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EXCHANGE RATE VOLATILITY AND FIRM PERFORMANCE IN NIGERIA: A DYNAMIC PANEL REGRESSION APPROACH

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ABSTRACT

This study investigated the effects of exchange rate volatility on firm performance in Nigeria, by examining cross sectional data for the most active 20 companies listed on the Nigerian Stock Exchange. The study developed three dynamic panel models that account for heterogeneities among the companies and it extended recent research by allowing international investors and corporations to base their investment decisions on the exchange rate volatilities between the Nigerian Naira and their home country currencies. The method used in the study is the dynamic panel data approach applying the Arrelano-Bond dynamic panel-data and Arellano-Bover generalized method of moments (GMM) estimators. The variables used in the study to proxy firm performance are the rate of return on assets (RRA), asset turnover ratio (ATR), and portfolio activity & resilience (PAR) variable. While RRA variable is obtained by simply dividing the firm's profits by the total assets of the business, ATR variable and the PAR variables are obtained by dividing the firm's sales revenue by the assets employed in the business and by dividing the percentage change in sales by the percentage change in gross domestic product GDP. The exchange rate volatility variable is simply obtained by taking the square of the mean adjusted relative change in the official exchange rate. The result of the paned data estimate shows that there is no significant difference between the Arrelano-Bond dynamic panel approach and Arellano-Bover generalized method of moments (GMM) estimators. The result of the three estimates revealed that exchange rate volatility has significant negative impacts on the rate of return on assets, asset turn ratio and the portfolio activity & resilience, thus, establishing that there exist a significant negative impact of exchange rate volatility on firm performance in Nigeria between 2004 and 2013. Overall, the study suggests that the higher the exchange rate volatility in an economy the less efficient will firms operating in the economy and by implication the lower will be firms' operating performance.

JEL Classifications: C34, D21, D51, D92, F31
Keywords: Exchange Rate Volatility, Firm Performance, Panel Data Regression, Rate of Return on Assets, Asset Turnover Ratio, Portfolio Activity & Resilience
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INTRODUCTION

Firrm performance has played a central role in management research. A series of important studies has allowed us to have a robust technical knowledge on key issues such as on the main determinants of firm performance (see, for example, Tse, Wu & Young 2003; Du & Wei 2004; Bae, Chan & Ng 2004; Lesmond 2005). There are two levels of determinants

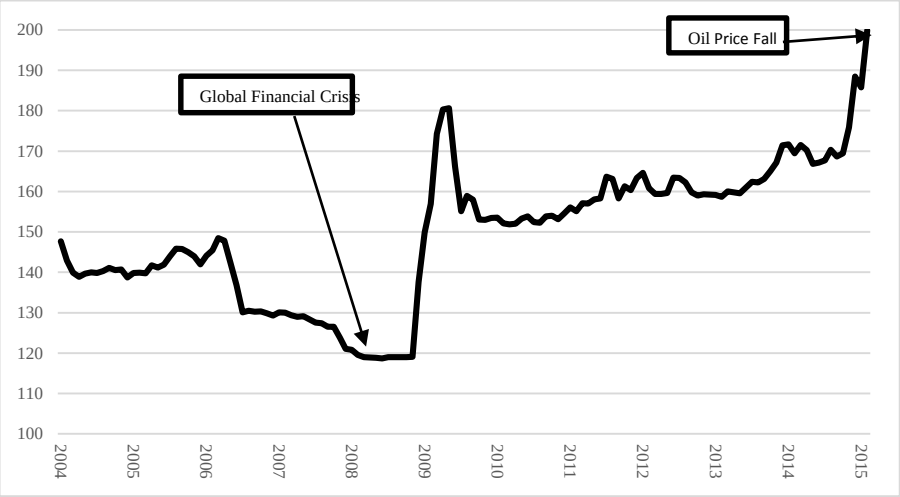
of firms' performance: the first relates to external factors beyond the control of the firms while the second relates to internal factors within the control of the firms (Babatunde & Olaniran 2009).

The principal objective of this paper is to gain insight on the effects of exchange rate volatility on firm's performance in Nigeria, using two key performance variables, cost of goods sold and gross profit before tax.

Firm performance in Nigeria has not particularly received much attention from macroeconomic point of view because the few existing studies on the subject have focused more towards individual firm performance in relation to micro variables. Yet, in the empirical literature, several scholars contend that firms can take advantage of changes in macroeconomic aggregates to influence business performance (Navarro, Bromiley & Sottile 2010).

