Real Estate Investment Performance and Macroeconomic Dynamics in Nigeria: A Sectorial Analysis

Richard Ugochukwu Elile, Dr. Sunday S. Akpan, Dr. Valliappan Raju

Abstract— **This study examined macroeconomic determinants of real estate investment performance in Nigeria. The growing housing problems and the critical role that real estate can play in solving the housing and other shelter-related as well as macroeconomic problems such as poor economic growth, made this study necessary. Specific objectives were to investigate individual effect of inflation, exchange rate, and per capita GDPr on performance of real estate investment in terms of its contribution to the growth of gross domestic product in Nigeria. The study adopted quantitative research method and used secondary data for the period of 37 years (1980- 2017). The analysis was performed using OLS multiple regression with lagged dependent variable model to account for endogeneity in the data set. Results show that inflation, and GDPr each has significant positive while exchange rate has significant negative effect on real estate sector performance. Based on these findings, it is concluded that inflation, per capita GDPr and exchange rate are important macroeconomic determinants of real estate performance in Nigeria. The study recommends that since monetary policy directives, often times, dovetail these macroeconomic factors, targeting inflation and growth of per capita GDP in future policies could significantly improve real estate sector performance and ultimately solve the perennial housing and related problems in Nigeria.**

Index Terms—**Exchange rate, Inflation Rate, Macroeconomic Dynamics, Real Estate, Per capita GDPR.**

I. INTRODUCTION

Around the world, real estate investment is given concerted attention due to its critical role and contribution to national economy and socioeconomic development of nations. For instance, inference from past studies suggest that real estate business contributes job creation and employment generation, housing provision, income enhancement and redistribution as well as poverty alleviation [1], [2],[3] and [4]. Furthermore, literatures confirmed that effective real estate investment could guarantee adequate housing provision, which can transcend to providing security of tenure, social amenities including water and electricity supply, good sanitary system as well as good environmental quality [3].

Richard Ugochukwu Elile. Faculty of Business Management and Globalization; Limkokwing University of Creative TechnologyCyberjaya, Malaysia

Dr. Sunday S. Akpan. Department of Insurance, University of Uyo P.M.B 1017, Uyo; Akwa Ibom State, Nigeria

Assoc. Prof. Dr. Valliappan Raju. Centre of Post Graduate Studies and Professional Development; Limkokwing University of Creative Technology, Cyberjaya, Malaysia

These roles and contributions stems from the business's vast array of operations which ranges from the purchase, development, ownership, management, rental, to sale of real estate and related properties investment for profit. It also extends to all property categories of single and multi family residential homes, mercantile and agricultural lands, water houses, office spaces, shopping complexes, malls as well as wholesale and retail outlets among others [5]. Real estate is further considered as an asset form with limited liquidity relative to other investment; it is also capital intensive (although capital may be gained through mortgage leverage) and is highly cash flow dependent [5]

In view of these enormous potential of real estate investment, efforts are shown to develop this important sector for optimal performance in Nigeria. These efforts would involve knowing the factors affecting the growth in the investment in order to know how to drive development in the sector. These efforts are in tandem with the Federal government policy on housing under the 1999 constitution. Section 16(2) (d) of the constitution under the Fundamental Objective and Directive Principles of State Policy acknowledged the right to housing for all citizens. The right to housing, and in-fact, the need for housing is one of the basic needs exemplified in Maslow's hierarchy of need prism or theory.

Real estate investment is seen as a gateway to meeting these important needs that has grown exponentially in recent times due to a number of factors such as growth in population, increased urbanization and industrial growth among other. Builders, property developers, and construction companies have privately or in partnership with public (government) worked and invested in real estate business, but it appear that housing demand has continue to either outgrow supply due to scarcity of land or is decreasing, leaving large population without shelter [6]. Moreover, commercial real estate in Nigeria has been faced with shrinking occupation demand and there exists disparities between expected and actual income which may be either positive or negative [7]. Real estate prices have also doubled, even tripled in the past few years [8]. Demand for housing units continues to outstrip the supply [5]. The size and scale of the real estate market makes it an attractive and lucrative sector for many investors. Reference [9] explains that financial commitment and investment in land, real estate development is noteworthy in the last decades. Statistics show that value-added of the building sector in real estate industry to the GDP grew from 3.5% to 13.4%. This indicates an annual compound development or growth rate of about 11.2%. From last five

years (2007-2012), property and real estate segment's contribution to GDP expanded and increased from 3.9% to 4.7%. But statistics shows that the growth and contribution of real estate market to GDP has been growing at a declining pace for some years now [10], and such trend is less desirable. A number of factors have been identified in literature as affecting real estate development including unstable macroeconomic environment, which theoretically include inflation (INF), exchange rate (EXR), and per capita gross domestic product (PGDP) [11], [12].

