





## Causal effects of macroeconomic predictors on real estate investment trust's (REIT's) performance in Nigeria

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### ABSTRACT

The paper examined the causal effects of macroeconomic predictors on the dividend return performance of the Nigerian Real Estate Investment Trusts (N-REITs) the macroeconomic indicators considered was interest rate (INTR), an exchange rate (EXGR), inflation rate (INFR), market capitalisation (MKCP) and all share index (ASI). The study is quantitative based on secondary data collected from various government institutions and annual financial reports of the Nigeria REITs for the study period (2008–2017). Autoregressive-distributed lag (ARDL) and Bound test were used to analyse the data. The result of the Bound test indicated that N-REIT, INTR and ASI with F-statistic values of 11.07, 5.71 and 4.18, respectively, co-integrated with other macroeconomic predictors, especially for the variable vectors. ASI with t-stat and prob. value 2.9491 and 0.0065, respectively, implies statistically significant contribution of ASI to REIT performance in the long run ( $p < 0.05$ ). Through ECM, the series was good at convergence and nonexplosive series ect (-1): -4.98 and p-value 0.0000, the macroeconomic predictors have significant explanatory power on N-REIT performance in the short run. The no capital gain nature of the N-REIT constitutes a limitation in this study, while the competitive dividend return is the driving force for the study.

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## 1. Introduction

Nigeria as an oil-dependent emerging economy was rated by the International Monetary Fund (IMF) as the third fastest growing economy in the world after China and Qatar with an annual growth rate of 7% in 2014 and 2015 fiscal years. The country is the sixth largest oil producer in the world and the largest on the African continent with a daily crude oil production capacity of about 2.5 million barrels constituting budgetary revenue and export product values of 75% oil revenue and 95% oil output, respectively. The revenue from oil exploration had complacently led to the sharp contraction of other sectors which would have served as revenue generation bases for the government. For instance, the leading role of the agricultural sector in revenue generation prior to crude oil discovery

has suffered a great setback to the extent that the nation can no longer feed itself without importing food items (Anyanwu, Aiyedogun, & Ohwofassa, 2013; NNPC, 2016; Olaniyi, Adedokun, Ogunleye, & Oladokun, 2015; World Bank, 2016).

Like other oil-dependent economies, Nigeria's macroeconomic outlook in nonoil sectors such as education, health and real estate/construction industry was rated strong up till the early 1980s. However, in recent times due to the slump in the oil market; the depreciation in the value of the Nigeria naira against US dollar; and the 17.2% high inflation rate being witnessed by the economy since 2015, the macroeconomic outlook in these sectors have declined significantly (NBS, 2016). Nigeria's real gross domestic product (GDP) growth rate was estimated at 2.11% in 2015 declining to 1.9% in 2018 before appreciating to 2.3% in 2019 with a projected growth at 2.4% in 2020 under the implementation of the economic recovery and growth plan (African Development Bank, 2019; NBS, 2016). The trend of these macroeconomic indicators has so far unfavourably affected the performance of the business environment in the country either directly or indirectly. The corresponding Consumer Price Index (CPI) increasing by 11.61% year-on-year depicts the level of inflation and the strength of the purchasing power of the citizenry, which reflects the consumer behaviour in the market with respect to their pattern of demand for products. Thus, the unfriendly business environment that the economy has been subjected to has discouraged both local and international investors to deploy their funds into the Nigerian investment market.

The real estate sector is in no way immune from the impacts of macroeconomic variables on the general investment market in Nigeria. Hence, by extension, the Real Estate Investment Trust (REIT) subsector, which is a multibillion investment vehicle, cannot stand in isolation amidst these economic challenges.

Earlier researches have investigated the effect of macroeconomic factors/variables on both direct and indirect real estate investments. However, the variable(s) considered by each study differs at their particular time of the study. The main focus of many of the literature on macroeconomic variables includes; inflation (Adrangi, Chatrath & Raffiee, 2004; Bello, 2005; Hamelink, Hoesli, & MacGregor, 1997; Hoesli, 1994; Hoesli, Matysiak, & Nanthakumaran, 1996; Laopodis, 2009; Lee & Lee, 2012; Ma'in, Arifin, Hatta, Hashim, & Isa, 2016; Maurer & Sebastian, 2002; Newell, 1996; Park, Mullineaux, & Chew, 1990), interest rate (Laopodis, 2009; Ma'in et al., 2016), GDP (Ajide, 2014; Ifeakackukwu & Ditimi, 2014), currency exchange rate (Diala, Kalu, & Igwe-Kalu, 2016; Lee, 2001; Lee & Thomas, 2006; Liu & Mei, 1992; Mordi, 2006; Quan & Titman, 1997; Tabet & McAllister, 1998) and government spending (Ajide, 2014).

However, Nigeria is a crude-oil-export dependent country from which it derives its main revenue (about 90%) which brings to mind a strong concern for the impact of currency strength knowing that the international price of crude oil determines the currency exchange rate in the Nigerian economy. Interest rates have been widely discoursed in relation to cost of funds and highly capitalized REITs were found to utilize leverage more in the market, the cost of which increases the cost of operation and could reduce revenue, thereby reducing dividend distribution (Olanrele, 2016). The current study is anchored on the search for the cause(s) of low performance of N-REIT and its twin problem of inactivity in the stock market. The macroeconomic factors of concern are those, to which no consensus of their effect can be pinned to a direction of influence such as Inflation, interest rates (INTR), all share index (ASI), Market Capitalization

(MKCP), and Currency Exchange Rates. The relationship between these individual variables was sought relative to the return on dividends as well as the joint effect of these variables on Nigeria REIT dividend return. The paper tries to unravel the causes of low REIT performance in Nigeria as reported by various authors. This is to establish the influence of macroeconomic factors in comparison to the effects of these factors in high-performance REIT market that have been reported in the literature. The study searches for the factors responsible for the inactive nature of the N-REITs in the capital market in consideration of the Nigerian economy in the African continent. This is the first study in such direction on Nigeria REIT. The immediate [Section 2](#) provides the review of past studies on the subject matter. [Section 3](#) presents the methodology and data used in the study, followed by [Section 4](#) with the focus on the presentation of results of empirical analysis, while [Section 5](#), of the study, discusses the empirical results. Conclusion and recommendations has drawn were presented in the last [Section 6](#) in this paper.

