

Impact of Macroeconomic Factors on Common Stock Returns: A Study of Listed Manufacturing Firms in Nigeria

Abdulkarim Garba, Ph.D

Department of Business Management, Faculty of Arts, Management and Social Sciences, Federal University
Dutsin-Ma, P.M.B. 5001, Dutsin-Ma, Katsina State, Nigeria
E-Mail: agarb1@fudutsinma.edu.ng; zumasag@yahoo.co.uk

Abstract

This paper examines the impact of macroeconomic factors on common stock returns of the manufacturing firms listed on the Nigerian Stock Exchange. The data for the study was generated from ten firms using stratified sampling technique. The study period was 1991 to 2003. Multiple regressions were used in examining the relationships between the dependent and independent variables of the study. Pearson Movement Correlation was used for assessing the magnitude and the direction of the relationships between/and among the variables of the study. Among the major findings of the study was that non of the four independent variables (inflation rate, interest rate, exchange rate of domestic currency and gross national income) examined in the hypotheses testing, on an individual basis, has significant impact on the common stock returns of the sampled firms. Among the recommendations made by the paper were the diversification of the productive sectors of the Nigerian economy and the internationalization of the nation's capital market.

Keywords: Common stock returns, Macroeconomic factors

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1. Introduction

In the capital market theory, the theory that explains the behavior of common stock returns, a security's return is divided into unique and market-related parts. Similarly, a security's total risk (as measured by the variance or standard deviation of the rate of return) is portioned into two parts, namely, the systematic risk, which is part of the total risk associated with the variability in the overall market, and the unsystematic risk, which is the part of the total risk not related to the variability in the overall Market (Jones: 1988 and Weston and Copeland, 1989). The unsystematic risk portion of a security's total risk, according to the theory, can be diversified by holding a portion of a portfolio of securities. At equilibrium, the only risk, which matters, is the systematic (or undiversifiable) risk. This shows how several securities pricing models emerge to offer explanations for the risk-return trade-off of different efficient portfolios.

The Capital Asset Pricing Model (CAPM), which was first introduced by Sharpe (1962), is the first model developed in line with the capital market theory.

In accordance with the CAPM, which is a single index model, prices covary only because of a common movement with one index, specifically that of the Market.

Among the most informant properties of the CAPM is that beta should be the only factor, which explains the rate of return on a risky asset and that if other factors are added to the model's regression, they should have no explanatory power.

However, many studies have discovered some non-market influences through the construction of multi-index models, (King: 1966).

The Arbitrage Pricing Theory (APT), originally formulated by Rose (1976), is another asset pricing model that explains the cross-section variations in asset returns.

Similarly, some studies have found out that tests of the APT are subject to several basic limitations and many of the problems associated with the CAPM are also present in the APT.

.Moreover, many factors other than beta are related to common stock returns. For instance, Fama and French (1992) argue that stock returns are related to book-to-market and market values. Similarly, Divid and Titman (1997) argue that return premiums in the United States are related to firm characteristics. Similarly, Tom and Carsten (2000) argue that the Danish stock returns moved closely with expected inflation although at long

horizons. In comparison, Town and Carsten (2001:1) argue that the relationship between the U.S. stocks expected returns and inflation is positive but quite weak at all horizons. Furthermore, Weston and Copeland (1989:300) argue that changes in the general level of interest rates cause the prices of securities to fluctuate. Moreso, Jones (1988; 305) adds that GNP and industrial production move together as the business cycles unfolds over time. In addition, Levy and Servant, cited by Blackman (1986:7), argue that the presence of exchange risk makes it necessary to take into account the national identification of the investor.

Thus, the objective of this study are to investigate into the relationships among some macroeconomic factors (exchange rate, inflation rate, interest rate, and gross national product) and average stock returns of some selected manufacturing firms listed on the Nigerian Stock Exchange (NSE), to measure the degree to which each of the macroeconomic factors affects the stock returns of the selected manufacturing firms listed on the NS, to propose an appropriate stock returns pricing model with a reliable explanatory power for assessing the impact of the factors on the stock returns of the manufacturing firms listed on the NSE, and to establish whether or not the evidence from Nigeria contributes to the international evidence from developed financial markets.

