Exchange Rate Volatility and the Stock Market: The Nigerian Experience

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Abstract

Through the Error Correction model, this paper investigates the effects of exchange rate volatility on the Nigeria stock markets. It was found that the exchange rate volatility generated via GARCH process exerts a stronger negative impact on the Nigeria stock markets. However the rate of inflation and interest rate did not have long run relationship with stock market capitalization since the major participant in the market is government. Based on this it is recommended that a coordinated monetary and fiscal policy should be put in place to check mate the fluctuation of exchange rate in order to deepen the depth of the Stock Market.

Keywords: Foreign exchange, Market capitalization, Nigeria.

INTRODUCTION

Stock market plays a very crucial role in assessing economic conditions of any country through improved stock returns usually signified by higher profit to firms. This consequently engenders economic growth and vice versa.

Basically stock exchange market serves as a channel through which surplus funds are moved from Lender-Savers to Borrower-Spenders who have shortages of funds (Mishkin 2000). Based on this premise, volatility in stock prices can significantly affect the performance of the financial sector as well as the entire economy. However understanding the origins of stock market volatility has long been a topic of considerable interest to policy makers and financial analysts. Policy makers are interested in the main determinants of volatility and its spillover effects on real activities. Financial analysts on other hand are interested in the direct effects time-varying volatility exerts on the pricing and hedging of more exotic derivatives. In both cases, forecasting stock market volatility constitutes a formidable challenge but also a fundamental instrument to manage the risks faced by these institutions (Corradi, Distaso and Mele 2009).

The financial position of an economy that is mainly determined by the capital market is susceptible to its foreign exchange volatility. Hence, this makes foreign exchange market developments to have cost implications for all the economic agents. Benita and Lauterbach (2004) upheld that exchange rate volatility have real economic costs that affect price stability, firm profitability and the general economic stability. Exchange rate volatility has implications for the financial system of a country especially the stock market. However a survey of the available literature revealed divergent views of researchers on the issue of whether foreign exchange rate

variability influences stock market volatility or not (Chen et al. 2004; Carruth et al., 2000; Kanas 2000 and Serven, 2003). Three events – Asian currency crises, the advent of floating exchange rate in the early 1970s and financial market reforms in the early 1990s have prompted financial analysts into determining the link between these two markets (Mishra, 2004). Also, the internationalization of capital markets has resulted in inflow of vast sums of funds between countries and in the cross listing of equities. This has therefore made investors and firms more interested in the volatility of exchange rate and its effects on stock market. Floating exchange rate appreciation reduces the competitiveness of export markets; and has a negative effect on the domestic stock market (Yucel and Kurt, 2003). But, for import dependent economy like Nigeria, it may have positive effects on the stock market by lowering input costs. Serven (2003) used the US industry-level investment to show that exchange rate uncertainty significantly has negative long-run effects on investment.

However, empirical evidence on the influence of foreign exchange market volatility on stock market is largely inconsistent. Mishra (2004) admitted that there is no theoretical consensus on the interaction between stock prices and exchange rate. For instance, Solnik (1987) is of the opinion that there is a negative correlation between stock market and local currency. In a recent study however, Alaganar and Bhar (2007) indicate that the first and second-order effects of exchange rate changes significantly affect diversified portfolios in the US share market.

Historically, in 1960, the Nigerian Stock Exchange (NSE) was formed and known as the Lagos Stock Exchange. In December 1977 it was renamed as The Nigerian Stock Exchange. Currently, The Nigerian Stock Exchange (NSE) consists of six branches and the Head Office is situated Lagos. The Trading System on the NSE is fully automatic. It recorded its annual market capitalization of =N=5.1billion in 1988 and ever since has continued to increase until 1997 when it dropped to =N=276.3 billion from =N=279.8 billion in 1996 and reduced further by =N=19.5 billion in 1998. Thereafter, it has been following an upward trend that got to its peak of =N= 10,301 billion in 2007 and later crumbled to =N=3343.5 billion in 2008 (CBN Bulletin, 2008). Further to this, a cursory examination of foreign exchange rate history in Nigeria shows some considerable level of volatility. Therefore, it would be interesting to explore the effect of Nigeria foreign exchange rate volatility on her stock market volatility. Again, much work on the effect of exchange rate movement on stock market capitalization in the developing country like Nigeria is

scanty. Hence this study examines the effects of foreign exchange movements on the Nigeria stock market.

