

# Nature of Beta in the Nigerian Stock Market – Challenges and Prospects

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**Abstract:** The paper appraise the nature of beta in the Nigeria stock market and the impact of Beta on Investors' wealth maximization strategy in the Nigerian Stock Market. Ex-pos facto was iused to design the research as secondary data from the Nigerian stock market was deemed fit for the study. The study also indicated that there is a strong relationship between the firms' Stock Return and Beta Coefficient. Finally, the study established that Beta Coefficient has a significant effect on the Stock Return of Firms Listed on the Nigerian Stock Exchange. Three years data collected (from January 2017 to December 2019) from the database of the Nigeria Stock Exchange was used to estimate the coefficient of the stocks' betas. The data collectected were monthly price rates of the stocks, the All Share Index monthly rates and the Nigeria Treasury Bills monthly rates. The All Share Index is used to calculate the market returns and the Treasury Bills used as the risk free rate. To carryout the data analysis, returns were calculated for stocks and the market. Regression Analysis wss then to regress the stocks' returns against the market returns in order to estimate the beta coefficient using the CAPM (Capital Asset Pricing Model) theory:  $R_i = R_{rf} + B_i (R_m - R_{rf})$ . The result showed that Guanranty Trust Bank, Ashaka Cement, Dangote Cement, Flour Mills Nigeria plc and Northern Nigeria Flour Mills plc have higher risk (beta) of investment than the other stocks meaning they are more volatile than the market and the other stocks that have beta value les than one (1), thence higher expected retuns. It is, therefore, recommended that Investors should invest in these mentioned Companies with higher risk as higher risk is synanimous to higher returns in order to maximise their returns.

**Keywords:** Return on Investment, Beta Coefficient, Securities, Volatilities, Dividends, Quoted Stocks, Risk

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## 1. Introduction

Investment in Stocks is sound financial decision especially where the need of the Investor is to grow his savings over a long term. Embarking on any human endeavor is tantamount to plunging into some kind of risk, which is of various degrees. Every investment carries one risk or the other. This existential reality is more pronounced in the quest for wealth through investment in stock markets. The stock market offers investors the opportunity to invest in securities of quoted firms such investment could be in fixed income isecurity e.g. Preference shares, debentures, etc. Or they could be inequities. Each of these securities offer returns to investors, depending on firms' risks and the nature of the stock invested on. Generally, the higher the risk, the higher the return, all things being equal (Oludoyi, S. B. [8]).

Most individuals and institutional investors invest and stocks in anticipation of returns (Monetary benefits). This anticipation of returns could occasionally lead to massive rate

of subscription of several public offers. With limited amount of resources at the disposal of these investors, the major problem confronting them will be where to place their limited resources that will maximize their future benefits. In addition, most investors in the Nigerian Stock Market do not probably possess the adequate analytical skills to evaluate the performance of the quoted firms in terms of risk characteristics associated with the returns (Richard, B. [12]).

## 2. Statement of Problem

Financial reforms to aid the Nigeria stock exchange market was focused on further liberalization of banking business; ensuring competition and safety of the system and proactively positioning their nterrelation with the capital market to boost financial intermediation. Some of these financial reforms includes: the formation of Second Tier Securities Market (SSM) established in 1985 geared to

streamline the role of the Nigeria Stock Exchange market to cater for small and medium sized indigenous enterprise to gain access to the resources in the capital market for expansion and modernization. Furthermore, the Central Securities Clearing System (CSCS) was institutionalized to provide an integrated central depository, clearing (electronic entry transfer of shares from seller to buyer) and payment for bought securities for all stock market transactions. It was incorporated as a subsidiary of the Nigeria Stock Exchange to obviate the inherent bottlenecks in the transaction process in the capital market and commenced operations in 1997.

To this end, the CSCS is to implement a computerized Stock Exchange Management System (SEMS), which emphasizes immobilization of share certificates in the central depository and elimination of the bottlenecks between registrars and company executives in issuing new certificates to investors and reduce the risk of return on investments. Risk taking is the fundamental concern of investors, whether local or foreign. The nature and behavior of beta since its amplification by Sharpe in 1963 have occupied the attention of financial researchers as this.

