[4] Epps, T. W., Epps, M. L. (1976). The stochastic dependence of security price changes and transaction volumes: Implications for the Mixture-of-Distributions Hypothesis. *Economet-rica, vol. 44*, 305-321.

[5] Fama, E. F. (1970). Efficient capital markets: A review of theory and empirical work. *Journal of Finance, vol. 25,* 383 – 417.

[6] Hui-Ching, (2014). The causal relationships between stock returns, trading volume, and volatility: Empirical evidence from Asian listed real estate companies, *International Journal of Managerial Finance,* Vol. 10 Issue: 2, pp.218-240, https://doi.org/10.1108/IJMF-10-2013-0103.

[7] Karpoff, J. (1987). The relation between price changes and trading volume. *Journal of Financial and Quantitative Analysis, vol. 22,* 109 -125.

[8] Lamoureux, C.G. and Lastrapes, W.D. (1990). Persistence in variance, structural change, and the GARCH Model. *Journal of Business & Economic Statistics, 8,* 225-234.

[9] Pathirawasam, C. (2011). The relationship between trading volume and stock returns. *Journal of Competiveness, 3,* 41-49.

[10] Pathirawasam, C., Idirisinghe, I.M.S.K. (2011). Market efficiency, thin trading and non-linear behevior: Emerging market evidence from Sri Lanka. *Economics and Management Journal, vol.8*, 112-122.

[11] Tauchen, G. E., & Pitts, M. (1983). The Price Variability Volume Relationship on Speculative Markets. *Econometrica, 5,* 485-550.

[12] Ying. C. (1966). Stock market prices and volumes of sales. *Ecommetrica, vol. 34*, 676-686.