Macroeconomic Determinants Of Stock Price Changes: Empirical Evidence From Nigeria

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INTRODUCTION

Investment is the commitment of funds in the expectation of some positive rate of return. As a major component of the Keynesian macroeconomic model of income determination, it is a sine-qua-non for economic development. Generally, investment is distinguished from speculation by the time horizon of the investor, as well as the risk-return characteristics of the investment (Fisher and Jordan, 2005). While the true investor is interested in earning a good rate of return on a rather consistent basis for a relatively long period of time, the speculator seeks opportunities promising very large returns, earned rather quickly (Fisher and Jordan, 2005). The speculator is less interested in consistent performance than the investor, and is more interested in the abnormal, more reliable, and more moderate rate. The investment process includes the investors and the speculators. Despite his motivations, the speculator adds to the market's liquidity and depth, for he is frequently *"turning over"* (changing) his portfolio. Thus, his presence provides a market for securities (depth) and a wider distribution of ownership of securities (breadth), and enhances the capital market.

The investment process provides an opportunity for firms to finance their operations and thus ensure that they do not go bankrupt due to paucity of funds (Inegbedion, 2008). Nevertheless, investors' preference for the shares of a company is a function of the share price behavior. This underscores the need to study share price behavior. The central problem of man, as revealed by economics, is the paucity of resources vis-à-vis the demands for these resources. This underscores the need for efficient allocation of resources. Investors seek to analyze securities thoroughly with a view to establishing the basis for efficient allocation of resources. It is believed that thorough security analysis will predispose the investor to make the adequate decision regarding the appropriate security or securities (Portfolio) to invest in with a view to maximizing his/her returns. However, the ability of the investor to maximize his/her returns through security analysis is a function of the nature of the capital market in which he operates (Inegbedion, 2008). The capital market is a network of specialized financial institutions, series of mechanisms, processes and infrastructure, that in various ways, facilitate the bringing together of suppliers and users of a medium to long-term capital for investment in socio-economic development projects (Al-Faki, 2006). It is a network of institutions and mechanisms existing for the mobilization and exchange of long and medium term funds in the form of shares, bonds and derivatives (Osaze, 2000). The capital market comprises of the network of institutions and mechanisms through which intermediate and long-term funds are pooled together and made available to businesses, governments and individuals (Dauda, 2006). Consequently, the capital market is the pivot upon which any economy revolves, especially as regards its role of creating, mobilizing, and rationing long-term funds for economic growth and development. Whether an economy develops or not depends, among other things, on the existence of a capital market or the extent of the development of the existing capital market and its ability to fund regenerative investments that are self-sustaining (Osaze, 2000). The traditional view of the stock exchange used to be that the capital market was the handmaiden of the industry and by implication and extension, the economy. However, this view has long given way to a modern perception that the industry, and by implication and extension the economy, is the handmaiden of the capital market (Odife, 2002). This explains why any study on the workings of the capital market, such as stock price behavior, is worthwhile.

AIMS AND OBJECTIVES

Changes in stock prices and the pattern of stock price behavior and the pattern of changes is of particular importance to investors and security analysts. Empirical studies abound, which seek to ascertain the pattern of stock price changes and the factors that are mainly responsible for such changes (Inegbedion, 2008). Some analysts believe that stock price

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changes are important indicators of changes in the economic activity. Owing to the importance of the stock price behavior to the investing public and capital market participants, security analysis has become an integral practice among speculators and other market participants. The essence of security analysis is to advise the investor on a purchasing decision and thus assist him to optimize returns from his investment. Specifically, if a market is not efficient, it is possible to beat the market (gain permanent advantage over other investors owing to privilege information). In spite of the arguments of technical and fundamental analysts about the behaviour of stock prices in the market, upon which profits can be made, there is the major underlying theory of stock price behaviour, which contends that the market is efficient, so efficient that one cannot beat it with either the fundamental or technical analysis (Osaze, 2000). Consequently, the aim of the study is to determine the factors that are germane to stock price behavior in the Nigerian capital market. The objectives are to determine: whether there is any relationship between the stock price movement and exchange rate; whether there is any relationship between the stock price movement and inflation rate; whether there is any relationship between the stock price movement and the interest rate; and whether there is any relationship between the stock price movement and money supply.