## 2. Literature review

The incessant adoption of the REIT regime in developing countries echoes the role of REITs in economic development and real estate markets generally. In the private business world, REIT has been widely acknowledged as an asset class important for portfolio diversification for enhanced return performance (Goebel, Harrison, Mercer, & Whitby, 2013). This attraction of REIT has been extended to the public economic and investment management where investment in real estate assets can foster the growth opportunity for an economy and also in the resuscitation of a recessed economy. This position is manifested in the development of different REIT regimes following different economic/financial crisis.

The Nigeria REIT came into existence following the enactment of Investment Securities Act of 2007 and the setting of guidelines by the Securities and Exchange Commission (SEC). SKYE Shelter Fund (SKYE REIT) was the first REIT registered in Nigeria in 2007 followed by the Union Homes Hybrid REIT in 2008 and lately is the 2013 entrant UPDC REIT. The REIT Sector in Nigeria falls within the Construction/real estate subsector of the Nigerian Stock Exchange with three REIT companies (Skye, Union Homes and UPDC REITs); one (1) property company (UACN Property Development Company – UPDC Plc) and five construction companies (ARBICO Plc, Costain West Africa Plc, G. Cappa Plc, Julius Berger Plc, Roads Nigeria Plc) listed in the Nigeria stock exchange.

The REIT sector has a total capitalization of NGN37.21 bn (US\$103.29 m) as at May 2019, having investment in both commercial and residential property sectors but predominantly in medium and high-income housing ([Table 1](#)).

Source: Authors' Compilation from the Nigerian Stock Exchange Daily Trading data

Over the period of existence of REIT in Nigeria, the REIT market has been assessed to have performed poorly in terms of both capital market REIT index ([Figure 1](#)) due to near absence of trading in the stock exchange market (Olanrele, 2016).

However, various studies have investigated the different factors that might be responsible for REIT return performance (both index/capital gain return and dividend/income return). The result shows that both internal (formal) factors that are peculiar to equity investments (size, income, leverage, net annual value-NAV, liquidity) and external



**Table 1. Nigeria REIT profile as of May 2019.**

REIT	Year Listed	Units	Price (NGN)	Capitalisation (NGN/m)	Sector Share (%)	Property Types
Skye Shelter	2007	20,000,000	100	1,900	5.37	Residential and Commercial
Union Homes	2008	250,000,000	45.22	11,301	30.38	Residential and Commercial
UPDC	2013	2,668,269,500	9	24,014	64.25	Residential, Commercial and Hotel
Total Capitalisation				37,216 (\$101.89 m)		
NSE Capitalisation				11,255,455.23 (\$30,829.12)		
N-REITs % share of Market Cap				0.33%		

Source: Authors' Compilation from the Nigerian Stock Exchange Daily Trading data



**Figure 1.** Nigeria REIT momentum in the capital market. A = Stock Market/REIT Capitalisation and Index, B = StockMarket/REIT Capitalisation, C = REIT Index, D = Market All Share Index and E = All Share Index and REIT Index

(informal) factors relating to the operating environment (government policy, infrastructure, security) ranks high among others. The influence of management style (advisor puzzle) has also been reported whether an internal or external advisor (Olanrele, 2016; Olanrele, Said, & Daud, 2014, 2015). Beneath the external factors of government policy, other operating environments that have been reported in the literature as having an influential relationship on real estate investment return and performance are macroeconomic factors.

Existing literatures on real estate market have focussed on different macroeconomic variables such as monetary policy, inflation, default risk premium, stock index, and real economic activity (Ewing & Payne, 2005; Fang, Chang, Lee, & Chen, 2016); whereas other authors consider prices, interest rates, exchange rate, output and investment (Ito, 2013; Kodongo & Ojah, 2014; Kola & Kodongo, 2017; McCue & Kling, 1994; Thomas & Lee, 2006). Most of these studies were carried out in established markets and found that unexpected macroeconomic conditions are inversely related to the REIT expected return.

Bredin, O'Reilly, and Stevenson (2006) investigated the monetary policy shock of the American Federal Reserve rate to REIT return and found a strong response of REIT return to unexpected interest rate movements. The test of asymmetry in volatility and calm in the stock market did not support REIT response to interest rate movements suggesting differences in the REIT sector and equity market responses to movements of interest rates. Cotter and Stevenson (2006) analysed daily REIT volatility, incorporating treasury bill into multiple variables in a generalised autoregressive conditional heteroskedasticity (GARCH) volatility clustering model thereby enhancing the accuracy of the prediction on treasury bill movement to REIT returns and volatility. A study of the determinant of Singapore REIT (S-REIT) performance indicated that debt-to-equity ratio, GDP, Inflation exchange rate and money supply, are all significantly related to S-REIT return (Arora, Killins, & Gangineni, 2019).

Among the variables identified and studied by researchers, there is no clear consensus on the pattern of the direction of influence/impact on real estate returns. Different rate/variable signifies the different directions of influence for instance of short and long-term behaviour (Allen, Madura, & Springer, 2000; Bredin, O'Reilly, & Stevenson, 2008; Conner & Liang, 2005; Devaney, 2001; Hoesli & Reka, 2015; Huang & Wu, 2015; Huang, Wu, Liu, & Wu, 2016). Other reports indicated the insignificant effect of interest rate (Kim, Leatham, & Bessler, 2007; Simpson, Ramchander, & Webb, 2007). Azmin and Shariff (2016) evaluated the response of Malaysian REITs' (M-REIT's) dividend yield to the movement of macroeconomic variables (interest rate, GDP, exchange rate and GDP per capita). All the variables exhibited a significant relationship with only interest rate showing a negative direction.