Therefore, the hypotheses for this study may be grouped into one as: macroeconomic factors (inflation rate, interest rate, domestic exchange rate, gross national product) have no individual or collective impact on the common stock returns of the manufacturing firms listed on the NSE.

2. Literature Review and Theoretical Framework

Some literature relating to the sensitivity of common stock returns to various factors rather than to the CAPM's beta alone and the theoretical framework considered relevant to this study are presented in this section.

2.1 Fama and French's (1993) Three-Factor Model

Fama and French (1993) argue that variability in common stock returns are explained by factors related to size and BM ratio. The three factors, according to these authors, are the market factor, the size factor and the distress (value) factor. They distinguish between distress and growth and what they found was that, in addition to the market factor in returns, stocks move together: small stocks move together and big stocks move together, but not in the same way. The value stocks move together and the growth stocks move together but the two groups are different from each other. Thus, according to Fama and French (1993), there are at least three dimensions of risk: market risk, small stocks versus big stocks risk, and distress stock versus growth stock risks. By risk, the authors mean that these stocks move together.

They collected data on stock returns from the 1963 to 1991 period and run three-factor regressions and came up with their three factor model of the following form:

$$R_{jt} - R_{ft} = a_j + b_j (R_{mt} - R_{ft}) + s_j \text{SMB}_t + h_j \text{HML}_t + e_{jt}$$

Where R_{jt} is the return to portfolio j for month t ,

R_{ft} is the T-Bill return for month t , and R_{mt} is the return to Centre for Research on Security Prices (CRSP) value weighted index for month t . SMB_t is the realization on a factor portfolio that buys small cap stocks and sells large cap stocks. Similarly, HML_t is the realization on a factor portfolio that buys high BtM stock and sells low BtM stocks. The s_j and h_j coefficients measure the sensitivity of the portfolio's return to the small-minus-big and high-minus-low factors, respectively. Portfolios of value stocks will have a high value for h , while growth portfolios will have a negative h . Large cap portfolios will load negative on SMB (s_j will be negative), and small cap portfolios will have a large positive value for s .

Davis (2001) believes that the Fama and French (1993) study results support a risk-based explanation of the return dispersion produced by size and book-to-market ratio. The three factor regressions, as explained further by Davis (2001), tend to produce significant coefficients on all the three factors, and the regression R^2 values are close to 1 for most of the portfolios used for the study. Accordingly, it implies that the three-factor capture much of the common variation in portfolio returns. In addition, it indicates that SMB and HML are able to capture independent sources of systematic risk. According to the Fama and French (1993) three-factor model, small cap stocks and value stock have high average returns because they are risky. In other words, such stocks have high returns because they have high sensitivity to risk factors that are measured by SMB and HML.

In contrast, Daniel and Titman (1997) doubt the Fama and French (1993) risk-based explanation. Daniel and Titman (1997) argue that it is "characteristics", not "covariance" that produce dispersion in common stock returns. According to the Fama and French (1993) risk-based proposition, the high book-to market ratio stocks have high average returns because they are sensitive to common variation in stock returns. In other wards, the high returns are due to a high sensitivity to HML. In contrast, Daniel and Titman (1997) argue that the high book-to-market ratio stocks have high returns because of some other reasons, possibly overreaction, so that the high returns have nothing to do with systematic risk. According to Daniel and Titman (1997), it is the characteristics (high Book-to-market) rather than the covariance (high sensitivity to HML) that could be associated with high common stock returns.

In relation to the above two different propositions, Davis (2001:9) argues that the cross-sectional correlation between book-to-market ratio and HML sensitivity is quite high to the extent that it is difficult to understand

which of these variables has more explanatory power for variations in stock returns. Davis (2001) explains further that when the longer 1929 – 1998 period is examined, covariance tend to show more explanatory power than characteristics. So, it is not clear why the shorter period produces different results, but, as he believes, the longer period should produce more reliable results, and these results according to him, should favour the risk-based proposition.

2.2 Lo and Wang (2001) Model.

Lo and Wang (2001:1) observe that fundamental shocks to the economy drive both the supply and demand of financial assets and their prices. Thus, Lo and Wang (2001:1) argue that any asset-pricing model that attempts to establish a structural link between asset prices and underlying economic factors also establishes links between prices and quantities such as trading volume.

