EFFECTS OF EXCHANGE RATE VOLATILITY ON COMMERCIAL PROPERTY RETURNS IN NIGERIA

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ABSTRACT

The study examined the relationship between commercial property market and foreign exchange markets in Nigeria from 2000 to 2010 with the aim of determining the effects of Naira/US Dollar exchange rate volatility on commercial property returns in Nigeria. This study was motivated by the progressive Naira/Dollar exchange rate regime and its potential consequences on real estate investment decision making. The Exponential Generalized Auto-Regressive Conditional Heteroscedasticity (EGARCH) was used in establishing the relationship between exchange rate volatility and property investment returns volatility in Nigeria. It was found that there exists a positive insignificant relationship between commercial property returns and Naira/US Dollar exchange rate movement in Nigeria. It was also discovered that there is volatility persistence of exchange rate on commercial property returns which implies that current period rate has an effect on the forecast variance of future rate. Leverage effect was not sufficiently significant within the study period.

Keywords: exchange rate, volatility, commercial properties, leverage effect, volatility persistence.

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I.   INTRODUCTION

Unstable exchange rate of Nigeria's domestic currency (Naira, ₦) which is domiciled in US dollars has in some cases made returns on investment to be negative, thereby discouraging real estate investments. Osinubi and Amaghionyeodiwe (2009) opined that the Naira/US Dollar exchange rate has witnessed a continuous slide in all the segments of the foreign exchange market (that is official bureau de change and parallel markets). In the official exchange market, it has depreciated progressively leading to a precarious operating environment which can be attributed to the reason why Nigeria has not only been unable to attract foreign investment to its fullest potentials but also has had a limited domestic investment. Despite the vast investment opportunities for real estate investment, many would be investors shy away as a result of uncertainties in the investment climate which can be attributed to high exchange rate volatility in Nigeria.

A historic examination of foreign exchange movement in Nigeria shows a considerable level of volatility, thus necessitating the need to determine its effect on commercial real estate returns. Nigeria is an emerging economy that offers opportunities for domestic and international real estate diversification such that all funds invested in Nigeria by foreign investors may be repatriated to the home country at end of the holding period, irrespective of the outcome of the investment.

A lot of studies have been done on the effects of exchange rate on real estate values in other countries but none has been carried out on Nigeria. Some studies on exchange rate in Nigeria have focused on agricultural trade flow, international trade, and foreign direct investment among others. Hence there is the need to investigate the effects of exchange rate variability on commercial real estate returns in Nigeria.

The objectives of this study are two- fold, namely; to determine the effects of US/Naira exchange rate volatility on commercial property investment returns in Nigeria, and to determine the correlation between commercial property returns and exchange rate movements. The postulated hypothesis is that there is no significant relationship between exchange rate volatility and commercial real estate investment returns in Nigeria.

II. LITERATURE REVIEW

According to Omolara (2010) exchange rate constitutes the price of one currency in terms of another. Jurion (1990) opined that a volatile exchange rate could raise strategic and managerial issue because it could lead to losses or gains. Since currency fluctuation can have influence on both domestic and international prices of goods, it will also be necessary to determine its effects on real estate returns because whatever affects the

prices of imported raw materials will affect property development and returns. Olowe (2009) posited that the Nigerian foreign exchange market is characterized by high volatility persistence; hence, there is the need to determine how this volatility of exchange rate (US dollar to Nigerian naira) affects commercial real estate investment returns in Nigeria.

According to Liu and Mei (1998), diversifications benefits are found to be primarily driven by unanticipated returns which are partially driven by changes in exchange rate risks. Barry, Rodrguez and Lipscomb (1996), have explored the diversification potential of real estate investment in emerging markets and they noted that even though emerging market's real estate is relatively riskier, its low correlation with returns of portfolios of developed markets provide the essential diversification benefit. Property market in Nigeria as an emerging economy ought to offer diversification benefit to international investors, hence the need to study the effect of exchange rate movement on commercial real estate returns in Nigeria.

Wogu and Kalu (2011) suggested that offices and shops provide the best real estate investments available in Nigeria presently. Most commercial real estate investments provide investors with stable, bond-like income from contractual leases (Ciochetti, Fisher and Gao, 2003). This is because commercial properties are mostly occupied by tenants that have long term leases making cash flow fairly predictable even during economic downturns.

