The Effect of Misalignment in Exchange Rate during Pre and Post Liberalization Periods

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Abstract
This study investigates the relationship between exchange rate misalignment and stock market volatility during pre and post financial liberalization era in Nigeria. This study uses quarterly data between 1985Q1 and 2011Q4 where the period of 1985Q1 to 1995Q2 represented the pre-financial liberalization era and 1995Q3 to 2011Q4 for post-financial liberalization. In testing our formulated hypotheses we adopted some statistical analysis such as descriptive statistics, correlation matrix and error correction model. To this end, our result shows that exchange rate misalignment had a positive but insignificant relationship with stock market volatility before the deregulation of the financial market in Nigeria. In the era of financial liberalization we observed that exchange rate misalignment had a negative and insignificant relationship with stock market volatility in Nigeria. We also find out that the adoption of financial liberalization policy in Nigeria had a positive but insignificant impact on stock market volatility. Finally, we therefore recommend that stable exchange rate policies that minimizes misalignment be pursed so as avoid significant stock market volatility and that liberalization of financial market should be encourage since the adoption could not be attributed to being the cause of volatility in Nigeria stock market.
Keywords: Exchange Rate Misalignment, Financial Liberalization, Stock Market Volatility

1. Background to the Study
Many developing countries have, since the 1980s increasingly opened up their stock markets to enable them attract foreign investment inflows. In line with what appears to be a stylized fact, increasing liberalization of the stock markets, have tended to engender wide swings and volatility in the markets. Consequently, such markets become informational more efficient leading to higher volatility as prices quickly react to relevant information, or speculative capital may induce excess volatility. Before the market liberalization process, there must have been large swings from fundamental values leading to higher volatility. In the long run, the gradual development and diversification of the stock markets could lead to lower volatility. Stock market volatility implies swings or gyrations in stock price/returns movements over a time varying period. Recent research evidence suggests that the degree of stock market volatility can help forecasters / speculators predict the path of the economy's growth as well as the behaviour of investors and portfolio managers alike (Krainer, 2002).

Ojo (2010) pointed out that due to adverse circumstances and the deteriorating economic and financial conditions in Nigeria; the financial system has been characterized by many deficiencies, reason for which it has been unable to generate economic growth. This undesirable state has prompted the implementation of the economic reform policies which are aimed at transforming the country's economy. Part of reforms initiated was the deregulation of the financial sector otherwise referred to as financial liberalization. The reform - financial liberalization means to give Central Banks more authority to: conduct monetary policy, privatize and restructure the banking sector, liberalize interest and exchange rates, and, more generally, develop and promote the role of financial markets in financing the economy. The main objective of the financial reforms is to enable economies to recover from recession, and then develop rapidly. This largely underscores the need to have a clear understanding of the concept of stock market volatility.

However, one very important element of liberalisation which forms a focal point of this study is exchange rate behaviour. Exchange rate fluctuation has in one way or the other influenced the behaviour of foreign investors. Lipsey and Chrystal (1995) and Begg (1994) for example, observed that exchange rate is the link connecting different national currencies which make international costs and price comparisons possible. They argue that exchange rate misalignment (ERM) implies variations in fluctuations of real exchange rates over a long term period, with potential adverse implications for the stock market. It is for this reason that we consider it appropriate in this study to examine the effect of misalignment in exchange rate, one of the fallouts of the liberalization of the exchange rate regime on the stock market.

1.2 The Research Problem
Many studies with divergent views in literature, have theoretically and empirically examined the impact of financial liberalization on financial sector and overall economic performance in emerging economies. The difference in the views emanate from the fact that some of the studies are focused on short-term effects of liberalization, while others are focused on its long-term effects. Most empirical studies neglect the idea that

liberalization is dynamic and progressive, thus, should not be allowed to reach definitive conclusions.

In addition, studies on exchange rate misalignment in the literature, apart from being relatively scanty in Nigeria, have created the problem of lack of a clear understanding of as well as a lack of how best to measure the variable – exchange rate misalignment. Indeed, known related studies in Nigeria, have studied exchange rate movement and variability (see for example, Akpokodje, 2009; Aliyu, 2010; Aliyu, 2009a; Aliyu, 2009b; Ogunleye, 2009; Olowe, 2009; Yinusa and Akinlo, 2008a, 200b; Yinusa, 2008; Yinusa, 2004, Imegi and Nwokoye, 2010). None has, specifically examined the effect of misalignment in exchange rate on stock the stock market swings. This is the major gap we seek to fill. Added to this, however, are our observations that most known studies have relied on the use of annual data. We intend to improve on such studies by using quarterly data which is likely to be more revealing especially in an emerging market such as Nigeria.

Following from the above, the research question we seek to answer in this study is:

What is the effect of exchange rate misalignment on stock market volatility in pre and post financial liberalization era in Nigeria?

