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Article

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A Causality Test of the Impact of Macroeconomic Factors on Firms' Shares Returns in Nigeria

Michael S. Ogunmuyiwa[1]

Abstract: Macroeconomic determinants of firm share returns had been a subject of debate among scholars. While the debate rages on, this study investigates the causal relationship between macroeconomic factors and firm share returns in Nigeria by taking a sample of fifty (50) quoted firms on the Nigeria Stock Exchange from January 2007 to December 2013. The monthly time series and cross sectional data was fitted to the Granger causality test and the results affirm that except money supply all other macroeconomic variables (inflation rate, interest rate, exchange rate and crude oil price) exhibit uni-directional causality with firm share returns and bi-directional causality with respect to the other three factors. The study recommends that to improve portfolio performance, investors in the Nigeria stock market need to be cognizant of the impacts of macroeconomic indicators particularly those that have been found to be causally related to stock returns like inflation rate, interest rate, exchange rate and crude oil price.

Keywords: Macroeconomic Factors; Firm Share Returns; Causality

JEL Classification: E00; F40; G12

1. Introduction

Stock market plays a major role in financial intermediation in both developed and developing countries by channeling idle funds from surplus to deficit units in the economy. Apart from the fact that the stock exchange market forms an integral part of any economy, it is the barometer through which the economy is perceived by many people. Stock exchanges are avenues where the general public largely takes part, as investors in the economy. Okoli (2012) asserts that the stock market plays a vital role in mobilizing individual resources and channeling same to investors. The market promotes savings and investments by providing an avenue for portfolio diversification to individuals, corporate investors and governments.

As noted by Olweny and Kimani (2011) and Kimani and Mutuku (2013), stock exchange markets encourage investors with surplus funds to invest them in additional financial instruments that match their liquidity preferences and risk appetite. In that respect better savings mobilization increases the savings rate, thereby stimulating investments and subsequently earning incomes to the owners of those funds. In addition, the liquid nature of these markets makes it possible for the investors to exchange ownership of securities and reap capital gains in the process.

The stock market like the financial institutions and intermediaries performs the function of financial intermediation. Through mobilization of resources the stock market promotes economic growth by providing avenue to pool large and long term capital through issuing of shares and stocks and other equities for industries in dire need of finance to expand their businesses and for governments through issuing of bonds for development of infrastructures. This promotes economic growth and development and it is true that the rate of economic growth of any nation is inextricably linked to the sophistication of its financial market and specifically its capital market efficiency.

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Virile financial markets assist the nations of the world to muster needed financial resources and skills for growth and development (Ewah, Esang & Bassey, 2009). Thus, the overall development of the economy is a function of how well the stock market performs, and empirical evidences have proved that development of the capital market is sine qua non to economic growth. While developed economies have fully explored the mobilization of resources through the capital market, the developing countries are yet to fully explore the benefits of raising capital via the capital market. Equity markets in developing countries until the mid-1980s generally suffered from the classical defects of bank dominated economies that have shortage of equity capital, lack of liquidity, absence of foreign institutional investors and lack of investor's confidence in the stock market (Adebiyi, 2005).

The movement of stock indices is highly sensitive to changes in fundamentals of the economy and to the changes in expectations about future prospects. These expectations are influenced by micro and macro fundamentals which may be formed rationally or adaptively by economic indicators and subjectively by factors which are unpredictable and unquantifiable. The relationship existing between macroeconomic indicators such as (interest rate, inflation rate, exchange rate, crude oil price, GDP growth rate) and stock returns has been extensively studied and documented in both developed and developing capital markets. Empirical studies have also been conducted on the relationship between macroeconomic indicators and performance of the stock market in Nigeria. However, this study looks at the causal relationship between stock returns and macroeconomic variables using monthly data from January 2007 to December 2013 on a sample of fifty (50) quoted firms from the Nigeria Stock Exchange. The rest of the paper is split into three (3) sections. Section two focuses on the review of past studies while section three centers on the methodology and empirical findings. The last section is based on the conclusions and policy recommendations of the study.