Ma'in et al. (2016) investigated the determinants of Islamic REIT performance in South-East Asia and Middle-East countries of Malaysia, Singapore, Bahrain and Kuwait. The performance was measured with NAV and the study found a positive relationship with only market capitalization. The result was not different from the general perception of the fact that the more capitalized a REIT is, the more fund it has to invest in high income-yielding properties for a better return on investment. The study only takes the individual REIT capitalisation and not the entire market capitalization (for all equities). Asteriou and Beghazi (2013) modelled daily REIT return (index) and its volatility and found a positive correlation between REIT return and the general stock market, the

study, however, did not use the general stock market capitalization but the index (S&P 500).

The common perception which considers real estate investment as a good hedge against inflation and justifying real estate as an attractive investment option has been subjected to discussion in literature with the emergence of diverse results perhaps due to data, methodology, market and time. Hamelink et al. (1997) in their study reported time diversification effect of the real estate inflation protection. Barkham, Ward, and Henry (1996) reported a positive relationship between inflation and real estate.

Other studies that found a positive relationship between inflation and real estate return include (Hamelink & Hoesli, 1996; Hoesli, 1994; Hoesli et al., 1996; Newell, 1996). Ma'in et al. (2016) identified both inflation and interest rates as having an insignificant relationship with REIT performance. Wurstbauer and Schafers (2015) investigated inflation hedge and protective quality of the real estate and infrastructure in the USA between 1991 and 2013 and pointed out that direct infrastructure has a better inflation protection than the real estate assets. This corroborated the study of Maurer and Sebastian (2002) in their analysis of German Open Ended Funds providing superior inflation protection quality better than indirect real estate investment options.

Bello (2005) decomposed inflation into actual and expected inflation and found that inflation hedge for real estate with actual inflation is nonexistent, while there is the existence of a hedge against inflation for real estate with expected inflation. In a study of the equity REIT in the US, Park et al. (1990) found a result of the negative but significant coefficient of return to expected and nonexpected inflation. Whereas a study on French REIT revealed that an increase in both the interest rate and inflation will bring about a decrease in the REIT return (Manni & Teng, 2007). There is a consensus that the stock market (equities) performs low as inflation rises (Bello, 2000; Bruegeman, Chen, & Thibodeau, 1992) and this suggests that real estate equities like REIT will not be an exception.

Lee and Lee (2012) affirmed that the global financial crisis of 2007–2008 evidently increased the volatility of risk hedging capacity of REIT's futures. A study of Australia and Japan REIT markets revealed that REIT as an effective hedging instrument outperformed other equity stock, interest rates and foreign currency but the hedging ability of REIT varies over time. The traditional low-risk feature of REIT was almost eroded by the global financial crisis suggesting that REIT return is subjective to capital market risk. Despite the acknowledgement of the importance of the REITs in investors' portfolio, the interaction of REITs as an asset class with the general stock market capitalization and the economy have been scarcely investigated.

In a study of the USA market, Laopodis (2009) emphasized the interest of the portfolio managers in the sensitivity of returns of asset options (REIT inclusive) to market movements and the general economy. It was found that the portfolio managers will be able to enhance their risk management strategy, especially for the real estate assets. Analysis of the data obtained from the USA market in the period 1971–2007 shows that the economy accounts for 8% of the equity REIT returns and 6% of the stock market excess returns indicating a nonturbulent response of equity REITs to stock from the small and mid-cap stock index (S&P500) movements. It was further reported that the stock market accounted for a smaller percentage (4%) of the equity REIT return reflecting that a pickup activity of the economy can also lead to high-interest rates which in turn may

reduce the return of equity stocks as well as equity REITs. The Laopodis' study used industrial production as a proxy for the economy excluding other variables of the economy and also stock market indices instead of market capitalization.

Other studies on the established REIT markets include Lee and Lee (2014) investigating the inflation absorption properties of real estate stock in both developed and developing markets (UK, Germany, France, Poland and Czech), over the short run and long-run horizons. The study revealed only developed markets having positive inflation hedge against predictable inflation in the long run. There was little evidence of inflation hedge ability in the short run. Developing markets have no positive inflation hedging capacity in the long run. In a study of the impact of interest rates and stocks prices on Japan REIT (J-REIT) market, the stock market has a positive effect on REIT while interest rate has a negative impact, both having varying larger impact in the period with fiscal crisis (Ito, 2013). Yunus (2012) studied securitised property markets, stock markets and macroeconomic factors for the developed countries and found that co-integration among the variable shocks of the stock market, GDP, money supply and inflation causes a positive effect in property returns while interest rate recorded a negative impact on property return. A low frequency but a strong and positive association was reported to have existed between macroeconomics risk and real estate securities volatility (Lee, Stevenson, & Lee, 2018).

Akimov, Stevenson, and Zagonov (2015) investigated the response of real estate securities to interest rate term structure in six global markets (UK, US, Australia, Hong Kong, Japan, Singapore). The result from the Nelson-Siegel term structure modelling shows a weakened-unanticipated interest rate post 2003 which could not empirically conclude if the REIT and property securities displayed increase or decline exposure to the structured interest rate. The findings show significant negative influence of interest rate on property securities especially in Australia and Singapore, with Japanese property having a positive response to short-term interest rate. UK market short-term interest rate shows an insignificant positive relationship but the significant negative relationship in the long-term interest rate. Large unexpected interest rate volatility impacted on Hong Kong and the US markets. Simo-Kengne, Miller, Gupta, and Balcilar (2016) studied asset return variation in response to monetary transmission mechanism proxy by interest rate, distinguishing low volatility of the bull market and high volatility of bear markets adopting VAR (Stochastic volatility). The study reported a negative response of housing and stock return to interest rates, stronger on housing prices. In a recent study, Australia REITs (A-REIT) were found to be sensitive to changes in the interest rate both in the short term and the long term. High leverage REITs are more sensitive to long-term hostile interest rate movement suggesting a significant impact of debt funds on REIT return (Wong & Reddy, 2018).

