The Impact of Macroeconomic Variables on All Share Index on the Nigerian Stock Exchange

Alayemi, Sunday Adebayo

Faculty of Business and Social Sciences, Department of Accounting, Adeleke University, Ede. Osun State, Nigeria.

*Corresponding Author

Alayemi, Sunday Adebayo Ph.D
Faculty of Business and Social Sciences, Department of Accounting, Adeleke University, Ede. Osun State, Nigeria.
E-mail: alayemisa@yahoo.com

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Unit root,
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1. Introduction

The Nigerian Stock Exchange was founded in 1960 as the Lagos Stock Exchange. It started operations in Lagos in 1961 having 19 securities listed for trading. In December 1977 it became metamorphosed into The Nigerian Stock Exchange, with branches established in some of the major commercial cities of the country. The Exchange maintains an All-Share Index formulated in January 1984 (January 3, 1984 = 100). Only common stocks (ordinary shares) are included in the computation of the index. The index is value-weighted and is computed daily. The highest value of 66,371.20 was recorded on March 2, 2008. Also, The Exchange has introduced the NSE-30 Index, which is a sample-based capitalization-weighted index plus four sectorial indices. Similarly, five sectorial indices have been introduced to complement existing indices. These are NSE-Food/Beverages Index (Later renamed NSE – Consumer Goods Index) NSE Banking Index, NSE Insurance Index, NSE Industrial Index and NSE Oil/Gas Index [1].

A market index is a statistical parameter to reflect the composite value of a market characteristic. When it is the price, we have a price index, which is an attempt to represent the overall price performance of the market with one statistic - the index value. In effect, the index is calculated in a way that makes it generally representative of the market. In all cases, effort is made to use a basis that best achieves the intended purpose. Usually, that entails some weighting of the individual components. If, for instance, we sum up the prices of all stocks, that will produce a statistic. However, that will not reflect the strength of each company. A weighting with market capitalisation would produce a capitalisation-weighted index that reflects company capitalization [1].

The performance of the stock market is therefore a reflection of the macroeconomic policy adopted by the government to drive the economy. Mostly, these economic variables are exchange rate, inflation rate, interest on saving, lending interest rate, unemployment rate and gross domestic product, the policy adopted as far as these macroeconomic variables are concerned are believed to drive the economy and as a consequence influence the operation of the market and hence, the performance of the all share index. Therefore, the common characteristic of all stock market is uncertainty. This uncertainty is related to both short and long term future state. However, this is undesirable for the investors but it is not avoidable whenever the stock market is chosen as the investment tool.

The main proposition of this study is to examine the impact of macroeconomic variables on all share indexes on the Nigerian Stock Exchange, from this main proposition four hypotheses were formulated to realize the objective of the study.

Statement of hypotheses

There are four (4) main hypotheses which are stated in null form

H0: Exchange rate does not cause all share index to rise
H1: Exchange rate does cause all share index to rise

H0: Inflation rate and all share index has no relationship
H1: Inflation rate and all share index has relationship

H0: Interest on saving does not cause all share index to raise
H1: Interest on saving does cause all share index to raise

H0: Lending interest rate and all share indexes has no relationship
H1: Lending interest rate and all share indexes has relationship

H0: Unemployment rate does not cause all share index to rise
H1: Unemployment rate does cause all share index to rise

H0: Gross Domestic Product and all share index has no relationship

2. Literature review

This section is divided into two: theoretical and appraisal of literature.

2.1 Theoretical framework

As far as the behaviour of stock prices is concerned, there are several schools of thought which offered theoretical explanations. The following are some of them: the fundamentalist school, the technical school, the random walk hypothesis school and the microeconomic hypothesis school [2].

The fundamentalist school of thought opined that the determinant of a company's stock value is the expected future earning as well as the discounting rate associated with the future earnings. On the other hand, the technical school of thought offered stiff opposition to the proposition of the view of the fundamentalist school of thought. The argument of this school of thought is based on the premises that stock prices tend to follow definite pattern and that each share is influenced by preceding prices, hence successive prices depend on each other. The random walk hypothesis is based on the assumption of market efficiency. This is based on the assumption that under the efficient market assumption, investors based on new information adjust security to reflect the new information made available in the stock market. Therefore, the theory is based on the assumption that stock prices are random and there is no chance for profitable speculation in the stock market. The macroeconomic school of thought argued that stock prices are sensitive to changes in macroeconomic variables.