This fluctuation in exchange rates became an issue of great concern to corporate establishments and policy makers in Nigeria in the wake of the 2007-2008 global financial crises and the recent fall in the global oil price

FIGURE 1: DOLLAR TO NAIRA EXCHANGE RATE (2004-2015)



Data Source: Central Bank of Nigeria (2015). Author's calculations using Microsoft Excel (2010) and graphical analysis results.

Notes: This chart shows the volatile movements of the exchange rate in Nigeria. It also depicts the drastic fall in the value of the naira in the past decade

From the trend analysis in figure 1, exchange rate during the period (January 2, 2008), opened at N115.00/US$ and closed at N130.32/US$ in the period (December 31, 2008) representing a depreciation of 13.32 percent. In November 2011, the naira exchanged at N153.5/US$ representing a depreciation of over 33.5 percent over the period 2008-2011. By February 2015, volatility levels have risen to the highest levels in a decade. The question raised by this trend is: what is the impact of the volatile movement in exchange rate on firm performance in Nigeria?

The volatile nature of the movement of exchange rate in Nigeria and the paucity of research in the area of exchange rate volatility and firm performance provides us a good opportunity for studying the effects of exchange rate volatility on firm performance in Nigeria.

This paper proceeds as follows: Section 2 reviews the major theoretical and empirical literature on exchange rate volatility and firm performance. Section 3 discusses the cross-sectional data and the dynamic panel methodology employed in the study. Section 4 summarizes the empirical results. Section 6 covers caveats and possible future research, and Section 7 conclude

LITERATURE REVIEW

Recent international financial crises have underscored the importance of the international monetary mechanism to corporations. As a consequence, external variables such as exchange rate fluctuations have become of great weight in determining the character of firm performance. From Harris's (2001) viewpoint, exchange rate depreciation is a necessary factor, influencing the gap in firms' productivities. In agreement, Auer and Chaney (2007) suggest that the market power of a given firm depends not only on the prices and qualities of its close competitors and on the prices of other closely related firms, but also on the exchange rate movement, which is hugely influenced by export transactions of low quality goods in the domestic market.

The study of firm performance has yielded a vast body of literature, showing that firm performance is determined by a vast number of factors such as inventory (Thille 2006), liquidity risk (Lesmond 2005), number of informed agents (Du & Wei, 2004), information asymmetry (Tse, Wu & Young 2003) and the impact of investibility (Bae, Chan & Ng 2004).

Much of the early literature have proposed that the main factors responsible for firm productivity include the ability to export, effective policy regulation, management style, ownership structure, technology and human capital (Bartelsman & Doms 2000; Girma, Greenaway, & Kneller 2002). These literature clearly placed less emphasis on the impacts of macroeconomic variables such as exchange rates on firm's performance.

The most recent studies that link exchange rate with firm's performance include the studies by Chatterjee, Carneiro and Vichyanond (2010) and Baggs, Beaulieu, Fung and Lapham (2011). Chatterjee et al. (2010) study on the effect of exchange rate shocks on pricing decision of multi-product firms revealed that, in the event of exchange depreciation, most firms increase the prices of products closer to their core competency. Chatterjee et al. claims that this kind of adjustments enhances firms' performance.

The study by Baggs et al. (2011) observed a negative exchange rate effect on retail firm performance due to a net effect on the prices of input driven by a rise in the domestic exchange rate. According to the study, exchange rate volatility influences the levels of sales, which decrease as the rate of exchange appreciates and increases as the rate of exchange depreciates.

Earlier studies by Berman, Martin & Mayer (2008) and Auer & Chaney (2009) focused explained the exchange rate effects on the volume of export. According to both studies, exchange rate has a significant positive impact on export volumes, which varies across firms; although it is significantly reduced for low performing firms. This suggests

that high and low productive firms have distinct strategies for various circumstances of exchange rate changes.

It must be noted that there is no conclusive evidence on the impact of exchange rate volatility on firms' performance. While a strand of the literature claim that exchange rate volatility provides little or no explanation for stock performance (Bartov & Bodnar 1994; Bernard & Galati 2000), others contend that stock performance is significantly affected by exchange rate volatility (Doukas, Hall & Lang 1999; Patro, Wald Wu 2002). Studies such as Aquino (2006), and Yau and Nieh (2006) claim that exchange rate volatility account for much of the volatility of equity markets.