### 3. Objectives of the Study

The objective of the study is to examine the nature of Beta. Its prospects and challenges in the Nigeria Stock Market and the specific objectives are:

- (i). Critically examine the Betas and their nature of quoted stocks in the Nigeria stock market
- (ii). Determine the benefits of betas and its applications in portfolio building on the Nigerian Stock Market
- (iii). Examine the impact of estimated beta on the investors wealth on the Nigerian Stock Market.

### 4. Research Hypotheses

The research study would, therefore, have the following hypothesis; stated in Null (Ho) form:

Ho<sub>1</sub>: there is no significant relationship between nature of beta and quoted stocks in the Nigerian Stock Market

Ho<sub>2</sub>: there is no significant relationship between the application of betas and the benefits of betas in the development of Nigerian Stock Market.

Ho<sub>3</sub>: There is no significant relationship between the estimated betas and investors's wealth on the Nigerian Stock market.

### 5. Literature Review

The independent variable of the study is the Nigeria Stock Exchange and the dependent variable is the Beta Coefficient. The Nigeria Stock Exchange (NSE) was established in 1960, and trading activity in most of the time until 1995 involved government bonds. The NSE has seen a significant growth following capital market liberalisation involving development in equities trading and financial market reforms in 1995. Market capitalisation soared from US\$ 13.6 billion in 1996 to a record value of US\$ 86.3 billion in 2007, representing a rise of 2297%.

Capitalisation as a proportion of GDP rose from 16.7% to 75.3% in the same period. Although the NSE has a large number of listed equities, over 200, its trading activities have been relatively low and illiquid (2.6% turnover in 1996 and 13.8% in 2007 (Girard & Sinha, [4]).

Abdullahi, I. B [1] showed that the two markets that determine to a large extent the directions and level of economic growth within an economy, apart from other factors such as political, social and environmental factors, are the money and capital markets. The stock market is a medium through which funds can be mobilized and channeled efficiently. It enables the government and industries to finance new and existing projects, expanding and modernizing industrial commercial concern. I

Idyu et al., [5] researched to determine the level of impact on the growth of the Nigerian industrial sector for the period 1990-2009. The ordinary least square (OLS) estimation technique was adopted using SPSS version 16.0 statistical computers software to evaluate the three objectives. The results showed (i) a positive significant impact of the market capitalization on industrial sector component of the gross domestic product and (ii) a positive significant impact of the market capitalization on average capacity utilization rates of the manufacturing sector. The result however showed (iii) a positive but non-significant impact of the annual market capitalization on industrial loans of the stock exchange. It was therefore concluded that every effort must be made by government and market operators to make the market viable and result oriented to further improve the economy.

Mohammed M. Tumola et al. [6] estimated the Logistic Smooth Threshold Model (LSTM) for the overall sampled daily time series from 2001 to 2012 using the conditional nonlinear least squares approach and also estimated the model for each of the All share Index (ASI) sub-samples taking the time of financial crisis (February 2008) as the break point. The results showed the significant correlations of stocks returns in each market industry with ASI. Nonlinear LSTM dynamics are found to be significant, with significant bull and bear betas in the overall and each of the sub-samples. We find in particular, that the Petroleum, Finance, and Food and Beverages sector equities to be of higher investment risk within the study period.

Prince C. Nwachukwu [11] researched on the random movement of beta coefficients over time and across market phases, using monthly stock returns from Nigerian Stock Exchange (NSE). The study showed that beta coefficients move randomly around a trend line when the market is up-beat, whereas they tend to be less volatile in the down market. However, a long-run equilibrium relationship between the return on the individual security and beta

components is evident in the two markets. Based on these findings we recommend that investors should arbitrage between these markets and take advantage of price differentials to earn riskless profit.

Wilson E. Hebert et al., [15] estimated (historical) betas of listed stocks in the chemicals and paints sector of the Nigerian Stock Exchange over a 13-year period (2000-2012). The results indicated that the unsystematic risk content in

chemicals/paints sector stocks constitutes the bulk of the sector’s risk profile and that most of the stocks’ betas had defensive attributes over the study period.

Oborkhale Christopher [7] examined the nature of beta in the Nigeria Stock Exchange for the period of five years between 2001 and 2005. The study showed that the market was dominated by stocks with low risk profile which means the market was dominated by defensive stocks.