In literature, it is argued that the cost (in USD) of building a three-bedroom residential house in three nations reveal large variations. It cost about US$50,000 to construct such house in Nigeria while in South Africa and India, the cost is put at US$36,000 and US$26,000 respectively [4]. These variations may possibly due to variations in exchange rate since most materials used are imported [13], [14]. To date, little empirical evidence on the extent to which exchange rate influences real estate performance is known. The above arguments are also true for all other macroeconomic factors including money supply among other. This study therefore investigates the extent to which inflation (INF), exchange rate (EXR), and per capita gross domestic product (PGDP) as key macroeconomic dynamics influence real estate performance in Nigeria..Specific objectives are to:

i. investigate the extent to which inflation rate (INF) influences real estate performance in Nigeria.

ii. Ascertain the effect of exchange rate (EXR) on real estate performance in Nigeria.

iii. Determine whether growth rate of per capita gross domestic product (PGDPr) significantly affects real estate performance in Nigeria.

II. LITERATURE REVIEW

A. Appraising the Real Estate Sector in Nigeria

The central issue in real estate as discussed in many empirical literature is housing provision. Though this may be a partial assessment of the status of real estate business in Nigeria as it covers more than just housing *per-se*, it is however important to mention that, in the context of this study, 'housing' refers to all forms of shelter for both individuals and corporation as well as for commercial and for industrial purposes. As such, the definition of real estate abounds. But in this study, real estate covers many dimensions of sheltering beyond residential housing. In this study, real estate comprises all immovable things and all rehabilitation and improvement practices attached to land for which purpose is to provide shelter of all sort for all being [15]

Characteristically, there are ways that real estate differs distinctively from other asset markets in many fronts [16]. These include assets tangibility and immobility, product complementarities, rental- and owner-housing markets, and long production time. Nigeria's real is not peculiarly different in terms of characteristics from other real estate market in Africa and indeed the world. The National Population Commission of Nigeria estimates the population at over 182 million in 2017 (World Population Review, 2016). Nigeria is described as the economic and commercial hub of Africa partly because of its high level commercial activities and its housing of all land, sea, rail and air ports.

In Nigeria, the demand for residential properties and for new

developments is considered to be an important factor in the development of the economy of the constituent states [17]. As the most populous country in Africa with a total land area of about 923,768 km^2 with a total of 36 States and about 250 ethnic groups, Nigeria has been pronounced the largest economy in Africa and 21st in the world having a GDP of more than US$500 bn. It is also rated the eight largest exporter of crude oil in the world [18], [4]. But the Nigeria's real estate sector which is dominated by housing provision has been rated poor and ineffective amidst sound policies [11].

However, there have been a number of housing schemes launched including the initiation of the first ever National Housing Policy (NHP) in 1991, followed by the launching of the National Housing Fund Scheme in 1992. Other initiatives include the establishment and implementation of the National Housing Programme, National Site and Service Programmes, Prototype Housing Programme and Infrastructure Development Fund Projects [19],[20][2]. Several policies and programmes, institutions and reforms have taken place in the Nigerian real estate sector. Table I presents a summary of housing development efforts by the federal government and achievements.

Table I. Summary of the Achievement of NHP in Nigeria, 1962 to 1995

Period	Programme target	Achievement	
		Number	%age
1062 – 1968	24,000	500	21
1970 – 1974	59,000	7080	12
195 – 1979	202,000	28,000	14.1
1980 - 1983	160,000	32,000	20
1994 – 1995	121,000	1,014	0.8

Sources: FGN (2012); Makinde (2013); Ibem*et al.* (2011)

From Table I, it is shown that the Federal government programmes toward better housing and ultimately real estate sector development has only had minimal success. Such effect could be due to frequent policy changes which were found to affect business development negatively in Nigeria [21]. These policy changes could be link to some macroeconomic factors such as inflation, exchange and growth rate of gross domestic product among others. For instance, in past study [22], it is confirmed that the size of nation's economy have a direct positive effect on investment activities of real estate sector. The conclusion was that a larger economy are usually more capable of cushioning external economic turmoil and guarantees more stability in the entire economy than smaller economies thereby allowing for relatively less risky operation and performance of real estate sector.

B. Theoretical Framework

A number of theories have been used to study real estate from different spectrums. But, from the perspective of this study, two of the theories namely, monetarism theory of inflation and structural form theory are considered. Reason being that these theories identify and explain how some macroeconomic factors influence real estate performance. These theories also mention the relationship between macroeconomic factors passively as factors to be considered when making real estate investment decision. These theories are explained in the

following sub-sections.