Given that changes in stock price and equity are directly linked to firm performance we can reasonably conclude that there is need to further investigate the relationship between exchange rate volatility and firm performance.

METHODOLOGY AND DATA

Data Set

A balanced panel of 10 annual observations from 20 companies over the period of 2004-2013 was used in this study. The company data comprises cross sectional yearly observations of company performance indicators for twenty most active companies listed on the Nigeria Stock Exchange. The companies selected for the study are Forte oil Plc, Ashaka Cement Plc, Cadbury Nigeria. Plc, Conoil Plc, Flour Mills of Nigeria Plc, Guinness Nigeria Plc, John Holt Plc, Julius Berger Nigeria Plc, Mobil Oil Nigeria Plc, Nestle Foods Plc, Nigerian Breweries Plc, Oando Plc, PZ Nigeria Plc, Texaco Nigeria Plc, Total Nigeria Plc, UAC Nigeria Plc, Unilever Nigeria Plc, Lafarge Cement, Transnational Corporation and Dangote Sugar.

The variables used in the study to proxy firm performance are the rate of return on assets (RRA), the asset turnover ratio (ATR) and portfolio activity & resilience (PAR). RRA is usually obtained by simply dividing the firm's profits by the total assets of the business while ATR is obtained by dividing the firm's sales revenue by the assets employed in the business. The third measure, PAR, is obtained by dividing the percentage change in sales by the percentage change in GDP. These three measures produce excellent metrics of assessing the firms' performance over a number of years and of comparing several companies.

To control for the influence of other macroeconomic aggregates in the model, we included variables such as crude oil price, prime lending rate, imports, Federal reserves and total government expenditure. The variable used to proxy exchange rate volatility is the square of the mean adjusted relative change in the official exchange rate.

The data set was sources directly from Nigerian Stock Exchange Fact Book (2014), companies' annual report and statements of accounts and the National Bureau of Statistics Nigeria.

Panel Unit Root Test

According to Pesaran and Shin (1999), the ARDL approach is valid irrespective of whether the regressors are endogenous or exogenous, and regardless of whether the variables are *I*

(0) or *I* (1). In order to guarantee appropriate specification, the panel unit test was carried out on the dependent and independent variables. We adopted the Im, Pesaran and Shin (2003) (IPS) test because the companies are heterogeneous[1]. The IPS test is based on this model:

$$\Delta Y_{it} = \partial_i Y_{i,t-1} + \Sigma_{j=1}^{p_i} \beta_{ij} \Delta Y_{i,t-j} + \gamma X_{it} + \varepsilon_{it} \quad (1)$$

For i=1,…,N and t=1,…,T.

The Dynamic Panel Model

The purpose of this section is to construct models of the relationship between exchange rate volatility and firm performance in Nigeria, as described by equations (2-4).

$$RRA_{it} = \alpha_1 + \alpha_2 EXCRV_{it} + \alpha_3 PLR_{it} + \alpha_4 IMPT_{it} + \alpha_5 OILP_{it} + \alpha_6 RESV_{it} + \alpha_7 TEXP_{it} + u_{it} \quad (2)$$

$$ATR_{it} = \beta_1 + \beta_2 EXCRV_{it} + \beta_3 PLR_{it} + \beta_4 IMPT_{it} + \beta_5 OILP_{it} + \beta_6 RESV_{it} + \beta_7 TEXP_{it} + u_{it} \quad (3)$$

$$PAR_{it} = \lambda_1 + \lambda_2 EXCRV_{it} + \lambda_3 PLR_{it} + \lambda_4 IMPT_{it} + \lambda_5 OILP_{it} + \lambda_6 RESV_{it} + \lambda_7 TEXP_{it} + u_{it} \quad (4)$$

Where the subscript *i* denotes the *i*th company (*i* = 1,…, 20) and the subscript *t* denotes the *t*th year (*t* = 1,...,10).