Vetiva Fund Managers Ltd [14] showed in their seminar paper that investing is the trade-off between risk and expected return. In general, therefore, it is assumed that assets with higher risks give a possibility of higher expected returns.

**5.1. Theoretical Review**

**Portfolio Theory and Capital Market**

Oke, B. O [9] showed in Journal that the Modern Portfolio Theory (MPT) is the fundamental brainwork of Professor William F. Sharpe, a Winner of the 1990 Nobel Prize in Economics. The genesis of his classic work on CAPM is traceable to his doctoral dissertation topic, Portfolio Analysis Based on a Simplified Model of the Relationships Among Securities, in 1961. Since then, CAPM has become not just an authoritative and often-cited theoretical framework but also a linchpin of modern investment theory. His dissertation dwelt on the positive theory of securities market behavior, in particular with the securities market line relationship under the restricted conditions of a one-factor model. The conclusions drawn from his dissertation constituted a basis both in terms of title and contents of the Capital Asset Pricing Model (CAPM) (Chan and Chui, [3]). Professor William F. Sharpe is most celebrated for his development of the Capital Asset Pricing Model. In an interview with Jason Zweig of Money Magazine published in Econ Journal Watch, Sharpe was asked to summarize his work. He responded: I wanted to answer why people act in certain ways when they invest and how risk and return are related. The bottom line: Yes, Virginia, some investments do have higher expected returns than others. Which ones? Well, by and large they’re the ones that will do the worst in bad times (Sharpe, 2007).

**5.2. Empirical Review**

Adetunji et al [2] in their study “Forecasting Movement of the Nigerian Stock Exchange All Share Index using Artificial Neural and Bayesian Networks” made use of daily stock prices; these are the opening price, high price, low price, closing price, volume and the All-Share index of the Nigeria Stock Exchange market. This study is actually a comparative study of the predictive ability of Artificial Neural and Bayesian Networks using the Nigerian stock exchange data. Attempts at providing explanations to the poor empirical results on the return-beta relationship

**6. Methodology**

Three years data collected (from January 2017 to December 2019) from the database of the Nigeria Stock Exchange was used to estimate the coefficient of the stocks’ betas. The data collected were monthly price rates of the

stocks, the All Share Index monthly rates and the Nigeria Treasury Bills monthly rates. The All Share Index is used to calculate the market returns and the Treasury Bills used as the risk free rate. To carry out the data analysis, returns were calculated for stocks and the market. Regression Analysis was then used to regress the stocks’ returns against the market returns in order to estimate the beta coefficient using the CAPM (Capital Asset Pricing Model) theory:  $R_i = R_{rf} + \beta_i (R_m - R_{rf})$  developed by Professor Sharp, W. F [13].

**6.1. Formulas and Model Specification**

In statistical terms, beta represents the slope of the line through a regression of data points from an individual stock’s returns against those of the market. Beta is used in Capital Assets Pricing Model (CAPM), which describes the relationship between systematic risk and expected return for assets, particularly stocks.

$$R_i = R_{rf} + \beta_i (R_m - R_{rf}) \text{ (CAPM Model)} \tag{1}$$

Where:

- $R_i$  = Return of the Stock
- $R_{rf}$  = Risk free rate
- $\beta_i$  = Beta Coefficient of the Stock
- $R_m$  = Return of the market
- $R_{rf}$  = Risk free rate

$$\text{Beta Coefficient } (\beta) = \frac{\text{Covariance } (R_{e,i}, R_m)}{\text{Variance } (R_m)} \tag{2}$$

Where:

- $R_e$  = the return on an individual stock
- $R_m$  = the return on the over all market
- 1. Covariance = how changes in a stock’s return is related to changes in the market’s returns
- 2. Variance = how far the market’s own returns spread out from their average value.

$$\text{Total Stock Return} = \frac{(P_1 - P_0) + D}{P_0} \tag{3}$$

Where:

- $P_0$  = Initial Stock Price
- $P_1$  = Ending Stock Price (Price 1)
- $D$  = Dividends

A mathematical model was developed based on the proxies specified for the dependent variable; Beta Coefficient.

$$\beta_{Co} = \beta_0 + \beta_1 StRt + \beta_2 GDP + \beta_3 EPS + \epsilon \tag{4}$$

Where:

- $\beta_{Co}$  = Beta Coefficient i
- $\beta_{01}$  = the intercept of the regression model
- $StRt$  = Stock Return
- $GDP$  = Gross Domestic Product
- $EPS$  = Earnings Per Share

**6.2. Data Presentation**

The data sources are mainly from the Nigerian Stock Exchange (NSE) Fact Book, Annual Financial Reports of

some firms listed on the Nigerian Stock Exchange and data from Bureau of Statistics.