2. Review of Previous Studies

Literature is replete on the relationship between macroeconomic factors and firm share returns on one hand and causality between macroeconomic variables and firm share returns on the other hand. Among the relevant studies is the work of Geske and Roll (1983) for the United States. The study confirms that stock price is negatively related to inflation rate and positively related to real economic activity. Chen, Roll and Ross (1986) while testing the validity of Arbitrage Pricing Theory affirm that, macroeconomic variables are causally related to share returns.

Naliniprava (2011) investigates the market efficiency and causal relationship between selected macroeconomic variables and the Indian stock market during the period January 2005 to February 2011. The study confirms the presence of autocorrelation in the Indian stock market and macroeconomic variables which implies that the market fell into the form of efficient market hypothesis. The Granger causality test shows evidence of bi-directional causality between interest rate and stock market, exchange rate and stock market, international stock market and BSE volume, exchange rate and BSE volume. Also, Mittal and Pal (2011) examine the Indian stock market volatility and conclude that inflation rate has notable influences in major stock markets in India. The study goes further to reveal unidirectional causality running from international stock market to domestic stock market, interest rate, exchange rate and inflation. The study conducted by Abdalla and Murinde (1996) investigate the interactions between exchange rates and stock prices in the emerging financial markets of India, Korea, Pakistan and the Philippines. The Granger causality results show unidirectional causality from exchange rate to stock prices in all the sampled countries

with the exception of Phillipines. Also, Yessengali et al (2011) investigate the causal relationship between macroeconomic indicators and Kazakstan stock exchange (KASE) index. The results indicate the existence of co-integration between the series implying violation of market efficiency hypothesis. The Granger causality test reveals that the main determinants of KASE are per capita income, inflation and exchange rate. Other effects of stock index come from oil price volatility measure causing windfall gain effect as a consequence of rapid, but temporary increase in oil price.

A study conducted by Perval et al (2008) test the Dutch disease hypothesis (which states that the inflow of oil windfalls into an oil exporting country could lead to an appreciation of the real exchange rate, reduce the country's competitiveness in the non-oil exporting sector, and limit its ability to build a diversified export base) by examining the relationship between oil prices and real exchange rate in a sample of 14 oil exporting countries using monthly data and autoregressive distributed lag approach. They conclude that there exists a long run relationship between the two variables in all countries sampled. Unidirectional causality was established from oil prices to exchange rate in four countries (Algeria, Colombia, Norway and Venezuela) and from exchange rate to oil prices in two countries (Bolivia and Russia). Bidirectional causality was also established in four countries (Gabon, Indonesia, Nigeria and Saudi Arabia), and no causality in the remaining four countries (Algeria, Bahrain, Kuwait and Mexico).

The study conducted by Omotor (2010) on the relationship between inflation and stock market returns in Nigeria reveals that stock market returns may provide and edge against inflation in Nigeria. Murtala et al (2012) investigate the impact of crude oil price and stock price on some selected macroeconomic indicators in Nigeria using co-integration and error correction on time series data from 1980 to 2010. The findings reveal that crude oil price, stock price and exchange rate are significant in determining the growth of the Nigerian economy. Amadsu (2012) analyzes the impact of interest rate, inflation and exchange rate on stock market index in Nigeria using co-integration on annual data between 1975 and 2009. The findings reveal that some relationships exist among the variables, albeit not significant. Also, Lawal and Okunola (2012) examine the relationship between stock prices, stock market operations and economic growth in Nigeria from 1980 to 2010. The findings show that the activities of the stock market are statistically significant with stock price and economic growth.

In the same vein, Onwumere (2012) investigates the relationship between stock market and economic growth in Nigeria using O.L.S regression on time series data from 1986 to 2010. The result reveals that economic growth has positive and non-significant impact on market capitalization and turnover ratio but had a negative impact on stock market value traded ratio. Adaramola (2011) investigates the impact of macroeconomic indicators on stock prices in Nigeria from 1985:1 to 2009:4 using pooled data. The study affirms that macroeconomic variables have varying significant impacts on stock prices of firms in Nigeria.

