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Macroeconomic Dynamics and the Causal Effect on Residential Real Estate Investment Returns in Abuja and Lagos, Nigeria

Faoziah Afolasade Gamu[1]; Halim Yusuf Agava[2]

[1]Dept of Est. Mgt, Fac. of Env. Scis., University of Lagos, Nigeria (agamu@unilag.edu.ng)

[2]Dept of Est. Mgt, Fac. of Env. Scis., University of Ilorin, Nigeria(agava.yh@unilorin.edu.ng)

Abstract

This study evaluated the performance of residential real estate investment and the causal linkages between important macroeconomic variables and real estate investment returns in Abuja and Lagos cities in Nigeria. A survey research design was employed using questionnaire to collect real estate transaction data from 2008 to 2022 from estate surveying and valuation firms in the study areas. The macroeconomic data used were retrieved from the archives of the Central Bank of Nigeria and National Bureau of Statistics. The rental and capital value data collected were used to construct rental and capital value indices using index number model and total returns on investment using holding period return model. Granger Causality test was employed to determine the causal effect of macroeconomic factors on residential real estate returns in the study areas. The finding of this study revealed among others that there was a progressive upward movement in rental and capita values of residential real estate investment in the study areas between 2008 and 2022. On the basis of total return and risk-adjusted return performances, residential real estate performed slightly better in Lagos with an average total return of 15.28% as against 15.20% in Abuja. On the other hand, Abuja performed better in terms of risk-adjusted return. Of the six macroeconomic variables analysed, only inflation rate, unemployment rate and real GDP per capita were found to have statistically significant causal effect on residential real estate investment returns in the study areas. The study recommended that whereas it is profitable for investors to invest their money in residential real estate in the study areas due to the positive rental and capital value growth potential, the government should implement economic policies that are capable of ameliorating the high rate of inflation and unemployment in the study areas.

Keywords: Macroeconomic variables; Modified value at risk; Performance; Real estate investment; risk-adjusted returns

Introduction

The increasing urbanisation across the world and its attendant implication has triggered the demand for land and landed properties or real estate. There is a continuous rising demand for spaces for human habitation, interaction and economic activities. Real estate has been adjudged as the largest store of the world's wealth and which plays a significant role in the development of a country's economy (Abidoye and Chan, 2016; Garay, 2016; Trung and Quan, 2019).

Over the years, real estate as an investment asset, has continued to draw increasing attention from investors around the world as one of the best investment assets existing (Yong and Pham, 2015; Ekwebelem and Emoh, 2020). Thus real estate investment has become the largest investment sector, especially in emerging economies of the world (Irene and Zubair, 2015). As stated by Wyatt (2013), the real estate market does not operate in isolation rather, it is influenced by movements in the economy as a whole and in the financial markets in particular; knowing this will facilitate more informed judgement about rental and capital values, rental growth, investment and occupier demand and development activity.

The real estate market is an imperfect and dynamic one thereby making investment decision a complex human cognitive process with regard to investment returns, risks and the factors that influence the real estate market. Understanding the macroeconomic variables that influence real estate prices as well as returns is expected to guide existing and potential investors in order to safeguard against potential loss of investment returns or capital invested. In literature, the factors responsible for the gap between demand and supply of real estate are known. They can be categorised into property-specific or physical factors, economic (microeconomic and macroeconomic) factors, political factor and social factors.

One of the most essential considerations in real estate investment analysis and decision making is the measure of investment performance alongside the factors that drive this performance. It is therefore important that real estate practitioners and investors alike monitor these key macroeconomic indicators and understand how their movements may influence real estate investment returns performance in different locations.

However, Elile et al. (2019) noted that little empirical evidence on the extent to which major macroeconomic variables, such as exchange rate, inflation rate, money supply, and unemployment rate, influences real estate performance is known. Specifically, studies that examine the effect of major macroeconomic variables on residential real estate investment returns in Nigeria are very few and limited in scope (Bello et al., 2020; Ekwebelem and Emoh, 2020). Whereas it is popularly believed that investing in real estate offers a substantial profit, real estate investment decision is not well understood by many investors in Nigeria (Salihu et al., 2020). In Nigeria, investors still engage in real estate investment relying on information obtained through informal market comparison, intuition or rule-of-thumb (Oyewole, 2013; Salihu et al., 2020).

Additionally, Oyewole (2013), Olowofeso (2019) and Salihu et al. (2020) have argued that the various studies conducted on real estate market of various countries could not be generalised to all countries and regions with differing property market environments but rather had to be considered separately for each country or region. The aim of this study, therefore, is to evaluate the effect of the variations in macroeconomic indices on residential real estate investment returns in Abuja and Lagos with a view to guiding potential and existing real estate investors (both in and outside Nigeria) and practitioners. The study's aim will be achieved through:

examining the trends in rental and capital values of residential property investment in Abuja and Lagos;

analysing the total return performance of residential real estate investment in the study areas; and

evaluating the significant macroeconomic factors that influence residential real estate investment returns in the study areas.