Lo and Wang (2001:4) developed an inter-temporal CAPM model of stock trading and pricing with multiple assets and heterogeneous investors in the spirit of Merton (1973)'s CAPM. Since the purpose, according to them, was to draw the model's qualitative implications on the joint behaviour of return and volume, the model was kept as parsimonious as possible.

In their model, assets are exposed to two sources of risks, namely, the market risk and the risk of changes in market conditions. According to their model, investors wish to hold two distinct portfolios of risky assets. One is the market portfolio and the other is the hedging portfolio. The market portfolio allows the investors to adjust their exposure to the market risks, while the hedging portfolio allows them to hedge the risk of changes in market conditions.

Lo and Wang (2001) model has several features that might seem unusual. Most importantly, investors are assumed to have a myopic, but state-dependent utility function.

The purpose for employing this utility function, as Lo and Wang (2001:4) argue is to capture the dynamic nature of the investment problem. They argue that this utility function should be interpreted as the equivalent of a value function from an appropriately specified dynamic optimization problem.

Another simplification in the model is the I_{ID} assumption for the state variables, which might leave the impression that the model is effectively static. Lo and Wang (2001:4) argued that this impression is false, since the state-dependence of investor's utility function introduces important dynamics over time, they could allow richer dynamics for the state variables without changing the main properties of the model.

In the model, Lo and Wang (2001) also assume an exogenous interest rate for the bond without requiring the bond market to clear. This is a modeling choice that they have made in order to simplify their analysis and to focus on the stock market. Changes in the interest rate are viewed not important for the issues they examine in their paper, (Lo and Wang, 2001:4). They argued that, from an empirical point of view, and, at the frequency they are interested in (i.e.; weekly) changes in interest rate are usually small.

Other Studies

Another study conducted by Mireku et al. (2013) has examined the effect of macroeconomic variables on stock prices in Ghana using monthly data from 1991 to 2010. The results of their study indicate that there is cointegration between macroeconomic factors and stock prices in Ghana, pinpointing a long-term relationship. The long-term relationship, as explain by Mireku et al. (2013), implies that interest rate and exchange rate have a negative effect on stock prices while inflation rate showed an implied positive effect on stock prices. Moreover, the results of Impulse Response Function and Forecast Error Variance Decomposition conducted by Mireku et al. (2013) show that the macroeconomic variables (interest rates, exchange rates and inflation rates) used in their study identified a low significant influence on share price movements in Ghana. Whatever affects stock prices will also affect common stock returns.

Similarly, Olweny and Omondi (2011) had investigated the effect of macroeconomic factors on the stock return volatility on the Nairobi Securities Exchange, Kenya. Their study focussed on the effect of foreign exchange rate, interest rate and inflation rate fluctuation on stock return volatility at the Nairobi Securities Exchange. The results of their study indicate, among other things, that foreign exchange rate, interest rate and inflation rate affect stock return volatility. On the foreign exchange rate, the magnitude of volatility, as explained by Olweny and Omondi (2011), was found to be relatively low.

However, in another study conducted by Shubita and Al-sharkas (2010) to examine the size effect and to determine the impact of selected macroeconomic variables on the New York Stock Exchange (NYSE), the results of the study reveal that size has impact on stock returns. In addition, it was reported that there was a reliable negative relationship between stock prices and inflation. Furthermore, the results of their study show the existence of a negative relationship between interest rates and stock prices.

2.3 The Theoretical Framework

This study strongly believes that there is no scientific reason why the expected stock return has to be the same through time. It could be higher in bad times if investors become more risk-averse. It could also be lower in good times when investors become less risk-averse. This study, which strongly believes that stock markets are neither perfectly efficient nor completely inefficient, cannot be theoretically based in the Efficient Market Hypothesis

(EMH). The efficiency theory might hold in an ideal laboratory setting. But, in the real world things are a little sticky as information flows may be delayed, altered or incompletely disseminated. And, more importantly, human beings often act on their personal, sometimes illogical, perceptions about the world around them.

