

Regression Modeling Of The Daily Output Of Nigerian Stock Exchange For Informed Investment

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Abstract: This study examined and modeled statistically the daily reported Market Capitalisation, volume of shares, Number of deals done, Value of trade and, All-share index of the Nigerian Stock Exchange to ascertain the pattern inherent in the variables, measure inter-relationships amongst them and fit appropriate model for the variables. The data was extracted from The Punch Newspaper January 1st, 2016 to December 31th, 2017. Multiple Regression and correlation analysis were performed with the aid of E-views 9.0. Market Capitalisation and Value of trade were each regressed on volume of shares, Number of deals done, and the All-share index. Result shows that All-share index and volume of trade have individual significant positive effect while number of deals have significant negative effect on Market Capitalisation ($p < 0.05$) while all the three explanatory variables individually, positively and significantly affect the value of trade ($p < 0.05$). Both regressor variables are positively and significantly correlated. It is therefore concluded that daily market capitalisation and value of trade are both functions of the all share index, volume of trade transacted and the number of deals involved. Investors and policy makers are hereby advised to observe and follow the trend of the market for maximum portfolio benefits.

Keywords: Market capitalisation, Value of Trade, All share index, Regression, Model

I. INTRODUCTION

Mobilisation of resources for national development has been the central focus of development by economist. As a result of this, the centrality of savings and investment in economic growth has been given considerable attention in various aspect of life. According to Ekpo & Umoh (2007), funds must be effectively mobilized and allocated to enable businesses and the economy harness their human material and management resources for optimum output and for sustainable growth and development.

The stock market therefore is an economic institution which promotes efficiency in capital formation and allocation. It enables government and industries to raise long – time capital for financing new project, expanding and modernising industrial concerns. According to Roberts (2001), the size of

the World Wide “Stock Market” is estimated at \$ 51 trillion, the stocks are listed and traded on stock exchanges which are Entities Corporation or mutual organizations specialised in the business of bringing buyers and sellers of stocks together.

The capital market is important because of its financial intermediation role of bringing together the deficit unit with the surplus unit of any economy. The failure of the capital market to carry out this role denies the economy of needed financial resources for investment and production of goods and services (Odili & Ezeudu, 2014). The capital market therefore, was set up to facilitate the mobilisation and channeling of funds into productive investments (Odili & Ede, 2015).

Most studies had considered the relationship between the market indices of the Nigeria Stoc Exchange with the growth of the economy and these were on yearly basis (Jibril, et al.,

2015; Akpan, 2013; Adenuga, 2010; Boubakari & Jin, 2010; Edame & Okoro, 2013; Olweny & Kimani, 2011), and with other micro and macro – economic variables (Adebayo, 2016) and none had compared nor considered the interplay of these indices among each other daily in order to understand the dynamics that come into play at the exchange. This study aimed to identify the pattern of the activities of the stock exchange and fit models that make investments objective. Also revealed to brokers are the relationships between these market variables and make them efficient professionals in their fields. Specifically, this study examined the relationships between market capitalisation and the value of trade and the other activities (number of deals done, volume of trade and all – share index).

The hypotheses considered to achieve the stated objective are:

H_0^1 : There is no significant linear relationship between all the variables.

H_0^2 : There is no significant linear relationship between the regressor variables (market capitalisation and value of trade) and the explanatory variables (number of deals done, volume of trade and all – share index).

II. LITERATURE REVIEW

Critics of the stock market, argued that the actual operation of the pricing and takeover mechanism even in well-functioning stock markets lead to short termism and lower rates of long term investment. It also generates perverse incentives, rewarding managers for their success in financial engineering rather than creating new wealth through organic growth (Singh, 2003). In addition, empirical evidence shows that the takeover mechanism does not perform a disciplinary function and that competitive selection in the market for corporate control takes place much more on the basis of size rather than performance (Singh, 2003). Therefore, a large inefficient firm has a higher chance of survival than a small relatively efficient firm.

