

## A STUDY OF INTERDEPENDENCY OF SOME STOCK MARKET INDICATORS ON MARKET CAPITALIZATION IN THE NIGERIAN STOCK EXCHANGE

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### ABSTRACT

Data on growth in new issues and stock index performance were examined to ascertain their contribution to the growth of market capitalization (dependent variable) between 1996 and 2005. The computation was done with the aid of Statistical Package for Social Sciences (SPSS) and the test on the overall regression estimates was significant at 5% ( $\alpha = 0.05$ ). The multiple regression fitted with sampled data showed that stock index contributed higher value than new issues to the growth of market capitalization. Positive and high partial correlation coefficients were also observed between the variables but low partial correlation was observed in respect of new issues and stock index.

### 1. Introduction

In today's global business and economic environment, vast amount of statistical information are available. The most successful government, managers and decision makers are the ones who give priority and invest a great deal of their resources towards understanding the behaviors of data, utilizing them effectively for organizational goals. A sensitive and most emerging segment of the financial system; the capital market for instance, is worth examining. Specifically, the swing in stock prices (on secondary market) and the rate of expansion in the new issuance of securities are apparently recurring activities linked to the growth of the total market value (NSE, 2005).

This calls for a substantive statistical investigation to establish the contribution, if it exists; and to what degree the new issues and stock index are related to the market capitalization. (Allen et al, 2000) opined that capital market is the market that facilitates the mobilization and allocation of long-term funds for sustenance and development of industries and government programmes.

Applications of data analysis and statistical methodology are an integral part of organizations. Modern business have more need to predict future operations than did those of past, when business were smaller. Small-business managers can often solve problems simply through personal contact but managers in large corporations, however, have to deal with problems incorporating interactive elements or constraints or variables with distinct attributes (Walpole and Myers, 1993).

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Draper and Smith (1981) reported that managerial decisions are often based on the relationship between two or more variables. For example, after considering the relationship between advertising expenditures and sales, a marketing manager might attempt to predict sales for a given level of expenditure. Areas of business that adopt statistical methods and techniques include industries (Quality Control), trend analysis and forecasting (Econometrics), counting of individuals (Demography) and so on (Myers, 1990).

The capital market is divided into the primary and secondary market. The stock exchange is the secondary type of the market. The primary market, also known as the new issues market, is the segment of the market that facilitates the actual issuance of new securities while the secondary market is often described as the re-sale segment of the market; the market facilitates transfer of already existing securities. On the other hand, the securities in the two markets may be either bonds or equities. Bonds are facilities for raising debts by corporate and government while equities confer ownership rights of a company on the holders (Anderson et al, 1996).

The strength and worth of a particular stock market is measured by its total market capitalization. This in turn depends greatly on the amount of new securities created and variation in prices of the stock and bonds. The external business environments especially government reforms and policies influence greatly the creation of more securities in the market, and of course, the market forces of demand and supply as well as companies performances plays a vital role in determining the stock value at a point in time (NSE, 2005).

The Nigerian Stock Exchange (NSE) on regular bases publishes stock performance in terms of gains, stock index, market capitalization, price/earnings ratios and so on. These indicators are worth examining as the market shows great potentials. This paper considers the extent and the strength of the relationship between market capitalization, new issues and stock price index of the Nigerian Stock Exchange (NSE) between 1996 and 2005.

## 2. Aims And Objectives Of This Paper

The aim of this paper is to study the empirical assessment of regression and correlation on the contribution of new issues and stock index performance to the growth of total market capitalization between 1996 and 2005. The objectives are to:

- (i) fit a multiple regression model involving two independent variables (Stock Price Index on the NSE-  $X_1$  and value of New Securities floated in the primary market -  $X_2$ ) and a dependent variable (Total Market Capitalization -  $Y$ ).
- (ii) ascertain the degree of correlation between Total Market Capitalization, New Issues and Stock Index.
- (iii) ascertain the significant of the overall estimated regression parameters using Analysis of Variance (ANOVA).

### 3. Estimate Of Multiple Regression Model

The regression estimate involving two independent variables  $x_1$  and  $x_2$  is given by equation (1):

$$\hat{y} = b_0 + b_1x_1 + b_2x_2 \quad (1)$$

By illustration, the value of the total market capitalization ( $y$ ) is dependent on the number of new issues ( $x_1$ ) created and stock index ( $x_2$ ) obtained. That is;

$$y = f(x_1, x_2) \quad (2)$$

For a multiple regression of the form given by equation (2), the least square criterion calls for minimisation of Sum of Square Error (Montgomery, 1991).

The Sum of Square Error (SSE) is given by equation (3):

$$SSE = \sum (y_i - b_0 - b_1x_{1i} - b_2x_{2i})^2 \quad (3)$$

To minimize (3), we take the partial derivatives and equate to zero as supported by Montgomery and Peck, (1992). We then solve for the estimated regression coefficients  $b_0$ ,  $b_1$  and  $b_2$ . We then have the following series of equations (4a-4c):

$$\sum y_i = nb_0 + (\sum x_{1i})b_1 + (\sum x_{2i})b_2 \quad (4a)$$

$$\sum x_{1i}y_i = (\sum x_{1i})b_0 + (\sum x_{1i}^2)b_1 + (\sum x_{1i}x_{2i})b_2 \quad (4b)$$

$$\sum x_{2i}y_i = (\sum x_{2i})b_0 + (\sum x_{1i}x_{2i})b_1 + (\sum x_{2i}^2)b_2 \quad (4c)$$