This study is, therefore, firmly rooted in the theory of fundamental analysis.

The phrase “fundamental analysis” is viewed as the determination of prices based on future earnings, (Investment Learning Center: 2000:2). According to this theory, stock prices change only when quarterly reports or relevant news is released, and investors seek fundamental data in an effort to find undervalued stocks.

The proper and recommended procedure in the framework for fundamental analysis is, first, to analyze the overall economy and the securities markets. The second is to analyze the industry within which a particular company operates. Finally, at the company level, the procedure involves the analysis of the basic estimates of the intrinsic values of the company in question, using either the divided discount or the P/E ratio (the multiple) approach, (Jones, 1988:289).

Fundamental analysis is used to determine whether a given security is under-priced or over-priced in relation to its intrinsic value, which is not constant. An intrinsic value of a security is believed to change as new information becomes available (Khoury 1982:67).

Therefore, based on the above outlined theoretical framework, the study model development processes are presented in the next section.

3. Methodology

The population of this study is made up of all the common stocks of the one hundred and six manufacturing firms listed on the NSE as at 30th December, 2004. Each of these firms is listed either as a manufacturing firm, or, manufacturing is mentioned as part of the nature of its business. In this study, ten (10) common stocks of the one hundred and six (106) manufacturing companies listed on the NSE were selected using stratified random sampling technique. Weekly stock prices of the sampled firms were collected and used in computing the stock returns, which were later annualized to make them comparable to the other variables considered by this study *The study period was 1991 to 2003. Multiple regressions were used in examining the relationships between the dependent and independent variables of the study. Pearson Movement Correlation was used for assessing the magnitude and the direction of the relationships between/and among the variables of the study.* The study model is formulated and presented as follows:

$$ARR = \beta_0 + \beta_1 INF + \beta_2 INR + \beta_3 EXR + \beta_4 GNP + E$$

Where

ARR= the stock's average rate of return (as dependent variable),

β_0 = the intercept,

β_1 to β_4 = the partial slope coefficients,

E= the stochastic disturbance term,

INF= Inflation rate (percent),

INR= Internet rate (percent),

EXR= Exchange rate (₦: US\$),

GNP = Gross national product

3.1 Findings and Discussions

This section presents an empirical analysis of the impact of macroeconomic factors on common stock returns.

The thirteen year financial statements of the sampled firms were employed for the analysis of the Pearson Correlations between and among the variables of the study. The analysis was conducted based on a 5.0 percent level of significance.

Table 1. presents the matrix of the Pearson moment correlation coefficients for each pair of the variables selected for the study.

Table 1: Pearson Moment Correlations among the Variables Selected for the Study

	FIRM	ARR	INF	INR	EXR	GNP
FIRM						
ARR	.268**					
INF	.000	-.157				
INR	.000	-.106	.406**			
EXR	.000	.160	-.678**	-.135		
GNP	.013	.280**	-.463**	-.341**	.809**	

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

Sources: Computed from various Financial Statements of the Sample Firms
 Daily Official Lists of the NSE
 CBN Publications, Publications of the Federal Office of Statistics

i) INF

Table 1.shows the existence of an inverse and weak relationship between INF and ARR of the sampled firms. The relationship between these variables is indicated by their Pearson correlation coefficient of -0.157 in the table.

ii) INT

Similarly, Table 1.shows that the relationship between ARR and INT is an inverse and weak relationship. Their Pearson correlation coefficient is -0.106 .

iii) EXR

Moreover, Table 1.pinpoints that the relationship between ARR and EXR is a direct but weak relationship as indicated by their Pearson correlation coefficient of 0.160

iv) GNP

However, Table 1.shows the existence of a positive and highly strong relationship between ARR and GNP. Their Pearson correlation coefficient, as indicated by the Table, is 0.280 , which is significant at the 0.01 level of significance. mpany's ARR, while up to 38.3 percent disagreed.

4. Hypotheses Testing:

Multiple regression analysis of the data collected was conducted in order to test the stated hypotheses. T-test was used in this study for the estimated partial regression coefficients. Also, F-ratio and R^2 were used as test statistics for testing the overall significance of the study model.