Monetarism theory of inflation- According to the proponents of this theory [23], [24], among all monetary and financial policy instruments, only money matters in stabilizing an economy because it principally leads to inflationary tendencies in an economy. They argued that money supply is the dominant determinant of short- and long-run output prices and determinant of the level of output in the short-run. This means that, in the long-run money supply cannot influence output, but inflation can. Further explanations reveal that inflation is ubiquitous and often arises from a more rapid expansion in the quantity of money than in total output. When there is inflation, more money would be required to buy little real estate services and this will hamper growth and performance of the sector.

Under inflationary environment, the volume of money that is available will determine how much money people will spend in acquiring real estate. Thus, in real estate market, property prices is determined by the forces of demand and supply; and the law of demand and supply, the prices will increase when the supply is lower than the demand and vice versa, all thing being equal. The real estate market is in constant adjustment to equilibrium where price range is adjusted in line with the supply. So, increases in price of properties are credited to high demand and low supply; and with inflation, the demand could reduce below supply thereby causing losses in property market. This specifically identifies inflation as having a negative association with real estate performance.

Structural form theory- The use of this theory is based on the challenges faced by real estate operators in delivering housing needs. The theory showed that a number of problems that challenged the delivery of formal housing finance amongst most, if not all the countries. These include 'macroeconomic instability, an adverse institutional, legal and regulatory environment which has resulted in inefficient, collateralization of housing assets, poor record of public sector housing banks, building societies. Other factors include poor management and a lack of funds and limited availability of long-term funding sources to carry out intermediation that would spread the cost of a house over a relatively long period of time' [25]. This theory support macroeconomic factors as determinants of real estate performance. And, as used in other studies [13], this theory is used here to provide theoretical support for other macroeconomic factors which do not have specific theoretical explanation of its effect or relationship with real estate performance.

C. Empirical Evidences

Growth in real estate in a region or country is among the many others factors that depend on the changes in economic activity and prosperity of a region or country. Earlier in the model developed by past author [26], it was shown that a productive economy influences the demand for real estate assets positively. In similar investigation, it was concluded that 'a sound economic structure and an expected strong and stable economy are perceived to be the most significant factors in the ability of a region to attract foreign real estate investments" [27]. It is on record that investment managers and investors use macroeconomic conditions to make decisions on real estate returns superior returns. For instance, earlier, we found in past study that returns in global property

markets are heavily related to fundamental economic variables such as GDP, inflation and economic growth [28]. In line with the objectives of this study, empirical studies involving inflation, exchange rate and GDP growth rate and real estate performance and related behaviors are presented here.

Inflation and real estate investment performance- Most studies involving inflation and real estate focus on the later as a risk management mechanism to the former. In such studies, we found real estate to have good hedging capabilities against inflation [29]. In this study, we consider the effect of inflation on real estate performance. We follow past study on the importance of inflation in driving housing prices [30]. The author found across countries that inflation, on average, accounts for more than half of the total variations in housing price, averring that in the short run, the size of the effect is larger. In quarterly analysis, the author attributed over 90% variance in real estate prices to inflation in first quarter and at the end of the fourth quarter, the variance dropped to about 60% (2/3 of 90%).

As the author explained further, the effect of inflation is more important when house prices are measured in real terms, (i.e. non-adjusted for inflation price). Persistent high inflationary level make the effect of inflation on housing prices also persistent leading into longer horizons or long-run effect. The association between inflation and real estate performance have also been examined empirically in terms of the cost of mortgage financing. It is suggested that a higher inflation would have a negative impact on house prices via cost of mortgage finance. Further argument is that where house financing decision is more sensitive to the nominal yield curve (i.e. a curve showing real estate returns that is not adjusted to inflation), rather than real rate (i.e. inflation-adjusted rate or returns), housing demand and real house prices would react to changes in inflation.

Another perspective that shows how inflation influences real estate performance is the use of inflation rate as proxy for existing financing condition for realtors. Used as such, the demand for real estate would be impacted. High inflation rate, other factors held constant increases the repayment of the mortgage principal and raise the real value of repayment in the early part of the repayment period of the loan. This dampens the demand for real estate services (housing) and affect real estate performance, probably negatively. In previous study [31], the authors conjectured inflation to have a significant link with asset prices, and in a securitized real estate market, unexpected inflation affects prices [32].

In another argument, it is shown that inflation rate and real estate market co-moved in the long-term. As the theory suggests, a growing output vis-à-vis growing level of income in the society creates demand via enhanced consumption and investment, which ultimately lead to a positive effect on prices of goods and services [33]. Following the boom-bust of the 'dot.com era', a rising optimism with new business and investment opportunities after financial crisis, and a general public perception of relatively low interest rates, real prices on assets like stocks and property (real estate inclusive) increases faster than the general prices level on consumer goods [34].