1.3 Objectives of the Study

The objective of this study is to examine the effect of exchange rate misalignment on stock market volatility in the pre and post- financial liberalization regimes in Nigeria. The specific objective is to; ascertain the effect of exchange rate misalignment on stock market volatility during the pre and post-financial liberalization era in Nigeria.

1.4 Statement of Hypothesis

In order to realize the objectives of this research, the following hypothesis have been formulated and tested:

H_1: *The effect of exchange rate misalignment on stock market volatility during the pre and post-liberalization period is not positive and significant.*

2. Review of literature

This chapter provides a review of the theoretical and empirical literature. The first section is the theoretical literature, while the second section provides a review of empirical literature. In this section, we addressed such conceptual issues as: financial liberalization, exchange rate misalignment, and exchange rate misalignment relations to stock market volatility.

2.1 Concept of Financial Liberalization

Financial liberalization is not a contemporary phenomenon. For decades, Western countries and companies were operating in a free economy. Thus, it is difficult to identify the emergence of financial liberalization in most cases. The term financial liberalization takes various meanings in the literature. Drawing from the multi-dimensional definitions given in Kaminsky and Schmukler (2003); Atsede and Adeniji (2008); Godwin (2010); Okpara (2010); Adeusi et al. (2012); among others, financial liberalization entails the deregulation of the capital account and the domestic financial sector, which includes the stock market.

Johnston and Sundararajan (1999) digressed by arguing that financial liberalization implies a set of operational reforms and policy measures designed to deregulate and transform the financial system and its structure with the view to achieving a liberalized market-oriented system within an appropriate regulatory framework. Supporting this view, Chandrasekhar (2004) affirms that financial liberalization refers to measures directed at diluting or dismantling regulatory control over the institutional structures, instruments and activities of agents in different segments of the financial sector. He maintains that these measures can relate to internal or external regulations.

According to Ojo (2010), the simplistic view pressing for full-fledged interest-rate liberalization can at the same time, create unrealistic and unsustainable expectations about the role of financial liberalization in turning economies around through the efficient mobilization of domestic resources. He stresses that according to Levine (1999), financial liberalization will not be sufficient on its own to promote economic growth unless efficient markets and financial institutions are in place. He maintains that liberalization per se, through increased competitiveness in the financial system has, as experienced in Nigeria, not delivered any discernible benefits in terms of the availability of long-term finance and term credit as well as the reduction of intermediation costs, while the quality of bank portfolios has uniformly deteriorated with a rising proportion of non-performing loans. His contention is that the main reason for the latter being the high and volatile interest rates in relation to the productivity of capital, which also drained-off the sources of long-term credit. He concludes that going by experience of some countries till-date including Nigeria, it is much harder to realize outright beneficial results from financial liberalization, compared to liberalization of other sectors such as agricultural sector. This implies that the expectation that financial market liberalization would induce foreign investment thereby fueling market liquidity is not the case in Nigeria.

2.2 Concept of Exchange Rate Misalignment (ERM)

An analysis of the behavior of exchange rate is important because there is growing body of evidence in the literature that pin-points the significant role the concept plays in macro-economic stability as well as stock market development. The behavior of exchange rate influence the foreign capital flows directly or indirectly. This has prompted the search for a clear understanding of what constitutes a misalignment of the exchange rate. Edwards (1989) and Eichengreen (2008) find that changes in exchange rate affects a country's competitiveness. This suggests that policy makers should ensure that the exchange rate is well aligned or rather, limit exchange rate misalignment to avoid economic under-performance, in order to stimulate economic growth. The questions here are: (i) what is exchange rate? and what constitutes exchange rate misalignment? Going by Caves and Jones (1981) and Imegi and Nwokoye (2010) definitions, exchange rate is the price of foreign currency one pays in his home currency to purchase a certain quantity of funds in another country. Other authors with simplistic definitions of the concept include: Aguirre and Calderon (2005); De- Broek and Slok (2006); among others. They stressed that exchange rate is the link connecting different national currencies which make international costs and price comparisons possible. On this note, several authors observed that Exchange rate misalignment (ERM) and exchange rate volatility are, in principle, different concepts. They argued that while exchange rate misalignment refers to variations in fluctuations of real exchange rates over a long term period, exchange rate volatility refers to fluctuations in real exchange rate over the short run. Clearly, these concepts are closely related. For instance, increasing misalignment of the exchange rate is perforce associated with rising or falling of exchange rate volatility on the average. In most cases, the two terms are used interchangeably. For the purpose of this paper, emphasis is mainly on exchange rate misalignment (ERM) in relation to stock market volatility under the financial liberalization regimes. Thus, the question here is, when exchange rate is misaligned, are funds channeled to the stock market?

