

EMPIRICAL ANALYSIS OF THE RELATIONSHIP BETWEEN MACROECONOMIC FACTORS AND STOCK RETURNS IN NIGERIA

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Abstract

This research work is aimed at ascertaining the causality among stock returns, inflationary rate, and money flow alongside with currency conversion rate in Nigeria. This work used quarterly data 2000Q1 – 2016Q4. Pairwise econometric technique was employed for data estimation. Return on stock alongside with inflationary rate were seen to have no causal relationship but return on stock was seen to be mutually related with currency conversion rate. The findings further showed that returns on stock has a unidirectional causation with money flow. The findings also showed that inflationary rate and conversion rate have unidirectional causation. The results implied that financiers can employ macroeconomic factors to predict the of movement stock in Nigeria.

Keyword: Currency conversion, money flow, return on stock, inflation

JEL Classification:

1. INTRODUCTION

The behavior of stocks with unequivocal stress on the forces that upset returns on stock has become an emblematic concern in accounting and finance research. Financial analysts are of the opinion that stock earnings and the undeniable value of assets at large are generally expected to react to macro-economic factors. There are material explanations for the perspicacity that respective returns are affected by extensive diversity of unexpected dealings.

Anecdotal proof reveals that some dealings have more ubiquitous impact on value of asset than others (Chen, Roll and Ross, 1986). Consequently various heights of inquiry as to what should elucidate the structure of a performing stock market have emerged. To this end numerous asset pricing models have been advocated for elucidation and evaluation of returns on equity. Extent literature reveals that one-factor Capital Asset Pricing Model (CAPM) is the prevailing asset pricing model in some quarters. Proponents of CAPM contend that beta (β), a dimension of methodical threat with relation to stock movement can be employed to ascertain the performance of stocks. Suffices to say that CAPM model is founded on the notion that the anticipated return on any asset is directly related with only one major factor, that is, its market beta. This solitary assumption is known to be the major shortcoming of the CAPM hence the introduction of a more encompassing and multi-faceted model that accounts for multifactor became imperative thus Arbitrage pricing technique (APT) was developed.

The APT model built by Ross (1976) thrives on the assumption that stock movements are affected by non-correlated common factors and a precise factor that is totally autonomous of other factors. APT allows the researchers to select whatever factors that provide the finest elucidation for the data. APT emanates from a completely dissimilar classes of assumption, as it principally does not place emphasis on efficiency of portfolios but rather establishes a line of causality between the returns on each stock and the prevalent and persistent macro-indicators against unsystematic turbulences in the market (Brealey et al., 2006). To be exact, APT infers that the return on asset can be divided into- anticipated return and an unanticipated. APT forecasts that “over-all news” will affect the performance index of all stocks but by dissimilar amounts.

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Azeez and Yonezawa (2003) opine that the employment of macroeconomic variables are beneficial because they are construal from economic standpoint and they also enhance intromission of extra information, connecting asset price performance with macroeconomic activities. Despite the series of researches done in the pass, it is obvious that the issues surrounding factors that influence stock performance are yet to be resolved.

Outcomes of prior researches on the influence of key economic indicators on earnings from stock are conflicting across countries. Obviously, developing nations are at present unable to present enough empirical evidence on this subject. There have also been divergent results in respect to which of these variables cause emblematic stock movement (Humpe and Macmillan 2007; Mukherjee and Tuftee 1998; Nishat and Shaheen 2004; Maghayereh 2002; Al-Sharkas 2004; Fama 1991). This study thus fills the gill gap in knowledge on the suitability of causation among stock returns, inflationary rate, money flow and conversion rate of local currency by applying APT. The objective of this study is to ascertain the causality between macroeconomic factors and stock returns.

LITERATURE REVIEW

2. Empirical Review

Ibrahim (1999) in Malaysia investigates stock movements and macroeconomic variables relationship. The researcher employs pairwise estimation technique to evaluate data gotten from the field. The outcome of his study shows that movement in conversion rate of local currency leads to significant changes in prices of stock in the short run.

Udegbumam and Eriki (2001) in Nigeria investigate inflation and performance of stock relationship. Their outcome confirms that inflation negatively influences performance of stock.