RRA_{it} is the Rate of Return on Assets for company i at time t. ATR_{it} is the Asset Turnover Ratio for company i at time t. PAR_{it} is the Portfolio Activity & Resilience for company i at time t. $EXCRV_t$ is the Exchange Rate Volatility at time t. PLR_t is the Prime Lending Rate at time t. $OILP_t$ is the log of Crude Oil Price at time t. $IMPT_t$ is the Import as a percentage of GDP at time t. $RESV_t$ is the log of Federal Reserves at time t. $TEXP_t$ is the log of Total Government Expenditure at time t. RRA, ATR, PAR, EXCRV and PLR are not used in log forms because they are either percentages, ratios or rates.

In order to capture the dynamic processes between exchange rate volatility and firm performance in Nigeria, a dynamic panel data analysis method was used.

Let y_{it} be the dependent variable in company *i*, and x_{it} be the vector of company-specific regressors. Then, a simple dynamic panel data model in levels can be represented as (Hsiao, 2003: 75):

$$y_{it} = \partial y_{i,t-1} + \beta x_{it} + \mu_{it} \qquad i = 1,\ldots N;\ t = 1,\ldots T. \quad (5)$$

∂ is a scalar; μ_i denotes the stochastic error term, *i*th individual's effect. The u_{it} follows a one-way error component model such that,

$$u_{it} = \eta_i + v_{it}. \quad (6)$$

where $\eta_i \sim IID(0,\sigma_\mu^2)$ and $v_{it} \sim IID(0,\sigma_v^2)$ independent of each other and among themselves (Baltagi, 2008). μ_i is a vector of unobserved common factors.

Further, it is assumed that

$$E(\eta_i) = 0,\ E(v_{it}) = 0,\ E(v_{it}\eta_i) = 0 \quad \text{for all } i = 1,\ldots,N \text{ and } t = 2,\ldots,T. \quad (7)$$

$E(v_{it}v_{is}) = 0$ for all i = 1, . . . , N and t ≠ s (8)
$E(y_{i1}v_{it}) = 0$ for all i = 1, . . . , N and t = 2, . . . , T . (9)

An assumption of no correlation between the regressors and the composite error term has been made. On the other hand, the inclusion of the lagged dependent variable y_{t-1} in the models breaks down the condition of zero correlation between explanatory variables and the error term. This is better explained by Baltagi (2008: 147) which states that:

The dynamic panel data regression is characterized by two sources of persistence over time. Autocorrelation due to the presence of a lagged dependent variable among the regressor; and individual effects, characterizing the heterogeneity among the individuals.

In order to ensure a convincing and robust estimation of the equation (11), Arellano & Bond (1991) proposed the generalized method of moments (GMM) estimator. The benefit of the GMM estimator lies in the ability to sweep across-time and individual-specific effect by taking first differences:

$$\Delta y_{it} = \alpha \Delta y_{it-1} + \beta \Delta x_{it} + \Delta v_{it} \quad (10)$$

Where $\Delta y_{it} = y_{it} - y_{it-1}$ for i = 1. . . N and t = 2. . . T.

In this study, we acknowledge that firm performance is very likely to be correlated with the firm-specific effects and the shocks to the firm performance in the previous periods. Therefore, we used the following moment conditions to identify the valid instruments in first differences:

$E(y_{it-s}\Delta u_{it}) = 0$ for t = 3, . . . , T and $2 \leq s \leq t-1$ (11)
$E(x_{it-s}\Delta u_{it}) = 0$ for t = 3, . . . , T and $1 \leq s \leq t-1$ (12)

In addition, to identify the instruments in levels, we used the moment conditions:

$E(u_{it}\Delta y_{it-1}) = 0$ for t = 3, . . . , T (13)
and
$E(u_{it}\Delta x_{it-1}) = 0$ for t = 3, . . . , T (14)

This is the idea behind Arrelano-Bover and the GMM estimators which are consistent for large N and finite T, and therefore more efficient than the Arellano & Bond estimator. Since an important assumption of the validity of GMM estimation is that the instruments are exogenous, we confirm validity of the instruments using the Sargan test. Further, an important assumption of the consistency of the GMM estimator is that the idiosyncratic errors are serially non-correlated. Therefore, we made use of Arellano and Bond (1991) test to check for presence of second-order autocorrelation.

The panel specification allows for a significant degree of cross-company heterogeneity, due to the fact that the effect of exchange rate volatility on corporate performance could vary across companies, depending on company-specific factors such as efficiency, management and assets. Since our major goal in this study is to determine the impact of exchange rate volatility on corporate performance in Nigeria, the method we

adopted did not dwell on the specific dynamics that might be germane to a specific company.