REVIEW OF RELEVANT LITRATURE

Two portfolio models have been proposed in the literature to explain the interaction between stock market volatility and exchange rate movement. Firstly, the flow models explain the impact of exchange rate movement on the international competitiveness of the firm as well as the balance of trade position (Choi, et.al 2008). Share price movements on the stock market also affect aggregate demand through wealth, liquidity effects and indirectly the exchange rate. Specifically a reduction in stock prices reduces wealth of local investors and further reduces liquidity in the economy. The reduction in liquidity also reduces interest rates which in turn induce capital outflows and in turn causes currency depreciation.

The second is the "Stock-Oriented" model where the stock market – exchange rate link is explained through a country's capital accounts. In this model the exchange rate equates demand and supply for assets (bonds and stocks). Therefore expectations of relative currency movements have a significant impact on price movements of financially held assets. With this, stock price movements may influence or be influenced by exchange rate movements. That is, if the Nigeria Naira for example depreciates against a foreign currency (the US dollar), it will increase returns on the foreign currency. Such events will motivate investors to move funds from domestic assets (stocks) towards dollar assets that consequently reduce stock prices. This in turn makes a depreciating currency to have a negative impact on stock market returns (Adjasi and Biekpe, 2005). This is in line with Ehrmann and Fratscher (2004) submission that monetary policy affects individual stocks in a strongly diversified manner.

In a related study, Arratibel, furceri, Martin and Zdzienicka (2009) discovered that lower exchange rate volatility is associated with higher growth, higher stocks of FDI, higher current account deficits, and higher excess credit. Adjasi and Biekpe (2005) showed that in the long-run exchange rate depreciation leads to increases in stock market prices in some of the countries, and in the short-run, exchange rate depreciations reduce stock market returns. In Mishra (2004) it was identified that there is no Granger's causality between the exchange rate and stock return. The study of Mishra (2004) indicated that stock return, exchange rate, the demand for money and

interest rate are related to each other though no consistent relationship exists between them. The author illustrated further that forecast error variance decomposition evidenced that exchange rate return affects the demand for money; interest rate causes exchange rate to change; exchange rate affects the stock return; demand for money affects stock return; interest rate affects the stock return, and demand for money affects the interest rate. Even though, Pan et al. (2007) showed that there is no co-integration between the exchange rate and the Malaysian stock market in the long run, their pair wise causality analysis reveals that a unidirectional causality exists from the exchange rate to the stock market in the short run. However, Ndri. Konan Leon (2008) discovered interest rates to be an important factor in explaining stock market return rather than volatility.

Engle and Rangel (2005) also examined the link between the unconditional volatility and a number of macroeconomic variables. Bercker and Clement (2005) extended the SPLINE GARCH model proposed by Engle and Rangel (2005) when they modeled stock market volatility conditional on macroeconomic conditions. They incorporated macroeconomic information directly into the estimation of such GARCH models. It was demonstrated that forecasts of macroeconomic variables can be easily incorporated into volatility forecasts for share index returns. Hence, their model lead to significantly different forecasts than traditional GARCH type volatility model.

Rizwan and Khan (2007) further explained varying importance of domestic macroeconomic variables in explaining the relationship between stock returns and volatility in Karachi stock exchange. A decline in exchange rate uncertainty also enhances price transparency increasing the efficiency of price mechanisms at international level (De Grauwe, 2005; Schnabl, 2007). Lower transaction costs and greater prices transparency also affect growth performance by increasing capital markets efficiency in capital allocation and by lowering risk premium and real interest rates (Dornbush, 2001). In addition, if there are credit constraints, or if investment is irreversible, lower aggregate nominal exchange rate volatility is likely to translate into higher growth.

It is also evident that the standard Granger causality method has been the most predominant model used in most studies as earlier discussed. Among the few studies on emerging markets are Mishra (2004), Chortareas et al (2000), Granger et al. (2000), and Apte (2001). They all found a significant positive relationship between stock prices and exchange

rates while others, such as Solink (1987) reported a significant negative relationship between the two variables. On the other hand, some studies, such as choi, Fang and Fu (2008) showed the possibility of a very weak or no relationship between stock prices volatility and exchange rates movement. On the issue of causation, most of the studies had mixed results (Ibrahim 2000; Kanas 2000; Morley and Pentecost 2000).

Even though some studies have linked foreign exchange markets to stock markets in some emerging markets, the researchers hardly came across any of such study on the Nigeria Stock Exchange. Some works have been done on the issue of stock market volatility on the Nigeria Stock Exchange, but it has basically been on how stock market returns vary and not linked with foreign exchange rate movements.