### 6.3. Descriptive Statistics

The Beta Coefficient can be interpreted as follows:

i.  $\beta = 1$ : Exactly as volatile as the market

ii.  $\beta > 1$ : More volatile than the market

iii.  $\beta < 1 > 0$ : Less volatile than the market

iv.  $\beta = 0$ : Uncorrelated to the market

v.  $\beta < 0$ : Negatively correlated to the market

## 7. Results

Twenty Five Companies were randomly selected and analyzed based on the availability of data. Table 1 shows the estimated beta coefficient for the companies and their volatility in relation to the market. The market beta is taking as 1.

*Table 1. Beta Coefficients and Volatilities of Selected Companies Listed on the Nigereian Stock Exchange*

S/N	Company	Beta	Volatility	Interpretation
1	First Bank of Nig. Plc.	0.89	(0.11)	Less Volatile than the Market
2	Guaranty Trust Bank	0.57	(0.43)	Less Volatile than the Market
3	United Bank for Africa	1.18	0.18	More Volatile than the Market
4	Union Bank Plc.	0.82	(0.18)	Less Volatile than the Market
5	Ashaka Cement Plc.	1.08	0.08	More Volatile than the Market
6	Dangote Cement	1.08	0.08	More Volatile than the Market
7	Guinness Nig. Plc.	0.91	(0.09)	Less Volatile than the Market
8	Nigerian Breweries	0.89	(0.11)	Less Volatile than the Market
9	Berger Paint Nig. Plc.	0.57	(0.43)	Less Volatile than the Market
10	Chemical and Allied Products	0.83	(0.17)	Less Volatile than the Market
11	UAC of Nig. Plc.	0.76	(0.24)	Less Volatile than the Market
12	Julius Berger Nig. Plc.	0.73	(0.27)	Less Volatile than the Market
13	Seven Up iBottling Company	0.77	(0.23)	Less Volatile than the Market
14	Cadbury Nig. Plc.	0.61	(0.39)	Less Volatile than the Market
15	Flour Mills Nig. Plc	1.05	0.05	More Volatile than the Market
16	Northern Nig. Flour Mill Plc.	1.07	0.07	More Volatile than the Market
17	Nestle Nig. Plc	0.80	(0.20)	Less Volatile than the Market
18	Nigerian Bottling Company Plc.	0.62	(0.38)	Less Volatile than the Market
19	Vitafoam Nig. Plc	0.21	(0.79)	Less Volatile than the Market
20	Niger Insurance Company Plc.	0.36	(0.64)	Less Volatile than the Market
21	Royal Exchange Assurance Plc.	0.18	(0.82)	Less Volatile than the Market
22	Mobil Oil Nig. Plc.	0.58	(0.42)	Less Volatile than the Market
23	Total (Nig) Plc.	0.43	(0.57)	Less Volatile than the Market
24	Longman Nig. Plc.	0.80	(0.20)	Less Volatile than the Market
25	University Press Plc.	0.45	(0.55)	Less Volatile than the Market

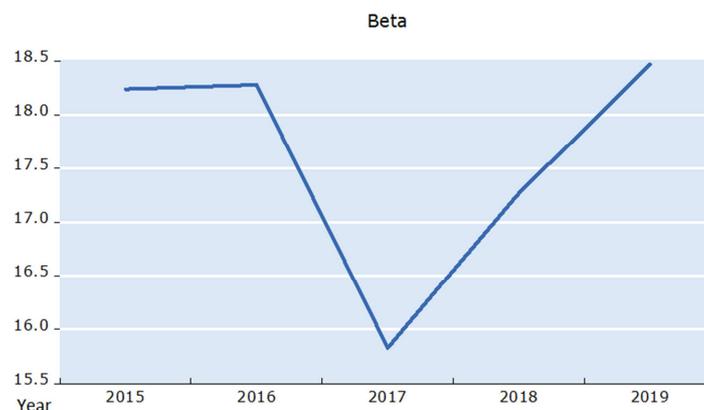
Source: Author's Computations, 2020

The table shows that among the 25 selected companies, beta coefficients of United Bank for Africa, Ashaka Cement Plc, Dangote Cement, Flour Mills Nig. Plc, and Northern Nig. Flour Mill Plc are more volatile than the market; while the other 20 companies' beta coefficients are less volatile than the market.