Muradoglu and Argac (2001) perform a research work to establish the association among stock returns, overnight interest rate, the money supply, and conversion rate of indigenous currency, from 1988 to 1995. Their findings revealed that entire monetary variables co-integrate with returns on stock for sub-period. Their findings infers that returns on stock are reactive to all the variables used for the study.

“Li and Wearing (2002)” in Kuwait employing Least Square estimation methodology carry out a work to establish inflation and prices of stock relationship. The outcome of study reveals that both variable are negatively related.

Maghayereh (2003) employs Johansen’s (1990) methodology to ascertain if key economic indicators have any link with market price index in the Jordanian capital market. Their study employs VECM. Its outcome confirms that entire macro-elements are emblematical for forecasting the prices of stock, which infers that the “Jordanian stock exchange market” violated the market efficiency theory.

Using quarterly data, Ahmed (2008) examines the long and short run link of key economic indicators with prices of stock in India. It was discovered that money supply has direct link with prices of stock in the long run but on the other hand interest rate exhibits insignificant relationship with of prices of stock.

Aydemir and Demirhan (2009), perform a study to ascertain if there is any significant link between market indices and currency conversion rate applying granger evolution technique. Their finding shows that price indices of stock is mutually related with foreign exchange rate. “Federova and Pankratov (2010) “in Russia using EGARCH model investigate the relationship macro elements and performance of stock. Their outcome establishes the existence of direct link of stock market with oil prices and conversion rate of local currency to American dollar.

“Asaolu and Ogunmuyiwa” (2010) examine the link amidst price movement and “key economic indicators “in Nigerian “Key economic indicators” used include external debt,

industrial output, interest rate, investment, exchange rate, foreign capital inflow and fiscal deficit. The outcome of the study establishes the existence of a weak linkage of key economic indicator with price movement in Nigeria.

Masuduzzaman (2012) investigates the connection of returns on stock with macroeconomic factors in German and the UK. The study covers a period of thirteen years, 1999-2011 and employs Johansen co-integration diagnostic test and “Impulse response function.” The outcome establishes a direction connection macroeconomic with returns on stock in long run and short run.

Abraham (2012) examines the key economic indicators and returns on stock relationship in Nigeria for twenty-three years. The study was specifically aimed at ascertaining the connection between returns on stock, exchange rate, interest rate and inflation, “Error Correction Model” was used for estimation of data gathered. Its outcome establishes that returns on stock is negatively related with exchange rate in the short run. Its outcome confirms that exchange rate has positive relationship with returns on stock in the long run.

Nkechukwu, Onyeagba and Okoh (2013) in Nigeria evaluate key economic factors and price movement relationship for twenty-seven years, 1980-2013. Least square evolution technique was used to analyze data collected from field. The outcome of study confirms price of stock to be directly connected with macroeconomic variables in the “long run”.

Issahaku, Ustarz and Domanban (2013) investigate the causation among stock returns on and macro-elements in Ghana for the periods, January 1995 to December, 2010. The study used “Engle and Granger” evaluation technique. Their results in the long run reveal that returns on stock is directly related with inflation, currency flow and Foreign Direct Investment (FDI), inflation and money supply while in the short run stock returns directly related with inflation, currency flow and interest rate.

Abdulkarim (2014) scrutinizes macro-elements/ stock performance relationship in Nigeria. ‘Time serial data’ between 1991 and 2003 were used. Least Square multivariate method was employed to evaluate data gotten from field. The results reveal that returns on stock is not related with any of the economic variables.

Inyama and Nwoha (2014) investigate the correlation that exist amidst price movement in the Nigeria and macroeconomic variables. The study spans from 2000 to 2012. “Granger causality” estimation technique was employed to evaluate the data. The outcome confirms that stock prices have positive relationship with currency conversion rate and inflationary rate but has insignificant relationship interest rate.

Zaighum (2014) carries out a study to investigate the relationship between returns on stock for selected nonfinancial quoted companies on “Karachi Stock Exchange” and macroeconomic factors. The study used panel data and OLS regression technique. The outcome establishes that returns on stock has negative relationship with consumer price index, and money supply.

