

## **Index of Industrial Production an Economic Index of Significant Effect on Nigeria Stock Exchange All Share Index**

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### **I. Introduction**

Kumari (2011) opined that a nation's economy is said to be efficient if it has a good banking system and a good stock market exhibiting upward trend. In the time past, gross domestic product has been the focuses of economic watchers in assessing a country economic status, but of late, stock market exert greater influence on a nation's economy.

Stock market often times experiences an unprecedented fluctuation which causes sleepless night and a great concern to the market managers. This trend most times results in instability of the stock market indices and consequently leads to distortions of market investors' strategies. Nigeria stock market experienced a dramatic downward trend for about six (6) years between 2007 and 2013 which caused untold economic displeasure in terms of monetary and job losses, the market is just recovering at a snail speed movement in the last two years. Although, the ugly incidence occurred at a time stock market crashed globally and since commenced a process of recovery to attain its known profitable status.

Understanding of stock market indices and its fluctuations is considered a very imperative issues among stock professionals and the public investors, the market movement is therefore becoming a difficult economic subject arrear to study and its forecasting even more difficult. This challenge therefore creates the need for an empirical analysis, which can assist in understanding its forecasting of price movements. Ipekten and Aksu (2009) reported that because stocks are risky assets, investors are keen to know what affects stock prices and how much these affects change the stock prices.

Economic watchers and professional economists have posited that stock market indices behavior is influenced greatly by certain macro and micro economic variables. Ferina Nurlaily et al (2013) sited Brigham and Daves (2004) and Nikolaos et.al., (2007) as having defined microeconomic indicators as the economic characteristic of a company such as growth stability, assets structure, operating leverage, growth rate, and others are the factors that influence capital structure. In the study, it is stated that the characteristics of the company can also be regarded as determinant of capital structure that could affect capital structure decisions and company financial performance. While Macroeconomics indicators are economic factors that are outside the managerial control of a company, but have influence on the increase or decrease the company performance either directly or indirectly. These economic indices have their movement and trends in a country economic growth and overall performance. Somoye et al (2009) in their work on determinant of equity prices in the stock market, stated that factors affecting asset prices are numerous and inexhaustible. The factors were categorized into firm, industry, country and international or market and non-market factors, and economic and noneconomic factors. All the factors can be summarized into two classes – micro and macro factors.

These microeconomic variables are inflation rates, interest rate, gross domestic product, industrial production index, foreign exchange etc. Consumer price index (CPI) is used as a proxy of inflation rate. Inflation rate has negative impact on different economic factors as well as general price level of goods and service. There are many types of interest rate but in this study we use long run interest rate, when interest rate increases stock exchange investment become decrease. Industrial production index (IPI) contains the amount of production of mining, manufacturing and public utilities.

Several studies have been conducted on the relationship between macroeconomic variables and the fluctuations of the stock market performance. Stock market index is a measuring parameter of the performance of stock market over time. This index is oftentimes used as a benchmark by the investor of fund managers in comparism of their investment returns with the market returns. It is generally known that stock market plays a significant role for the industry and also for the investors, who want to invest in the stock market to gain maximum return on their investment.

Security situation in a country is also identified as a very significant factor that militates against positive performance of stock indices; this is confirmed by Rigobon and Sack in their study of the effects of Iraq war on US financial market. Rigobon and Sack (2004) discovered that increases in war risk caused declines in Treasury yields and equity prices, a widening of lower-grade corporate spreads, a fall in the dollar, and a rise in

oil prices. A positive correlation exists between the price of oil and war. They argue that war has a significant impact on the oil price.

### **Conceptual Framework and Literature Review**

Stock market is one of the barometers of assessing the economic condition of a country. The growth of stock market is a sign of the development of industrial sector and of the economy of a country. It is also helpful to mobilize the savings and create investment opportunities. More often than not, stock prices are affected by a number of factors and events, some of which influence stock prices directly and others that do so indirectly. According to Chris Wolski (2007) there are varied internal and external factors affecting the price of a share, Internal factors are those that depend on the firm such as share bonuses, stock split, company dividends, etc. External factors are those which are beyond the control of the firm, such as raw material prices, economic trends, inflation, and investor confidence.