2.2 Appraisal of literature

The study on the effects of macroeconomic variables as it affects stock returns dates back to the late 1970s. Then studies were concentrated on developed, emerging and both developed and emerging capital market [3].
In appraising the work of other researchers as it relates to this study, attention is firstly being given to the contribution of Nigerian researchers. Premium is placed on their contribution because Nigerian stock market is an emerging one. Thereafter, attention is directed to contribution of researchers from developed market.

A. Contribution from Nigerian researchers

The role and performance of the capital market [4]. The researcher used a disaggregated analysis to carry out investigation between exchange rate and stock prices fluctuations. The result showed that Naira depreciation through exchange rate increases stock prices.

The relationship between stock market and macroeconomic variables: an empirical analysis [5]. The author attempted to investigate the association between stock prices and macroeconomic variables such as exchange rate, inflation and interest rate. His findings revealed that macroeconomic variables cointegrated with stock prices are as a consequent related to stock prices.

Macroeconomic variables and stock prices. A multivariate analysis [6]. They made use of multiple regression as a mean of estimating functional association between money supply, inflation, interest rate, exchange rate and stock prices. The study revealed consistence in their findings with theoretical postulation and empirical findings as far as the relationship between stock prices and the macroeconomic variables in some countries. However, they discovered that the relationship between stock prices and inflation is at variance with some other researches outside Nigeria.

Stock market capitalization and interest rate in Nigeria: A time series analysis [7]. The investigation was carried out to study the relationship between stock market capitalization rate and interest rate. It was discovered that prevailing interest rate exerts positive influence on stock market capitalization. It was also found that government development stock rate has negative influence on stock market capitalization rate and prevailing interest rate influenced government development stock rate negatively.

The impact of macroeconomic indicators on stock prices in Nigeria [8]. The study investigated the impact of macroeconomic indicators on stock prices in Nigeria. The pooled or panel model was employed. The findings revealed of the investigation showed that macroeconomic variables have a varying degree of impact on stock prices of individual firms in Nigeria. Aside inflation rate and money supply, all other economic variables have significant impact on stock prices in Nigeria.

The relationship between macroeconomic variables and stock market index in Nigeria [9]. The study tried to show the relative influence of macroeconomic variables on the all share index of the Nigerian capital market. The major finding is that macro-economic variables influence stock market index in Nigeria.

The extent of relationship between stock market capitalization and performance on the Nigerian economy [10]. The result of the study revealed that there is a strong association between stock market capitalization and performance on the Nigerian economy with 91% degree of relationship.

Macroeconomic variables and share price movements in Nigeria brewery industry: Evidence from Guinness Breweries plc. [11]. The study made use of Ordinary Least Square modeled inform of multiple regression to evaluate the level of relationship between the variables. The findings showed that there is positive and strong correlation between share price and real gross domestic product, as well as exchange rate on the other hand a weak and negative correlation is found between share price and interest rate. A strong and negative correlation exists between inflationary rate and share prices. The result indicated that that no causal relationship is indicated by Granger causality test in the short run.

Impact of macroeconomic factors on common stock returns: A study of listed manufacturing firms in Nigeria [12]. The study covered a period between1991-2003. Multiple regressions were employed to study the relationship between the dependent and independent variables of the study. The findings showed that none of the four independent variables namely, inflation rate, interest rate, exchange rate of domestic currency and gross national income studied on an individual basis exerts significant impact on the common stock returns of the sample of the study.

Multiple regressions on some selected macroeconomic variables on stock market returns from 1986-2010 [13]. In this investigation, multiple regressions were used to model the long term relationship between macroeconomic variables (inflation rate, interest rate and exchange rate) and stock prices (all shares index) in Nigeria. The result of the study revealed that only exchange rate was significant while interest rate and inflation rate were not significant in the determination of all share indices for the period under study. Conversely, the study showed that there was high a high correlation coefficient between all share index and macroeconomic variables.

B. Contributions from foreign researchers

Economic forces and the stock market [14]. This study that has its focus on USA revealed that future stock market returns could be forecasted by interpretation of some macroeconomic variables such as default spread, term spread, one month t-bill rate, industrial production growth rate and the dividend-price ratio.

Dynamic relations between macroeconomic variables and the Japanese stock market. An application of vector error correlation model [15] the findings detected cointegration among stock prices and the six macroeconomic variables (exchange rate, inflation rate, money supply, real economic activity, long-term investment bond rate and call money rate.