EMPIRICAL INVESTIGATION

Panel Unit Root Test

An important issue before making the appropriate specifications, often ignored by previous studies, is to determine if the variables are stationary or not. We carried out IPS panel unit root tests on the dependent and independent variables; the obtained results are as shown in Table 3. The results show that we can reject the null hypothesis of a unit root in favor of stationarity at the 5% level of significance. Hence, we can safely begin the panel data estimation.

TABLE 1: PANEL UNIT ROOT TESTS

Variables	IPS Statistics	Prob. Values
RRA	-2.915* *	0.002
OILP	-2.152*	0.016
PAR	-4.089**	0.000
ATR	-2.933**	0.002
EXCRV	-3.636**	0.000
PLR	-2.058*	0.020
IMPT	-3.142**	0.001
RESV	-13.046**	0.000
TEXP	-4.209**	0.000

Source: Author's calculation using *STATA 11*
Notes: By Schwarz criterion, the lag length was 1. (**) and (*) indicate stationarity at significance levels 1% and 5% respectively.

The panel unit root tests established that the variables are $I(0)$ or $I(1)$. The dynamic approach is valid regardless of whether the regressors are endogenous or exogenous, and regardless of whether the variables are I (0) or I (1) (1995; Pesaran & Shin 1999).

Dynamic Panel Estimation

Each of the three performance measures of the firms is regressed on Exchange Rate Volatility, Crude Oil Price, Prime Lending Rate, Imports as a % of GDP, Reserves and Total Government Expenditure in order to examine the contemporaneous effect of Exchange Rate volatility on firm performance The Least Squares estimates obtained are reported for two cases[2]:

(a) Arellano-Bond dynamic panel-data and,

(b) Arrelano-Bover/Bundell-Bond system dynamic panel-data.

Panel estimates of the effects of Exchange Rate Volatility on the Rate of Return on Assets using both Arrelano-Bond & Arellano-Bover GMM estimation methods are shown in Table 2.

TABLE 2: PANEL ESTIMATES OF THE EFFECTS OF EXCHANGE RATE VOLATILITY ON THE RATE OF RETURN ON ASSETS, 2004-2013

	Arelano-Bond Dynamic Panel	**Arrelano-Bover/Blundell-Bond System dynamic panel**
Lagged RRA	0.024 (0.645)	0.007 (0.908)
EXCRV	-0.134** (0.002)	-0.145* (0.024)
PLR	-0.105 (0.549)	-0.093 (0.628)
IMPT	0.122* (0.040)	0.134* (0.047)
OILP	-0.068* (0.025)	-0.072* (0.043)
RESV	-0.032* (0.034)	-0.035** (0.004)
TEXP	3.047* (0.011)	4.142* (0.030)
N	160	180
Wald χ^2	1693.68*	1384.42*
Sargan test	97.307	77.241
AB test	-0.324	-0.293

Source: Author's calculation using STATA 11.
Notes: The (**) signifies variable significant at 1%, (*) significance at 5%. Values in brackets are probabilities

The values in parentheses are probabilities. AB test is Arellano and Bond test for AR(2). The Sargan test reports that under the null hypothesis, the over-identified restrictions are valid. The estimations were conducted with two-step efficient GMM and small sample corrections to the covariance matrix estimate. The results across both Arrelano-Bond & Arrelano-Bover/Blundell-Bond System GMM specifications are not materially different. The estimates suggest an inverse relationship between Exchange Rate volatility and Rate of Return on Assets. The coefficients of Exchange Rate volatility are negative and always statistically significant, with their values ranging from -0.134 (the Arrelano-Bond model) to -0.145 (Arrelano-Bover/Blundell-Bond model).

From the estimation results of both models, the one period lagged Rate of Return on Assets has a positive but insignificant effect on the current Rate of Return on Assets, suggesting a weak adjustment dynamics in the effect and behavior of previous Rate of Return on Assets. No significant effect is observed for Prime Lending Rate while imports

produced positive and significant impact on the Rate of Return on Assets. Based on Arrelano-Bover/Blundell-Bond model, increases in Imports lead to an increase (coefficient of 0.134) in the Rate of Return on Assets.