However, in the period of crisis, the association between inflation and real estate stocks is reported to be significantly

weaker and negative. From this, it may suffice to explain that inflation play an important role in determining the prices of real estate services. And based on literature, uncertainty drives the association between inflation and asset prices not actual inflation. The relationship between inflation and real estate performance, particularly property prices has generated different views among many authors from time immemorial [35], [36], [37], and [38].

In summary, past study showed that inflation affects house prices but did not point out the direction of the effect [39]. Some authors [40] studied the effect of house price expectation on house price of residential properties and found that price expectations account for about 8% of the house price in Spanish house market and yet the direction of the effect was undetermined. References [41] and [40] suggested that expectation that future house selling price will go up is driven by current increase in house price. Another author [37] opine that a rising inflation reduced people's incentive to invest in real estate and this in turn lowers housing demand. But, other author [35] argues further that inflation raised nominal housing payment up which also leads to lower housing demand. While a higher inflation rate by theory is expected to lead to higher price of housing, we do not know if higher inflation would also lead to higher real estate contribution to GPD, but what we can conjecture is that housing demand may decrease and this may reduce the sector's contribution to GDP. This conjecture is insufficient to makes a unanimous decision on the direction of the link between inflation and real estate performance in Nigeria without empirical test. This led to the formulated and test of the hypothesis below.

H1: Holding other factor constant, inflation rate will have a significant impact on real estate investment performance in Nigeria

Real Exchange rate and real estate investment performance- The entry of exchange rate in the equation of macroeconomic factors and real estate performance is based on the purchase and importation of material for building real estate properties. Interests on factors that influence real estate buyer behaviour have been investigated by many authors [42], [43], [44]. As it seems, their studies focus on final buyer behaviour which are mostly domestic buyers, though no information is available concerning foreign buyer (if any). This claim is based on the core focus of most of these studies which include attitude, intention, finance, social factors, a subjective norm of the Nigerian consumer, the location of real estate and housing, planning and intention to purchase and intention to invest in real estate. All these point to domestics real estate buyers and as such little is known or mentioned in empirical study about exchange rate

Nonetheless, in quite a different perspective from material importation, exchange rate has also entered the equation from the perspective of vacation, tourism and hospitality. In a day, exchange rate often changes many times. Regular and frequently travelled individuals are very much aware of this dynamism of exchange rate and this can affect how much they can afford to spend and for how long they can embark on their vacation. This decision is partly, and mostly depends on how strong is the local currency. Additionally, the watching and trading of currencies, formal and informal, have spurned the whole business. Currencies fluctuation is caused by the

demand and supply of forex. Based on economic theory, every seasoned investors knows that once currency demand increases beyond supply, the demand for property would either decrease due to crushing interest or remain unaffected, leading the value of the currency to increase. Logically, when there are many willing and ready sellers than willing and ready buyers due to a fall in the value of currency, the value will go down.

Exchange rate is also argued in terms of its negative effect on the purchasing power of overseas' residents. The contention is that it reduces the purchasing power of foreign resident who want to buy property in the country because it impact severely on the real estate property prices. An example of this is illustrated in the excerpt below:

When currency rates depreciate in a given country it will not affect the real estate price but a sustained depreciation of the currency eventually lead to prices becoming dearer for buyers. As a result of currency depreciation the country will have to pay more for imported goods thereby decreasing their disposable income and making houses less affordable [45]

Previous scholar [24] investigated the effect of exchange rate amidst other macroeconomic factor on performance of real estate performance in Kenya using OLS with SPSS using about 42,180 registered real estate firms. Quarterly data were used and the period covered 2000 to 2014. In the result, exchange rate had a coefficient of 0.192, t-value of 0.852 and p-value of 0.422. This shows an insignificant relationship and could be interpreted to mean that exchange rate was not a significant determinant of real estate performance and as such it is not important factor. The author has however, acknowledged that exchange rate influences real estate industry due to its information content to the investors. Since the theory says that exchange rate has an influence on real estate operations, we will test eh hypothesis presented below.

H2: Holding other factor constant, exchange rate has a significant effect on real estate investment performance in Nigeria

Per capitaGDPr and Real Estate investment Performance -Earliest empirical studies have found GDP to have an important influence on return levels of economic entities [46]. Past authors [47] found that GDP per capita is regularly used in strategic real estate asset allocation to determine the level of economic development of a nation. Using GDP in allocating real estate asset implies, in some ways, that GDP influences realtors' asset management decision and this can ultimately influence realtors' performance. It is also reported that, among other factors, GDP has proved to be a useful demand side indicators in real estate retail industrial subsectors. GDP has also played a significant role in determining rental income and prices in real estate as an economic variable along with the forces demand and supply.