The study conducted in Nigeria by Ajide (2014) investigated the nation's economic growth in the face of capital formation and population. GDP was used as a proxy for economic growth, while the factors of capital formation include FDI and economic freedom (EF) are predictors. Economic freedom was assumed to involve government spending, inflation and "black market" premium on the exchange rate. The study concluded that economic freedom factors affect the GDP and impacts on all sectors including the real estate sector of the economy.



In respect of the global oil price and its impact on the currency exchange rate, Ifeakackukwu and Ditimi (2014) affirmed a strong negative impact of international oil price on the exchange rate between Nigerian naira and the US dollar. Furthermore, the relationship between exchange rate (Naira/US dollar) to commercial property return was investigated in Nigeria by Diala et al. (2016) from which a positive but insignificant correlation was postulated. Osinubi and Amaghonyeodiwe (2009) in a study of direct commercial property investment reported a negative pattern of property return of the slide of Nigerian naira against the US dollar in both official and parallel currency market. The study suggested that given such a situation, limited FDI will be experienced in the real estate sector as a result of the volatility of the currency exchange rate. Adamu (2005) aligned with the negative impact of exchange rate volatility on investments. The unanticipated return driven by changes in exchange rates was later found to be a driven factor in international diversification (Liu & Mei, 1992). Mordi (2006) cautioned that improper management of the exchange rate can introduce destabilizing distortions to an economy. The risk of the exchange rate can also lead to volatility of return from real estate asset (Lee, 2001).

The foregoing, considerable efforts have been recorded in the performance evaluation of real estate return, both direct and indirect up to the present moment across different markets. Some of these studies were carried out in relation to state-influenced variables of the economy. Analysis of real estate market performance incorporated the effects of macroeconomic factors and the role of REITs in risk diversification strategies of investors and other market participants have also grown considerably (Ewing & Payne, 2005). Few of similar studies have concentrated on africa emerging REIT markets (Kodongo & Ojah, 2014; Olanrele et al., 2015; Olanrele, 2016; Akinsomi et al., 2016; Akimov et al., 2015; Kola & Kodongo, 2017).

Generally, Nigeria REIT has been scantily researched probably due to small size and low performance of N-REIT market as reported by Olanrele (2016). Previous studies have concentrated more on inflation and interest rates, the duo that can be influenced by the currency exchange rate volatility and amount of foreign earnings. Nigeria being a mono-product economy depending solely on oil and gas exploration and export deserves a similar study, with its peculiar exchange rate volatility which depends on global crude oil price. The stock market capitalization and the market return – all-share index (ASI) is also included in this study to explore the impact of the stock market on REIT as done in other studies (Ito, 2013; Simo-Kengne et al., 2016; Yunus, 2012).

### 3. Methodology

We have adopted time series data in analysing the relationship and interaction of the selected variables. Ma'in et al. (2016) adopted Panel Data Analysis with quarterly observation over a period of 5 years. Diala et al. (2016) used exponential generalised autoregression conditional heteroskedasticity (EGARCH) in their study of the exchange rate and property return in Nigeria. Laopodis (2009) adopted vector autoregression (VAR) and granger causality and cointegration analysis, while Lee and Lee (2012) combined ordinary least square (OLS) and GARCH models in assessing inflation hedge effectiveness of REIT futures.

The GARCH model was also adopted by Asteriou and Begiazi (2013). Ifeakackukwu and Ditimi (2014) employed granger causality and error correction modelling (ECM) to investigate the effects of the capital inflow on the exchange rate in Nigeria. Their choice of model (Multivariate) was dependent on the properties of unit root analysis, cointegration, and multicollinearity. Ajide (2014) also adopted multivariate modelling in a study of determinants of economic growth in Nigeria. Azmin and Shariff (2016) adopted pooled ordinary least square (POLS) in their study of Malaysian REIT. Fang et al. (2016) adopted ARDL bound test in their study of macroeconomic factors impact o REIT index in three Asian markets of Japan, Singapore and China to establish cointegration long-run equilibrium between REIT index and macroeconomic factors of interest rate, inflation and stock index. Adoption of the ARDL Bound test was to take care of the small dataset (small sample size). Bound Test has the capacity to overcome problems of unit root test, endogeneity and small sample size in a cointegration test (Fang et al., 2016)

The variables are a mix of  $I(0)$  and  $I(1)$  input variables and the study adopted Bound test to examine cointegration relationships between the variables and REIT return. This is to avoid the possible challenges of unit root test of a small sample and endogenous variables. The long and short-run elasticity was estimated using autoregressive-distributed lag (ARDL) model and ECM. The period of the study for this paper is 10 years (2008–2017) which according to Atkinson (1969) can be regarded as long-term period defined for the economic model. The study of Arora et al. (2019) is of a similar time period (2004–2013) using panel data regression. The data points are regarded as small for its quarterly observation for 10 years which lead to the choice of Bound Cointegration Test model – ECM in this paper.

### 3.1 Data description

The study used quarterly data of INF, EXGR, INTR for macroeconomic factors while market indexes MKCP and ASI were added to reflect the influence of the capital market on the causal relationship, within the period 2008 to 2017. The dependent variable in this study is the dividend return in the absence of capital gain as N-REIT exhibits a no trading nature in the Nigerian Stock Exchange market. The choice of the aggregate economic indicators was influenced based on their noticeable impact on both emerging and matured REITs markets which were evident in the recent studies reviewed above, most of the literature examined inflation, interest rate and stock market (either capitalisation or index).