To simplify our efforts, therefore, the grouped hypotheses given earlier were further divided into four and each of them is expressed in the form of a null form as presented and tested below:

i) Inflation rate has no significant impact on common stock returns.

The results in Table 2. were used in testing this hypothesis. This hypothesis was tested using the reject/accept decision criterion. From the said table, it is observable that inflation rate has no significant impact on ARR ($P < 0.05$). Thus, this hypothesis could not be rejected. This means that inflation rate has no significant impact on the common stock returns of the sampled firms.

In a related study, Johnson and Diego (2001) investigated the effects of changes in the consumer price index on industrial production and stock returns for China. Using 1994 to 1998 as their study period, the results of their study indicates a very significant and positive relationship between inflation and real output. But, these authors concluded that inflation had no impact on the Chinese real stock returns.

In another development, Tom and Carsten (2000) had studied the relationship between asset returns and inflation at both short and long horizons, as mentioned earlier. Similarly, these authors found that the Danish stock returns had moved closely with expected inflation at long horizons but not at short horizons. But, they further argue that the relationship between the U.S stock expected returns and inflation was positive but weak at all horizons.

Table 2.: Regression Results of the Impact of Macroeconomic Factors on Common Stock Returns.

Variable	Unstandardized coefficient		t-value	Signt.
	B	Stand. Error		
(Constant)	0.690	5.097	0.135	0.893
INF	-0.018	0.014	-1.314	0.195
INR	-0.104	0.096	-1.078	0.285
EXP	-0.011	0.010	-1.144	0.257
GNP	-0.045	0.040	1.126	0.264
R-value = 0.835 R ² -value = 0.696 F-value = 13.553				0.0000

Sources: Computed from various Financial Statements of the Sample Firms

Daily Official Lists of the NSE

CBN Publications, Publications of the Federal Office of Statistics

ii) Interest rate (commercial banks' prime lending rate) has no significant impact on common stock returns.

This hypothesis can be tested using the results in Table 2., which shows that interest rate has no significant impact on ARR ($P < 0.05$). Thus, we could not reject the stated null hypothesis. This means that commercial banks' lending rate has no significant impact on common stock returns of the sampled manufacturing firms. However, almost 79.4 percent of the respondents to the questionnaire item agreed that changes in interest rate affect common stock returns.

iii) Exchange rate of domestic currency has no significant impact on common stock returns.

The above stated hypothesis was tested using the regression results in Table 2.. Accordingly, the exchange rate has no significant impact on ARR ($P < 0.05$). This hypothesis too could not be rejected, implying further that the exchange rate of the domestic currency has no significant impact on the common stock returns of the sampled manufacturing firms.

In a related study, Boyer (2002) assessed the determinants of Canadian oil and gas stock returns and found out, among other things, that a weakening of the Canadian currency against the U.S dollar had a negative impact on the oil and gas stock returns, but the influence of the exchange rate, as Boyer (2002) argues, "changes" significantly over the years 1995 – 1998 and 2000 – 2002.

iv) Gross national product has no significant impact on common stock returns.

Table 2. was used for testing this hypothesis. From the said table, GNP has no significant impact on ARR ($P < 0.05$). Thus, this hypothesis could not be rejected. This implies that changes in GNP have no significant impact on the common stock returns of the sampled manufacturing firms.

Analysis of the results in Table 2. shows that none of the macroeconomic factors has significant impact on the common stock returns of the sampled firms.

The following section presents the examination of the overall significance of the model, which was formulated and presented earlier.

4.1 Testing the Overall Significance of the Model

This study is on the assessment of the impact of macroeconomic factors on common stock returns. The T-test conducted and presented in Table 4.4 had examined the impact of each of the independent variables on the dependent variable. But, in reality, many variables could be at work in jointly affecting the dependent variable. This section, therefore, examines the overall significance of the model formulated for the study, taken into cognisance all the selected variables for the study.