Graphical Representation

### Time Series Plot of Firms Beta

The above graph shows that the selected companies listed on the Nigereian Stock Exchange have 18.24% Beta Coefficients in 2015, an increased of 18.28% in 2016, a decreased of 15.83% in 2017, an increase of 17.27% in 2018, and an increase of 18.47% in 2019.



*Figure 1. Time Series Plot of Listed Nigerian Firms' Beta Coefficient.*



Figure 2. Time Series Plot of Listed Nigerian Firms’ Earnings Per Share.

The above graph shows that the selected companies listed on the Nigerian Stock Exchange have ₦237.44 Earnings per Share in 2015, an increase of ₦255.09 in 2016, a decrease of ₦235.55 in 2017, an increase of ₦240.09 in 2018, and an increase of ₦235.02 in 2019.

In this study, the author examines the relationship that exists between firm’s beta (Beta Coefficient) and two dependent variables (Firm’s Stock Return and Gross Domestic Product). A sample size of 25 listed manufacturing firms on the Nigerian

Stock Exchange (NSE) between 2017 and 2019 was used. The method of analysis is linear regression analysis.

This study has established that Beta Coefficient has a significant effect on the Stock Return of Firms Listed on the Nigerian Stock Exchange. Also, that Beta Coefficient has no any significant effect on the Nigerian Economy Growth.

Hypothesis I: ‘There is no significant relationship between nature of beta and quoted stocks in the Nigerian Stock Market’.

Table 2. P-Value for Ho<sub>1</sub>

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.495198	3.591998	-0.137862	0.8991
RETURN	0.093184	0.018455	5.049344	0.0150
R-squared	0.894722	Mean dependent var		17.61800
Adjusted R-squared	0.859629	S. D. dependent var		1.103300
S. E. of regression	0.413364	Akaike info criterion		1.360197
Sum squared resid	0.512609	Schwarz criterion		1.203972
Log likelihood	-1.400493	Hannan-Quinn criter.		0.940905
F-statistic	25.49588	Durbin-Watson stat		1.984250
Prob (F-statistic)	0.014983			

Dependent Variable: BETA  
 Method: Least Squares  
 Date: 04/30/20 Time: 16: 53  
 Sample: 2015 2019  
 Included observations: 5  
 Source: Compilation of the author, based on the analysis results using Eviews

The R-square value is 0.89; it means that the model has successfully predicted the variables. This implies that 89% changes in the firms’ Stock Returns are explained by the changes in Beta Coefficients of the firms. The value of 86% of the Adjusted R-squared value indicates that there is a strong relationship between the firms’ Stock Return and Beta Coefficient. Finally, the P-value (Probability F-statistic) is

0.014983, less than 0.05. We therefore, reject the null hypothesis and conclude that there is significant relationship between nature of beta and quoted stocks in the Nigerian Stock Market.

Hypothesis II: ‘There is no significant relationship between the application of betas and the benefits of betas in the development of Nigerian Stock Market’.

Table 3. P-Value for Ho<sub>2</sub>.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	196.9299	72.54149	2.714721	0.0729
BETA_COEFFICIENT__	2.480875	4.111021	0.603469	0.5888
R-squared	0.108251	Mean dependent var		240.6380
Adjusted R-squared	-0.188999	S. D. dependent var		8.319217
S. E. of regression	9.071375	Akaike info criterion		7.537299
Sum squared resid	246.8695	Schwarz criterion		7.381074
Log likelihood	-16.84325	Hannan-Quinn criter.		7.118007

Variable	Coefficient	Std. Error	t-Statistic	Prob.
F-statistic	0.364175	Durbin-Watson stat		2.247916
Prob (F-statistic)	0.588771			