Al – Tamimi (2007) identified company fundamental factors (performance of the company, a change in board of directors, appointment of new management, and the creation of new assets, dividends, earnings), and external factors (government rules and regulations, inflation (CPI), and other economic conditions, investor behavior, market conditions, money supply (MS), competition, uncontrolled natural or environmental circumstances) as influencers of asset prices. He went further to develop a simple regression model to measure the coefficients of correlation between the independent and dependent variables  $SP = f(\text{EPS, DPS, OL, GDP, CPI, INT, MS})$

The change in stock price is mainly affected by the exchange rate, macroeconomic prosperity index, consumer's confidence index and corporate good price index, (Wang L., 2010). Other school of thought has it that stock performance is by large reflect the economic situation of a country, which is affected by both country domestic economic situation and by foreign economic events

Auranazeb (2012) identified foreign direct investment and exchange rate as having significant positive impact on performance of stock market in South Asian countries, while interest rate has negative and significant impact. It is also said that inflation has negative and significant impact on stock market performance in the same study

The different literatures identified different variables which are important to explain stock return variations. Such as Sari and Soytaş (2005) Humpe and Macmillan (2009), Sohail and Hussain (2009) and Frimpong (2009) all these in their respective investigation reported that inflation rate has negative and significant influence on stock return. Hence, it is an important variable which use to explain stock return variations. Kumari (2011) investigates the relationship between stock returns and inflation in India and found that there is no significant relation between stock returns and inflation in the post-reform period in India. It implies that stock returns do not provide a hedge against inflation. Erdem, C. et al (2005) studied relationship between Istanbul Stock Exchange- ISE and a number of macroeconomic factors, inflation and interest rates were found to affect the volatility of the ISE indices

Muradoglu et al. (2000), Kandir (2008) and Mohammad et al. (2009) investigate the role of macroeconomic factors, namely inflation, industrial production index, interest rate and foreign exchange rate in explaining the stock returns. Foreign exchange rate and interest rate appeared to be significant in explaining the stock returns, while other variables were not much significant.

Gan, et al., (2006), Ahmad and Imam (2007), Frimpong (2009), Humpe and Macmillan (2009) and Pilinkus and Boguslauskas (2009) also from their studies found that changes in interest rate have significant and negative impact on stock exchange returns.

Also, Mumcu (2005) using multiple regression and Granger causality test in the relationship between Istanbul Stock Exchange indices and a set of macroeconomic indices reported that the most important factors affecting the ISE indices in descending order are treasury bond, interest rate, dollar exchange rate, industrial production and money supply. Ray (2013) in his study on relationship between Indian stock prices and selected macroeconomic variables, concluded that industrial production index presents a measure of overall activity.

Sohail and Hussain (2009), Mahmood and Dinniah (2009), Humpe and Macmillan (2009) investigate relationship between Industrial production index and stock market returns. The findings of their studies show that industrial production index has positive and significant relation with stock market returns.

Qadir (2012) finds a positive relationship between Treasury bill, Interest rate, and Industrial production with market stock returns, but the coefficients have turned out to be statistically insignificant. Somoye et al (2009) concluded that the forces of demand and supply have direct effect on the stock price while the other indeterminate number of firm, industry and country factors influences the demand and supply factors. Pethe and Karnik (2000) study the relationship between stock market behaviour and some macroeconomic variables and found a weak causality running from Index of Industrial Production to Sensex (Nifty). Maysami et al. (2004) and Ahmed and Imam (2007) investigate the relationship between stock market and different

macroeconomic variables in Singapore and Bangladesh, it was found that the Singapore stock market and the SES All-S Equities Property Index formed significant relationships with all macroeconomic variables identified. On the other hand, Bangladesh stock market does not reflect macroeconomic effect on stock price indices. Young (2006) in the study of industrial production and stock returns, admitted that industrial production significantly affects stock returns. He further explained that increased industrial production leads to increase in economic activities, which translate to potential higher earnings and result in an increase in stock valuations, a consequence of stock gains

### **Problem Statement**

The slow phase of stock market recovery in Nigeria is creating cause for worries among the stock market watchers and managers. Opinion tends to attributes this phenomenal slow response recovery to the bad economic performance in the country. This study therefore seeks to identify the effect of certain macroeconomic variables on the stock market performance. According to Ipekten and Aksu, (2009), stocks are risky assests, investors are keen to know what affects stock prices and how much these effects change the stock prices.

## **II. Objectives Of The Study**

To identify macroeconomic variables that influence All Share Index of Nigeria Stock Exchange and establish a statistical model of linear relationship of the identified variables. It also aimed at investigating the impact of the identified variables against the All Share Index.

### **Implication of the Study**

The rationale behind the study is to check the informational efficiency of the Nigeria Stock market. If lagged changes in some macroeconomic variables cause variations in stock prices and past fluctuations in stock prices cause variations in the economic variable.