DATA AND METHODOLOGY

The data obtained for this study was mainly from secondary sources. This includes the IMF Direction of Trade Statistics Yearbook and the Central Bank of Nigeria Statistical bulletin where data on volumes and values of exports and imports, foreign exchange rates, inflation rates, net capital flow, external reserve, degree of openness and trade deficit was obtained; the Nigeria Stock Exchange quarterly publications, where the data on stock indices was obtained. Nominal figures were used for the study. The data was tested for stationarity or the order of integration of the data series using the Augmented Dickey Fuller method.

The exchange rate volatility was generated via GARCH technique. Hence stock market capitalization (SSMC) is expressed as a function of exchange rate volatility (LVOL), interest rate (IR), inflation rate (INF) and gross domestic product (LGGDP) as follow:

LSSMC= f (LVOL, LGGDP, INF, IR).

Note however that the “L” in the denotation above stands for natural log.

RESULTS AND DISCUSSION

The data set used in the study comprises annual stock market capitalization, gross domestic product, inflation rate, interest rate and exchange rate volatility for the period between 1981-2007.

As highlighted in the table 1, all series are positively skewed by pointing out an asymmetrical right tailed distribution. Furthermore, the Jarque-Bera statistics of series indicated that only stock market capitalization (SSMC) and gross domestic product (GGDP) departed from normality while others are asymmetrically distributed. This characteristic of the series is further illustrated in figure 1.

Figure 1 showed that official exchange rate of Nigeria to dollar was stable between 1981 to around 1986. This was probably attributed to the fixed exchange rate regime practiced during this period. However the introduction of structural adjustment programme in 1986 witnessed a moderate increase in the exchange rate due to the flexible exchange rate regime that characterized the period. And by 1992 the official exchange rate stabilized again before 1998 structural break in the trend.

The figure 2a showed that there was a moderate change in the rate of economic growth over the years before a negative trend in 1996. However, this trend did not last long before it inreased with a sharp growth rate in year 2003. The same trend was witnessed in the stock market capitalization, except that in its own case the sharp changes occurred in 2005 as shown in figure 2b.

It was clearly shown in figure 3 that inflationary rate in the country has been unstable over the years with series of structural break. The rate got to its peak in 1995 and ever since it has been following a moderate change till recent time. Interest rate like other financial instruments discussed is full of instability as shown by figure 4 below. This could be attributed to various monetary policies formulation during the period of study.

Test of Stationarity

The unit root test was carried out by the Augumented Dickey-Fuller (ADF) to investigate the stationarity of the series (Dickey and Fuller, 1981). The test results shown in table 2 indicated that all the series are integrated of order one "I(1)".

It is important to emphasize here that the exchange rate volatility was generated through GAECH (11) process. And it was also stationary at first difference. Hence, the existence of unit root test in all the series showed that the relationship would be spurious if stated at level. However, the co-integration test confirmed the existence of long run relationship since the residual (E) of the relationship was integrated of order zero.

Result of Error Correction Model

The result of the Error Correction Model is presented in table 3. The above ECM result indicates that short run change in exchange rate volatility had strong impact on the change in growth rate of stock market capitalization. The effect of net capital flow, degree of freedom and external reserve is felt by the stock market via the exchange rate volatility. This impact is confirmed to be significant such that increase in the exchange rate volatility will lead to a significant reduction in the growth rate of stock market capitalization. The result further showed that change in inflation rate reflected in the change in stock market. However this impact was not that significant. The same relationship was exhibited by the interest rate too.

Furthermore, it is clearly indicated in the e-view output that change in the growth rate of gross domestic product had a significant positive impact on the stock market development. While E(1) is the lagged value of the error correction term from the proceeding period. As shown by the result, 0.73 of the discrepancy in the five variables in the previous year was eliminated this year.

CONCLUSION AND POLICY OPTIONS

Based on the findings of this study, we concluded that exchange rate volatility has a very serious implication on the Nigeria stock market. Hence for any serious development of the stock market there is need to stabilize the exchange rate movement. This is in line with Adjasi and Biekpe (2005) that exchange rate depreciation reduces stock market return. Coupled with this, increase in government participation in the market will make the Nigeria stock market strong again. Hence we are able to illustrate with this study that Nigeria stock market is not frugal and that global economic condition will definitely affect the market through exchange rate movement. However government can deepen the depth of the capital market and build a virile stock market that will stand the test of time, by encouraging multinationals via stable exchange rate and be listed on the Nigeria stock Market.