Olowe (2009) stated that the introduction of Structural Adjustment Programme (SAP) in Nigeria in 1986 led to the deregulation of the foreign exchange market and the introduction of market determined exchange rate, managed floating rate regime which has increased uncertainty in exchange rate thus increasing its volatility. The volatility, frequency and instability of the exchange rate movement since the beginning of the floating exchange rate raises concern about the impact of such movements on construction materials and commercial real estate returns in Nigeria. Dahiru and Joseph (2013) identified exchange rate and its volatility as key factors that influence economic activities in Nigeria.

Joseph and Akhanolu (2011) stated that many analysts of international economics concur that the generalized floating of exchange rate system in operation since the post Bretton Wood period have engendered substantial volatility in both developed and developing economies. Adamu (2005) found an adverse effect of exchange rate volatility on private investments. Mordi (2006) while employing GARCH model opined that failure to properly manage exchange rates can induce distortions and also create risks with destabilizing effect on the economy.

Attela, Atzeni and Belvisi (2003) observed that exchange rate volatility determines the uncertainty on expected profit, but the extent and the implication of this relationship remain an empirical question. Gyourko and Linneman (1988) suggested that ommercial real estate was virtually riskless since there will be less volatility of rents paid by corporate tenants, due to their earnings. Kalu (2005), on the contrary said that this of

course cannot hold true, as it does not apply to unsecuritized real estate and non-rent payment or volatility of rent payment is not necessarily a function of the earnings of the tenant because some irrational tenants owe even when their business is doing well. Lee (2001) opined that capital markets are becoming global markets and that commercial real estate markets are no exceptions. He also identified exchange risk as one of the risks responsible for real estate returns volatility.

Eun and Resnick (1988) noted that fluctuating exchange rates may mitigate the gains from diversification. Addae-Dapaah and Young (1998) in a study of currency risk on office investment within Asia region found that for a single country investment, exchange rate can be of substance. Addae - Dappah and Hwee (2009) in their study found that currency risk predominantly have detrimental effects on office investments. Addae –Dapaah and Young (1998) in a study of currency risk and office investment within the Asian region found that for a single country investment, exchange risk can be substantial. Nonetheless the impact was statistically insignificant which is consistent with the findings of Ratcliffe (1994), Zibrowoski and Curico (1991) and Worzala (1995).

According to Patrick (2008), there has been limited empirical work on the effects of exchange rate in relation to property market. Some of the studies include. Newell and Webb (1996) who examined the effects of exchange rate volatility for five property markets (UK, US, Canada, Austria and New Zealand) between 1985 and 1993 using bi-annual data and identified impacts similar to the stock and bond market. Theirs finding are consistent with Tarbert and McAllister (1998), who examined the similar markets over a longer period. On the contrary, Quin and Titman (1997) examined the relationship between changes in annual property values and rents from 17 urban centers in different countries between 1987 and 1994 and found out that exchange rate changes did not severely distort the relative average returns in these countries. However we are concerned with home based property investments such that the effect of exchange rate volatility on property returns will also depend on the interrelationship between the performance of individual property markets and the national currencies. Lee and Thomas (2006) examined the impact of exchange rates on international real estate portfolio allocation and noted that currency fluctuation changes the diversification benefits associated with real estate investment. Similarly, Liu and Mei (1998) confirmed that diversification benefits are found to be primarily driven by unanticipated returns which are partially driven by changes in exchange rate risk. Webb and O' Keefe (2002) opined that international real estate investment is now an essential part of the real estate portfolio construction process. Since investing in international property markets means converting domestic currency to that of the foreign country, there is therefore the need to determine the effects of currency fluctuations on property returns.

Engle and Patton (2001) opined that volatility exhibits persistence and that volatility is said to be persistent if today's return has a large effect on the forecast variance of many periods in the future.

III. RESEARCH METHODOLOGY

This is an explanatory survey research design. Data was collected from 398 firms of Estate Surveyors and Valuers within the study area. Documentary data on exchange rate movements was collected from the Central Bank of Nigeria (CBN) statistical bulletin within the study period.

This study is limited to commercial (Office/Shop) property returns and exchange rate movement from 2000 to 2010 using Naira/ US Dollar exchange rate. The property markets chosen for this work are Lagos, Port Harcourt and Abuja because a lot of real estate transactions in Nigeria occur in these cities. Also, direct real estate investment data over the study period was used.