Exchange rate misalignment is defined as "a situation in which actual real exchange rate (RER) differs significantly from its long-run equilibrium value" (Montiel, 1999:1). By definition, when the value of the observed RER at current period is above the equilibrium RER value, it indicates an overvalued RER. If the value of the RER at current period is below the value of the equilibrium RER, it is said to be an undervalued RER. Whilst some theories postulate that exchange rate misalignment hamper macroeconomic performance, others advocate otherwise. From a micro viewpoint, Schnabl (2007) point out that exchange rate misalignment reduces growth in Gross Domestic Product as it raises international trade costs as well as the cost of capital flows. From a macro viewpoint, it brings about macroeconomic instabilities. Edwards (1989), Ghura and Grennes (1993), Hinkle and Montiel (1999) and Di Bella et al. (2007) confirm a negative relationship between ERM and economic performance. This has motivated further studies on the effects of exchange rate misalignment in emerging markets. There are several reasons why exchange rate would be misaligned. Imegi and Nwokoye (2010) showed that justification for ERM include; government deficit financing, scarce foreign exchange inflows, sharp practices in exchange dealings resulting from overvaluation of the naire, unsound domestic policies and poor economic performance resulting from wide inflation differentials, large and persistent balance of payment deficits, capital flight, capacity under-utilization in domestic economy. Conventionally, the real exchange rate is regarded as "misaligned" if its realized value exhibits a persistent departure from its long run equilibrium trend line. The long run equilibrating value, in turn, is taken to be that rate which, for a given set of "structural fundamentals" is compatible with simultaneous achievement of internal and external equilibrium (Moosa, 2000; Vieira & Mac-Donald, 2007).

2.3 Exchange Rate Misalignment and Stock Market Volatility

Most empirical studies regarding the interaction between stock price changes and exchange rates disequilibrium are built on the traditional and portfolio balance economic theories (Aydemir and Demirhan, 2009). The traditional approach suggests that exchange rate changes are expected to lead to stock price changes (Dornbusch & Fisher, 1980). While the portfolio balance approach postulates negative relationship as changes in stock prices may influence movements in exchange rate.

However, a number of the available literature reveals divergent views of researchers on the issue of whether exchange rate variability / disequilibrium influence stock market volatility. Franck and Young (1972) were among the first authors to analyze the relationship between stock prices and exchange rates fluctuations. Using correlation regression analyses, they reported no significant interaction. Mishra (2004) and Arratibel et al. (2009) found a significant positive relation between stock prices and exchange rates changes; others that share the same view include: Wu (2000), who suggests that domestic firms can also be influenced by changes in exchange rate since they may import a part of their inputs and export their outputs. He stressed that a devaluation of its currency makes imported inputs more expensive and exported outputs cheaper for a firm. This is in line with Aggarwal, (1981), who argue that devaluation will make positive effect for export firms and increase the income of these firms, consequently, boosting the average level of stock prices. He also found that the U.S stock prices and the trade-weighted dollar value are positively correlated, contrary to Soenen and Hennigar (1988),

who indicated a strong negative correlation between U.S stock indices and a fifteen currency-weighted value of the dollar.

Zia and Rahman (2011) analyzed the dynamic relationship between stock market index and exchange rate misalignment in Pakistan using Johansen procedure for co-integration test, show that the variables do not influence each other in the long-run; consequently, standard Granger causality method was used to analyze direction of causality. But results failed to provide evidence of causality in either direction indicating that variables are independent of each other. In a related study, Adjasi and Biekpe (2005) show that in the long-run, exchange rate depreciation leads to increase in stock market prices in some of the countries, and in the short-run, exchange rate depreciations reduces stock market returns, which eventually leads to swings in the market. Pan et al. (2000) found that exchange rate misalignment had significant effect on stock prices in seven Asian countries during 1988-1998. Similar to Granger et al. (2000), they reported much stronger interaction during and after the financial crisis of 1997. Rim and Mohidin (2002) examine relations between industry indices and exchange rates misalignment using monthly data before and during the Asian financial crisis. Their findings show that industry indices had long-run positive effects on exchange rate, and exchange rate also had long-run positive effects on most indices. Short-run effects proved to be generally negative in both directions. They also assert that foreign exchange rate volatility influence the value of the firm since the future cash flows of the firm change with the fluctuations in the foreign exchange rates. They explained that when the exchange rate appreciates, exporters will lose their competitiveness in international market, hence, sales and profits of exporters will shrink and the stock prices will decline. They argue that on the other hand, importers will increase their competitiveness in domestic markets. Therefore, their profit and stock prices will increase.

