

Factor Analysis on the variability of the Nigerian Stock Market

Bilesanmi A. O.¹, Ekwueme, O. G.² and Aronu, C. O.^{3*}

¹Department of General Studies,
Petroleum Training Institute, Effurun-Delta State, Nigeria

²Department of Industrial Production Engineering,
Nnamdi Azikiwe University, Awka, Anambra State, Nigeria

³Department of Statistics,
Chukwuemeka Odumegwu Ojukwu University, Anambra State, Nigeria

*Email of Corresponding Author: amaro4baya@yahoo.com

DOI: 10.31364/SCIRJ/v7.i11.2019.P1119721

<http://dx.doi.org/10.31364/SCIRJ/v7.i11.2019.P1119721>

Abstract: This study focused on using factor analysis in determining the variability of the Nigerian Stock Exchange Market. The study used secondary data sourced from daily official list of the Nigeria Stock Exchange (NSE). The data comprises of monthly stock rates of returns of the Nigerian Stock Exchange daily official list for the period of January, 2015 - December 2017. The objective of the study was to identify the companies that contribute to the variability of the Nigeria Stock Exchange within the period 2015-2017. The findings of the study showed that that five factors can be retained since their Eigen values were larger than 1 and they were able to explain about 89.71% of total variability in the model. It was further found that listed companies that explain over 50% of the variability attributed to the model were in the following order dangsugar, dnmeyer, fcmb, oando, cadbury, fidelitybk, transcorp, guaranty, diamondbnk, flourmill, livestock, abbeybds, conoil, glaxosmith, academy, zenithbank, jberger, uba, dangflour, skyebank, access, Sevenup, guinness, aiico, maybaker, unilever, sterlnbank, mrs, total, unitybnk, dangcem, abctrans, mobil, studpress, pz, and wemabank. This result implies that wemabank was the least performer with about 63.18% while dansugar performed better within the observed period. Based on the findings of the study, potential investors are advised to invest in companies such as dansugar since it was found to be the best in determining the variability in the Nigerian Stock Exchange Market within the scope of the present study.

Keywords: Eigen value, Factors Analysis, Nigeria Stock Exchange, Maximum Likelihood Analysis

1. Introduction

The Nigerian capital market has been developed for the purpose of acquiring and selling shares in the market. Government and its parastatals have overtime put effort in reducing the level of such economic unit and this has brought about a significant boast and public-image recognition to most companies in the market. The resultant of investment in the capital market is that when fully consumed it leads to cash flow in the form of cost of capital to the public or tax the government.

The Nigerian Stock Exchange (NSE) is a highly organized institution that trades stocks and shares. Hence through stocks, stocks and debentures, companies could raise capital. To be listed on the Nigerian stock exchange, a company must meet the minimum requirements of the NSE (the Exchange), in addition to complying with the stock exchange listing rules, comply with the relevant provisions of the 2004 Securities Act., the Investments and Securities Act 1999, the rules and regulations set out therein and other relevant legal requirements (Iliemena and Goodluck, 2019).

Capital market instruments can be classified into 3 main groups of securities which include: preferred shares, common stocks and debt securities. Other key players in the Nigerian market comprises of securities brokers, investment advisers, issuers, registrars, fund managers, financial advisers, and others. The Nigerian Stock Exchange is the focal point of the Nigerian capital market. It provides a mechanism for mobilizing private and public savings and making these funds available for productive purposes. The objective of the present study is to identify the companies that contribute to the variability of the Nigeria Stock Exchange within the period 2015-2017.

2. Literature Review

Obubu *et al.* (2016) considered the contribution of Nigerian Stock Market on Economic Growth. The study employed the regression analysis and ordinary least square technique in analysing the data obtained for the study. The findings of the study revealed presence of a positive relationship between economic growth, all share index and market capitalization with a strong coefficient of determination value (99.1%) and this indicate that economic growth in Nigeria is adequately explained by the regression model.

Study by Mukail *et al.* (2019) considered pooled data from the Factbooks of the Nigerian Stock Market and the Annual Reports across different industries from 1990 to 2016 in assessing the growth of investment in the Nigerian Stock market. The tools used in the analysis of the data obtained for the study include: descriptive methods and Arellano and Generalized Methods of Moment (GMM) xtabond2. The findings showed that the Value Portfolio over-performed the Growth Portfolio in terms of returns in the NSE.

Iliemena and Goodluck (2019) examined the effect of delisting on the performance of the Nigerian Stock Exchange (NSE) with focus on evaluating the effect of delisting on market capitalization, Stock Traded and All Share Index as market performance indices. The secondary data collected for the study were analysed using simple linear regressions analysis. The findings of the study revealed that delisting has significant impact on market capitalization and stock traded. Also, it was found that delisting has insignificant effect on all share indexes.