In Kenya, Ouma and Muriu (2014) scrutinize the connection returns on stock return with macroeconomic variables for ten years, 2003- 2013 using the APT and CAPM). The multivariate regression method was applied to ascertain connection of dependent variables with the independent variables. The finding shows that return on stock is directly connected with macroeconomic variables. .

Barakat, Elgazzar and Hanafy (2016) examine if key economic indicators have any link with returns on stock for two unspecialized markets (Tunisia and Egypt) from “January 1998 to January 2014”. The outcome confirms the presence of mutual causation amidst interest rate, market index, rate of inflation, local currency conversion rate and currency flow in Egypt. All macroeconomic factors used except inflation have causation with stock performance in Tunisia

Okoro (2017) investigates the correlation of macro-elements with returns on stock in Nigeria. Least Square regression was used as data analysis technique. It was discovered that a combination of currency conversion rate, inflation, currency supply Gross Domestic Products and interest rate have no emblematic effect on returns of stock in Nigeria.

Kabeer (2017) using data obtained from “SAARC countries” and China to ascertain if returns on stock is related with macroeconomic variables. To achieve this study author used least square regression technique. It was discovered that inflation and foreign exchange are positively related with returns on stock while in Bangladesh. It was discovered that returns on stock is not related with FDI. For the other category, India and China, inflation and foreign exchange are highly correlated while returns on stock has weak correlated with FDI.

Model specification

The model is specified below;

$$SPR = F (INF, EXCH \text{ and } MS) \quad (1)$$

The above equation mathematically as;

$$SPR = a + \beta_1 INF + \beta_2 CONRT + \beta_3 CF + u \quad (2)$$

Where: SPR= Share price returns measured as the % change in the stock market all share index

INFL = inflation measured with consumer price index, CONRT = conversion rate, this variable is computed from the dollar-naira basis, CF = Currency flow, that is, money supply per quarter. The error correction model (ECM) of share price returns is thus specified:

$$\begin{aligned} \Delta(SPR) = & \Delta(f_0) + f_{1i} \sum_{i=0}^k \Delta(INF_{t-i}) + \\ & f_{2i} \sum_{i=0}^k \Delta(CONRT_{t-i}) + f_{3i} \sum_{i=0}^k \Delta(CF_{t-i}) + \\ & f_4 [SPR_{t-1} - f_0 - INF_{t-1} - CONRT_{t-1} - CF_{t-1}] + e_{1t} \\ \Delta(SPR) = & \Delta(f_0) + f_{1i} \sum_{i=0}^k \Delta(INF_{t-i}) + \\ & f_{2i} \sum_{i=0}^k \Delta(CONRT_{t-i}) + f_{3i} \sum_{i=0}^k \Delta(CF_{t-i}) + \\ & f_4 ecm(t-1) + e_{1t} \quad (6) \\ \text{where, } ecm(t-1) = & SPR_{t-1} - f_0 - INF_{t-1} - CONRT_{t-1} - CF_{t-1} \end{aligned}$$

Where, Δ is first difference operator.

METHODOLOGY

3. DATA ANALYSIS METHOD

The study used secondary data extracted from Nigerian stock exchange and Central Bank of Nigeria statistical bulletin. Quarterly data of three macroeconomic variables alongside with one stock exchange variable for seventeen years were collected (2000-2016). The three macroeconomic factors used for the study are: exchange rate, rate of inflation and currency flow. The period was chosen because it is synonymous with the financial crises which occurred globally. This crisis affected the most developed stock markets across the globe.

Data collected were subjected to pre-test and posttest. We tested for presence of unit root in order ascertain whether the variables are stationary or non-stationary. Johansen test used ascertain the long term association among the series and “Pairwise Granger causality was employed to find out the causation in series.

PRESENTATION AND ANALYSIS OF DATA

Table 1 The ADF unit root test for the Variables at Levels at 5% sig level with intercept

Variable	ADF value	Critical value	PP test value	Critical value
ASINDEX	-2.071	-2.939	-1.662	-2.938
EXRT	-1.564	-2.939	-1.309	-2.947
CPI	-0.609	-2.949	0.638	-2.947
M2	-2.378	-2.949	-2.468	-2.947

**Significant at 5%

Table 2 The ADF unit root test for the variables at 1st difference at 5% sig level at intercept.

