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Does Inflation Granger Cause Stock Market Performance in Nigeria?

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Abstract
The crux of this paper was an investigation of the direction of causality between inflation and movements in stock market index in Nigeria. While attempting to do this, monthly time series data from June 2011 to March 2013 were fitted to Augmented Dickey Fuller (ADF) and Phillips Perron (PP) tests as well as the Granger causality test. Empirical findings revealed that inflation and NSE index are I(2) and I(1) series respectively. The Granger causality test revealed a weak unidirectional causality from inflation to stock index and this means that inflation is not a strong factor determining movements in stock market variables in Nigeria.
Keywords: Inflation Rate, Nse Index, Causality.

1 Introduction

Inflation a period of rising prices of goods and services affects the overall performance of the economy and in particular performance of the stock market. The role of the stock market in promoting economic growth through financial intermediation could be hampered by incessant inflation because inflation greatly influences the prices of financial assets. Persistent inflation affects the prices of stock and the eventual returns and also the performance of other stock market indices. Inflation rate has both positive and negative effect on the corporate sector as some industries benefit while others suffer (Chandra 2004). It also has negative effect on consumer price index (CPI), (Fama and Schwert, 1977), and share prices as investors under- value equity (Feldstein, 1980; Summers, 1981; Amadi and Ddubo (2002).

Tanggaard (2002) study finds a moderately positive relationship between expected stock returns and expected inflation in the U.S. Also, Sharfe (2002) suggests that rise in expected inflation reduces equity prices in the U.S. The negative relationship between inflation and stock returns has been established by Najandand and Noronhal (1988) in Japan, Zhao (1999) in China and Crossby (2001) in Australia.

Contrary to the above, Samarakoon (1996) found that nominal stocks are positively related to expected inflation in a one-to-one correspondence in Sri Lanka. For the Ghanian economy, Kyereboah-Coleman and Agyire-Tettey (2008) concluded in their study of the impact of macroeconomic indicators on Ghana stock market that lending rates from deposit money banks have adverse effect on stock market performance. The study also found inflation to be negatively related to stock market performance and this effect takes time because of the presence of a lag period.

Onwusu-Nantwi and Kuwornu (2011) investigates the relationship between macroeconomic variables and stock market returns using monthly data spanning from January 1992 to December, 2008. The OLS model in the context of Box-Jenkins methodology was used in analyzing the impact of macroeconomic variables on stock market returns in Ghana. Their empirical findings reveal that there is a significant relationship between stock returns and consumer price index used as a proxy for inflation. The study conducted by Kimani and Mutuku (2013) on the Kenyan economy using quarterly data from 1998 to 2010 revealed a negative relationship between inflation and stock market performance in Kenya.

The study conducted by Omotor (2010) on the relationship between inflation and stock market returns in Nigeria and the findings revealed that stock market returns may provide and edge against inflation in Nigeria. Also in Nigeria, according to Daferighe and Aje (2009) the effect of inflation on stock prices are reflected especially when there is a change in the expected rate of inflation. They posited in their study that a reduction in inflation and interest rate resulted in increased stock prices. If the earning stream of a company remain unchanged and inflation changes, stock prices will experience a decline. Hence, investors who own shares in such a company will experience a decline in returns.

Amadsu (2012) analyzed 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 revealed that some relationships exist among the variables, albeit not significant. Singh et al (2012) conducted a study on the influence of exchange rate and inflation on the performance of Bombay Stock Exchange (BSE) sensex. The study employed regression analysis on monthly time series data from April, 2007 to March, 2012. The results revealed that inflation and exchange rate significantly affect the performance of BSE sensex.

1.1 Methodology

1.1.1 Unit Root Test (ADF and PP)

Most time series data are trended over time and regressions with trended series may produce significant

parameters with high R^2, but may be spurious and meaningless. To make time series data with unit roots stationary, an evaluation of each of the variables for the presence of unit root using both the Augmented Dickey Fuller (ADF) and Phillips Perron (PP) tests. The regression equations for both levels and first difference are formulated below:

$$\Delta y_t = \alpha y_{t-1} + \sum_{i=1}^{m} \beta_1 \Delta y_{t-1} + \theta + \gamma_1 + \varepsilon_1 \ldots\ldots\ldots\ldots\ldots for\ levels \ldots\ldots\ldots\ldots (1)$$

$$\Delta\Delta y_t = \alpha y_{t-1} + \sum_{i=1}^{m} \beta_1 \Delta\Delta y_{t-1} + \theta + \gamma_1 + \varepsilon_1 \ldots\ldots for\ 1st\ difference \ldots\ldots (2)$$

Where y is the variable whose stationarity is being examined, M is the number of lags and t represents time. The rule is that M should not be too large to prevent the presence of autocorrelation. In this case M=1. Before proceeding to conducting the Granger causality test, it is pertinent to determine the stationarity of the series and thereafter subject it to causality test to determine the direction of movement between the variables.