Macroeconomic factors do increase aggregate stock returns[16]. The study reevaluated the effect of some macroeconomic series on US stock. The study found out that among the macro economic variables, six out of it, namely, balance of trade, housing start, employment, consumer price index, money supply (M1) and producer price index affect stock returns. However, two popular measures of aggregate economic activity (real gross domestic product and industrial production) do not appear to be related with stock returns.

Macroeconomic variables effect on all share price index in Colombo stock exchange of Sri Lanka [3]. The study made use of four major macroeconomic variables namely, interest rate, exchange rate, inflation rate and money supply. The study revealed that, all share price index has a strong relationship with money supply and exchange rate.

Gap in the literature

From the available literature, most of the researchers concentrated on the influence of macroeconomic variables on stock returns. Similarly, some studies who carried out research on macroeconomic variables on stock market concentrated on one sector of the economy. Most of the analysis concentrated on regression analysis. This present study, however, considered every company quoted on the Nigerian Stock Exchange. to lend credence to the analysis as well, apart from multiple regressions analysis, stationary and unit root analysis was carried out to eliminate the error of autocorrelation so as to make the data reliable. The author is not aware of research where every company quoted on the Nigerian Stock Exchange was studied and where analysis combined regression and stationary and unit root.
4. Results

Under this section, the findings of the research in relation to the relationship between all share index and macroeconomic variables (Exchange rate, Inflation rate, Interest on saving, Lending interest rate, Unemployment rate and Gross domestic product). Table 1 showed correlation between each variable. However, emphasis is on the relationship of all the variables and all share index.

From the table, there is positive but weak correlation between ASI and exchange rate. This is an indication that when there is an increase in exchange rate, the ASI will increase accordingly and vice versa. In the same vein, there is a negative and very weak relationship between ASI and inflation rate. There is a negative but low correlation between ASI and interest on savings. Equally important, there is negative but weak relationship between ASI and lending interest rate.

The relationship between ASI and unemployment rate which is positive but weak one. Finally, there is positive but strong relationship between ASI and gross domestic product.

Table 1: Correlation

<table>
<thead>
<tr>
<th></th>
<th>ASI</th>
<th>EXR</th>
<th>INR</th>
<th>INS</th>
<th>LIR</th>
<th>UER</th>
<th>GDP</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASI</td>
<td>1.0000</td>
<td>0.58359</td>
<td>-0.224805</td>
<td>-0.541142</td>
<td>-0.312055</td>
<td>0.524167</td>
<td>0.783109</td>
</tr>
<tr>
<td>EXR</td>
<td>0.58359</td>
<td>1.00000</td>
<td>-0.185924</td>
<td>-0.709980</td>
<td>0.197466</td>
<td>0.914259</td>
<td>0.715553</td>
</tr>
<tr>
<td>INR</td>
<td>-0.224805</td>
<td>-0.185924</td>
<td>1.000000</td>
<td>0.642300</td>
<td>0.180069</td>
<td>0.180069</td>
<td>0.180069</td>
</tr>
<tr>
<td>INS</td>
<td>-0.541142</td>
<td>-0.709980</td>
<td>0.642300</td>
<td>1.000000</td>
<td>0.193805</td>
<td>-0.676193</td>
<td>-0.681432</td>
</tr>
<tr>
<td>LIR</td>
<td>-0.312055</td>
<td>0.197466</td>
<td>0.180069</td>
<td>0.193805</td>
<td>1.000000</td>
<td>0.094443</td>
<td>-0.278606</td>
</tr>
<tr>
<td>UER</td>
<td>0.524167</td>
<td>0.914259</td>
<td>0.180069</td>
<td>0.193805</td>
<td>1.000000</td>
<td>0.094443</td>
<td>0.793921</td>
</tr>
<tr>
<td>GDP</td>
<td>0.783109</td>
<td>0.713553</td>
<td>0.163922</td>
<td>-0.681432</td>
<td>-0.278606</td>
<td>0.793921</td>
<td>1.000000</td>
</tr>
</tbody>
</table>

From the table, the result is as follows: from the table only gross domestic product satisfied the criteria. This means if the test statistic < critical value (i.e. less than the negative value) it is only gross do. From Table 3, the relationship between ASI and lending interest rate. With test critical 4.56 (Exchange rate, Inflation rate, Interest on saving, Lending interest rate, Unemployment rate and Gross domestic product). Table 2 shows the significance of each variable in determining all share index and dependency of ASI on the considered variables.