Contrary to other studies that suggest a positive relationship, Kim (2003), find that stock prices negatively relate to exchange rate misalignment. Mao and Kao (1990) support a significant negative relationship and very weak or no relationship. Solnik (1987) and Soenen and Hennigan (1988) also report strong negative interaction using monthly data of the U.S. dollar effective exchange rate variations and U.S stock market index. But Jorion (1990) found a weak link between stock returns of U.S multinational companies and the effective U.S dollar exchange rate for the period 1971-1987. Although, other papers that study the causality between stock indices and exchange rate dynamics using the same econometric procedures have reported diverse results. But Benita and Lauterbach (2004) upheld that exchange rate variability have real economic costs that affect price stability, firm profitability and the general economic stability. Hatemi-J and Irandoust (2002) examine the causal relationship between stock price movement and exchange rate misalignment in Sweden. Monthly stock prices and nominal effective exchange rate over the period from 1993 to 1998 was used for the analysis. They indicate unidirectional causal effect from stock prices to exchange rate misalignment. Pan et al. (2007) employed data of seven East Asian countries over the period 1988 to 1998, proving bidirectional causal relation for Hong Kong before the 1997 Asian crises and unidirectional causal relation from exchange rates changes and stock prices volatility for Japan, Malaysia, and Thailand and from stock prices to exchange rate for Korea and Singapore. They found that only a causal relation from exchange rates to stock prices is seen for all countries except Malaysia during the Asian crisis.

In the finance literature, the empirical studies on the relationship between exchange rate misalignment and stock market volatility especially in the Nigerian context appear to be very scanty to the best of our knowledge. Rather, most of the works centre on the relationship between exchange rate and fundamental macro-economic variables vis-a–viz economic growth (Akpokodje, 2009; Aliyu, 2010; Aliyu, 2009a; Aliyu, 2009b; Ogunleye, 2009; Olowe, 2009; Yinusa, 2004; Yinusa and Akinlo, 2008; Yinusa, 2008). Most studies fail to consider the trend or persistence of volatility in the Nigerian stock market as a result of ERM. This clearly implies that there is no theoretical consensus neither on the existence of any relationship between stock market behaviour and exchange rate misalignment nor the best measure of ERM especially in Nigeria. Moreover, the reviewed literature did consider either the direction of causality between exchange rate changes and stock prices / stock returns respectively. Neither did any study consider or predict the actual trend of the swing which exchange rate misalignment assert on the stock market volatility. Therefore, this is one vital gap we have observed, which this study will attempt to fill.

3. Research Methodology
This chapter presents an overview of the methods, the procedures, the modalities and the sequential steps we used in the research work to ensure that the results achieved are dependable, realistic, accurate and valid. It presents a description of the research design, model specification, data description and collection, as well as data analysis techniques. The principal method common to this type of research is empirical method. This entails the use of quantitative, statistical or regression techniques in evaluating the research issues or problems.

3.1 Model Specification: Combined Period of financial Liberalization Model
The objective of the combined period of financial liberalization model is to examine the relationship between

exchange rate misalignment and stock market volatility under both pre and post-financial market liberalization regimes in Nigeria. The time series nature of the data suggests that the most appropriate estimation technique to use would be a pre and post (combined) financial liberalization model error correction model. This is because the error correction model corrects the discrepancy between the short-run and long-run impact of explanatory variables. The combined period of financial market liberalization error correction model used in this study is specified below:

$$\Delta SMV = \partial_0 + \partial_1 \sum_{i=1}^{n} \Delta SMV_{t\text{-}i} + \partial_2 \sum_{i=1}^{n} \Delta EXRM_{t\text{-}i} + \partial_3 \sum_{i=1}^{n} \Delta INFR_{t\text{-}i}$$

$$+ \partial_4 \sum_{i=1}^{n} \Delta INTR_{t\text{-}i} + \partial_5 \sum_{i=1}^{n} \Delta GDPG_{t\text{-}i} \, \partial_6 LIDUM + \varepsilon_t \quad ....[3.11]$$

Where:

ΔSMV = stock returns volatility for pre and post- financial liberalization. This represents the historical quarterly GARCH and EGARCH stock returns volatility series between 1985Q1-2011Q4 in Nigeria

$\Delta EXRM$ = Exchange rate misalignment pre and post-financial liberalization. This represents the historical quarterly naira-dollar exchange rate misalignment series between 1985Q1-2011Q4 in Nigeria.

$\Delta INFR$ = Inflation rates pre and post-financial liberalization. This represents the historical quarterly inflation rate series between 1985Q1-2011Q4 in Nigeria.

$\Delta INTR$ = Interest rates pre and post-financial liberalization. This represents the historical quarterly interest rate series between 1985Q1-2011Q4 in Nigeria.

$\Delta GDPG$ = Gross Domestic Products growth pre and post-financial liberalization. This represents the historical quarterly growth in Gross Domestic Product series between 1985Q1-2011Q4 in Nigeria.