1.1.2 Granger Causality Test

In addition, the Granger Causality model as described by (Granger, 1969) is explained as follows:

$$NSE_t = \sum_{j=1}^{K} A_j CPI_{t-i} + \sum_{j=1}^{K} B_j NSE_{t-j} + Uit \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3)$$

$$CPIt = \sum_{j=1}^{K} C_i CPI_{t-i} + \sum_{j=1}^{K} D_j NSE_{t-j} + U2t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (4)$$

Equation (3) postulates that current NSE is related to past values of itself as well as that of CPI and vice- versa for equation (4).Unidirectional causality from CPI to NSE is indicated if the estimated coefficient on the lagged CPI in equation (3) are statistically different from zero as a group (i.e$\sum$ Ai $\neq$ 0) and the set of estimated coefficients on the lagged NSE in equation (4) is not statistically different from 0 (i.e $\sum X_j = 0$).The converse is the case for unidirectional causality from NSE to CPI.

Feedback or bilateral causality exists when the sets of CPI and NSE coefficient are statistically different from 0 in both regressions (Gujarati, 2004).

2. Empirical Results and Discussion of Findings

The ADF and PP test were conducted with intercepts only to compare the results of both tests. From table (1), it is observed that both ADF and PP regressions generated similar results. NSE and CPI were found to contain unit roots and therefore not stationary at levels. After applying 1st difference on the variables, NSE was found to be stationary and CPI with repeated lags up till the 4th lag was not stationary. Therefore, the 2nd difference was performed on CPI and that made it an I(2) series.

The Granger causality test results in table (2) show clearly that at various lag levels inflation using Consumer Price Index (CPI) as proxy does not granger cause NSE index at both 1 and the conventional 5 percent levels. Only at 10 percent level that inflation was found to granger cause NSE index at the 3rd lag. Continuous lagging of the series up to the 5th and 6th lags showed no improved results.

Applying 1st difference to the series with a view to obtaining improved results proved abortive as all the results at various lag lengths remain unchanged. Unidirectional causality was again confirmed from FDCPI to FDNSE index at the 3rd lag.

3. Conclusion and Policy Implications

This paper investigates whether inflation Granger causes NSE index and vice-versa. Applying unit root test to monthly time series data from June 2011 to March 2013, empirical results showed that both inflation and Nigeria Stock Exchange Index are not stationary at levels. NSE index was found to be I(1) and CPI was found to be I(2) series. The Granger causality test revealed that inflation does not Granger cause NSE index at 1 and 5 percent even after applying 1st difference of the series at various lag lengths. Albeit, a unidirectional causality running from inflation to NSE index was established at 10 percent when lagged the 3rd time.

The policy implication of the above is that inflation does not actually determine movements in the performance of the stock exchange index in Nigeria because of the weak causality existing between them. Other macroeconomic factors like exchange rate, interest rate, money supply etc are likely to be more potent in determining movements in stock market index in Nigeria. Secondly, it signals that the stock market in Nigeria does not provide a hedge against inflation in Nigeria. This means that there is the likelihood of better performance of stock market variables like market capitalization, stock prices and the overall index under a

period of inflation. Figure (1) in the Appendix clearly shows the movements in both CPI and NSE index for the period under review. Inflation rises towards the 4th quarter of 2011 up till 2nd quarter of 2012 and thereafter declined while the NSE index rises steadily from 1st quarter of 2012 and maintaining that trend through 2012 up till 1st quarter of 2013. This empirical outcome in the Nigerian case is in agreement with previous studies such as Choudhry (2001), Maysami et al (2004) and Onwusu-Nantwi and Kuwornu (2011). Hence, investors in the Nigerian stock market should not be weary of inflationary pressures as it does not exhibit a strong influence on stock market performance in Nigeria.

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Appendix.

Table 1: ADF AND PP TEST REULTS (2011:6-2013:3)

AUGMENTED DICKEY FULLER (ADF) TEST RESULTS (2011:6-2013:3)							
LEVEL (Intercept only)					**1st Difference (Intercept only)**		
Lags	**Vars**	**ADF**	**P-Value**	**Stationarity**	**ADF**	**P-Value**	**Order of Integration**
1	NSE	1.25203	0.9973	Not Stationary	-2.9267	0.0591	I(1)
1	CPI	-1.9941	0.2867	Not Stationary	-6.5625	0.0000	I(2)
PHJLLIPS PERRON (PP) TEST RESULTS (2011:6-2013:3)							
Lags	**Vars**	**PP**	**P-Value**	**Stationarity**	**PP**	**P-Value**	**Order of Integration**
Nil	NSE	1.25203	0.9973	Not Stationary	-2.8256	0.0725	I(1)
Nil	CPI	-2.0369	0.2700	Not Stationary	-6.5889	0.0000	I(2)