The Federal Reserve variable and Total Government Expenditure both proved to be important factors in explaining the Rate of Return on Assets. What is interesting, though, is that the Federal Reserves has a negative significant impact on the Rate of Return on Assets. That is, the higher the Federal Reserves, the lower the Rate of Return on Assets.

For both models, the Sargan test rejects the null hypothesis of misspecification while, Arellano–Bond (AB) second order autocorrelation test rejects the null hypothesis of serial correlation in the idiosyncratic error. Panel estimates of the effects of Exchange Rate Volatility on the Asset Turnover Ratio using both Arrelano-Bond & Arellano-Bover GMM estimation methods are shown in Table 3.

TABLE 3: PANEL ESTIMATES OF THE EFFECTS OF EXCHANGE RATE VOLATILITY ON THE ASSET TURNOVER RATIO, 2004-2013

	Arelano-Bond Dynamic Panel	**Arrelano-Bover/Blundell-Bond System dynamic panel**
Lagged ATR	0.723* (0.000)	0.113* (0.000)
EXCRV	-0.137* (0.002)	-0.113** (0.048)
PLR	-0.009* (0.862)	-0.058* (0.551)
IMPT	0.010 (0.814)	0.012* (0.900)
OILP	-0.051 (0.180)	-0.045 (0.359)
RESV	-0.037* (0.012)	-0.028** (0.238)
TEXP	2.972* (0.016)	1.359* (0.251)
N	160	180
Wald χ^2	278.15*	773.98*
Sargan test	91.590	74.382
AB test	-0.262	-0.389

Source: Author's calculation using STATA 11.
Notes: The (**) signifies variable significant at 1%, (*) significance at 5%. Values in brackets are probabilities

The values in parentheses are probabilities. AB test is Arellano and Bond test for second order autoregressive scheme AR(2). The Sargan test reports that under the null hypothesis, the overidentified restrictions are valid. The estimations were conducted with two-step efficient GMM and small sample corrections to the covariance matrix estimate.

As shown in Table 3, the results across both Arrelano-Bond & Arrelano-Bover/Blundell-Bond System GMM specifications are not too different. The estimates suggest an inverse relationship between Exchange Rate volatility and Asset Turnover Ratio. The coefficients of Exchange Rate volatility are negative and always statistically significant, with their values ranging from -0.137 (the Arrelano-Bond model) to -0.113 (Arrelano-Bover/Blundell-Bond model). In other words, the higher the exchange rate volatility, the lower the Asset Turnover Ratio.

From the results obtained from both models, lagged one period Asset Turnover Ratio has a positive and significant effect on the current Asset Turnover Ratio, suggesting a strong adjustment dynamics in the effect and behavior of previous Asset Turnover Ratio. This suggests that companies with low Asset Turnover Ratio would not experience persistent decline in performance with volatile exchange rate changes. The coefficients of the lagged Asset Turnover Ratio are between zero and one, implying partial catch-up. The Prime Lending Rate, Oil Price and Reserves variables have a significant negative impact on Asset Turnover Ratio. That is, the higher the Prime Lending Rate, Oil Price and Reserves, the less will be the Asset Turnover Ratio.

No significant effect is observed for Imports, suggesting no impact of Imports on the Asset Turnover Ratio. Total Government Expenditure has a positive and significant impact on the Asset Turnover Ratio. For both models the Sargan test rejects the null hypothesis of misspecification. As well, the Arellano–Bond (AB) second order autocorrelation test also rejects the null hypothesis of serial correlation in the idiosyncratic error. Panel estimates of the effects of Exchange Rate Volatility on the Portfolio Activity & Resilience using both Arrelano-Bond and Arellano-Bover GMM estimation methods are shown in Table 4.

TABLE 4: PANEL ESTIMATES OF THE EFFECTS OF EXCHANGE RATE VOLATILITY ON THE PORTFOLIO ACTIVITY & RESILIENCE, 2004-2013

	Arelano-Bond Dynamic Panel	**Arrelano-Bover/Blundell-Bond System dynamic panel**
Lagged ATR	0.171* (0.037)	0.117** (0.000)
EXCRV	-0.701* (0.042)	-0.532** (0.000)
PLR	-2.417** (0.000)	-1.113* (0.047)
IMPT	0.272 (0.494)	0.110 (0.402)
OILP	-0.401* (0.035)	-0.251** (0.006)
RESV	-0.213** (0.001)	-0.164** (0.000)
TEXP	2.035* (0.024)	1.130** (0.003)
N	160	180