Edame & Okoro (2013) found that various measures of stock market activity are positively correlated with measures of real economic growth across countries, and that the association is particularly strong and significant for Nigeria. Durham (2002), on the other hand, found that the positive impact of stock market development is largely dependent on the inclusion of higher income countries in the regression samples, which limits the relevance for lower income countries. He provided evidence that indicated that stock market development has a more positive impact on growth for greater levels of GDP per capital, lower levels of country credit risk, and higher levels of legal development. The decomposition of stock price movements is very sensitive to what assumption is made about the presence of permanent changes in either real dividend growth or excess stock return (Balke & Wohar, 2006)

Corwin (2003) identified uncertainty and asymmetric information as a strong influence on the firm's equity pricing and as a matter of fact led to underpriced instrument. Many factors, both micro and macro-economics, have impacted on equity pricing in the stock market, and the impact differed

from firm to firm, industry to industry, economy to economy and from time to time, but one comforting conclusion is that most of the factors appear to have the same behavior regardless of time, industry or firm constraints. Increased inflation and interest rates, declining dividends, earnings, and poor management, for instance, leave negative impact on equity pricing and vice-versa. A lower degree of efficiency in less developed markets might be caused by common characteristics of loose disclosure requirements as well as thinness and discontinuity of trading. It is generally assumed that the emerging markets are less efficient than the developed markets. Raihan & Ullah, (2007) found that in Chittagong Stock Exchange (CSE) in Bangladesh, stock return series do not follow random walk model and the significant autocorrelation co-efficient at different lags do not accept the hypothesis of weak form efficiency. Firth, Wang & Wong (2015) found that when limit hits are imminent, stock prices approach limit bounds at faster rates and with increased volatility and higher trade efficiency. They also argued about asymmetry effects between limit hits at the ceiling and floor bounds.

In a study of the impact of dividend and earnings on stock prices, Hartone (2004) argued that a significantly positive impact is made on equity prices if positive earnings information occurs after negative dividend information. Also, a significantly negative impact occurs in equity pricing if positive dividend information is followed by negative earning information. Docking & Koch (2005) discovered that there is a direct relationship between dividend announcement and equity price behavior. Al-Qenae, Li & Wearing (2002) in their study of the effects of earning (micro-economic factor), inflation and interest rate (macro-economic factors) on the stock prices on the Kuwait Stock Exchange, discovered that the macro-economic factors significantly impact stock prices negatively.

A previous study by Udegbumam & Eriki (2001) of the Nigerian capital market also shows that inflation is inversely correlated to stock market price behavior. New theoretical research works show that stock market development might boost economic growth and empirical evidence tends to provide some support to this assertion. Edame & Okoro (2013), for instance, found that stock market development plays an important role in predicting future economic growth. Equity investment became gradually more attractive as political risk is resolved over time (Perotti & Van Oijen, 2001). Therefore, the development of good quality institutions can affect the attractiveness of equity investment and lead to stock market development.

However, this study considered the inter-plays and relationships among the key variables of the Nigerian Stock Exchange to enable an understanding of what drives what.

III. METHODOLOGY

The study estimated the relationship between market capitalisation and value of trade with the volume of trade, all – share index and the Number of deals done, a model fit was adopted from the theories of multiple linear regression.

The general linear model is given as:

$$Y = XB + \epsilon \quad (1)$$

Where Y is an n x 1 vector of criterion variable

β is a p x 1 vector of parameters

X is an n x p matrix of predictor variables

ϵ is an n x 1 vector of random components i.e. the unexplained variation in the response variable.

The goal of the general linear regression procedure is to fit a line through some points so that the squared deviations of the points from the line are minimized and is known as Least Square Estimation. The data collected is the daily summary of the activities on the floor of the Nigerian Stock Exchange included the volume of trade (#millions); value of trade (#billions), the number of deals done, the all-share index and the market capitalisation (# trillion) collected daily from January 1st, 2016 to December 31st, 2017 obtained from The Punch Newspaper.

IV. RESULTS

The results obtained are outlined in this section.