The study model, as earlier specified and presented is as follows:

$$ARR = \beta_0 + \beta_1 INF + \beta_2 INR + \beta_3 EXR + \beta_4 GNP.$$

However, the coefficients of this study model were extracted from the results of the multiple regression analysis shown in Table 2. as follows: $ARR = 0.690 - 0.018INF - 0.104INR - 0.011EXR - 0.045GNP$

The results in Table 2., which were used in testing the overall significance of the model, indicate that the study model has an F- value of 13.559 that is highly significant ($P < 0.01$). The R² value of 0.696 indicates that the independent variables in the model jointly explain about 69.6 percent of the total variability in the dependent variable. Thus, the explanatory power of the model is great. The R value of 0.835 shows that the relationship between the dependant variable, on one hand, and the independent variables, on the other hand, is also highly significant.

4.3 Conclusion and Recommendations

This study is on the assessment of the impact of macroeconomic factors on common stock returns. The study was undertaken with the major aim of discovering results that can assist stockholders, security analysis and all other stakeholders, as regards the assessment of common stock returns, to become acquainted with the types of risk factors that are uniquely related to common stock returns of the manufacturing sectors in developing

economies that have developmental characteristics similar to that of Nigeria. Bearing that in mind, the major conclusion of the study is *that non of the four independent variables (inflation rate, interest rate, exchange rate of domestic currency and gross national income) examined in the hypotheses testing, on an individual basis, has significant impact on the common stock returns of the sampled firms.*

Based on the findings of the study, the followings are, therefore, recommended:

- i. Government should adopt some appropriate measures that could specifically lead to the curbing of inflation, improving the exchange rate of the Naira and reduction in the dramatic increases in banks' lending rates. The continuous depreciation of the naira exchange rates, high factor costs as a result of high commercial banks lending rates, have negative and unfavorable impact on the manufacturing sector's profitability and in turn, the returns to shareholders.
- ii. Government should pursue some important policies that can lead to the diversification of the productive sectors of the economy, reduction of import tendency. The government should encourage local sourcing of raw materials and attainment of a non inflationary growth so as to assist towards improvements in the levels of the GNPs. Therefore, a new economic order should be thought of and religiously pursued in order to aid the growth of the economy.
- iii. Government should reduce the level and varieties of taxes and levies on the Nigerian populace, as excessive taxes and levies can be counter productive by impacting negatively on the people's living standard and their abilities to save for future investment in stocks.
- iv. States and local governments should be encouraged to be exploring the capital market as a viable source of funds for development purposes and enhancement of their peoples' welfare.
- v. Government should take all necessary steps that can lead to reduction in the cost of doing business in the country. Improvement in infrastructures, higher effective demand and a reduction in smuggling activities will ensure growth and more investments in the manufacturing sector of the nation's economy.
- vi. Directives should be given by the SEC to all operators in the nation's capital market to raise their minimum paid up capital to a level conceived as reasonable by the SEC. This is regarded by this study as a healthy policy that might lead to the deepening of the market. The essence is to have a stronger capital market and ensure investor confidence. The federal government should give the SEC needed backings in this direction as adequate financial base for any business enterprise determines its soundness to perform effectively and efficiently, which will in turn, enhance business activities for the organization, thereby providing extra earnings, at the end, to the stockholders. Moreso, the investing public will have more confidence in the stockbrokers or issuing houses that are financially strong as the case is in other parts of the world.
- vii. The current economic climate for the pooling together of all resources, via mergers and acquisitions, and the efficient use of such resources to guarantee economies of scale, survival of business corporations as well as to reactivate the national economy is a welcome development. As such, the Securities and Exchange Commission, the apex regulator of the nation's capital market, should append its signature favorably on all sound applications for mergers and acquisitions in Nigeria, while at the same time taking proper precautions to avoid restraining or creating monopoly as a result.
- viii. Both the regulatory and participatory institutions in the capital market like SEC and NSE, should embark on massive public awareness and campaign on the benefits and techniques of making investment in the capital market.
- ix. There is the dire need to demonopolise the transactions in the capital market in the economy. Thus, other Stock Exchanges should be established to encourage healthy competition amongst operators, rather than the monopoly being enjoyed by NSE.
- x. More trading floors should be opened by the NSE, at least one in each state capital to provide more opportunities for making investments in capital market by all the citizens.
- xi. The internalization of the capital market should be vigorously pursued to boost the capital bases of the local companies, which will enhance more productivity in the economy, thus, encourage more investments in equities and create more employment opportunities in the economy.

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