### 3.2 Method

ARDL was deployed to capture the cause–effect relation of the macroeconomic risks on N-REITs. ARDL is a standard least square regression (SLSR) which allows the lags of both the dependent (endogenous) and predictors (exogenous) to be included as regressors (Greene, 2008; Pesaran & Shin, 1999). The generalized ARDL model is given as

where  $Y_t$  is a vector and represent the N-REITs return,  $\gamma$  is the constant,  $\delta$  and  $\beta$  are the coefficients of the dependent variable (N-REITs) and predictors (INF, EXGR, INTR, MKCP and ASI) denoted by  $X_j, j = 1, \dots, k$ ; are optimal lag orders while  $\epsilon_{jt}$  is vector error terms. However, the variable contained  $(X_j)'$  must be stationary at  $I(0)$  or  $I(1)$  or co-

integrated. The  $p$  lag for the endogenous variable (stated with one) and  $q$  lag for exogenous variables may not be the same. The ARDLs requires the test for co-integration to check the appropriate model to be deployed. The condition of deploying appropriate method as requested for ARDLs reads thus

*Case 1: If all the exogenous variables are co-integrated, VECM is used;*

*Case 2: If some of the exogenous variables are co-integrated but not all, ECM is used; and*

*Case 3: If there is no co-integration among the variables, VAR is used.*

Hence, the study employed Bound test to determine the co-integration relationship among N-REITs and the macroeconomic factors.

### 3.3 Bound cointegration test

Bound cointegration test was proposed by Pesaran, Shin, and Smith (2001). Authors such as Mah (2000) have recommended the use of bound test approach to determine the long-run relationship between variables for three major reasons. Firstly, the test is nonresponsive to the uncertainties that associated with whether the variable series is stationary at level (I(0)) or at first difference (I(1)). Secondly, it is flexible in adjusting to possible problems of exogeneity variables and lastly, the bound test is applicable to small sample sizes and it is expressed mathematically as follows:

The existence of long-run relationship is confirmed in:

$$\rho = 0; \delta_1 = \delta_2 = \delta_3 \dots = \delta_k = 0$$

## 4. Empirical results

### 4.1 Descriptive statistics

Table 2 presents the summary statistics of the data series for quarterly data of N-REITs, EXGR, INF, INTR, MKCP and ASI for the period of 2008 to 2017 giving 40 observations/data points. The data represent the full period of which the REIT distributed dividends. The descriptive analysis shows positive skewness of exchange rate, inflation rate and all share index indicating that the series has higher data values above its means in the series. The ASI witnessed healthy growth in the capital market, the economy experienced high inflationary trend and weak value of Naira in the exchange market. On the other hand, the negatively skewed N-REITs indicates that N-REITs return recorded more earnings below its mean value indicating the low earning capacity of N-REITs for the period under review. Similarly, interest rate and market capitalization have more values below their mean value indicating a decline of the series. However, the series exhibited normal distribution since the absolute Skewness values for all the series were less than the critical value ( $\pm 1.96$ ).

The data are also free from multicollinearity as the maximum correlation coefficient among the variable is 0.81 less than 0.85 boundary that will indicate multicollinearity. Multicollinearity occurs when the independent variables are highly correlated with  $r \geq 0.9$  (Pallant, 2011). Chua (2009) opined that the  $r > 0.85$  indicates multicollinearity. Other authors suggested  $r > 0.7$  points to the presence of multicollinearity and suggested a further test using Tolerance and VIF (Tabachnick & Fidell, 2007; Vatcheva, Lee,



**Table 2.** Summary of descriptive statistics of the data series.

Series	Descriptive Statistics					Correlation Analysis					
	Mean	Std. Dev.	Max.	Min.	SKW	N-REIT	EXGR	INFR	INTR	MKCP	NASI
N-REITs	5.61	1.30	7.51	3.41	-0.16	1.00	0.48	0.22	0.45	0.23	0.16
EXGR	179.7	57.1	305.9	117.7	1.47		1.00	0.60	0.81	0.21	-0.21
INF	11.9	3.1	18.4	7.8	0.42			1.00	0.38	-0.43	-0.37
INTR	20.5	1.8	24.5	16.6	-0.05				1.00	0.12	-0.39
MKCP	9241	2576	13,740	4865	-0.02					1.00	0.69
ASI	31,561	9533	60,953	20,551	1.35						1.00

Note: Standard Deviation (S.D), Maximum (Max), Minimum (Min), Skewness (SKW)

Source: Authors Field Work

McCormick, and Rahbar (2016)). Tolerance is expressed as  $Tol = 1-r^2$ , where  $r$  is the correlation coefficient between the two variables of concern. VIF is the inverse of Tolerance. Tolerance less than 0.1 ( $Tol < 0.1$ ) or VIF greater than 10 ( $VIF > 10$ ), there is an indication of multicollinearity (Ozdemir, 2011; Shu, Zhung, Li, Qu, & Chen, 2014). Williams (2015) stated that multicollinearity is a matter of degree and not an irrefutable test of whether it creates a problem or not. Multicollinearity does not affect model fit but it is associated with biased standard error. However, realising the potential impact of multicollinearity on the findings from the regression analysis leads to careful data interpretation and predicting the effect of variables (Vatcheva et al., 2016; Williams, 2015). A correlation coefficient that is greater than 0.7 ( $r > .7$ ) can be regarded as high and subjected to further confirmatory test of Tolerance and VIF. This study set its collinearity cut off of 0.85 as suggested by Chua (2009) but proceeded for a further check using Tolerance and VIF. With a correlation coefficient of 0.81, Tolerance is 0.34 (greater than 0.1) and the VIF is 2.91 (less than 10). The data series for this study is free from multicollinearity.

#### 4.2 Data stationary test

Table 3 presents the series stationary test for the explanatory variables. Both the ADF (Dickey and Fuller, 1979) and the complementary Phillips-Perron (1988) tests were conducted at 5% confidence level using Schwarz information criterion (SIC) lag length selection criterion (Schwarz, 1978) to test for the presence of unit root in the series. The ADF test, level shows the presence of unit root (nonstationary) data series except the ASI which is significant at  $P \leq 0.05$ . The first difference I(1) of ADF test for the data series is significant at  $P \leq 0.05$  indicating no unit root (stationary) of the explanatory (exogenous) variables except EXGR series with a p-value of 0.9671. Also, the complementary first level Phillips-Perron (PP) test further confirmed the stationary of the explanatory variable series including the exchange rate at ( $P < 0.05$ ).