$LIDUM$ = Dummy variable that assign the value of "0" to represent pre-financial liberalization (1985Q1-1995Q2) and "1" to represent post-financial liberalization (1995Q3-2011Q4). This dummy variable is included within the model in order to study the effect of financial liberalization on stock market volatility.

apriori Sign;

$$\partial_1, \partial_2, \partial_5 > 0, \quad \partial_3 >< 0, \partial_4 < 0$$

3.2 Data Collection
The nature of this study necessitates the use of secondary data. The data include All share price index, which will be used to proxy market condition. All data will be sourced from the publications of the Central Bank of Nigeria (CBN), Securities and Exchange Commission (SEC) and Nigerian Stock Exchange (NSE). The macroeconomic variables viz exchange rate (EXRT), inflation rate (INFL), real Gross Domestic Product growth (RGDPG) and prime lending rate (INTR) will also be sourced from CBN publications. This data would be quarterly and are grouped into pre- financial liberalization era (1985Q1-1995Q2) and post financial liberalization era (1995Q3-2011Q4). The pre-liberalization period is the period before the market was opened up to foreign investors. This period is characterized by direct controls. The post – liberalization period is characterized by deregulation policies. This is to enable us account for structural shifts as a result of liberalization. Therefore, the general data scope of this study is 1985Q1 - 2011Q4.

3.3 Data Estimation Techniques
The econometric techniques adopted to achieve the objectives of this study include unit root test, co-integration test, error correction model and Granger causality test. In conducting this analysis, we will use E-views 8.0 econometric software. Due to the possibility of non-stationarity which is common with time series data, in this study, the unit root test is conducted to test the null hypothesis that there exists unit roots (1) in the collected time series data, (2) in the existence of unit roots in times series data indicating that they are non-stationary. This is because the use of non-stationary time series data in OLS regression model especially at levels has recently been criticized by econometricians. The following is the fundamental justifications for the less reliance on OLS regression model in this study; the high tendency for most time series variables to be non-stationary and OLS

results become spurious when time series data are non-stationary. In this study, we started by conducting preliminary statistical analysis such as descriptive statistics and correlation matrix to properly describe the nature of our data.

3.5 Error Correction Model (ECM)

The original pre- and post- financial liberalization model above (equation 3.11) assumes that the time series data for testing this model are stationary at levels but recent empirical studies have shown that most time series data are not stationary. This therefore means that the most appropriate estimation technique to use is the pre and post financial liberalization error correction model. The error correction model connects the short run and the long-run behaviour of the dependent and independent variables. Following the above, the error correction model version of the pre and post financial liberalization model is specified as follows:

$$\Delta SMV = \partial_0 + \partial_1 \sum_{i=1}^{n} \Delta SMV_{t-i} + \partial_2 \sum_{i=1}^{n} \Delta EXRM_{t-i} + \partial_3 \sum_{i=1}^{n} \Delta INFR_{t-i} + \partial_4 \sum_{i=1}^{n} \Delta INTR_{t-i}$$
$$+ \partial_5 \sum_{i=1}^{n} \Delta GDPG_{t-i} + \partial_6 LIDUM + \partial_7 ECM_{t-1} + \varepsilon_t \quad ....[\ 3.14\ ]$$

Where *ECM* represents the error correction term from the pre and post financial liberalization long run regression model for each equation; the short run effects are captured through the individual coefficients of the difference terms. The coefficient of the *ECM* variable contains information about whether the past values of variables affect the current values of the variables under study. The size and statistical significance of the coefficient on the error correction term measures the tendency of each variable to return to the equilibrium. A significant coefficient implies that past equilibrium errors play a role in determining the current outcomes. The coefficient of the *ECM* (-1) therefore captures the long-run impact.

4. Results and Discussions

The dependent variables for this study is stock market volatility (EGARCH) which represents the historical quarterly EGARCH stock returns volatility series between 1985 to 2011 in Nigeria. The independent variables were exchange rate misalignment (MREXRT), interest rate (INTR), gross domestic product growth (GDPG) and inflation rate (INFR). The below is a line graph that shows the historical performance of the variables used in this study. The graphs show that there is evidence to suspect the presence of structural break in stock returns volatility, exchange rate misalignment and other macroeconomic variables. This study uses first difference of the variables so as to avoid the problem of non-stationarity in the levels of variables. A careful observation of all the variables in the graph (Figure 1) without using the popular augmented dickey fuller (ADF) shows that they all exhibit some mean revision property and are likely to be stationarity at their first difference.

In addition to the historical description of the variables used in this study, we conducted a chow test to find out if there was a structural break in the relationship between stock market volatility and exchange rate misalignment. The chow test with F-value of 1.74 and p-value of 0.03 indicate that there is a structural break and we should reject the null hypotheses of no structural break at 5% level of significance. This implies that the relationship between exchange rate misalignment and stock market volatility witness a structural break between 1985Q1 to 2011Q4 period and this statistically validate our separation of the period of analysis into pre-financial liberalization (1985Q1- 1995Q2) and post-financial liberalization (1995Q3-2011Q4).