Variable	ADF value	Critical value	PP test value	Critical value
ASINDEX	-3.267**	-2.942	-3.423**	-2.939
EXRT	-3.378**	-2.953	-4.876**	-2.949
CPI	5.465**	-2.953	-6.736**	-2.949
M2	-3.743**	-2.953	-5.807**	-2.949

Tables 1 discloses stationary at levels and with intercept. It further divulges that entire used exceed the critical values at 5% significance levels using the ADF test statistics and the Philip Perron statistics respectively. Specifically, ASINDEX (ADF =-2.071, PP = -1.662), EXRT (ADF=-1.564, PP=-1.309) CPI (ADF=0.669, PP=0.638), M2 (ADF=2.378, PP=-2.468) are exhibit a value that is less than their critical values at 5% hence the hypothesis that the data is stationary was rejected.

Table 2 displays the outcome for stationary test at first variance with intercept only. As observed ASINDEX (ADF =-3.267, PP = 3.423), EXRT (ADF=-3.378, PP=-4.876), CPI (ADF=5.465, PP=6.736), M2 (ADF=-3.743, PP=-5.807). Relating each variables with respective ADF and PP- critical values indicates that entire variables achieved stationarity using both the “ADF and PP test “statistic at 5% level.

Table 3: Co-integration Test (Engle and Granger Procedure)

Variable	Trace Sta	CV	Hypothesized	Max-Eigen	CV	Hypothesized
ASINDEX	51.166	47.856	None**	21.466	27.584	None**
EXRT	29.700	30.797	At most1**	29.775	21.131	At most1**
CPI	9.924	15.494	At most2	9.521	14.264	At most2
M2	0.403	3.841	At most 3	0.403	3.841	At most 3

Source: Researcher's computation

** Detonate rejection at 5%sig level

The table 2 shows that Johnson co-integrated test to ascertain if the variables are co-integrated. The test reveal that is at least one co-integration series among the macroeconomic variables used.

Pairwise causality test

We verified for the absence of “Granger causality” employing the following models:

$$Y = a_0 + a_1 Y_{t-1} + \dots + a_p Y_{t-p} + b_1 X_{t-1} + \dots + b_q X_{t-q} + \mu \quad (1)$$

$$X = c_0 + c_1 X_{t-1} + \dots + c_p X_{t-p} + d_1 Y_{t-1} + \dots + d_q Y_{t-q} + \mu \quad (2)$$

Testing: $H_0: b_1 = b_2 = \dots = b_q = 0$, a test that X_t does not cause Granger-cause Y_t

Y_t similarly testing $H_0: d_1 = d_2 = \dots = d_q = 0$

For Granger causality estimation, two variables are normally analyzed together, while testing for their interaction. All possible results are: One way relationship between Y_t and X_t , One way relationship between X_t and Y_t , Bi-directional causality and No causality

Table 4: Results of Pairwise Granger causality

Ho	F-statistics	p-value	Type Causality for
INFL does not Granger Cause SP	1.238	0.298	No causality
SP does not Granger Cause INFL	1.474	0.238	
MS does not Granger Cause se SP	3.81079	0.0282	Uni-directional causality
SP does not Granger Cause	0.51053	0.6030	
EXRT does not Granger Cause SP	4.67351	0.0133	Bi-directional causality
SP does not Granger Cause EXRT	5.04673	0.0097	
MS does not Granger Cause INFL	0.75501	0.4748	No causality
INFL does not Granger Cause MS	0.40555	0.0696	
EXRT does not Granger cause INFL	6.21881	0.0037	Uni-directional causality
INFL does not Granger Cause EXRT	2.20606	0.1198	

Source: Researchers' computation

The empirical outcome establishes that inflation has no mutual causation with stock returns, similarly, returns on stock has no causation with inflation rate. Furthermore, it was observed that returns on stock exhibit one-way causation with money supply. This infers that money supply expansion will cause increase in investments in stocks but movement in stock returns will not cause emblematic variation in currency flow. The result also shows that bi-directional causality exit amidst conversion rate and stock performance. This implies that change in currency exchange rate will cause a significant movement in stock returns.