Dependent Variable: EARNINGS\_PER\_SHARE

Method: Least Squares

Date: 05/06/20 Time: 10: 56

Sample: 2015 2019

Included observations: 5

Source: Compilation of the author, based on the analysis results using Eviews

The R-square value is 0.11; it means that the model has not successfully predicted the variables. This implies that 11% changes in the firms' Gross Domestic Product are explained by the changes in Beta Coefficients of the firms. The value of -19% of the Adjusted R-squared value indicates that there is a weak and a negative relationship between the firms' Earnings per Share and Beta Coefficient. Finally, the P-value (Probability F-

statistic) is 0.588771, greater than 0.05. We therefore, accept the null hypothesis and conclude that there is no significant relationship between the application of betas and the benefits of betas in the development of Nigerian Stock Market'

Hypothesis III:

'There is no significant relationship between the estimated betas and investors's wealth on the Nigerian Stock market.

Table 4. P-Value for  $H_{O3}$

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	18.11116	5.583204	3.243865	0.0477
GDP	-0.004761	0.053622	-0.088792	0.9348
R-squared	0.002621	Mean dependent var		17.61800
Adjusted R-squared	-0.329838	S. D. dependent var		1.103300
S. E. of regression	1.272310	Akaike info criterion		3.608720
Sum squared resid	4.856318	Schwarz criterion		3.452495
Log likelihood	-7.021799	Hannan-Quinn criter.		3.189428
F-statistic	0.007884	Durbin-Watson stat		1.964216
Prob (F-statistic)	0.934843			

Dependent Variable: BETA

Method: Least Squares

Date: 04/30/20 Time: 16: 53

Sample: 2015 2019

Included observations: 5

Source: Compilation of the author, based on the analysis results using Eviews

The R-square value is 0.002; it means that the model has not successfully predicted the variables. This implies that 0.00% changes in the firms' Gross Domestic Product are explained by the changes in Beta Coefficients of the firms. The value of -33% of the Adjusted R-squared value indicates that there is a weak and a negative relationship between the firms' Beta Coefficient and Gross Domestic Product. Finally, the P-value (Probability F-statistic) is 0.934843, greater than 0.05. We therefore, accept the null hypothesis and conclude that There is no significant relationship between the estimated betas and investors's wealth on the Nigerian Stock market.

using monthly data on returns for the period of April 1996 to march 2000. Large and well established enterprises are in a privileged position because they can make investment from retained earnings and bank borrowings, while new companies do not have easy access to finance. Without being subjected to the scrutiny of the stock market, big firms get bigger and for the emerging smaller companies, retained earnings and fresh cash injections from the controlling shareholders may not be able to keep pace with the needs for more equity financing which only an organized market place could provide (Popoola, 2014).

## 8. Discussion of Findings

The study established that 89% changes in the firms' Stock Returns are explained by the changes in Beta Coefficients of the firms. The study also indicated that there is a strong relationship between the firms' Stock Return and Beta Coefficient. Finally, the study established that Beta Coefficient has a significant effect on the Stock Return of Firms Listed on the Nigerian Stock Exchange. However, these results are consistent with the study conducted by Porter and Ezze [10] who investigated the stability of beta

## 9. Conclusion

It is important to know the risk-return characteristics of quoted firms such as Guaranty Trust Bank, Ashaka Cement, Dangote Cement, Flour Mills Nigeria plc and Northern Nigeria Flour Mills plc have higher risk (beta) of investment than the other stocks meaning they are more volatile than the market and the other stocks that have beta value less than one (1), hence higher expected returns. The firms with betas greater than 1 are referred to as aggressive companies while those with betas less than 1 are referred to as defensive

companies.

Regression Analysis was used to determine the beta of the stocks. The stock returns were considered as dependent variables and are the Y – variables, while all share index was considered as the market return (the independent variables) and are X – variables. The outcome was subsequently presented and analysed.

## 10. Recommendations

- i. Stocks' Betas should be periodically estimated, particularly between two to three years, and made accessible to the Investors and other Stakeholders in order to aid in optimal investment decision making; especially for portfolio building.
- ii. Investors, portfolio managers and other investing stakeholders should develop investment strategies towards market and regularly review these strategies to make sure they are line with their business objectives.
- iii. Investors should invest in the Companies with higher risk such as Guanranty Trust Bank, Ashaka Cement, Dangote Cement, Flour Mills Nigeria plc and Northern Nigeria Flour Mills plc, in order to maximise their returns. This is because higher risk is synonymous to higher returns.

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