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Table 1: Descriptive Statistics of the Series

	SSMC	EXCH	GGDP	IR	INF
Mean	1.05E+12	46.87071	4.01E+12	13.13667	22.12222
Median	6.63E+10	21.88610	9.04E+11	12.59000	14.00000
Maximum	1.33E+13	133.5004	2.33E+13	23.99000	72.80000
Minimum	5.00E+09	0.610000	5.05E+10	6.250000	5.400000
Std. Dev.	2.70E+12	53.60547	6.18E+12	5.184725	18.81240
Skewness	3.768482	0.710418	1.905133	0.784408	1.206357
Kurtosis	17.11718	1.663307	5.671787	2.479387	3.411464
Jarque-Bera	288.1132	4.281214	24.36364	3.073751	6.739303
Probability	0.000000	0.117583	0.000005	0.215052	0.034402

Source: Authors' computation

Table 2: Unit Root Test

Variable	ADF			
	LEVEL		1st DIFFERENCE	
	No trend	With trend	No trend	With trend
LSSMC	1.7930	-1.3109	-2.7251*	-3.6557**
LVOL	-2.2777	-2.2030	-3.7053**	-4.0223**
LGGDP	-0.0055	-2.5174	-38059***	-3.6880**
INF	-2.9462*	-3.0705*	-4.8447***	-4.7602***

IR	-1.5813	-1.5919	-3.2450**	-3.5685**
E	-2.9644	----	----	-----

Note: ***, ** and * indicated at least significance at 1%, 5% and 10% level.

Source: Authors' computation

Table 3: Output of Error Correction Model

Variables	Coefficient	T-Statistics	Probabilty
DLVOL	-1.9617	-5.1754	0.0000
DLGGDP	0.6005	3.8248	0.0011
DINF	-0.0036	-2.1932	0.0403
DIR	-0.0210	-2.6936	0.0140
E(1)	-0.7304	5.4224	0.0000
C	-0.1607	-3.4724	0.0024
R2= 0.8077 DW= 1.73 F.test= 16.8087			

Source: Authors' computation

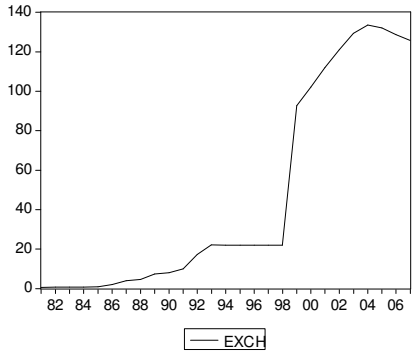

Figure 1: Exchange rate volatility curve

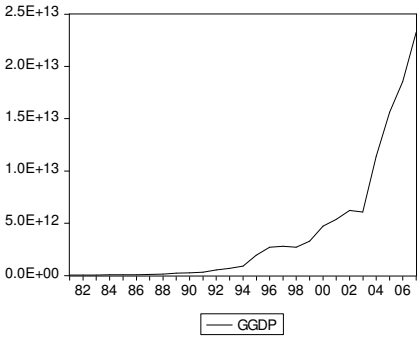

Figure 2a: Gross domestic Product curve.

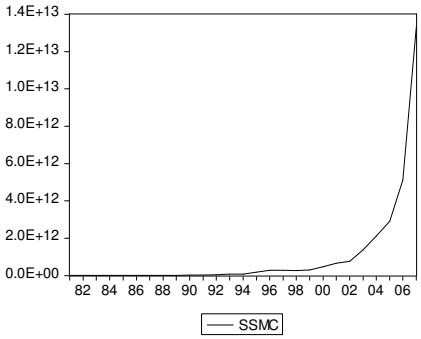

Figure 2b: Stock market capitalization curve.

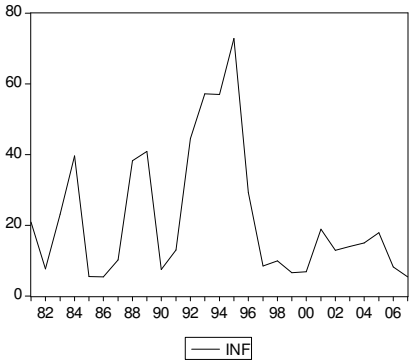

Figure 3: Rate of Inflation Curve

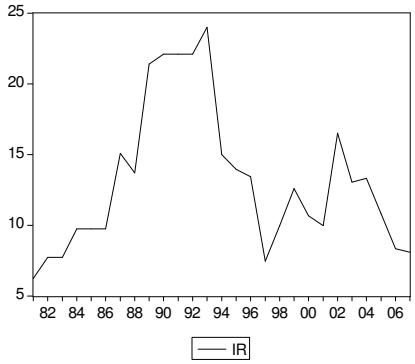

Figure 4: Interest rate Curve