The Study Areas at a Glance

Nigeria is the most populous country in the continent of Africa with an estimated population of about 213 million people in 2021 (World Bank, 2022). It is therefore the largest real estate market in Africa. Also, in 2021, the World Bank put the Nigeria's GDP at about 441.5 billion U.S. dollars; again, the highest in Africa. The Nigerian Population has been a driving factor for the real estate market, particularly in Abuja, the capital city (Fig 1). Since the movement of the administrative capital from Lagos (Fig. 2) in 1991, the population and economic activities of the city have continued to grow constantly. With population of about 6 million people, Abuja real estate market is fast growing and arguably becoming one of the largest real estate markets in Nigeria, after Lagos thus, attracting high inflow of direct foreign investment (DFI) from institutional investors.

Residential real estate forms a substantial real estate investment proportion Abuja and Lagos but the drivers of residential real estate investment returns in this cities has not been well researched. Particularly, there is need for empirical study that will unravel the effect of important macroeconomic variables on residential real estate investment returns in these important cities where residential investment assets are believed to be thriving. According to a survey by Northcourt (2022), Abuja and Lagos have the fastest growing real estate market in Nigeria. Both indigenous and foreign investors are continually committing funds to residential real estate to benefit from the increasing demand for housing in these cities.

Fig. 1:

Nigeria showing Abuja

Fig. 2: Nigeria showing Lagos

Review of Literature on Macroeconomic Variable Effects on Real Estate Investment

Real estate market is one of the important input resources markets of the national economic system. This market has its own characteristics different from other input resource markets because,

according to Foldvary and Jaffe (2010), the real estate market is developed on land with distinctive characteristics, supply and demand for real estate are less elastic compared to prices and the operation of the real estate market is subject to government policies and control.

The macroeconomic environment of any given nation no doubt has significant impact on real estate investment performance which in turn influences real estate investment decision-making among existing and potential investors. Favourable macroeconomic conditions may not only create favourable conditions for investment projects to come into existence and operate effectively but also, to a certain extent, the performance of investment.

The performance of real estate in any given country depends largely on enhanced economic activity and the growth of that country. Wyatt (2013) observed that the decision to develop or acquire and own real estate assets for purpose of investment requires an assessment and understanding of the current and future macroeconomic conditions of the real estate market. The key macroeconomic indicators, according to Wyatt (2013), include gross domestic product, trade deficit, tax-to-GDP ratio, inflation, employment and unemployment figures, oil prices, house prices, household debt and debt as a percentage of income. As identified by Tze (2013); Trung and Quan (2019), inflation rate, employment/unemployment rates, interest rate on loan, exchange rate, government monetary policy, balance of payment and per capita real gross domestic product as major macroeconomic factors that influence real estate investment. If interest rates rise sharply, for instance, consumer spending tends to decline and the demand for real estate reduces and, in some instances, may even become surplus to requirements.

A productive economy is expected to have a positive influence on the demand for and supply of real estate assets. Elile et al. (2019) submitted 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. Real estate investment is equally susceptible to external influences and government intervention in the form of planning, environmental controls, buildings regulations, rent control, security of tenure add to management obligations and affect value (Trung and Quan, 2019). Investment managers and investors therefore use macroeconomic conditions to make decisions on real estate investment both at regional and national levels.

As observed by Okumu (2015), the research and evaluation of macroeconomic conditions are important in the process of making and managing investment projects. Trung and Quan (2019) recommended that investors should keep in mind when conducting the macroeconomic environment assessment on the characteristics of regional real estate market participants, real estate market conditions in the region, annual GDP growth rate of the country, the average annual inflation rate, exchange rate, employment and unemployment rates.

The extent to which macroeconomic indicators influence the rate of return of the United States' income generating property market was investigated by Kofoed-Pihl (2009) using un-smoothed transaction-based return index error correction regression model. This was developed to analyse the macroeconomic determinants of the quarterly real estate total returns from 1984-2008. The study discovered that unemployment and the long-term interest rate negatively influenced the total

return of the US real estate market, while the gross domestic product over time heavily influences the total return positively. However, noticeable impact of inflation effect was not found on the return which revealed the importance of timing the real estate investments.

Fleming (2010) examined the macroeconomic factors that determine commercial real estate performance in the United States of America. The study used property transaction data and macroeconomic variables such as unemployment rates, Gross Domestic Product (GDP), interest rates, commercial real estate overall inventory and vacancy rate. The study adopted a stepwise multiple linear regression to assess the impact of these macroeconomic variables on commercial real estate prices and vacancy rate. The findings of the study suggested that vacancy rates were significantly influenced by unemployment, Gross Domestic Product decline and location.