A historic examination of foreign exchange movement in Nigeria shows a considerable level of volatility, thus necessitating the need to determine its effect on commercial real estate returns. Two objectives and a hypothesis were examined, viz; to determine the effects of US/Naira exchange rate volatility on commercial property investment returns in Nigeria; to determine the pattern or correlation between commercial property returns and exchange rate movements and, H_1: There is no significant relationship between exchange rate volatility and commercial property returns in Nigeria.
The residential real estate used in the study include detached bungalows, duplexes, tenement buildings, and apartment blocks while that of commercial real estate include office properties and shops. A target population of 700 firms of Estate Surveyors and Valuers in Abuja, Lagos and Port Harcourt was used in this study.

The strategy that was adopted in the data collection includes a combination of questionnaire, measurement and documentary data collection. The questionnaires were administered to firms of Estate Surveyors and Valuers in the selected cities. The questionnaires were designed in such a way as to collect data that are specific to the research questions. The major focus of the questionnaire was income (rent) from real estate investments within the period covered by the study. The data generated was market based and has not been published.

A total number of 398 questionnaires were administered. They were distributed by the researcher and research assistants. The total number of questionnaires administered was derived from the total number of Estate Surveying and Valuation firms (using the Taro Yamane formula) as contained in the directory [as at 2013] of members and registered firms of the Nigerian Institution of Estate Surveyors and Valuers in our study locations i.e. Lagos, Abuja and Port Harcourt. Archival data collection involved the collection of data on exchange rate movements from the Central Bank of Nigeria (CBN)

within the study period. The archival data were reported as they appear from the source.

Real estate returns for the different property classes were calculated using

$$R_t = \frac{(CV_t - Cv_{t-1}) + NI_t}{CV_{t-l}}$$

Where:

R_t =   Return at time t
CV_t =   Capital value at time t
Cv_{t-1} =   Capital value at time t -1
NI_t =   Net income at time t

The correlation analysis is expressed as:

$$p = \frac{COV(X,Y)}{\sigma_x \, \sigma_y}$$

Source: Gujarati, (1995)

Where:

p = correlation value (a measure of linear association between two variables and lies between +1 and -1. +1 indicates perfect positive association while -1 indicates perfect negative association.)

COV(X,Y) = Co-variance of variable X and Y

σ_x = Standard deviation of variable X

σ_y = Standard deviation of variable Y

Econometric models were used in the study to analyze the results so as to ensure accurate result. One of the variants of the GARCH models the Exponential Generalized Auto-Regressive Conditional Heteroscedasticity (EGARCH) was used in determining

the effects of exchange rate volatility on commercial property investment return volatility in Nigeria. The EGARCH is most often preferred to the GRACH model in studying financial markets. Koulakiotis, Papasyriopoulos and Molyneux (2006) opined that the GARCH (Generalized Autoregressive Conditional Heteroscedasticity) is relatively Weaker than the EGARCH in studying financial markets phenomenon. The weaknesses of the GARCH according to them include; (i) it assumes that there is a negative correlation between current returns and future volatility;(ii) it imposes parameter restrictions that are often violated by estimated coefficients which may unduly restrict the dynamics of the conditional variance process; (iii) it is difficult to interpret whether shocks to conditional variance persist or not in GARCH. Statistical software (Eviews 7.0) was used in the analysis of the EGARCH models.

The models are:

$$Y_t = \beta_0 + \beta_1(\blacktriangle ER_t) + \beta_2(ACPR_t) + \beta_3(ACPR_{t-1}) + \mu_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(3.1)$$

$$\ln(\sigma_t^2) = \omega + \beta \ln(\sigma_{t-1}^2) + \gamma \frac{u_{t-1}}{\sqrt{\sigma_{t-1}^2}} + \alpha \left[\frac{|u_{t-1}|}{\sqrt{\sigma_{t-1}^2}} - \sqrt{\frac{2}{\pi}} \right] \ldots\ldots\ldots\ldots\ldots\ldots (3.2)$$

Where in equation (3.1)

Y_t= Commercial property returns

$\blacktriangle ER_t$ = the first difference of exchange rate at time t

ACPR = Aggregate commercial property returns

$\beta_{1,2,...,5}$ = Model coefficient parameters

μ_t = Random Error which is assumed to be: $N(0, \sigma_t^2)$

Where In equation (3.2)

σ_t^2 = The conditional variance at time t.

ω = Constant.

σ_{t-1}^2 = Lag 1 conditional variance.

u_{t-1} = Lag 1 of Random Error.