Hoesli, Liziei, and MacGregor (2008) did a similar test in their study and conducted a KPSS to further screen their study data series for stationarity. Only UK data is stationary at I(1) ADF, US data are stationary at I(2) ADF, but Stationary at I(1) PP test, Inflation is stationary at I(1) in the ADF test. The study then assumed stationary at I (1). The current study, in the same line conducted a KPSS stationarity test on the data series as presented in Table 4.

In Table 4, Kwiatkowski-Phillips-Schmidt-Shin (KPSS) test result shows that the LM-stat value for the exogenous variables, that is EXGR (0.2279), INF (0.1653), INTR

Table 3. Series Stationary test.

Independent Variables	ADF: (Null Hypothesis)				PP: (Null Hypothesis)			
	I(0)		I(1)		I(0)		I(1)	
	t-stat	Sig	t-stat	Sig	t-stat	Sig	t-stat	Sig
EXGR	-1.2201	0.9976	0.1805	0.9671	0.3966	0.9803	-5.4483	0.0001
INF	-2.4023	0.1479	-3.7299	0.0074	-1.7669	0.3908	-3.6156	0.0174
INTR	-1.1822	0.6725	-4.9640	0.0002	-1.3151	0.6129	-4.9031	0.0003
MKCP	-1.1990	0.6653	-4.3995	0.0012	-1.6401	0.4531	-4.3995	0.0012
ASI	-3.3950	0.0174	-3.7190	0.0077	-1.1513	0.0309	-3.6398	0.0094

Source: Authors Field Work

**Table 4.** Kwiatkowski-Phillips-Schmidt-Shin (KPSS) unit root test.

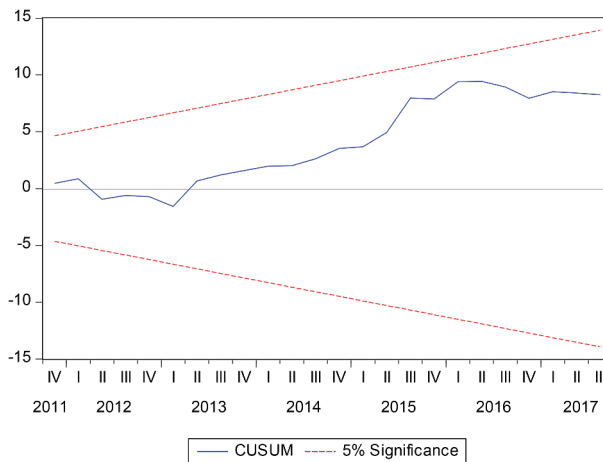
Independent Variables	Asymptotic Critical Value			LM – Statistics.	Decision	Level
	1%	5%	10%			
EXGR	0.7390	0.4630	0.3470	0.2279	Stationary	I(1)
INF	0.7390	0.4630	0.3470	0.1653	Stationary	I(1)
INTR	0.7390	0.4630	0.3470	0.0698	Stationary	I(1)
MKCP	0.7390	0.4630	0.3470	0.2003	Stationary	I(1)
ASI	0.7390	0.4630	0.3470	0.3529	Stationary	I(1)

Significant level at 5%

(0.0698), MKCP (0.2003) and ASI (0.3529) are lower than the asymptotic critical value (0.4630) at 5% confidence level. This result shows the absence of unit root. Thus, the explanatory variables are stationary at the first order of differentiation I(1).

### 4.3 Tests of serial correlation and structural stability of the series

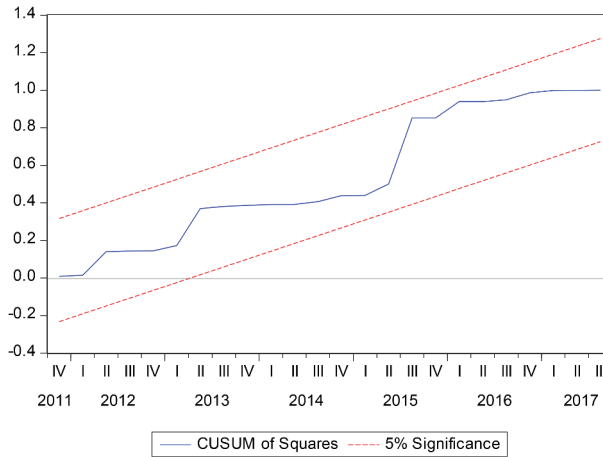
To ensure the reliability of the predictive power of the predictors, a residual diagnostic test of Breusch-Godfrey serial correlation LM test was conducted. The test showed that the F-statistics is 0.3138, R-square (0.9060), F-probability (0.7335) and probability value of Chi-square is 0.6357 at 5% significance level. The nonsignificance of Chi-square p-value ( $p > 0.05$ ) confirms no serial correlation in the series (Table 5). For structural stability test, the study deployed stability diagnostic of recursive estimation using CUSUM linear (Figure 2) and CUSUM of Square test (Figure 3). At 5% confidence level, the series graph was found within the error margin for both tests (linear and square) indicating that the series were structurally stable over the study period (2008 to 2017). Hence, the results of residual diagnostic of serial correlation and stability test showed that prediction emanating from the macroeconomic variables under consideration will be reliable.



**Figure 2.** CUSUM linear stability test.

**Table 5.** Breusch-Godfrey serial correlation test.

F-statistics	0.3138
R-Square	0.9060
Prob. F(1, 23)	0.7335
Prob. Chi-Square	0.6357



**Figure 3.** CUSUM of square test.

**4.4 ARDL bond test of co-integration**

Table 6 present results of autoregressive-distributed lag of bound test for co-integration analysis among the series using Akaike Info Criterion (AIC). The series (i.e. N-REITs, EXGR, INFR, INTR, MKCP and ASI) was tested as dependent variables at a distributed lag of 0 and 1. The first lag number (1) represents the dependent variable lag (p) and other lag numbers (e.g. 0, 0, 0, 1, 1) represent the lag of explanatory variables (q) for each case. The critical value for F-statistics (I0) and (I1) were 2.60 and 3.79, respectively, at 5% significant level for the study sample size using an unrestricted constant and no trend specifications.