Abina and Lemea (2019) investigated the performance of capital market on the Nigeria economy. The study employed secondary data sourced from Central Bank of Nigeria Statistical Bulletin from 1985 to 2017. The variables considered in the study include: Gross Domestic Product (GDP), Total Market Capitalization (TMCAP), Total Value of New Issues (TVNI), All Share Index (ASI), Total Volume of Transactions (TVSI) and Value of Government Bonds (VGBC). The tools used for analysing the data comprises if Stationarity, Johansen Co-integration, Error correction and Granger Causality. The findings of the study showed that there exist a long positive association among the variables. Findings from the Granger Causality test revealed the presence two significant unidirectional causalities flowing from gross domestic product to total market capitalization and to total value of new issues respectively.

3. Methods and Material

3.1 Method of Data collection

The data used in this study is secondary data from daily official list of the Nigeria Stock Exchange (NSE). This data comprises of monthly stock rates of returns of the Nigerian Stock Exchange daily official list for the period of January, 2015 - December 2017. In addition, data on daily market price of stock for 37 companies were obtained out of a total of 43 listed companies. Six companies were excluded because they have constant market price for the three years period under study.

3.2 Factor Analysis

Factor analysis (FA) is a class of multivariate statistical analysis whose main objective is to reduce the dimensionality of a given data and help the interpretation of the variability in the data of interest. This tool is very useful in solving the problem of determining the correlation between a large number of variables and then explaining these variables in terms of common underlying factors. The factor analysis method concerns the correlations between a large volume of quantitative variables. It reduces the number of primary variables by calculating a smaller number of new variables, called factors. This reduction is achieved by grouping the variables into factors, which means that each variable in each factor is closely correlated and the variables belonging to different factors are less correlated (Hair *et al.*, 2010).

In the area of factors calculation, the maximum likelihood analysis (MLA) is one of the popular techniques employed in the extraction of adequate factors for the model.

3.2.1 The Maximum Likelihood Analysis

Maximum likelihood analysis is a statistical tool that can be used to estimate the parameters of a given statistic by making known maximum likelihood distribution. It can also provide estimators that have both a reasonable intuitive basis and many desirable statistical properties. Indeed, once a maximum likelihood estimator is derived; the general theory of maximum likelihood estimation provides standard errors, statistical tests, and other useful results for statistical inference. A maximum likelihood estimator is a measure of the parameter such that the likelihood function is maximal.

4. Data Analysis and Results

4.1 Maximum Likelihood Analysis result for the listed Companies

Table 1: Table showing the Eigen Values and Cumulative Proportion

Factor analysis/correlation		Number of obs	=	248
Method: maximum likelihood		Retained factors	=	5
Rotation: (unrotated)		Number of params	=	390
		Schwarz's BIC	=	2899.57
Log likelihood = -374.6668		(Akaike's) AIC	=	1529.33
Factor	Eigenvalue	Difference	Proportion	Cumulative
Factor1	3.97956	-12.7973	0.1217	0.1217
Factor2	16.77686	10.7267	0.5131	0.6349
Factor3	6.05016	4.70068	0.1851	0.8199
Factor4	1.34948	0.17558	0.0413	0.8612
Factor5	1.1739	0.24984	0.0359	0.8971
Factor6	0.92406	0.27346	0.0283	0.9254
Factor7	0.65061	0.24589	0.0199	0.9453
Factor8	0.40471	0.04491	0.0124	0.9576
Factor9	0.35981	0.04434	0.011	0.9686
Factor10	0.31547	0.05436	0.0096	0.9783
Factor11	0.2611	-0.02181	0.008	0.9863
Factor12	0.28291	0.1169	0.0087	0.9949
Factor13	0.16601	.	0.0051	1

Result obtained in table 1 displayed the Eigen values and the proportions of the explained variance. It was found that five factors can be retained since their Eigen values were larger than 1 and they were able to explain about 89.71% of total variability in the model.

Table 2: Table showing the Factor loadings (pattern matrix) and unique variances

Variable	Factor1	Factor2	Factor3	Factor4	Factor5	Uniqueness
Sevenup	0.0201	-0.5917	0.6626	0.3175	0.1118	0.0706
abbeybds	0.0198	0.591	-0.657	-0.3781	-0.0254	0.0324
abctrans	0.2924	0.6065	0.1519	-0.1141	0.3545	0.2223
academy	-0.0123	0.8482	-0.4574	0.0567	-0.1291	0.0414
access	0.4317	0.7484	-0.1073	-0.2542	0.0764	0.0569
zenithbank	0.5104	0.7008	0.2576	-0.2379	0.0699	0.0432
wemabank	0.3797	0.2192	0.1707	-0.2361	0.4204	0.3682
unitybnk	0.0662	0.2208	0.7211	0.3144	0.0004	0.1561
unilever	0.4153	-0.1346	0.6456	-0.0067	0.1944	0.1153