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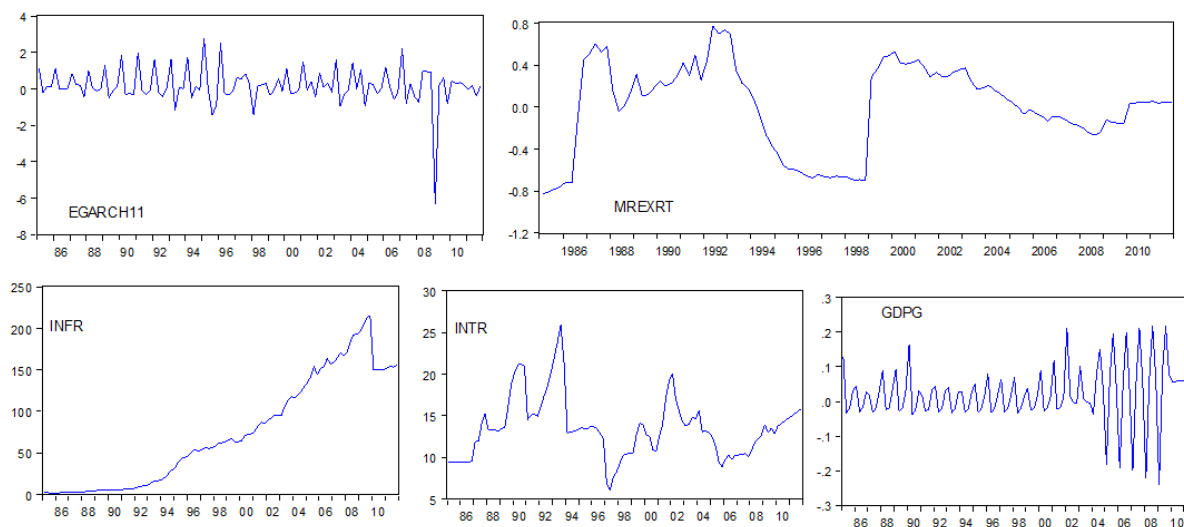
Figure 1: Time series plot.

The introduction of financial liberalization dummy variable to capture the effect of this different financial liberalization regime on stock market volatility in Nigeria was also based on the fact that the chow test identified a structural break (Table 4.1).

Table 4.1: Chow Test

MREXRT EGARCH	**Value**	**P-Value**
F-Statistics	1.760	0.030
Likelihood Ratio	1.460	0.000

4.1 Descriptive Statistics

The descriptive statistics shows the description of the mean, standard deviation and normality test. The below is the descriptive statistics of the variables over the period of pre and post liberalization financial era.

Table 4.2: Descriptive statistics for combined liberalization

Variable	Mean	Std	Jarque-Bera	P-Value	Observations
EGARCH	0.169	1.004	112.026	0.000	108
MREXRT	0.000	0.416	5.925	0.051	108
INTR	13.533	3.627	19.060	0.000	108
GDPG	0.022	0.079	28.327	0.000	108
INFR	73.646	65.126	9.625	0.008	108

Source: Author (2014)

In Table 4.2, we focus on the descriptive statistics for combined liberalization financial era. The result shows that stock market volatility (EGARCH) had an average value of 0.17, exchange rate misalignment (MREXRT) on the average was zero (0.00), interest rate (INTR) on the average was 13.53, gross domestic product growth (GDPG) had an average value of 0.02 and inflation rate (INFR) had an average value of 73.65 for the periods. This means that the mean value of the stock market volatility (EGARCH) was higher in pre-liberalization financial era compare to post and combined liberalization era, exchange rate misalignment (MREXRT) had a higher mean value in pre-liberalization financial era compared to post and combined liberalization era, interest rate (INTR) had a higher mean value in pre-liberalization financial era compared to post and combined liberalization era, gross domestic product growth (GDPG) had a higher mean value during thepost-liberalization financial era compared to pre and combined liberalization era and inflation rate (INFR) had a higher mean valueduring the post-liberalization era compared to pre and combined liberalization . The standard deviation shows that there was dispersion in the variables over the period of study. This means that no single variable was constant over the period of study. The Jarque-Bera statistics shows that the variables were normally distributed at 1%.

4.3 Correlation Matrix

Correlation measures the degree of linear association among the variables. In most regression analysis study, correlation matrix is often used to test for the existence of multicolinearity, which is the existence of high correlation in any two explanatory variables. Table 4.3 provide the obtained Pearson correlation coefficients results;

Table 4.3: Correlation Matrix for Combined Liberalization

	EGARCH	MREXRT	INTR	GDPG	INFR
EGARCH	1	0.03	0.03	0.33	-0.15
MREXRT		1	0.56	0	-0.09
INTR			1	0	-0.23
GDPG				1	0.18
INFR					1

Source: Author, (2014)

In Table 4.3, we focus on the combined liberalization correlation between the macroeconomic variables and stock market volatility (EGARCH). The result shows that stock market volatility (EGARCH) has weak positive correlation with exchange rate misalignment (MREXRT = 0.03), interest rate (INTR = 0.03) and gross domestic product growth (GDPG = 0.33)while a weak negative association with inflation rate (INFR = -0.15). A close look at the value of the correlation coefficient results revealed that stock market volatility (EGARCH) over the period was associated with low stock market volatility.