The analysis showed that series such as N-REITs, INTR and ASI have F-statistics value of 11.0708, 5.7083 and 4.1822, respectively, which was greater than the upper bound critical value (3.79) suggesting long-run relationship, while the F-Statistics of EXGR

**Table 6.** Bound test of co-integration.

Exogenous	F-Stats	ARDL	Bounds	Long run relationship
N-REITs	11.0708	1,0,0,0,1,1	> I1	Yes
EXGR	2.0959	1,0,0,0,0,0	< I0	No
INF	2.0049	1,0,0,0,0,0	< I0	No
INTR	5.7083	1,1,0,0,0,0	> I1	Yes
MKCP	1.7755	1,1,0,0,1,1	< I0	No
ASI	4.1822	1,1,1,0,0,1	> I1	Yes

Significant at 5%

**Table 7.** Regression model summary.

R-squared	0.732756	Mean dependent var	0.001286
Adjusted R-squared	0.662593	S.D. dependent var	0.379613
S.E. of regression	0.118477	Akaike info criterion	-1.161444
Sum squared resid	0.182480	Schwarz criterion	-0.183797
Log likelihood	42.32527	Hannan-Quinn criter.	-0.823961
F-statistic	16.00242	Durbin-Watson stat	2.084199
Prob(F-statistic)	0.000004		

(2.0959), INF (2.0049) and MKCP (1.7755) was less than the lower bound critical value (2.60) implying the absence of long-run relationship.

The regression model summary is presented in [Table 7](#). R-square value of 0.7328 shows that the variables considered in this study contribute 73.28% to the changes in REIT dividend return. The adjusted R-square shows the percentage of the effect of main variables that affect REIT in reality to be 66.26%. The F-statistics (16.00) is significant at  $P = 0.000004$  ( $P < 0.05$ ) suggesting the significance of the joint contribution of macroeconomic variables to REIT return. The Durbin-Watson statistics value of the regression is 2.0842 and falls within an acceptable range of 1.5–2.5 indicating no autocorrelation in the data set.

#### 4.5 Long-run causal effect

[Table 8](#) presents the long-run coefficient of the predictors of the exogenous variables. The long-run coefficient with a p-value of ASI is 0.0177 (0.0065) and significant at  $P \leq 0.05$ . The coefficient suggests that ASI contributes 1.8% of the positive change in dividend return. MKCP (0.0672; 0.1749) and EXGR (0.1050; 0.0534) are contributing insignificant 6.7% and 10.5%, respectively, to REIT dividend return. The impacts of INF (-0.0233; 0.9562) and INTR (-0.8896; 0.3163) are negative and insignificant with 2.3% and 88% degree of influence on the performance of N-REIT in the long run.

#### 4.6 Short-run elasticity

This study deployed ECM to examine the causal effect of the macroeconomic indexes on N-REITs return in the short run. Error correction model was used since only some of the exogenous variables were co-integrated (see [Table 6](#)). Thus, *Case 2* of ARDL models was adopted. The ECT (-1) measures the speed of adjustment towards long-run equilibrium. The negative coefficient of the error correction term (-0.0406) with significant probability (0.0000) showed that the series is good at convergence and free from data explosion. The explanatory variables were differentiated on the examination of their short-run elasticity ([Table 9](#)).

The study revealed that ASI has a positive coefficient (0.0417) and significant p-value (0.0003) inducing 4.2% effect on REIT return. EXGR with a coefficient value of 0.0095 showed a positive relationship but with a nonsignificant p-value (0.0544). The coefficient of MKCP at lag 0 and 1 was -0.0490 and -0.1205, respectively, with the significant p-values ( $p < 0.05$ ) implying that the series has a negative strong causal impact on N-REITs return in the short run but changes to positive impacts as it converges towards long-run equilibrium ([Table 8](#)), about 4.9% degree of influence. Similarly, negative



insignificant effects of INF (-0.0168) INTR (-0.0961) with a p-value of 0.9563 and 0.2527, respectively, showed that the fluctuations in the interest rate and the inflation rate have adverse effects on the growth of real estate securities.

## 5. Discussion of findings

This paper has investigated the causal effect of macroeconomic predictors (market capitalisation, all share index, inflation interest rate and currency exchange rate) on Nigeria REIT dividend return. These variables were considered for this study because few literature reports them like the exchange rate, which is a critical factor in the Nigeria market. Other variables were considered because of the no consensus in the existing literature of their direction of influence so as to examine the direction in which Nigeria market portrays the variables.

The regression model shows that the variables considered significantly contributes 73.28 to changes in REIT return (R-square 0.7328) and the adjusted R-square indicated 66.26% contribution of the variables in reality. ARDL Bound test confirms that there is a causal effect between both the exogenous and endogenous variables as reported in the literature. Interest rate and all share index have long-term causal relationship with the REIT return, while other variables (inflation, exchange rate and market capitalization) show the absence of long-run relationship as presented in Table 8. The long-run coefficient of all share index (0.0177) was positive and significant ( $p = 0.0065$ ), therefore the all-share index granger cause N-REITs return. This finding corroborates the findings of Laopodis (2009) that reported nonturbulence response of the REIT return to a stock market index and Asteriou and Begiazi (2013) in the US market using (S&P 500). The result also agrees with Ito (2013) who found the stock market having a positive effect on the REIT confirming that REIT also behaves like stocks. The result may be attributed to the fact that increasing stock shares indicate active capital market where real estate stocks can also be attractive to potential stock investors. The significant causal effects of all share