We argue therefore, that increase in real GDP would lead to increase in income of the population in the economy resulting in increased demand for real estate through higher prices of primary property and higher rentals. Thus, GDP does appear to exert some level of effect on realtors' performance because a high GDP put reasonable amount of money in the hands of its citizenries, their disposable income will increase, and they can afford to buy houses and realtors' services. Nigeria is a low GDP nation by world classification [48]. As explained by

earlier writer [49], news about GDP generally influences stock markets; and, for realtors, there may not necessarily be a strong relationship [50]. This argument was made based on one of the peculiar features of a securitized real estate market, which is that unanticipated changes do not affect its operations.

Also, in past studies, it is contended that increase in real output ('PGDP') should lead to higher innovations in industrial production [32]. Companies including those in real estate sector can exploit, to their advantage, a growing economy and improve revenues [51]. To date it is unknown how much influence this GDP have had on the growth and development of real estate performance in Nigeria. As a result, the hypothesis below will be tested in this study.

H3: Holding other factor constant, GDP will have a significant influence on real estate investment performance in Nigeria.

The review of empirical literature as presented above shows that two aspects of real estate performance is dominance and that include property prices and real estate investment. Some pockets of studies have also considered stock market performance-based factors, though not explicit. But findings are mixed, some are inconclusive and while other presents contradictory results. Besides, real estate investment contribution to economic development is rarely examined as a measure of real estate performance. These issues led to further investigation taking into account the peculiar nature of real estate market in Nigeria and the deficiencies in past studies.

III. MATERIALS AND METHODOLOGY

In this study, a descriptive research design is adopted. This design requires quantitative research approach, which involves gathering data from secondary sources over a period of time and analyze same using appropriate technique and models. The period of this study will cover thirty-seven years from 1980 to 2017. These secondary data were collected through document review and internet surfing focusing on some data streams and corporate websites. Specifically, data on real estate contribution to economy was collected from the Central Bank of Nigeria website. Data on macroeconomic factors were collected from a combination of sources, which include Federal Reserve Bank of St. Louis (https://fred.stlouisfed.org), World Bank data (https://data.worldbank.org), and index mundi (https://www.indexmundi.com).

A. Variables and Data Analyses.

In this study, there are three categories of variables namely the dependent variable, independent variables, and controlled variables. The dependent variable is the contribution of real estate sector to the economy. The independent variables are the macroeconomic factors namely inflation rate, exchange rate, and real GDP. The controlled variables are the socio-demographic factors such as population growth, poverty index, disposable income, Diaspora remittances, and firm-specific factors like market capitalization of real estate sector.

To analyse the data both descriptive and inferential statistics are used. Descriptively, the mean, minimum, maximum, standard deviation and pair-wise correlation are employed to reveal the characteristics and behaviour of the original data in

terms of their interrelationships, trends, and directions. Inferentially, the data is analyzed using lag dependent OLS (Multiple) regression, which purpose it to test the hypotheses developed for this study.

B. Model Estimation

As stated earlier, a multiple regression model is used in this study as proposed and used in previous studies [52], [53], and [54]amongst others. The baseline model (1) is presented below:

$$Y_t = \beta_0 + \beta_1 \sum_{t=1}^{n} X_t + \beta_n \sum_{t=1}^{n} Z_t + \varepsilon_t \dots\dots\dots (1)$$

Where: y = dependent variables (real estate contribution to economy); β_0 = Constant; $\beta_{1 \to n}$ = beta coefficient of explanatory variables; $\sum_{t=1}^{n} X_t$ = vector of independent variables; $\sum_{t=1}^{n} z_t$ = vector of controlled variables; ε_t = error term

However, it is a known fact that the development of the housing sector is widely recognized as an integral part of economic development [13]; because,real estate investments and prices serve as good predictors of economic growth [55]. In other words, real estate contribution to the economy can predict economic growth or the error term in the regression model may contain macroeconomic factors that correlated with real estate contribution to the economy thereby creating endogeneity problem and violate one of the most important classical linear economic assumption of independency of error term from explanatory variables. To solve this endogeneity problem, our baseline model is remodelled to include lag dependent variables as presented in equation 2 thus.

$$Y_t = Y_{t-1} + \beta_0 + \beta_1 \sum_{t=1}^{n} X_t + \beta_n \sum_{t=1}^{n} Z_t + \varepsilon_t \dots\dots\dots (2)$$

Where: Y_{t-1} = lagged dependent variables. Other variables as defined earlier

From the above baseline equations, each objective and hypothesis of this study is examined and tested. Further, the following translated or derived models were used for each objective. For objective number one, two, and three equation 3, 4, and 5 was applied to test the corresponding hypothesis H1. H2 and H3 respectively:

$$REST_t = REST_{t-1} + \beta_0 + \beta_1 INF_t + \beta_2 POPU_t + \beta_3 POVA_t + \beta_4 DIAR_t + \varepsilon_t \dots\dots\dots (3)$$

$$REST_t = REST_{t-1} + \beta_0 + \beta_1 REXR_t + \beta_2 POPU_t + \beta_3 POVA_t + \beta_4 DIAR_t + \varepsilon_t \dots\dots (4)$$

$$REST_t = REST_{t-1} + \beta_0 + \beta_1 PGDPR_t + \beta_2 POPU_t + \beta_3 POVA_t + \beta_4 DIAR_t + \varepsilon_t \dots\dots\dots (5)$$