4.4 Unit Root Test
In testing for unit root for the combined liberalization era variables, we use the augmented dickey-fuller (ADF) unit root test and the results for the time series are presented in Table 4.4.

Table 4.4: Augmented Dickey-Fuller Unit Root Test

		Lag	ADF Statistics	ADF(95%)	Remark
Level	EGARCH	2	-9.7555	-2.8092	Stationery
	MREXRT	0	-2.5284	-2.8886	Not stationery
	INTR	1	-3.4804	-2.8889	Stationery
	GDPG	5	-7.7294	-2.8900	Stationery
	INFR	0	-0.4166	-2.8887	Non-stationery
		Lag	ADF Statistics	ADF(95%)	Remark
First Difference	DEGARCH	4	-9.1609	-2.8900	Stationery
	DMREXRT	0	-8.2697	-2.8880	Stationery
	DINTR	0	-7.5030	-2.8880	Stationery
	DGDPG	4	-10.2463	-2.8900	Stationery
	DINFR	0	-9.9243	-2.8880	Stationery

Source: Author, (2014)

The empirical findings from the table above reveal that stock market volatility (EGARCH) was stationary at level, exchange rate misalignment (MREXRT) was not stationary at level, interest rate (INTR) was stationary at level gross domestic product growth (GDPG) was stationary at level while inflation rate (INFR) was not stationary at level. They all became stationary at first difference. This simply means that a regression model with the first difference for the variables would be more appropriate in testing our formulated hypotheses; this also means that the use of levels variables in this study would lead to spurious regression results.

4.5 Co-Integration Test
The co-integration test for the combined liberalization financial era using Trace and Max-Eigen is presented in table 4 below;

Table 4.5: Co-integration Test

Jeluis & Johansen Co-integration Test

No of CE(S)	Trace Statistics	95% Critical Value	Max-Eigen Statistics	95% Statistics
r=0	111.967*	69.818	57.325*	33.876
r≤1	54.641*	47.856	26.178	247.58
r≤2	28.462	29.797	14.815	21.131
r≤3	13.646	15.494	13.045	14.264
r≤4	0.6	3.841	0.6	3.841

Source: Author, (2014)

The co-integration results were based on the Jeluis and Johansen using Trace Statistics and Max-Eigen statistics. The findings from the Trace Statistics reveals that the selected variables are with two co-integrating vector while the Max-Eigen statistics identified one co-integrating vector. The existence of co-integration among the variables justified the use of error correction model in this study.

4.6 Error Correction Model
The Error Correction Model (ECM) focuses on the combined liberalization era.

4.6.1 Error Correction of Combined liberalization Model

The combined liberalization era error correction model examines how stock market volatility and exchange rate misalignment are related. It also examines other controlled variables such as interest rate, gross domestic product growth and inflation rate. The combined liberalization result is presented in table 11 below;

Table 4.6: Error Correction Model- Combined Liberalization Era

	Coefficients	t-statistics	P-value
C	0.007	0.046	0.96
DEGARCH(-1)t-1	0.182	2.180	0.03
DMREXRTt	-0.359	-0.640	0.52
DINTRt	-0.080	-1.490	0.13
DGDPGt	5.153	6.317	0.00
DINFRt	-0.011	-0.856	0.39
ECM(-1)	-1.430	-10.220	0.00
DUMMYLIB	0.020	0.112	0.91
R^2		0.690	
Adjusted R^2		0.670	
F-Statistics		30.96[0.000]	
No of observation DW=2.20		106	

Source: Author, (2014)

From the Error Correction Model result above under combined liberalization era, it would be revealed that the adjusted R-squared value of 0.67 shows that 67% of the systematic variation in the dependent is jointly explained by the independent variables during the combined liberalization era. The F-statistics value of 30.96 and its associated p-value 0.00 show that the model overall is statistically significant. This means that there exists a significant linear relationship between the dependent and independent variables during the combined liberalization era.

Following the above, **past stock market volatility (EGARCH)** has a positive (0.182) and significant (2.18) impact on current stock market volatility (EGARCH) during the combined liberalization. This therefore means that increase in past stock market volatility (EGARCH) would significantly increases current stock market volatility during the combined liberalization.

In the case of **Exchange misalignment (DMREXRT),** the variable had a negative (-0.359) and insignificant (-0.635) impact on stock market volatility (EGARCH). This indicates that increase in exchange misalignment (DMREXRT) would reduce stock market volatility (EGARCH)under the combined liberalization but was not significant. This suggests that we should accept the null hypotheses (H3) which states that the effect of exchange rate misalignment on stock market volatility during the combined liberalization is not positive and significant.

Expectedly, **gross domestic product growth (GDPG)** had a positive (5.153) and significant (6.317) impact on stock market volatility (EGARCH). This therefore means that increase in gross domestic product growth (GDPG) would significantly increase stock market volatility (EGARCH) during the combined liberalization.