β = Magnitude of volatility

α = Volatility persistence

γ = Assymetry or Leverage Effect.

The model specification for aggregate commercial property returns is specified below

$ACPR_t = \beta_0 + \beta_1 (\blacktriangle ER_t) + \beta_2 (\blacktriangle ER_{t-1}) + \beta_3 (ACPR_{t-1}) + \mu_t \ldots\ldots\ldots (3.3)$

Where:

$t = 1, 2, \ldots 10$

$$\ln(\sigma_t^2) = \omega + \beta \ln(\sigma_{t-1}^2) + \gamma \frac{u_{t-1}}{\sqrt{\sigma_{t-1}^2}} + \alpha \left[\frac{|u_{t-1}|}{\sqrt{\sigma_{t-1}^2}} - \sqrt{\frac{2}{\pi}} \right] (3.2)$$

Where in equation (3.3):

ACPR = Aggregate commercial property returns

β_0 = *constant or the regression intercept*

μ_t = *the error term at time t of the first difference*

$\blacktriangle ER_t$ = *exchange rate at time t of the first difference*

$\blacktriangle ER_{t-1}$ = *exchange rate of the first difference at lag 1*

$\beta_{1,2,3}$ = The model parameters of equation (3.3), the mean equation
Other variables and parameters are as defined in equations (3.2).

IV.   DATA ANALYSIS AND PRESENTATION

The instruments that were used to determine the effects of exchange rate volatility on commercial real estate returns include the unit root Augmented Dickey Fuller (1979, 1981); EGARCH Nelson (1991).

Table 1.   Commercial Property Returns (2000 – 2010)

YEAR	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
COMMERCIAL PROPERTY RETURNS	-	0.05620	0.24710	0.07630	0.21180	0.09880	0.12050	0.20050	0.12180	0.20560	0.11910

Source: Diala O.A (2015)

The commercial property returns represent aggregate returns from the various study locations.

Table 2. Naira/UD Dollar Exchange Rate (2000 – 2010)

YEAR	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
EXCHANGE RATE	-	111.94	120.97	129.36	133.50	132.15	128.65	125.80	118.57	148.88	150.30

Source: Central Bank of Nigeria

The data on exchange rate were reported as seen from the CBN

A.   Test for Stationarity:

Testing for stationarity is usually done in time series data so as to ascertain if the series is stationary because inferences cannot be made on non-stationary data. In order to address the issue of non-stationarity and also avoid the problem of spurious regression, the researcher used the quantitative analysis known as the Augmented Dickey - Fuller test (ADF).

B.   Decision Rule for Augmented Dickey-Fuller Test

If t* > ADF (Augmented Dickey-Fuller) critical value do not reject null hypothesis this implies that unit root exist which indicates non-stationarity.

If t* < ADF (Augmented Dickey-Fuller) critical value reject null hypothesis this means unit root do not exist which indicates stationarity.

In this analysis the researcher is testing at t* = 5% level.

where t* refers to MacKinnon critical values.

Table 3.   **Summary of the Augmented Dickey-Fuller unit root test analysis.**

VARIABLES	LEVEL(t*)	ADF	FIRST DIFF(-1)	ADF	DECISION
$ACPR_t$	-3.259808*	-10.51052*			Stationary
ER_t	-3.259808**	-1.452181**	-1.995865*	-2.827286*	Stationary

* Stationary at 5%

** Not stationary at 5%

According to the statement of Augmented Dickey-Fuller decision rule, it is indicated in the Table .3 above that ACPR is stationary at t* while ER became stationary after the first differencing. The researcher ascertained that the series is stationary.

Table 4.   **Correlations of Aggregate Commercial Property Returns with Exchange Rate.**

	Exchange rate	Aggregate commercial returns
Exchange rate	1	.216
Aggregate commercial returns	**.216**	**1**

Table 4 above shows the Pearson correlation matrix analysis of aggregate commercial property returns and exchange rate variables. The values show a positive relationship between aggregate commercial property returns and Exchange rate with a correlation coefficient of 0.216. The positive correlation indicates that exchange rate and commercial property returns move in the same direction such that an increase in exchange rate leads to a rise in commercial property returns volatility.

Having ascertained the stationarity of the variables, we now proceed to test for Exponential Generalized Conditional Autoregressive Heteroscedasticity (EGARCH) model.