Wald χ^2	415.21**	975.73*
Sargan test	71.764	71.523
AB test	-0.125	-0.17

Source: Author's calculation using STATA 11.
Notes: The (**) signifies variable significant at 1%, (*) significance at 5%. Values in brackets are probabilities

Table 4 shows the estimates for the impact of Exchange Rate Volatility on the Portfolio Activity & Resilience. The estimations were conducted with two-step efficient GMM and small sample corrections to the covariance matrix estimate. The results across both Arrelano-Bond and Arrelano-Bover/Blundell-Bond System GMM specifications are similar. The estimates suggest an inverse relationship between Exchange Rate volatility and Portfolio Activity & Resilience. The coefficients of Exchange Rate volatility are negative and always statistically significant, with their values ranging from -0.701 (the Arrelano-Bond model) to -0.117 (Arrelano-Bover/Blundell-Bond model). In other words, the higher the exchange rate volatility, the lower the Portfolio Activity & Resilience.

From the estimation results of both models, a one period lagged Portfolio Activity & Resilience has a positive and significant effect on the current Portfolio Activity & Resilience, suggesting a strong adjustment dynamics in the effect and behavior of previous Portfolio Activity & Resilience. This suggests that companies with less than adequate Portfolio Activity & Resilience would not experience persistent decline in performance. The coefficients of the lagged Portfolio Activity & Resilience are between zero and one, implying partial catch-up.

The Prime Lending Rate variable, Oil Price and Reserves have a significant negative impact on Portfolio Activity & Resilience. That is, the higher the Prime Lending Rate, Oil Price and Reserves, the less the Portfolio Activity & Resilience. No significant effect is observed for Imports, suggesting no impact of Imports on Portfolio Activity & Resilience. Total Government Expenditure produced a positive and significant impact on Portfolio Activity & Resilience. For both models, the Sargan test rejects the null hypothesis of misspecification. As well, the Arellano–Bond (AB) second order autocorrelation tests which also rejected the null hypothesis of serial correlation in the idiosyncratic error.

Overall, this study suggests that exchange rate volatility and other macroeconomic parameters (i.e. prime lending rate, oil price and reserves) adversely affect rate of return on assets, asset turnover ratio, portfolio activity & resilience and, consequently, firm performance, consistent with the empirical literature.

CONCLUSIONS, LIMITATIONS AND FUTURE RESEARCH

This study focused on explaining the link between exchange rate volatility and firm performance in Nigeria. The study made use of three dynamic panel model which include firm efficiency dependent variables such as Rate of Return on Assets, Asset Turnover Ratio, and Portfolio Activity & Resilience calculated from data drawn from 20 most active companies listed on the floor of Nigerian Stock Exchange.

The point of departure of the study from other similar studies is the performance indicator variable used to proxy firm performance and the use of the Arelano-Bond Dynamic Panel and Arrelano-Bover/Blundell-Bond System Dynamic Panel models. The result of the study shows that exchange rate volatility has significant negative impacts on the rate of return on assets, asset turnover ratio and portfolio activity & resilience variable over the sample period 2004-2013. Overall, the study suggests that the higher the volatility in exchange rates, the less will be the efficiency and productivity of firms operating in the domestic market.

A number of policy implications can be drawn from this analysis for investors and financial market participants. Because all firms are not uniformly susceptible to exchange rate volatility, risk diversification possibilities across industries are recommended. Information on firm vulnerability, relative immunity or strength in the face of exchange rate volatility can be used to inform portfolio strategies on exchange rate risk exposures of firm.

When exchange rate shocks are imminent or the foreign exchange environment changes, investors and market participants can alter or rebalance their portfolios with stocks of dissimilar firms by looking at the response of the firms to volatile changes exchange rate.

ENDNOTES

[1] Panel unit root tests are divided into two, based on the assumption of homogeneity and heterogeneity. Examples of studies based on the assumption of a homogeneous model are Breitung (2000) and Levin, Lin and Chu (2002). Studies based on the assumption of a heterogeneous model are Im, Pesaran and Shin (2003) and Choi (2001).

[2] Individual company estimates are available on request, but note that they are likely to be individually unreliable considering the fact that the time dimension of the panel is relatively small.

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