IV. RESULTS AND DISCUSSION

The result of the descriptive statistics is presented in Table II and the correlation results are contained in Table III. The regression results for each hypothesis are presented in Tables IV, V, and VI. The first column of each table contains the explanatory variables of the study. The second column contains the result of the original regression model. The third contains result for the regression model without outliers in the data set while the last column contains results of the regression model without outliers and time effect. At the bottom of the tables are the various diagnostic tests results of the regression model. Each, except the last model is tested for

compliance with relevant econometric assumptions of autocorrelation, heteroskedasticity misspecification, and multicollinearity.

Although all model passed the diagnostic tests, the need to remove the effect of outliers and time effect led to final model which is the baseline model for interpreting the results of various regressions. Also, for avoidance of redundancy, it is stated here that in all models, the coefficient of one period lagged dependent variable (L.lnrest) are statistically significant at 1%, meaning that REST is an endogenous variable in the model. This justifies the use of lagged dependent regression model in this study to account for the effect of endogeniety in the parameter estimates in all estimated regression equations.

A. Descriptive Statistics

Focusing on the key variables of this study, the mean and standard error (in brackets) of the variables of the study are as follows REST [1884.47 (2637.96)]; INFL [19.24 (17.29)] %; REXR [161.03 (126.13)] %; and PGDPr [3.47 (7.42)] %. The mean value of about 1884.468 for REST implies that the sector has contributed, on average, a total of N1884,470.00 billion naira to the economy. The double digits rates for all explanatory variables suggest that these variables are important factors in real estate operation and are likely to influence the sector's contribution significantly. This is much so in the case of triple digit rate as it is with exchange rate. The single rates with regard toGDPr suggest less influence on the sector.

Table II: Descriptive Statistics of Variables

Variable	Obs	Mean	Std. Dev.	Min	Max
rest	38	1884.47	2637.96	5.24	8187.55
infl	38	19.24	17.29	5.40	72.80
rexr	38	161.03	126.13	49.78	546.40
pgdpr	38	3.47	7.42	-13.13	33.74
popu	38	2.59	0.08	2.49	2.86
pova	38	30.87	17.52	0.00	63.50
diar	38	3.35	3.64	0.00	13.04

Source: Authors' computation based on data from various sources

B. Correlation Statistics

The correlation statistics of the study's variables are presented in Table III. In general, the dataset or variables are not high correlated. Directionally, all explanatory variables except PGDPR have negative correlation with REST. This suggests that the higher the inflation rate, and exchange rate, the lower the performance of REST sector in terms of its contribution to the per capita-GDPr whereas a higher per capita-GDPr lead to higher REST.

Table III Correlation Matrix of Variables

	rest	infl	rexr	pgdpr	popu	pova	diar
rest	1.000						
infl	-0.317	1.000					
rexr	-0.187	-0.161	1.000				
pgdpr	0.127	-0.082	-0.331	1.000			
popu	0.456	-0.312	0.055	-0.035	1.000		
pova	-0.826	0.421	0.171	-0.182	-0.421	1.000	
diar	0.370	-0.186	-0.377	0.235	0.066	-0.344	1.000

Source: Authors' computation based on data from various sources

C. Result of Inflation Rate Regression on Real Estate Investment Performance

As presented in Table IV, and based on model 3, this result reveals an average volume of real estate sector performance to be about N2.592 billion naira.

Table IV: Result of Inflation Effect on Real Estate Performance

Variables	OLS Model 1	OLS Model 2 (without outliers)	OLS Model 3 (robust) (without outliers & time effect)
L.lnrest	1.011***	1.007***	1.007***
	(0.0173)	(0.0124)	(0.0101)
infl	0.00583***	0.00374***	0.00374***
	(0.00168)	(0.00126)	(0.00112)
popu	-1.142**	-1.002***	-1.002***
	(0.468)	(0.337)	(0.292)
pova	0.00129	0.000533	0.000533
	(0.00251)	(0.00181)	(0.00139)
diar	0.0140	0.0126*	0.0126*
	(0.00961)	(0.00691)	(0.00702)
Constant	2.882**	2.592***	2.592***
	(1.266)	(0.911)	(0.789)
Observations	37	36	36
R-squared	0.997	0.999	0.999
Model Diagnostic			
Autocorrelation (B-G LM χ^2 - stat.)	0.027 (0.8698)	2.480 (0.1153)	
Heteroskedasticity (Breusch-Pagan / Cook-Weisberg χ^2 - stat.)	0.73 (0.3928)	0.48 (0.4873)	
Misspecification (Ramsey RESET F-stat)	0.91 (0.4488)	2.56 (0.0758)	
Multicollinearity (mean vif)	2.15	2.09	