Asaolu and Ogunmuyiwa (2011) investigate the relationship between macroeconomic variables and average share price in Nigeria. The study concludes that a weak relationship exists between ASP and macroeconomic variables in Nigeria. Haung and Chen (2011) employ various research methods of time series, VAR, Granger Causality Test, Impulse Response Function and Variance Decomposition in order to explore the interactions among stock returns, the term structure of interest rates and economic activities in Taiwan. The study finds out that there were causality between stock returns and industrial production and between stock returns and the spread between long-term and short-term interest rates. Gan et al (2006) investigate the relationship between New Zealand stock market and 7 macroeconomic variables (1990-2003) using co-integration and Granger causality. The study reveals that long run

relationship exists between NZSE40 and macro variables and the Granger causality reveals that NZSE40 is not a leading indicator for changes in macro variables. Haruna et al (2013) examine causality between macro variables and stock returns in Ghana from1995:1 to 2010:12 and the findings reveal that causality runs from interest rate and exchange rate to stock returns and from stock returns to interest rate, money supply and FDI.

Ogunmuyiwa (2016) in a recent study on Macroeconomic Indicators and Firms' Shares Performance in Nigeria applies a wide range of econometric techniques such as co-integration, Vector Error Correction Method, Difference and Systems GMM and Granger Causality test on times series and panel data between January 2007 (2007, p. 1) and December 2013 (2013, p. 12). The findings reveal that varying impacts exist between macroeconomic indicators and firm share returns on one hand and stock market index on the other hand. The study concludes that Inflation rate, interest rate and crude oil price are however found to exert strong and significant influence on firm share and stock market performance in Nigeria.

3. Methodology and Empirical Results

3.1. The Model

A sample of fifty (50) firms that are traded at least once in a month was purposively selected from eight (8) different sectors out of a total population of two hundred and sixty five (265) firms quoted on the Nigeria Stock Exchange. The sampled sectors are banking, breweries and distilleries, consumer products, insurance, building materials, pharmaceuticals, other financial institutions and oil and gas. The Granger causality test by Granger (1969) was hereby formulated below.

$$FSP_{t=}\sum_{j=1}^{k} A_j\, MEV_{t-1} + \sum_{j=1}^{k} B_j FSP_{t-j} + U_{1t} \ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

$$MEV_t = \sum_{j=1}^{k} C_t\, MEV_{t-1} + \sum_{j=1}^{k} D_j FSP_{t-j} + U_{2t} \ldots\ldots\ldots\ldots\ldots\ldots (2)$$

Where FSP= firm share performance, MEV= macroeconomic variables. The macroeconomic variables are CPI= consumer price index, INT= interest rate, EXR= exchange rate, MS= money supply and COP= crude oil price.

(i). The Firm Share Performance (FSP) was measured using the firm share returns of individual companies selected in the sampling process. Taking January, 2007 i.e 2007:1 as the base period, the individual firm's share return for January, 2008 can be computed as: $\frac{P_{1-}P_0}{P_0} \times 100$ where P_0 is January, 2007 defined as the base period and P_1 is corresponding monthly observations from February 2007 to December 2013. (ii). Monthly Consumer Price Index (CPI) was used to measure the rate of inflation from the overall point of the economy. (iii). Monthly Treasury Bill Rate (TBR) was used to measure interest rate. (iv). Exchange rate was measured by nominal exchange rate on monthly basis. (v) Broad money (M_2) was used to measure money supply on monthly basis. (vi). Month end crude oil price per barrel was used to measure the price of crude oil.

3.2. Empirical Results and Discussion

The pair wise Granger causality test as put forward by Granger (1969) was adopted to determine the direction of causality between the variables. The pair wise Granger causality test allows for a one by one causality comparison to determine whether causality is unidirectional, bidirectional or no existence of causality among the variables.