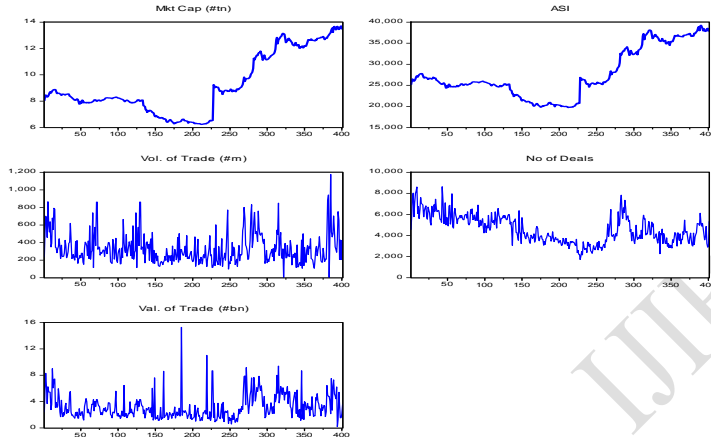


Fig. 1: The time plot of official daily market capitalisation (#tn), All Share Index, Volume of Trade (#m), Number of deals and Value of Trade (#bn) at Nigerian Stock Exchange from January 1st, 2016 - December 31st, 2017.

	MKT_CAP (#tn)	ASI	Vol. of Trade (#m)	No of Deals	Val. of Trade (#bn)
Mkt Cap. (#tn)	1.0000				
	0.9956**	1.0000			
ASI	(211.2927)				
	0.0000				
Vol. of Trade (#m)	0.1557**	0.1676**	1.0000		
	(3.1488)	(3.3953)			
	0.0018	0.0008			
No of Deals	-0.0518	0.0104	0.4058**	1.0000	
	(-1.0358)	(0.2072)	(8.8686)		
	0.3009	0.8360	0.0000		
Val. of Trade (#bn)	0.3037**	0.3162**	0.4632**	0.2958**	1.0000
	(6.3672)	(6.6589)	(10.4410)	(6.1860)	
	0.0000	0.0000	0.0000	0.0000	

NB: Correlation, (t=Statistic), probability; n = 401; ** significant at 1%

Table 1: Correlation matrix of the NSE daily market summary from Jan. 1st, 2016 – Dec.31st, 2017

The correlation matrix revealed that all the variables were positively correlated except Market capitalisation and number of deals. Based on the result it was determined that there is no strong correlation among the explanatory variables (All-share index, volume of trade and number of deals), which implies the absence of multicollinearity.

Dependent Variable: Mkt Cap (#tn)

Method: Least Squares

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ASI	0.000388	1.37E-06	282.3017	0.0000
No of Deals	-0.000120	6.57E-06	-18.20628	0.0000
Vol. of Trade (#m)	0.000232	5.16E-05	4.492136	0.0000
C	-1.041744	0.046924	-22.20087	0.0000
R-squared	0.995242	Mean dependent var		9.217337
Adjusted R-squared	0.995206	S.D. dependent var		2.299919
S.E. of regression	0.159246	Akaike info criterion		-0.826804
Sum squared resid	10.06768	Schwarz criterion		-0.786964
Log likelihood	169.7742	Hannan-Quinn criter.		-0.811029
F-statistic	27679.22	Durbin-Watson stat		0.422524
Prob(F-statistic)	0.000000			

Source: E-Views version 9.0 Output

Table 2: Modelling market capitalisation on all share index, volume of trade and number of deals

The fitted model is:

$$Mkt\ Cap. = 0.00038 \cdot ASI + 0.00023 \cdot Vol.\ of\ Trade - 0.00012 \cdot No\ of\ Deals - 1.04174$$

The adjusted coefficient of determination obtained was 0.995 which showed that 99.5% of the total variation on daily market capitalisation was explained by the explanatory variables (All-share index, volume of trade and number of deals). The all the explanatory variables significantly impact on market capitalisation with All share index having the greatest contribution (0.00038, $p < 0.05$) while the least contributor was number of deals with a negative contribution to market capitalisation (-0.00012, $p < 0.05$).