Standard errors in parentheses except for Breusch-Godfrey LM test, Breusch-Pagan / Cook-Weisberg test and Ramsey RESET test which are p-values; *** p<0.01, ** p<0.05, * p<0.1

Further result shows that inflation rate (INFL) and real estate sector performance has a positive association with the coefficient of 0.00374, which is statistically significant at 1% level. This implies that a percentage increase in inflation rate, causes about 0.37% increase in real estate performance for period reviewed. Based on this result, we failed to reject the hypothesis that, 'holding other factor constant, inflation rate does have a significant effect on real estate performance in Nigeria'. The R^2 value of 0.999 indicates that the model has a good fit and remarkable predicting power. Thus, taken together inflation and the controlled variables jointly explained about 99.9% variance in real estate performance in Nigeria for the period reviewed.

Ordinary, inflation is supposed to have a negative effect on real estate performance according to theory. But in this study, the effect of inflation rate on real estate performance is positive and significant, meaning that as inflation rate increases; the performance of realtors also increases. The economic implication of this is that inflation makes significant positive contribution to REST performance in Nigeria. This means that an increase in inflation will affect REST performance positively rather than negatively. Earlier, 90% variation in housing prices were attributed to inflation by past scholar [30]. Logically, higher housing prices are likely to lead to higher RSET performance.

Also, by nature, real estate is a kind of investment that is often undertaken to hedge against inflation [29]. Going by these, the finding in this study is supported by past empirical results. This is because, a higher housing price of 90% found earlier to be caused by inflation [30] is confirmed in this study to have the potential of translating to positive contribution of the sector to the economy in Nigeria. Other studies also reported that inflation rate and RSET market co-move in the long-term [33]. This means that as inflation rises, REST market performance also increases, indicating a positive effect of inflation on REST performance.

D. Result of Exchange Rate Regression on Real Estate Investment Performance

From model 3 in Table V, this result indicates that, on average, the volume of real estate sector performance was about N2.975billion naira. The result also shows that exchange rate relates negatively with a coefficient of -0.000455 to REST performance at a statistically significant level of 1%. This implies that as exchanger rate rose by a percentage, real estate performance decreased by about -0.05% during that period. Consequently the hypothesis that, 'holding other factor constant, exchange rate has a significant effect on real estate performance in Nigeria is retained. With the R^2 value of 0.999, the model is said to have a good fit. This means that, amidst all controlled variables, 99.9% variance in REST performance in Nigeria during the period of this study is explained by exchange rate; while 0.01% variance may be explained by other variables not included in the model as stated earlier.

Table V: Result of Exchange Rate Effect on Real Estate Performance

Variables	OLS Model 1	OLS Model 2 (without outliers)	OLS Model 3 (robust) (without outliers & time effect)
L.lnrest	0.994***	0.994***	0.994***
	(0.0196)	(0.0131)	(0.0131)
rexr	-0.000555**	-0.000455**	-0.000455***
	(0.000254)	(0.000170)	(0.000156)
popu	-1.285**	-1.068***	-1.068***
	(0.511)	(0.344)	(0.298)
pova	0.00205	0.000728	0.000728
	(0.00274)	(0.00184)	(0.00198)
diar	0.0113	0.0103	0.0103
	(0.0106)	(0.00710)	(0.00726)
Constant	3.530**	2.975***	2.975***
	(1.380)	(0.928)	(0.785)
Observations	37	36	36
R-squared	0.997	0.999	0.999
Model Diagnostics			
Autocorrelation (B-G LM χ^2 - stat.)	2.021 (0.1551)	0.379 (0.5379)	
Heteroskedasticity (Breusch-Pagan / Cook-Weisberg χ^2 - stat.)	1.23 (0.2677)	0.18 (0.6752)	
Misspecification (Ramsey RESET F-stat)	1.04 (0.3899)	0.87 (0.4689)	
Multicollinearity (mean vif)	2.18	2.14	

Standard errors in parentheses except for Breusch-Godfrey LM test, Breusch-Pagan / Cook-Weisberg test and Ramsey RESET test which are p-values; *** p<0.01, ** p<0.05, * p<0.1

The relationship between exchange rate and performance of real estate sector is negative as predicted by theory. Higher exchange rates lead to lower realtors' performance in Nigeria. The economic implication of this result is that exchanger rate made a significant negative contribution to real estate performance in Nigeria. Thus, a rise in exchange rate will result in a reduction in REST contribution to the economy. This finding clarifies that exchange rate is a significant determinant of REST performance in Nigeria, unlike in Kenya, where it was found to be insignificant [24]. More specifically, its negative effect is supported by past author [45] who said that sustained domestic currency depreciation caused a country to pay more for imported goods and this decreases the disposable income and make house less affordable. Theoretically, increase in exchange rate can be triggered when demand exceeds supply of foreign exchange, and once this happens, the demand for property will reduce and the sector will perform poorly.