uba	0.3797	0.5799	0.621	-0.1019	0.1261	0.0495
total	0.4565	0.385	0.5083	-0.058	-0.2763	0.1304
sterlnbank	-0.0334	0.616	-0.5784	0.0462	0.1858	0.1266
studpress	0.1794	0.4325	-0.066	0.3547	0.2594	0.279
transcorp	0.2457	0.9183	-0.1189	0.0446	0.1514	0.0216
skyebank	0.4129	0.7268	0.197	0.1523	0.3222	0.0556
pz	0.1278	0.3966	0.2817	0.2972	-0.3398	0.3032
oando	0.2077	0.9534	-0.0217	0.1265	0.0588	0.017
mrs	-0.2918	0.6453	-0.3813	-0.031	0.2013	0.1295
mobil	0.1785	0.6107	-0.0424	0.2142	0.0416	0.2701
maybaker	0.1985	0.9118	-0.0425	-0.0217	0.045	0.1073
livestock	0.2285	0.94	-0.0818	0.0688	0.0125	0.0321
jberger	0.1809	0.8365	0.2952	0.1212	-0.0628	0.0456
guinness	0.408	0.4564	0.5496	0.0243	0.325	0.0857
guaranty	0.5013	0.5839	0.565	-0.0074	0.0916	0.0229
glaxosmith	0.2958	0.7892	0.1841	-0.3354	-0.2196	0.0393
flourmill	0.0757	0.934	-0.2136	0.093	-0.0875	0.0306
fidelitybk	0.4388	0.5824	0.6033	-0.236	-0.0019	0.0186
fcmb	0.4083	0.7358	0.4726	-0.001	-0.1286	0.0148
dnmeyer	0.0555	0.8187	-0.5285	-0.0594	0.0786	0.0143
diamondbnk	0.1616	0.9515	-0.0197	0.0954	0.0873	0.0289
dangsugar	1	0	0	0	0	0
dangflour	0.2489	0.9082	0.0264	-0.0214	0.0199	0.0504
dangcem	0.2842	0.3464	0.6705	0.197	0.0253	0.1649
conoil	0.0443	0.8538	0.1945	0.2958	-0.2615	0.0375
cadbury	0.0432	0.9342	-0.2608	0.1191	-0.1351	0.0174
aiico	0.4022	0.2902	0.6488	-0.3803	-0.1312	0.1062

The result obtained in table 2 revealed that the listed companies that explain over 50% of the variability attributed to the model were in the following order dangsugar, dnmeyer, fcmb, oando, cadbury, fidelitybk, transcorp, guaranty, diamondbnk, flourmill, livestock, abbeybds, conoil, glaxosmith, academy, zenithbank, jberger, uba, dangflour, skyebank, access, Sevenup, guinness, aiico, maybaker, unilever, sterlnbank, mrs, total, unitybnk, dangcem, abctrans, mobil, studpress, pz, and wemabank with corresponding uniqueness values of 0.0, 0.0143, 0.0148, 0.017, 0.0174, 0.0186, 0.0216, 0.0229, 0.0289, 0.0306, 0.0321, 0.0324, 0.0375, 0.0393, 0.0414, 0.0432, 0.0456, 0.0495, 0.0504, 0.0556, 0.0569, 0.0706, 0.0857, 0.1062, 0.1073, 0.1153, 0.1266, 0.1295, 0.1304, 0.1561, 0.1649, 0.2223, 0.2701, 0.279, 0.3032, and 0.3682. This result implies that all the variables were able to explain over 50% of total variability in the model with wemabank recording the least performer with about 63.18% while dansugar recorded the better performing company within the observed period.

Conclusion

This study focused on using factor analysis in determining the variability of the Nigerian Stock Exchange Market. The findings of the study showed that that five factors can be retained since their Eigen values were larger than 1 and they were able to explain about 89.71% of total variability in the model.

It was further found that listed companies that explain over 50% of the variability attributed to the model were in the following order dansugar, dnmeier, fcmb, oando, cadbury, fidelitybk, transcorp, guaranty, diamondbnk, flourmill, livestock, abbeybds, conoil, glaxosmith, academy, zenithbank, jberger, uba, dangflour, skyebank, access, Sevenup, guinness, aiico, maybaker, unilever, sterlnbank, mrs, total, unitybnk, dangcem, abctrans, mobil, studpress, pz, and wemabank. This result implies that wemabank was the least performer with about 63.18% while dansugar performed better within the observed period. Based on the findings of the study, potential investors are advised to invest in companies such as dansugar since it was found to be the best in determining the variability in the Nigerian Stock Exchange Market within the scope of the present study.

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