Dependent Variable: Log (Val. of Trade (#bn))

Method: Least Squares (Gauss-Newton / Marquardt steps)

	Coefficient	Std. Error	t-Statistic	Prob.
C	-13.00946	1.289000	-10.09268	0.0000
Log (ASI)	0.848533	0.112566	7.538079	0.0000
Log (No of Deals)	0.478191	0.084837	5.636564	0.0000
Log (Vol. of trade)	0.238271	0.042561	5.598296	0.0000
R-squared	0.300089	Mean dependent var		1.013488
Adjusted R-squared	0.294800	S.D. dependent var		0.554680
S.E. of regression	0.465800	Akaike info criterion		1.319802
Sum squared resid	86.13676	Schwarz criterion		1.359642
Log likelihood	-260.6203	Hannan-Quinn criter.		1.335578
F-statistic	56.73827	Durbin-Watson stat		1.541395
Prob(F-statistic)	0.000000			

Source: E-Views version 9.0 output

Table 3: Modelling value of trade on all share index, volume of trade and number of deals

The fitted model is:

$$\text{Log}(\text{VaOT}) = 0.8485 \cdot \log(\text{ASI}) + 0.4782 \cdot \log(\text{No of Deals}) + 0.2383 \cdot \log(\text{VoOT}) - 13.0095$$

The adjusted coefficient of determination obtained was 0.2945 which showed that 29.45% of the total variation on daily value of trade was explained by the explanatory variables (All-share index, volume of trade and number of deals). The results showed that all the explanatory variables significantly and positively impact on value of trade with All share index having the greatest contribution (0.8485, $p < 0.05$) while the least contributor was volume of trade (-0.00012, $p < 0.05$).

V. DISCUSSION

The study revealed a very strong positive and relationship between the All share index and market capitalisation which agreed with the findings of Kaburu (2012) who observed a positive correlation between the variables. The correlations between the all share index and the volume of trade also agreed with the findings of John, Okanta, & Nkama, (2017) that a weak positive relationship exists between them. The finding that market capitalisation and volume of trade were positively and significantly correlated agreed with the findings of Musebe (2015).

The Coefficient of determination (R^2) of 0.995 for market capitalisation and 0.295 for value of trade implied that the explanatory variables (All-share index, volume of trade and number of deals) explained 99.5% of the total variation on daily market capitalization and only 30% of the total daily variation of value of trade. The implication is that the explanatory variables better model market capitalisation than value of trade.

The model formulated is

$$\text{Mkt Cap.} = 0.00038 \cdot \text{ASI} + 0.00023 \cdot \text{VoOT} - 0.00012 \cdot \text{NDeals} - 1.04174 \quad (2)$$

It showed that all-share index and volume of trade increases on market capitalisation while number of deals reduces market capitalisation and their impact on market capitalisation is significant ($p < 0.05$). The findings agree with (Zubair, 2013) who noted market capitalisation and all share index had trended upward.

$$\text{Log}(\text{VaOT}) = 0.8485 \cdot \log(\text{ASI}) + 0.4782 \cdot \log(\text{NDeals}) + 0.2383 \cdot \log(\text{VoOT}) - 13.0095 \quad (3)$$

It showed that a percent increase in the all share index, volume of trade and number of deals will increase value of trade by 85%, 48% and 24% respectively and the increase is also significant.

VI. CONCLUSIONS

From the analysis and findings above, the following conclusions were therefore made:

- ✓ There was a significant linear relationship between market capitalization and All-share index, volume of trade and number of deals done in the Nigeria stock exchange during the period of study.

- ✓ There was a significant linear relationship between value of trade and all-share index, volume of trade and number of deals done at the Nigerian stock exchange for the period considered for the study.
- ✓ The model fitted for market capitalisation and value of trade (VaOT) on all share index, volume of trade (VoOT) and number of deals (NDeals) are:

$$\text{Mkt Cap.} = 0.00038 \cdot \text{ASI} + 0.00023 \cdot \text{VoOT} - 0.00012 \cdot \text{NDeals} - 1.04174$$
 and

$$\text{Log}(\text{VaOT}) = 0.8485 \cdot \log(\text{ASI}) + 0.4782 \cdot \log(\text{NDeals}) + 0.2383 \cdot \log(\text{VoOT}) - 13.0095$$
 and both models were adequate though model 1 was better as shown by the coefficient of determination for both models.

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