The variable, **inflation rate (INFR)** had a negative (-0.011) and insignificant (-0.856) impact on stock market volatility (EGARCH). This therefore means that increase in inflation rate (INFR) would reduce stock market volatility (EGARCH) but not significant during the combined liberalization.

Also, **interest rate (INTR)** had a negative (-0.080) and insignificant (-1.490) impact on stock market volatility (EGARCH). This indicates that increase in interest rate (INTR) would reduce stock market volatility (EGARCH) during post-liberalization but was not significant.

The dummy variable, **financial liberalization (DUMMYLIB)** had a positive (0.020) and insignificant (0.112) impact on stock market volatility (EGARCH). This therefore means that increase in financial liberalization would increase stock market volatility (EGARCH) during the combined liberalization but was not significant. This suggests that we should reject the null hypotheses (H4) which states that the effect of financial liberalization on stock market volatility is not positive and significant. This finding confirm with the findings of Stiglitz (2002) and Rodrik (1998) that no link between financial liberalization and stock market volatility behaviour. Also confirm with the findings of Levine &Zervos (1996) that financial liberalization increases stock market liquidity and negate the findings of Baldacci et al (2002) that financial liberalization increases financial crisis.

The Error Correction Model (ECM (-1)) coefficient of -1.430 had a correct negative sign was statically significant (-10.220) during the combined liberalization era. This shows that short-run deviation from stock market volatility (0.182) can be quickly corrected. The high value of ecm (-1) is based on the fact that the

dependent variable (stock market volatility (EGARCH)) is highly volatile. This result also clearly shows that long-run deviation in stock market volatility is quickly adjusted to equilibrium in the short-run. Also, we found that the Durbin-Watson value for the model was 2.20 which indicate that there is absence of autocorrelation in the model.

5.1 Summary of Findings

In this study, we seek to examine the effect of exchange rate misalignment on stock returns volatility during the pre and post liberalization periods in Nigeria. The dependent variable was stock returns volatility for pre and post- financial liberalization was (ΔSMV). While the explanatory variables were Exchange rate(ΔEXRM), Inflation rate (ΔINFR), interest rates (ΔINTR), Gross domestic product growth (ΔGDPG), and dummy variable (LIDUM).In estimation of the models formulated statistical techniques which include descriptive statistics, correlation analysis, unit root test, The Johansen co-integration test, and error correction model (ECM).

The results from all our analysis showed that, past stock market volatility (EGARCH) has a significant impact on current stock market volatility (EGARCH) during the combined liberalization. Which means that increase in past stock market volatility (EGARCH) would significantly increases current stock market volatility during the combined liberalization. Exchange misalignment (DMREXRT), had an insignificant impact on stock market volatility (EGARCH). Expectedly, gross domestic product growth (GDPG) had a positive significant impact on stock market volatility (EGARCH). The variable, inflation rate (INFR) had an insignificant impact on stock market volatility (EGARCH). Also, interest rate (INTR) had an insignificant impact on stock market volatility (EGARCH). This indicates that increase in interest rate (INTR) would reduce stock market volatility (EGARCH) during pre and post-liberalization but was not significant.

The dummy variable, financial liberalization (DUMMYLIB) had an insignificant impact on stock market volatility (EGARCH). This therefore means that increase in financial liberalization would increase stock market volatility (EGARCH) during the combined liberalization but was not significant. Also confirm with the findings of Levine & Zervos (1996) that financial liberalization increases stock market liquidity and negate the findings of Baldacci et al (2002) that financial liberalization increases financial crisis. The Error Correction Model (ECM (-1)) coefficient had a negative sign was statically significant during the combined liberalization era. This shows that short-run deviation from stock market volatility can be quickly corrected.

5.2 Conclusion

The preceding section reveals that past stock market volatility (EGARCH) has a significant impact on current stock market volatility (EGARCH) during the combined liberalization in Nigeria. Moreover, our ECM had a statistically significantly relationship with stock market volatility in Nigeria. We also learn from our analysis of macroeconomic fundamentals that exchange rate misalignments. Interest and inflation rates, were insignificant in explaining stock market volatility in Nigeria.

5.3 Recommendations

Based on the findings of this study, we suggest the following measures:

1. Stable Exchange Rate Policies: Because in our study, we found that ERM does not necessarily lead to stock market volatility, therefore the policy makers should encourage stable exchange rate policy in order to minimize ERM. This is because the fact that our study does not show that it is critical to volatility behavior in Nigeria does not invalidate its existence, hence we suggest that there should be serious monitoring of the implementation of the ER policies.

2. Promote financial liberalization Policies: Since our study has shown that financial liberalization is good since it does not necessarily cause market crisis in Nigeria as anticipated, this may mean either that we are getting the process right or probably there are some other policies complimenting the consequences that may have arisen.

3. Promote equity investors confidence: In case of Nigeria, we observed that ERM does granger cause SMV. This therefore implies that investors should be assured that future misalignment in exchange rate would not necessarily lead to loss of shareholders' value.

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