EMPIRICAL EVIDENCE

As mentioned earlier, the investment process provides an opportunity for firms to their operations and is thus crucial to economic development. However, stock price behavior and stock market returns are significant determinants of the investment process. This explains the importance of stock price behavior to the market process. Extensive literature abounds globally on some causative factors of stock price behavior. Among these studies are those that examine empirical relations between market volatility and the level of short-term interest rates. Campbell (1987), Shanken (1990), Glosten, Jagannathan, and Runkle (1993) report a significant positive relation between market variance and nominal one-month treasury bill. Other studies also examined the direct relation between the market risk premium and short-term interest rates (N'dri, 2008). Campbell (1987) and Shanken (1990) observed that nominal treasury bills are negatively correlated with future stock price returns. However, the studies cited above dealt mainly with the US markets. In his study on *"The Effect Of Interest Rate Volatility On Stock Returns And Volatility"*, N'dri (2008) found that conditional market returns have a negative and significant relation with interest rates. This is consistent with the findings from the US market. Furthermore, the conditional variance was found to be positively related to interest rates but the correlation was, however, not significant when compared to the one documented in the US market. The results indicate that interest rates have a strong predictive power for stock price returns in Korea and a weak predictive power for volatility (N'dri, 2008). In her study on stock market and macroeconomic behavior in India, Sangeeta (2007) found that the index of industrial production and inflation affect stock prices, but stock prices do not influence either of the two, thus implying that the correlation is unidirectional. Furthermore, the author found that there was a unidirectional causal relation between stock price and money supply as stock prices influence the money supply while the latter do not influence stock prices. Lastly, the author observed that there was no causal relation between stock prices and exchange rate and there was no causal linkage between gold prices and stock prices. In his remarks to the Banco de Mexico International Conference, Mexico, Ferguson (2005) observed that it is plausible that more stability in output and inflation could tend to lower volatility in financial asset prices. Consequently, he harped on the need to be more attentive to financial markets, since asset prices affect spending to a greater degree than before and because asset prices, including stock prices, provide policymakers with a greater amount of timely information to guide policy. Oaikhena (2003), Amadi and Odubo (2002) as well as Udegbunan and Oaikhenan (2002) tested the relationship between macroeconomic variables and stock price movement using Nigerian data, and the findings were found to be consistent with the existing theory - changes in macroeconomic variables affecting stock price movements.

THEORETICAL FRAMEWORK

Emerging from theories of stock-price behaviour are four schools of thought, namely: The Fundamental School; The Technical School; The Random Walk School (Weak form of the Efficient Market hypothesis), and The Macroeconomic Hypothesis School (essentially economy fundamental). The fundamental theory is concerned with the estimation of the intrinsic value of shares, thus, the fundamental analyst makes investment decisions on the basis of some qualitative and quantitative indices in an industry and the economy (Heman, 2001). The technical analysts, also called *Chartists*, believe that historical share prices provide a useful insight into the future prices of shares.

Consequently, they adopt trend analysis in predicting the prices of shares (Inegbedion, 2008). On the other hand, the macroeconomic approach attempts to examine the sensitivity of stock prices to changes in macroeconomic variables like money supply, interest rate, inflation rate, exchange rate, GDP and other macroeconomic variables/indicators. Lastly, the Efficient Market hypothesis (weak form) argues that the pattern of stock-price movement is random, hence, it is also known as the Random Walk Theory. Simply put, the theory states that security prices adjust rapidly to the infusion of new information and that current stock-prices fully reflect all available information. The Efficient Market hypothesis was first published by Louis Bachelier, a French Mathematician, in his 1900 dissertation *"The Theory Of Speculation"* . However, his work was largely ignored until the 1950s, when isolated independent works had been found to have corroborated his thesis (Wikipedia, 2007).

RESEARCH METHODS

The population of the study consisted of the prices of shares of all the companies listed on the floor of the Nigerian Stock Exchange for the period 2001-2009. The All-Share Index of the Nigerian Stock Exchange, which is the aggregation of price gains and losses for all the securities, traded on the floor of the Nigerian Stock Exchange, served as a measure of stock price movement in the Nigerian Stock Exchange. Unit root test was conducted to test for Stationarity, as well as determine the degree of integration. Research data were analyzed first, by using the Ordinary Least Squares Method. However, with a calculated value of 0.20665, it was evident that the stochastic error terms were auto correlated, thus indicating that the results of the Ordinary least square test are spurious. This necessitated some adjustment to correct the presence of the auto correlation of the stochastic error terms; this was done using Cochran-Orcutt autoregressive model of order 2 AR (2). After the adjustment, the calculated value of the Durbin-Watson statistic was 2.0477, thus indicating the absence of the stochastic error terms. The model was given by

$$\Delta Sp = b_0 + b_1 Ir + b_2 If + b_3 Er + ei,$$

where ΔSp = stock price changes, represented by All-Share index;
b_0 is the proportion of the variation in stock prices that is not explained by macroeconomic variables;
Ir. = Interest rate;
If = Inflation rate;
and Er. = Exchange rate.
b_1, b_2, and b_3 are the slopes of interest rate, inflation rate, and exchange rate, respectively.
Appriori expectations of the signs of the slopes are $b_1 < 0$, $b_2 > 0$, and $b_3 < 0$.

RESULTS

Table 1 : Results Of The Unit Root Tests For Residuals

Based on OLS Regression of Y on					
X1		X2	X3		X4
36 observations used for estimation from 2001 Q1 to 2009 Q4					
	Test Statistic	LL	AIC	SBC	HQC
DF	-2.0250	-333.4878	-333.4878	-335.2361	-334.7396
ADF(1)	-2.3360	-331.6830	-331.6830	-335.1796	-334.1866
ADF(2)	-2.5216	-331.2330	-334.2330	-336.4777	-334.9883

95% critical value for the Dickey - Fuller Statistic is -4.4454
LL = Maximized Log-likelihood AIC = Akaike Information Criterion
SBC = Schwarz Bayesian Criterion HQC = Hannan-Quinn Criterion

Results in Table 1 indicate that neither the Dickey-Fuller test statistic, nor any of the Augmented Dickey-Fuller test statistics is less than -4.4454, the 95% critical value for the Dickey-Fuller statistic. The implication is that we cannot reject the Null Hypothesis that the data used in this study are not stationary, but integrated of order 1. In other words, the data becomes stationary after differencing it once.
Results of the Cochran Orcutt AR (2) method are tabulated in the Table 2.