Table 1. Pair Wise Granger Causality Test Result (2007; p. 1 to 2013, p. 12). Lags: 2

Variables	F-statistics	Prob
COP → FSR	3.12716	0.0439***
FSR → COP	0.10911	0.8966
CPI → FSR	9.73581	6.E-05***
FSR → CPI	2.95877	0.0520*
EXR → FSR	10.6527	2E-05***
FSR → EXR	5.91134	0.0027***
INTR → FSR	10.9495	2.E-05***
FSR → INTR	9.54430	7E-05***
MS → FSR	0.34780	0.7063
FSR → MS	0.6139	0.8510
CPI → COP	123.314	1E-52***
COP → CPI	47.7210	3E-21***
EXR → COP	46.1290	2E-20***
COP → EXR	168.205	6.E-71***
INTR → COP	57.9501	2E-25***
COP → INTR	76.9661	2E—33***
MS → COP	4.57312	0.0104***
COP → MS	2.30648	0.9997
EXR → CPI	45.5886	3E-20***
CPI → EXR	222.301	2E-92***
INTR → CPI	11.9889	6.E-06***
CPI → INTR	95.0992	4.E-41***
MS → CPI	7.4847	0.0006***
CPI → MS	76.5891	2.E-33***
INTR → EXR	498.375	2E-194***
EXR → INTR	0.80706	0.4462
MS → EXR	7.25101	0.0007***
EXR → MS	54.1095	6E-24***
MS → INTR	0.25487	0.7750
INTR → MS	34.0807	2E-15***

Author's computation, 2016

****, ** and * indicate significance at 1, 5 and 10 percent respectively*

It is obviously clear going by the p-values that the Granger causality test reveals the existence of bi-directional causality between exchange rate (EXR) and firm share returns (FSR); interest rate (INTR) and firm share returns (FSR); consumer price index (CPI) and crude oil price (COP). Furthermore, exchange rate (EXR) and crude oil price (COP); interest rate (INTR) and crude oil price (COP); exchange rate (EXR) and consumer price index (CPI) Granger cause one another at the 1 percent level of significance.

In addition, bi-directional causality also exists at the 1 percent level between interest rate (INTR) and consumer price index; money supply (MS) and consumer price index (CPI) and money supply (MS) and exchange rate (EXR). Also, bi-directional causality exits between consumer price index (CPI) and

firm share returns (FSR) at both 1 and 10 percent respectively. Unidirectional causality however runs from interest rate (INTR) and exchange rate (EXR). Also, interest rate (INTR) Granger causes money supply (MS) at 1 percent level of significance.

3.2.1. Discussion of Findings

The findings from the results reveal that all the macroeconomic variables with the exception of money supply actually Granger cause firm share returns. The bi-directional causality points to the fact that movement in macroeconomic variables can be used to predict changes in firm share returns in Nigeria and vice-versa. The two-way causality further strengthens the impact of macroeconomic variables in the determination of firm share returns in Nigeria. The earlier studies of Haruna et al (2013) and Huang and Chen (2011) corroborate this finding while the study conducted by Gan et al (2006) negates it.

4. Conclusion and Policy Recommendations

No doubt, findings from the Granger causality test confirm that almost all the variables except money supply were causally related to firms' share returns. This signifies that macroeconomic indicators and returns of shares of quoted firms in Nigeria drive one another. In addition, interest rate, inflation rate, exchange rate and crude oil price are the major macroeconomic variables determining movements in firm share returns in Nigeria.

The study recommends that to improve portfolio performance, investors in the Nigeria stock market need to be cognizant of the impacts of macroeconomic indicators particularly those that have been found to be causally related to stock returns like inflation rate, interest rate, exchange rate and crude oil price. Also, since crude oil price has been found to be causally related to firm share returns, it is recommended that in an economy like Nigeria that heavily depends on oil revenue, practical and urgent steps need to be taken to develop alternative sources of revenue to prevent dwindling oil revenue arising from fall in oil prices or cut in production quotas or a combination of both as the nation is presently experiencing.

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