Table 2: Coefficient

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>4477.51</td>
<td>26142.62</td>
<td>0.171273</td>
<td>0.8683</td>
</tr>
<tr>
<td>EXR</td>
<td>389.512</td>
<td>169.2322</td>
<td>1.883107</td>
<td>0.0958</td>
</tr>
<tr>
<td>INR</td>
<td>-416.1204</td>
<td>679.7872</td>
<td>-0.612133</td>
<td>0.5574</td>
</tr>
<tr>
<td>INS</td>
<td>2273.048</td>
<td>2978.871</td>
<td>0.768057</td>
<td>0.4673</td>
</tr>
<tr>
<td>LIR</td>
<td>-1075.247</td>
<td>1411.476</td>
<td>-0.761790</td>
<td>0.4680</td>
</tr>
<tr>
<td>UER</td>
<td>-2386.558</td>
<td>1457.143</td>
<td>-1.491512</td>
<td>0.1377</td>
</tr>
<tr>
<td>GDP</td>
<td>11.66566</td>
<td>4.556779</td>
<td>-0.256066</td>
<td>0.8336</td>
</tr>
</tbody>
</table>

As shown in Table 2 there are some relationships to be considered. R- Squared is the coefficient of determination. From the table, the value of R² IS 0.7513 (75.13%) of All share index is determined by six (6) macroeconomic variables considered in this study while the balance 24.87% is determined by other variables that were not considered in this study.

The t-statistics gives explanation on the significance of a variable in determining the independent variables. If the probability is less than 0.05 it means that, that particular variable is significant. From the table only gross domestic product satisfied the criteria. This means it is only gross domestic product that has significant effect on ASI.

As regards testing of hypotheses, the above multiple regressions cannot be relied upon because Durbin-Watson statistic (DW) is 1.45. The rule is that if DW is not close to 2 or 2 and above, the regressions cannot be relied upon because Durbin-Watson statistic (DW) is 1.45. The rule is that if DW is not close to 2 or 2 and above, the test is not reliable because there is existence of autocorrelation. To overcome this Stationarity and Unit Root Test were carried out to test the hypotheses. The result is as shown in Table 3 below.

Table 3: Unit Root Test

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASI(-1)</td>
<td>-1.359566</td>
<td>0.487859</td>
<td>-2.786798</td>
<td>0.0270</td>
</tr>
<tr>
<td>D(ASI(1))</td>
<td>0.939578</td>
<td>0.344103</td>
<td>2.730516</td>
<td>0.0293</td>
</tr>
<tr>
<td>D(LIR)</td>
<td>-0.728065</td>
<td>0.414289</td>
<td>-1.757391</td>
<td>0.1223</td>
</tr>
<tr>
<td>C</td>
<td>-16399.36</td>
<td>7466.721</td>
<td>-2.196327</td>
<td>0.0641</td>
</tr>
<tr>
<td>@TREND(1)</td>
<td>5608.850</td>
<td>1795.802</td>
<td>3.123311</td>
<td>0.0168</td>
</tr>
</tbody>
</table>

From Table 3 the DW is 1.92 which is closer to 2. The rule is that if the test statistic < critical value (i.e. less than the negative value) reject Null hypothesis (H0). This is no unit root. From Table 3, the Augmented Dickey Fuller test statistic is -2.786798 and the test critical values are:

Test critical values:
- 1% level = -4.992279
- 5% level = -3.875302

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10% level –3.388330

From the above, all the six null hypotheses are strongly rejected. This is an indication that all the six macroeconomic variables (Exchange rate, Inflation rate, Interest on saving, Lending interest rate, Unemployment rate and Gross domestic product) have impact on all share indexes.

5. Conclusion

From the findings it is evident that there is varying degree of correlation between all share index and all the six macroeconomic variables considered. The only variable out of the six variables examined, it is only the gross domestic product that has significant impact on all share index. All the six considered independent variables determine 75.13% of the share index while 24.17% is determined by other macroeconomic variables. Result of Prob(P-statistic).04 revealed that all the six macroeconomic variables (Exchange rate, Inflation rate, Interest on saving, Lending interest rate, Unemployment rate and Gross domestic product) have a collective significance in the determination of all share index.

References