Table 2: Cochran- Orcutt Method AR (2) Converged After 3 Iterations				
Dependent variable is Y				
36 observations used for estimation from 2001 Q1 to 2009 Q4				
REGRESSOR	**COEFFICIENT**	**STANDARD ERROR**	**T-Ratio**	**[Prob]**
X1	-165.2062	107.5227	-1.5365	[0.134]
X2	266.8114	562.0735	.47469	[0.638]
X3	-566.9875	204.8752	-2.7675	[0.009]
CONSTANT	103665.7	29000.4	3.5746	[0.001]
R-SQUARED	0.92325	R-BAR-SQUARED	0.90954	
S.E. OF REGRESSION	4428.6	F-STAT. F (5, 28)	67.3645 [0.000]	
MEAN OF DEPENDENT VARIABLE	26300.6	STD. DEV. OF DEP VAR	14847.9	
RESIDUAL SUM OF SQUARES	5.49E+08	EQUATION LOG LIKELIHOOD	-330.4018	
AKAIKE INFO CRITERION	-336.4018	SCHWARTZ BAYESIAN CRITERION	-341.15	
DW-STATISTIC	2.0477			
Parameters of the Auto regressive error Specification				
U = 1.2495 * U(-1) + -0.34602* U(-2) + E				
(6.5620) [0.000] (-1.9188) [0.065]				
t-ratio(s) based on asymptotic standard Errors in brackets				

Results in the Table 2 indicate that the calculated t-ratio of Interest rate (X1) is -1.5365, with a computed significant probability of 0.134, thus indicating that the slope is not significant at the 5% level. The implication is that interest rate is not a significant predictor of stock price changes; the calculated t-ratio of Inflation rate (X2) is 0.47469, with a computed significant probability of 0.638, thus indicating that the slope is not significant at the 5% level. Again, the implication is that inflation rate is not a significant predictor of stock price changes; the calculated t-ratio of Exchange rate (X2) is -2.7679, with a computed significant probability of 0.009, thus indicating that the slope is significant at the 1% level. We may thus conclude, at the ninety-nine percent (99%) confidence level, that the Exchange rate is a significant predictor of stock price changes. Furthermore, the calculated values of the Coefficient of Determination and the adjusted Coefficient of Determination are 0.92325 and 0.90954 respectively, thus indicating that approximately ninety-one percent (91%) of the variation in stock prices is explained by variations in the explanatory variables (interest rate, inflation rate, and exchange rate). Although only one of the explanatory variables (Exchange rate) proved to be a significant predictor of stock price changes, the high value of the variation in stock prices explained jointly by all the explanatory variables is a consequence of the interaction. The F-test for the overall significance of the regression parameters had a calculated value of 63.3645, with a significant probability of 0.000, thus indicating that the overall significance of the regression model is good. The result of the F-ratio test is consistent with the result of the coefficient of determination. The calculated value of the Durbin-Watson statistic (2.0477) clearly indicates that the stochastic error terms are devoid of any form of auto-correlation. The implication is that the results of the test are dependable.

POLICY IMPLICATIONS

The Nigerian capital market, like other capital markets the world over, plays a vital role in economic development. By the same token, a failure of the system can precipitate economic doom. To this end, the need for policy makers in government to be up and doing as well as formulating policies that will help to stabilize the capital market and ensure its smooth functioning at all times becomes evident. One step in this direction is to continuously study the market to identify the factors that have implications for its major indicators, and thus formulate policies that will help to stabilize or keep these factors in check. The results of this study revealed that the Exchange rate alone significantly affects changes in stock prices and that the three explanatory variables (interest rate, inflation rate, and exchange rate) jointly affect stock prices significantly. It is advisable that macroeconomic policies regarding these variables should, at all times, take cognizance of the possible effects that such policies will have on stock price changes and the capital market

in general. Such a holistic approach to policy formulation will help to ensure stability in the capital market and thus reduce the possibility of crashes in share prices, which may lead to disequilibrium in the capital market.

CONCLUSION

Results of the study indicate that there is a negative relationship between exchange rate and stock price changes; there is also a negative relationship between interest rate and stock price changes, but this relationship is not significant; and there is a positive relationship between inflation rate and stock price changes, and this relationship is not significant. The joint effect of these macroeconomic variables on stock price changes is significant, as it accounts for over ninety percent of the variation in stock prices. Thus, it would appear that interest rate, inflation rate, and exchange rate are the macroeconomic determinants of stock price changes in Nigeria. To this end, the government's macroeconomic policy formulations have significant implications on the stability of the capital market and by implication, the economy; since developments in the capital market have implications for economic development.

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