**Table 8.** Long-run predictors of N-REIT performance.

Variables	Coefficient	t-Statistics	Prob.
ASI	0.0177	2.9491	0.0065
MKCP	0.0672	1.3934	0.1749
INF	-0.0233	-0.0554	0.9562
INTR	-0.8896	-1.0209	0.3163
EXGR	0.1050	2.0198	0.0534
C	11.121	0.1926	0.8487

Dependent variable – N-REITs

**Table 9.** Error correction model (short-run elasticity).

Variables	Coefficient	t-Statistics	Prob.
D(ASI)	0.0417	3.2661	0.0003
D(MKCP)	-0.0490	-4.2923	0.0002
D(MKCP(-1))	-0.1205	-4.8819	0.0000
D(INF)	-0.0168	-0.0553	0.9563
D(INTR)	-0.0961	-1.1688	0.2527
D(EXGR)	0.0095	2.0109	0.0544
ECT(-1)	-0.0406	-4.9834	0.0000

Dependent variable – N-REIT

index at both short and long run indicate a strong time dynamic influence on N-REITs return in further agreement to Yunus (2012) and Lee et al. (2018).

Most times, the currency volatility devalues the Nigeria currency against the US dollar which is a plus for the FDI as the investment into the country will be more in value and this study has proven that more fund into the real estate sector is entering the country with a positive effect on investment return and REIT is not excluded. Exchange rate exhibited an insignificant effect on REIT return both in the short run and long run in agreement with Diala et al. (2016), suggesting that the volatility of exchange rate has no impact on REIT return in support of the findings of Ajide (2014). However, the result contradicts Osinubi and Amaghyeodiwe (2009) and Adamu (2005) who had earlier reported a negative impact of exchange rate on property return in their separate studies. Hence, the volatility nature of the country's currency has larger positive effects on real estate stocks perhaps due to economic shock-absorbing nature of real estate assets.

Market capitalization showed positive insignificant long-run relationship and a short-run negative causal effect on REIT return. The result can be arguably attributed to the small size of the market capitalization of real estate stock compared to other sectors of the capital market. The short-run stock market capitalization negative relationship to N-REIT return can be explained in two ways. Firstly, the previous studies of market capitalization and REIT return performance conducted their studies on individual REIT capitalization and the results abound identified that the more capitalised REIT will be providing sufficient fund to be invested in high profile properties that will yield good income for a higher return (Olanrele, 2016). The finding of a long-run positive relationship between market capitalisation and REIT return agreed with existing studies of Lee and Lee (2014), Ito (2013) and Laopodis (2009). Few studies argued that at a point, bigger REIT may not yield a better return due to a long decision-making process and possible-increased expenditure. Ma'in et al. (2016) considered market capitalization in this context for individual REIT size and reported market capitalization to be the only variable of a significant positive contribution to the Islamic REITs in Asia and the Middle East. The current study neither considered individual REIT size nor REIT sector capitalization, but the entire stock market capitalisation found a negative short-run effect of market capitalisation on REIT return. The finding of a negative relationship suggests that an increase in stock market capitalization could result in a fall in REIT return but in the short run, this is not totally unconnected as N-REIT sector constitutes only 0.41% of the market capitalization (Olanrele, 2016). This indicates that the REIT sector is not attracting new investors to benefit from the new fund coming into the market. It is fairly illiquid and contributes nothing to the rise in the entire stock market capitalization.

The inflation hedge characteristics of real estate is absent in REIT investment as there exist a negative but insignificant long and short-run relationship, in support of the findings of (Park et al. (1990), Bello (2000, 2005)), Manni and Teng (2007), Yunus (2012), Lee and Lee (2014) and Loo, Annuar, and Ramakrishan (2016). The study could not affirm the inflation hedge characteristics of real estate assets found by Barkham et al. (1996), Hamelink and Hoesli (1996), Maurer and Sebastian (2002), Lee and Lee (2012) and Wurstbauer and Schafers (2015). The interest rate shows a similar behaviour of negative insignificant relationship with REIT return. The study agrees with other studies conducted by Bredin, O'Reilly, and Stevenson (2010), Azmin and Shariff (2016), Akimov et al. (2015), Simo-Kengne et al. (2016), Lee and Lee (2014) and Yunus (2012) where the significant

negative causal effect of interest rate to REIT return had been echoed. The findings, however, disagreed with Simpson et al. (2007) and Kim et al. (2007) who portrayed the causal effect of both inflation and interest rate to be significant. Nonetheless, this study shares the opinion of Kola and Kodongo (2017) that the volatility of the two factors cannot be used to judge the response of REIT return due to their insignificant behaviour.

## 6. Conclusion

To enhance the investment attraction quality of REITs in the Nigeria market, the performance in terms of dividend return and the capital gain would need to improve. The study emphasizes on the macroeconomic factors as they play a major role in REIT return performance. The findings revealed a long-run relationship between N-REITs return with interest rate and all share index and a short-run relationship with Inflation, Exchange rate and market capitalisation. At both short and long run, all share index have a significant positive effect on REIT return confirming the stock-like behaviour of the REIT. Market capitalisation and the exchange rate have a direct causal effect on REIT return but not significant. The effect of market capitalisation is significantly negative while the exchange rate remained insignificantly positive. Inflation and interest rate have an insignificant negative causal effect at both short and long run on REIT return. The short-term negative significance of the market capitalisation portrays no harm for the REIT market as it converges to a significant positive relationship in the long run. The negative causal effect of interest rates and inflation is not exceptional to the Nigerian market but of no significance. The study concludes that Nigeria REIT return is not badly affected by the macroeconomic variables but a market to watch and invest. This study adjudged the no trading nature of REIT in the capital market to be of further concern and as to limitation, other similar markets that have been investigated posit a vibrant capital market trading. Nevertheless, the dividend return from N-REIT is competitive and can equally be subjected to the causal effect study in the emerging REIT sector of Nigeria.

## Disclosure statement

No potential conflict of interest was reported by the authors.

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