The coefficient of determination is used to measure the goodness of fit for the estimated regression model. The Sum of Square Total (SST) is partitioned into two: Sum of Square due to Regression (SSR) and Sum of Square due to Error (SSE) given in equations (5a), (5b) and (5c) respectively.

$$SST = \sum (y_i - \bar{y})^2 \quad (5a)$$

$$SSR = \sum (\hat{y}_i - \bar{y})^2 \quad (5b)$$

$$SSE = \sum (y_i - \hat{y}_i)^2 \quad (5c)$$

The multiple coefficient of determination, denoted as  $R^2$  and given by equation (6) is the proportion of the variability in the dependent variable that can be explained by the estimated multiple regression equation.  $R^2$  multiplied by 100 is interpreted as the percentage of variability.

$$R^2 = SSR/SST \quad (6)$$

To determine the adequacy of regression model, we used both overall significant test (ascertaining all set of predictor variables) and individual significant test (ascertaining the contribution of individual predictor variables). To do this, we used  $F$ -test statistic computed from Analysis of Variance (ANOVA) with the aid of Statistical Package for Social Sciences (SPSS) and the test significant level is 5 % ( $\alpha = 0.05$ ).

For this study, we have the following hypotheses:

$$H_0: \beta_1 = \beta_2 = 0$$

$$H_1: \text{at least one of } \beta_1 \text{ or } \beta_2 \neq 0$$

#### 4. Summary Of Estimates

The estimates obtained with the aid of Statistical Package for Social Sciences (SPSS) are presented in tables 1-3 for model, coefficient and analysis of variance respectively:

Table 1: Model Summary

| Model | R    | R Square | Adjusted R Square | Std. Error of The Estimate |
|-------|------|----------|-------------------|----------------------------|
| 1     | .995 | .989     | .986              | 12.47418                   |

a Predictors: (Constant), X2, X1

Table 2 : Coefficients

| Mode 1       | Unstandardized Coefficients |            | Standardized Coefficients | t     |            | Sig. |
|--------------|-----------------------------|------------|---------------------------|-------|------------|------|
|              | B                           | Std. Error | Beta                      | B     | Std. Error |      |
| 1 (Constant) | 20.502                      | 46.970     |                           | .437  |            | .014 |
| X1           | .170                        | .059       | .378                      | 2.890 |            | .023 |
| X2           | .908                        | .189       | .628                      | 4.806 |            | .002 |

a Dependent Variable: Y

Table 3 : Analysis Of Variance (ANOVA)

| Mode 1       | Sum of Squares | Df | Mean Square | F       | Sig. |
|--------------|----------------|----|-------------|---------|------|
| 1 Regression | 100414.366     | 2  | 50207.183   | 322.657 | .000 |
| Residual     | 1089.237       | 7  | 155.605     |         |      |
| Total        | 101503.603     | 9  |             |         |      |

a Predictors: (Constant), X2, X1

b Dependent Variable: Y

Table 4 : Correlations

| Control Variables |    |                         | X1    | X2    | Y     |
|-------------------|----|-------------------------|-------|-------|-------|
| Year              | X1 | Correlation             | 1.000 | .618  | .712  |
|                   |    | Significance (2-tailed) | .     | .076  | .031  |
|                   |    | Df                      | 0     | 7     | 7     |
|                   | X2 | Correlation             | .618  | 1.000 | .937  |
|                   |    | Significance (2-tailed) | .076  | .     | .000  |
|                   |    | Df                      | 7     | 0     | 7     |
|                   | Y  | Correlation             | .712  | .937  | 1.000 |
|                   |    | Significance (2-tailed) | .031  | .000  | .     |
|                   |    | Df                      | 7     | 7     | 0     |

## 5. Results

From the estimates obtained in tables 1-4 above, the multiple coefficient of determination ( $R^2$ ) is:

$$R^2 = .989 \text{ (98.9\%)} \quad (7)$$

The estimate of  $Y$  is:

$$\hat{Y} = 20.502 + 0.170X_1 + 0.908X_2 \quad (8)$$

Also, the  $P$ -value is:

$$P\text{-value} = 0.000 \quad (9)$$

And the partial correlations are given in table 4

## 6. Discussion Of Results

From the results above, we observed that the proportion of the variability in the dependent variable explained by the estimated multiple regression model given in equation (8) is 0.989 (i.e. 98.9%). The multiple regression fitted shows that the second independent variable  $X_2$  (stock index) contributes higher to the value of Predictor  $Y$  (market capitalization) given its positive coefficient value of 0.908 while variable  $X_1$  (new issues) increases the growth in market capitalization with 0.170.

Similarly, the partial coefficients of correlation obtained in table 4 supported by Mohammed (2007) suggested a positive and high correlation between new issues and market capitalization (0.712), positive correlation of 0.618 between new issues and stock index while the strength of relationship between stock index and market capitalization was 0.937. The test on the overall coefficients of regression carried out was significant ( $p\text{-value} = 0.000 < \alpha = 0.05$ ). We reject  $H_0$  and conclude that the value of market capitalization is significantly related to new issues and stock index.

### Conclusion And Recommendations

Round the globe, a shift to a capital market base economy from a money market one is intensifying. To sustain and strengthen the current pace of the Nigeria capital market, continuous assessment and exploration of every element (parameter) and structure are essential. This paper considered the contributions of both new issues and stock index to the growth of market capitalization. Consequently, a multiple regression model (involving these two independent variables) was obtained for the attainment of a more accurate and reliable projection and estimates.

Hence, this work is recommended to professionals in capital market, stakeholders, government and corporate individuals to strengthen the nation's planning and budgeting processes by aligning numerical inferential findings with empirical evidence.

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