## **III. Data And Methodology**

The data for this study consist of annual time series data of the selected macroeconomic variables namely, Exchange Rate, Index of Industrial Production (IIP), Interest Rate, Money Supply, Gross Domestic Product and Nigeria Stock Market indicators (All Share Index- ASI) covering a period of 19 years from 1994 to 2012. The data for macroeconomic variables were obtained from the official website National Bureau of Statistics. The All Share Index monthly data was summed from which the annual average for the study was obtained

Consumer price index (CPI) is used as a proxy to inflation rate, this is because from several studies reviewed, Inflation rate has negative impact on different economic factors as well as general price level of goods and services.

This work follows Al-Tamimi (2007) multiple regression of stock price against the macroeconomics variables

$$SP = f(\text{EPS, DPS, GDP, INT, OIL, INFL, FX})$$

Where, SP is the stock price; EPS is the earnings per share; DPS is the dividend per share; GDP is the gross domestic product, INT is the lending interest rate, OIL is the oil price; INFL is inflation and FX is the foreign exchange rate.

The factors of dependent relationship between economic variables can be statistically studied through application of multiple-regression tool using a competent statistical package like SPSS, to establish a model of possible linear system. For instance, if Y represents stock market All Share Index and X1, X2, X3, X4 and X5 represents the selected economic variables influencing the stock market performance, we can have a multi-linear regression model like

$$Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5 + \epsilon$$
$$= \beta(X_1, X_2, \dots, X_k) + \epsilon$$

The relationship between the macroeconomic variables and the Stock Index can be represented using simple Taylor's series as defined below

$$\text{NSE index - ASI} = f(\text{USD/N, InfRate, IntRate, MoneySupply, InduProduction, etc})$$

From the above expression,

$$ASI = \beta_0 + \text{USD/N} \beta_1X_1 + \text{InfRate} \beta_2X_2 + \text{IntRate} \beta_3X_3 + \text{Moneysupply} \beta_4X_4 + \dots$$
$$\dots, \text{IndProduction} \beta_5X_5 + \epsilon$$

## **IV. Analysis And Result**

The data analysis follows a two stage approach, namely the multicollinearity presence detection and multiple regression formulation

1. Test of Multicollinearity first

Before running a multiple regression model, the first step is to check for the presence of multicollinearity among the independent variables.

A linear expression where more than two variables are deployed, multicollinearity between variables may not be ruled out. Multicollinearity is a matter of degree, not a matter of presence or absence. The higher the degree of multicollinearity, the greater the likelihood of its disturbance consequences. Among the know several techniques for detecting multicollinearity are correlation coefficient test and variance inflation factor (VIF) estimation. For correlation coefficient test, a coefficient far greater than 0.8 between any two independent variables is believed to exhibit multicollinearity. Hence, one or the two variables is dropped.

**Table. 1.0 The correlation coefficient matrix of selected macroeconomic variables**

	GFCF	FDI	GDP	IIP	IR	ASI	M2	CPS	TAMC	ExRate
GFCF	1.000	-.120	.592	.390	.372	.263	.641	.649	.583	.376
FDI	-.120	1.000	-.437	-.502	-.500	-.341	-.362	-.346	-.352	-.497
GDP	.592	-.437	1.000	.773	.039	.563	<b>.960</b>	<b>.961</b>	.915	.768
IIP	.390	-.502	.773	1.000	-.203	.833	.774	.725	.824	.837
IR	.372	-.050	.039	-.203	1.000	-.215	-.055	-.074	-.118	-.157
ASI	.263	-.341	.563	.833	-.215	1.000	.609	.547	.772	.597
M2	.641	-.362	<b>.960</b>	.774	-.055	.609	1.000	<b>.993</b>	<b>.924</b>	.818
CPS	.649	-.346	<b>.961</b>	.725	-.074	.547	<b>.993</b>	1.000	<b>.912</b>	.780
TAMC	.583	-.352	<b>.915</b>	.824	-.118	.772	<b>.924</b>	<b>.912</b>	1.000	.711
ExRate	.376	-.497	.768	.837	-.157	.597	.818	.780	.711	1.000

From the table above, pair of variables having coefficients far greater than 0.8 are collinear, hence will be discarded from further incorporation into the regression model. Variables like

Determining multicollinearity from estimation of variance inflation factor (VIF). A VIF = 1 indicates no collinearity, whereas increasing higher value suggests increasing multicollinearity. Zuur et al (2010) suggests that VIF for each variable be calculated, and if they are larger than some cutoff, sequentially drop the independent variable with the largest VIF. Note  $VIF = 1/(1-R^2)$ .