Table 5 .   **Result of the EGARCH model on the effect of exchange rate volatility on aggregate commercial property returns**

Dependent Variable: ACPR

Method: ML - ARCH (Marquardt) - Normal distribution

Date: 03/28/15   Time: 16:28

Sample (adjusted): 2003 2010

Included observations: 8 after adjustments

Convergence achieved after 27 iterations

Presample variance: backcast (parameter = 0.7)

LOG(GARCH) = C(5) + C(6)*ABS(RESID(-1)/@SQRT(GARCH(-1))) + C(7)

*RESID(-1)/@SQRT(GARCH(-1)) + C(8)*LOG(GARCH(-1))

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	0.254213	0.090749	2.801285	0.0051
D(ER)	0.000774	0.001320	0.585891	0.5579
D(ER(-1))	-0.000979	0.001198	-0.817347	0.4137
ACPR(-1)	-0.649856	0.469584	-1.383897	0.1664
Variance Equation				
C(5)	-5.694311	85.28817	-0.066766	0.9468
C(6)	-4.251700	2.152944	-1.974831	0.0483
C(7)	-2.904069	7.513205	-0.386529	0.6991
C(8)	-0.025156	9.755511	-0.002579	0.9979

R-squared	0.675266	Mean dependent var	0.144300
Adjusted R-squared	0.431716	S.D. dependent var	0.053284
S.E. of regression	0.040168	Akaike info criterion	-4.732768
Sum squared resid	0.006454	Schwarz criterion	-4.653327
Log likelihood	26.93107	Hannan-Quinn criter.	-5.268569
Durbin-Watson stat	2.176791		

Table 6.   Summary of the EGARCH result (MEAN EQUATION).

The result of the analysis is presented below

	Coefficient	Probability
C	0.254213	0.0051
D(ER)	0.000774	0.5579
D(ER(-1))	-0.000979	0.4137
ACPR(-1)	-0.649856	0.1664

As can be seen from the mean equation in Table 6, there is a positive insignificant relationship between exchange rate volatility and aggregate commercial property returns. The result shows a negative insignificant relationship between exchange rate and aggregate commercial property returns of the previous time period.

Table 7.   Summary of the EGARCH result (variance equation)

VARIANCE EQUATION

	Coefficient	Probability
ω	-5.694311	0.9468
α	-4.251700	0.0483
β	-2.904069	0.6991
γ	-0.025156	0.9979

From the variance equation the magnitude of volatility is low and insignificant as represented by β. This may be attributable to the fact that exchange rate volatility has

relatively small impact on commercial property investment returns in Nigeria. Volatility persistence of naira/US dollar exchange rate on commercial property investment returns in Nigeria denoted as α is low at -4.251700 but significant at 5% level of testing. The direction of effect of γ < 1 is insignificant at the conventional level of testing. The negative sign of -0.025156 suggest that there exists leverage effect and that bad news has a larger impact on commercial property returns volatility. This should raise concern for real estate investors following the huge demand for commercial properties.. However being insignificant means that these effects were not pronounced within the sample period.

V. CONCLUSION

The study examined the effects of exchange rate volatility on commercial property returns in Nigeria between 2000 and 2010. From the findings of the study, it is concluded that there is an insignificant relationship between exchange rate volatility and commercial property investment returns in Nigeria. This finding is consistent with the findings of Adde Dapaah and Young (1988), Addae-Dapaah and Choo (1996), Zibrowoski and Curion (1991) and Worzala (1995). This findings are in contrast to the findings of Addae-Dappah and Hwee(2009).

The findings also reveal that there is a positive correlation between exchange rate volatility and commercial property returns volatility. Also there is significant volatility persistence of exchange rate on commercial property returns. Leverage effects were found to be insignificant. The low volatility persistence within the study period could have been as a result of intervention by the Central Bank of Nigeria in the foreign exchange market.

A. Recommendations

It is recommended that International property investors seeking exchange rate risk reduction may consider adding Nigerian real estate to their portfolios because of their relatively low volatility persistence. Investors are also encouraged to take into consideration the nature of volatility in exchange rate in the economy so as to make informed decisions as to where to direct their investments. However, policy makers should put in place measures that will seek towards stability in exchange rate, since any disturbance in exchange rate will affect real estate investment return A stable exchange rate regime through regular policy intervention in times of abnormal volatility should

be vigorously pursued so as to attract foreign direct real estate investments and studies on persistence of news on commercial real estate investment returns in Nigeria should be carried out since it will be useful to investors in making rational investment decisions.

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