Movement in stock returns also caused an emblematic alteration in conversion rate. Additionally, it was observed that alteration in inflation did not cause any emblematic variation in currency flow. Also, findings confirms there is a one-way causation amidst exchange rate and inflation rate. This infers that alteration in conversion rate will cause an emblematic variation in inflation but alteration in inflation will not cause an emblematic alteration in exchange rate.

Empirical Analysis of Error Correction Estimates

The estimated EC coefficient is -0.879 and it is significant at 1% level with a t-ratio of 5.932. the size and sign of the coefficient so conformed to economic theory, with inference that adjustment towards equilibrium each time there is a perturbation to share price returns emanating from changes in inflation rate, conversion rate of the naira-dollar exchange rate and currency flow. This also authenticated absence of serial correlation as made manifest in the D-W statistic of 2.011.

The F-ratio of 152.6 denotes overall significance of the ECM estimation at 1% level. In effect, our estimated ECM exhibit robust explanatory power. Thus, 74.1% of total variation in share price returns have been explained by the ECM. The Ramsey reset test reported 0.003 with a high probability value which revalidates success in correction for serial correlation in our estimation.

The results explicitly show significance of one-period lag of conversion rate between naira-dollar exchange rate with coefficient of -0.015 whose t-ratio stood at 2.136. The current conversion rate also do not pass significance test with a t-ratio of 2.052. The positive sign accompanying these coefficients upholds that a higher conversion rate has had stimulant effect on share price returns.

Current and one-period coefficients of currency flow are 0.132 and 1.053. These coefficients are statistically significant with t-ratios of 2.451 and 5.972 respectively. Thus, a 10% rise in currency flow induces 13.2% rise in share price returns at current period. This signifies profitable effect of the amount of money in circulation in Nigerian stock market.

Similarly, coefficients of inflation rate at both current and lagged period are statistically insignificant with t-statistic of -1.792 and -1.725 respectively. In effect, conversion rate and currency flow are significant determinants of share price returns in Nigeria stock market.

Table 5: Results of Error Correction Equation

Variables	Coefficients
$\Delta(f_0)$	0.172 (1.954)***
$\Delta(CF)$	0.132 (2.451)**
$\Delta(CF(-1))$	1.053 (5.972)*
$\Delta(CONRT)$	0.013** (2.052)
$\Delta(CONRT(t-1))$	0.015** (2.136)
$\Delta(INF)$	-0.014 (-1.792)
$\Delta(INF(t-1))$	-0.009 (-1.725)
$ecm(t-1)$	-0.879 (2.932)**
<i>Adjust R²</i>	0.741
<i>D – W</i>	2.011
<i>F stat</i>	152.6(0.000)
<i>Ramsey R.</i>	0.003(0.245)

Source: Authors' estimation with Eviews

In final analysis, the results show that the inflation is an insignificant determinant of the share price returns while currency flow, that is amount of money in circulation within a quarter and average exchange rate of naira to dollar are significant determinants of share price returns in Nigeria.

5. CONCLUSION

Stock market performance and without any doubt asset prices at large are normally assumed to react to major economic activities. There are justified grounds for one to assume that each stock price is affected by an extensive change in unforeseen activities and that some activities tend to have more inescapable relationship with asset prices than others. Hence some degree of inquisitiveness has emerge as to what should be the determinant of stock performance in an ideal market.

Against this background we applied pairwise Granger causality estimation method to the ascertain causation between returns on stocks macroeconomic factors. The outcome establishes that variation in inflation rate does not cause variation in stock returns, movement in stock returns do not lead to emblematic alteration in inflation. Similarly, it was observed that alteration in currency conversion rate causes an emblematic alteration in returns of stocks. It was also observed that movement in stock returns cause an emblematical variation in currency conversion rate. The results further show that variation in flow of money will alter returns on stock significantly but variation in stock returns will not cause an emblematical variation in money.

The study implies that macroeconomic factors are veritable variables for predicting stock performance in the Nigeria. The result also implies that stock movement in the market can used by the Apex bank to articulate fiscal guidelines while investors be use macroeconomic factors to predict stock performance per time.

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