Table 3.0 shows the VIF collinearity statistics, from where the independent variables with corresponding larger values CPS = 108.163 and M2 = 133.822 are dismissed. Hence, the variables credit to private sector and money supply are discarded as having higher degree of collinearity.

2. Multiple regression model between All Share Index (ASI ) against selected macroeconomic variables like GFCF; Foreign Direct Invest (FDI); Gross Domestic Product (GDP); Index of Industrial Production (IIP); Inflation Rates (IR); Money Supply (M2); Credit to Private Sector (CPS); (TAMC) and Dollar Exchange Rate (\$ ExRate).

**Table 2.0 Coefficients of Variable Parameters and Collinearity Statistics<sup>a</sup>**

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
1 (Constant)	<b>-39290.308</b>	23888.138		-1.645	<b>.124</b>		
Foreign Direct Investment	<b>187.259</b>	1116.075	.027	.168	<b>.869</b>	.692	<b>1.446</b>
ExRate	<b>-226.630</b>	149.653	-.440	-1.514	<b>.154</b>	.207	<b>4.823</b>
CPS	<b>-5.652</b>	3.703	-2.099	-1.526	<b>.151</b>	.009	<b>108.163</b>
M2	<b>6.478</b>	4.208	2.355	1.540	<b>.148</b>	.007	<b>133.822</b>
Index of Industrial Prod.	<b>914.340</b>	291.209	.912	3.140	<b>.008</b>	.207	<b>4.830</b>

a. Dependent Variable: ASI

The independent variables with higher VIF are indicating higher level of collinearity, hence will be discarded from the regression model. The variables affected are Money Supply (M2) and Credit to Private Sector (CPS).

Following the dismissal of higher collinear independent variables from the list of independent variables earlier selected, Index of Industrial Production (IIP); Dollar Exchange Rate ( \$ ExRate) and Foreign Direct Investment (FDI) are found adequate to regress All Share Index (ASI). That is  $ASI = f( FDI; IIP; \$ExRate )$

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	-60542.388	15922.595		-3.802	.002		
	IIP	1134.813	249.103	1.132	4.556	.000	.290	3.449
	ExRate	-161.839	127.650	-.314	-1.268	.224	.292	3.424
	FDI	507.588	1101.321	.072	.461	.651	.728	1.374

The regression model can be represented by the expression

$$ASI = -60542.388 + 1134.813IIP - 161.839ExRate + 507.588FDI$$

Each of the independent variables has a variance inflation factor within an admissible coefficient, while the VIF for Index of Industrial Production (IIP) has a positive and significant effect on All Share Index (ASI). Dollar Exchange Rate is noticed to have negative relationship, while Foreign Direct Investment is having positive effect.

Model	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	Std. Error of the Estimate	Change Statistics				
					R <sup>2</sup> Change	F Change	df1	df2	Sig. F
1	.855 <sup>a</sup>	.731	.678	7983.18127	.731	13.607	3	15 <sup>a</sup>	.000

The model diagnostic summary shows that the model is

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	2601520818.353	3	867173606.118	13.607	.000 <sup>b</sup>
	Residual	955967747.590	15	63731183.173		
	Total	3557488565.943	18			

## V. Result Discussion

The finding from the data studied for the period 1994 to 2012, showed that Index of Industrial Production (IIP) has a positive and significant effect on All Share Index (ASI) of Nigeria Stock Exchange. For Exchange Rates and Foreign Direct Investment t-ratio did not indicate that the variables are statistically significant, but exchange rates is negatively related to ASI and foreign direct investment is positively related. It can therefore be concluded that index of industrial production is a very significant single macroeconomic index that influences performance of All Share Index of Nigeria Stock Exchange positively. This finding is also confirmed by a number of different research reports, Sohail and Hussain (2009), Mahmood and Dinniah (2009), Humpe and Macmillan (2009) investigate relationship between Industrial production index and stock market returns. The findings of their studies show that industrial production index has positive and significant relation with stock market returns. Muradoglu et al. (2000), Kandir (2008) and Mohammad et al. (2009) investigate the role of macro-economic factors, namely inflation, industrial production index, interest rate and foreign exchange rate in explaining the stock returns. Foreign exchange rate and interest rate appeared to be significant in explaining the stock returns. Singh (2014) submitted that India stock market has significant influence of gold prices, inflation, money supply, exchange rates and foreign institutional investments. It concluded that exchange rates had negative impact on stock market during the period of study.

Young (2006) in the study of industrial production and stock returns, admitted that industrial production significantly affects stock returns. He further explained that increased industrial production leads to increase in economic activities, which translate to potential higher earnings and result in an increase in stock valuations, a consequence of stock gains

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