Table 2: PAIRWISE GRANGER CAUSALITY TEST RESULTS (2011:6-2013:3)

Variables	F-statistics	Prob	Lags
NSE→ CPI	0.14690	0.8646	2
CPI →NSE	2.40440	0.1242	2
NSE →CPI	0.22130	0.8797	3
CPI→ NSE	2.77464	0.0871	3
NSE →CPI	0.52187	0.7225	4
CPI →NSE	2.19128	0.1510	4
PAIRWISE GRANGER CAUSALITY TEST RESULTS USING FIRST DIFFERENCE OF VARIABLES (2011:6-2013:3)			
FDNSE→ FDCPI	0.14690	0.8646	2
FDCPI→ FDNSE	2.40440	0.1242	2
FDNSE→ FDCPI	0.22130	0.8797	3
FDCPI→ FDNSE	2.77464	0.0871	3
FDNSE→ FDCPI	0.52187	0.7225	4
FDCPI→ FDNSE	2.19128	0.1510	4

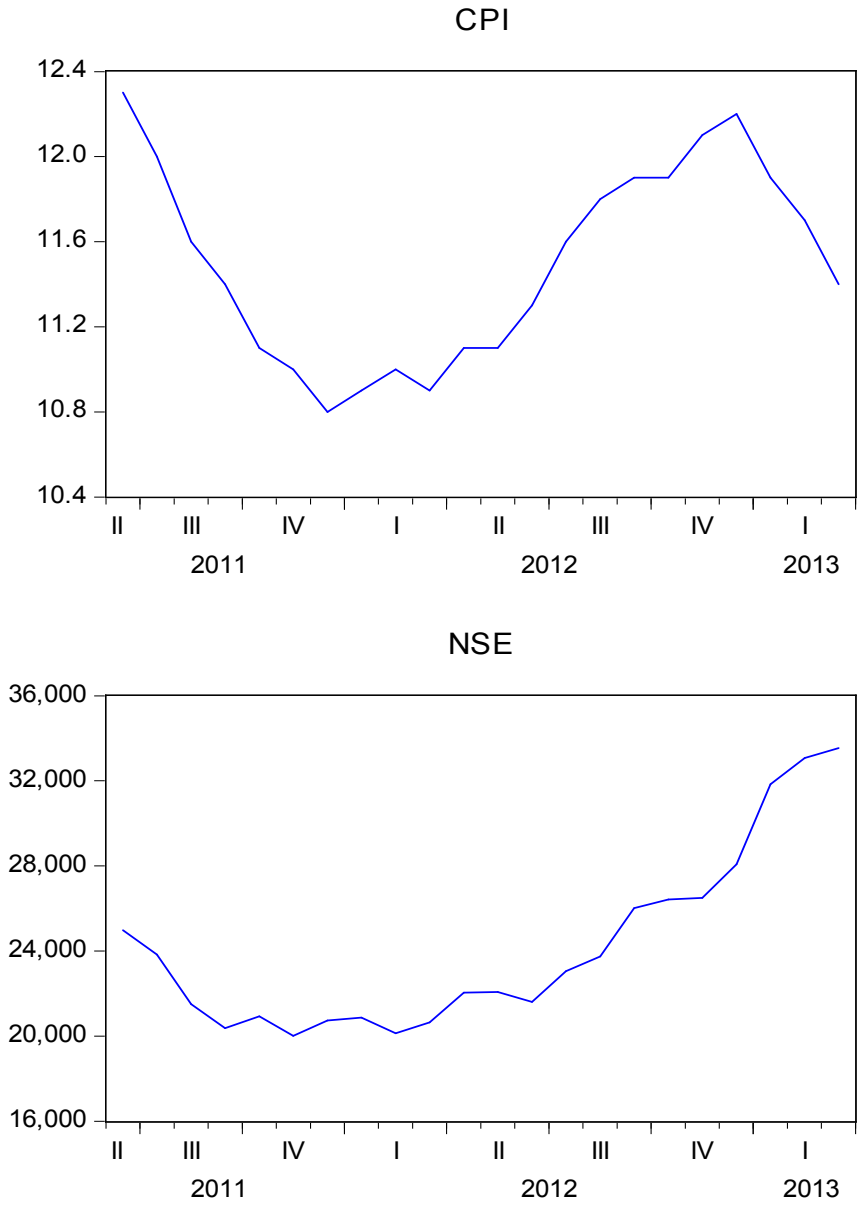

Fig (1): Line Graph Of CPI and NSE (2011:6-2013:3)

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