E. Result of GDPr Regression on Real Estate Investment Performance

In Table VI, model 3 returned the result for this relationship. It reveals that, on average, the volume of real estate sector performance, on average, stood at about N2.519billion naira.

Table VI: Result of GDPr Effect on Real Estate Performance

VARIABLES	OLS Model 1	OLS Model 2 (without outliers)	OLS Model 3 (robust) (without outliers & time effect)
L.lnrest	0.999***	0.995***	0.995***
	(0.0207)	(0.0137)	(0.0149)
Gdpr	0.00504	0.00615**	0.00615**
	(0.00442)	(0.00293)	(0.00256)
Popu	-1.197**	-0.939**	-0.939***
	(0.547)	(0.363)	(0.311)
Pova	0.00276	0.00119	0.00119
	(0.00286)	(0.00190)	(0.00201)
Diar	0.0143	0.0127*	0.0127
	(0.0111)	(0.00733)	(0.00783)
Constant	3.139**	2.519**	2.519***
	(1.469)	(0.975)	(0.825)
Observations	37	36	36
R-squared	0.996	0.998	0.998
Model Diagnostics			
Autocorrelation (B-G LM χ^2 - stat.)	1.504 (0.2201)	0.235 (0.6279)	
Heteroskedasticity (Breusch-Pagan / Cook-Weisberg χ^2 - stat.)	1.75 (0.1861)	0.70 (0.4015)	
Misspecification (Ramsey RESET F-stat)	2.35 (0.0940)	2.13 (0.1194)	
Multicollinearity (mean vif)	2.30	2.14	

Standard errors in parentheses except for Breusch-Godfrey LM test, Breusch-Pagan / Cook-Weisberg test and Ramsey RESET test which are p-values; *** p<0.01, ** p<0.05, * p<0.1

The result reveals further that per capita-GDPr has a positive association with REST performance with a coefficient of 0.00615, which is statistically significant at 5% level. This implies that a percentage increase in PGDPr led to about 0.62% increase in REST performance during that period. Thus, we failed to reject the corresponding hypothesis, which state that, 'holding other factor constant, PGDP will have a significant influence on real estate performance in Nigeria'. Given the R^2 value of 0.998, it suffices to say that the model

has a good fit because, it means that, with all controlled variables taken together, PGDPr explains 99.8% variance in REST; while 0.02% variance may be explained by other variables not included in the model.

Per capitaGDPr relate positively and significantly with real estate performance as the theory explained. It follows therefore that, an increase in PGDPr will result in increase in realtors' performance. In economic perspective, this result is that PGDPr has a positive association with REST performance such that a higher PGDPr will lead to a higher REST performance. This is in line with findings of past authors [47] who found that PGDPr is used in strategic REST asset allocation thereby influencing realtors' asset management decision and ultimately their performance. Also, in support of the finding of this study are propositions by past authors [32], and [51]. The authors argued that increase in real output ('PGDP') should lead to higher innovations in industrial production while the later argued that firms, in this case realtors, can exploit a growing economy ('PGDPr') to their advantage to improve revenues. However, some authors have express contrary opinion which does not support this finding. For instance, some authors [49], and [50] shared the idea that news about GDPr does affect stock market generally, but for realtors, there may not necessarily be a strong relationship

V.   CONCLUDING REMARKS

In this study, we have identified inflation, exchange rate and per capita GDPraas macroeconomic determinants of real estate investment performance in Nigeria. From the study, we conclude that, for sake of spillover effect of inflation, policy directive toward increase in inflation to attain higher real estate performance might be too complex and difficult to embark on for such growth to be achieved. Instead, policy toward improve PGDPr should be the most important macroeconomic policy directive that will not only improve real estate performance but also socioeconomic wellbeing of citizens via accessibility and consumption of housing and other real estate services.

The present study focuses more on macroeconomic factors that influence real estate investment performance in Nigeria.Other factors like demographics and socioeconomic were only used as controlled variables and were not extensively explored. Moreover, firm- and market-specific factors like size of real estate market were not included in this study. The period covered was between 1980 and 2017, which make the findings of this study valid within the variables considered, time covered, and measures used. Further studies that integrate these are also recommended.

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