Muli (2013) investigated the factors affecting the growth in real estate investment in Kenya. The effects of factors such as GDP growth, interest rate, inflation rate and population growth on real estate investment were examined. Data collected through questionnaire survey and secondary sources were analysed using correlation and regression models. The finding of the study confirmed that GDP, inflation rate and interest rate were the major factors affecting real estate investment growth in Kenya. It was further revealed that population growth has the least effect on real estate investment growth.

Grum and Govekar (2016) examine the macroeconomic factors that are significantly associated with property prices among; unemployment, share index, current account of a country, industrial production and gross domestic product in relation to the different cultural environments of Solvenia, Greece, France, Poland, and Norway. The study adopted the Spearman correlation analysis and found that there was statistical significant relationship between the prices of residential real estate and the selected macroeconomic variables in different ways.

Trung and Quan (2019) gave detailed classification of the factors that influence real estate performance to include natural, economic, market, legal, political and macroeconomic factors. This was part of the finding of their study on the effect of the factors influencing real estate investment in Ho Chi Minh City, Vietnam. Primary and secondary were collected through survey method for the period January 2019 to July 2019. The data was tested for internal consistency using Cronbach's Alpha. The exploratory factor analysis (EFA) and multiple linear regression technique were used to further analyse the data. The findings of the study indicated that the six factors affect real estate investment in the study area with significance level 0.05.

In Nigeria, few related studies have been carried out in this field. The determinants of commercial property rental growth in Minna were examined by Udoekanem et al. (2014). The study adopted survey research design. Primary and secondary data were used for the study. Primary data obtained for the study include office rental levels and office space data in the study area for the period, 2001-2012. Secondary data obtained for the study are mainly macroeconomic variables in Nigeria for the period, 2001-2012.Granger causality and Augmented Dickey Fuller Unit root tests statistical techniques were used for data analysis. The study found that real GDP growth and

vacancy rate were the major drivers of rental growth in the office property market in Minna, accounting for about 83% of the variation in office property rents.

Udoekanem et al. (2015) investigated the major drivers of office rents in Asokoro, Maitama and Utako in Abuja. The office rental values and office space data for the period from 2001 to 2012 were obtained using structured questionnaires which were administered to active estate surveying and valuation firms in the study areas. Secondary data were retrieved from National Bureau of Statistics (NBS) and the Central Bank of Nigeria (CBN). Using regression analysis, the developed office rent model accounted for 76%, 72% and 75% of the variation in office property rents in the commercial property market of the Asokoro, Maitama and Utako districts respectively. The study further revealed that real GDP growth and vacancy rate are the major determinants of rental growth in the office property market in the districts of Asokoro and Maitama, while real GDP growth is the major driver of office rents in the Utako district. The study only covered office property, among the commercial property categories.

The factors influencing investment performance of commercial property in Lagos were examined by Anule and Umeh (2016). Structured questionnaire was used to seek the opinions of real estate practitioners in Lagos on the factors influencing commercial property performance in the area. The responses were analysed using the mean item score and the principal component analysis. The result of the study revealed that the top factors common to each location were cost of building materials, location, quality of road infrastructure, rental growth and security. Findings across submarkets also revealed three critical set of factors; condition of the premises, a mixture of socio-cultural and legal framework and a mixture of socio-cultural, political and economic factors. Although the study expanded previous work from one location to five, the study is limited to only commercial property.

Olatunji et al. (2017) examined the influence of macroeconomic factors on residential property returns in Abuja using a survey research methodology. Primary data used to calculate returns were rental value and sales and secondary data were annual macro-economic indicators from 2001 to 2015. These indicators were real GDP, interest rate, unemployment rate, employment rate, exchange rate and inflation rate. The Augmented Dicker Fuller test, regression and Granger Causality test were the analytical tools adopted to analyse the gathered data. The results of the analyses suggested an existence of longrun relationship between macroeconomic factors and residential property returns. The result of co-integration regression suggested further that between 18.2% and 83.6% and 16.2% and 79% variation in 3-Bedroom and 4-Bedroom property returns respectively across seven out of twelve residential markets were significantly influenced by macroeconomic indicators.

Elile et al. (2019) conducted a study to examine the macroeconomic determinants of real estate investment performance 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 Ordinary Least Square multiple regression. The findings of the study revealed that inflation, and real per capita each has significant positive effect while exchange rate has significant negative effect on

real estate sector performance. They concluded that inflation, real per capita and exchange rate are important macroeconomic determinants of real estate performance in Nigeria. The study however ignored other factors such as property-specific factors and neighbourhood factors that could influence real estate investment performance significantly.

Olowofeso (2019) carried out an assessment of the factors influencing the growth of real estate investment in Lagos, Nigeria. The author gathered primary data from real estate professionals' practice in Lagos State. Fifteen variables were identified as factors that influence the growth of real estate practice. The data collected were analysed using principal component analysis (PCA) with varimax rotation. The result of the analysis showed that three factors account for about 67% of the total variance. Factors such as innovation, education background and experience of real estate practitioners were the most significant factors that influence the growth of real estate investment in the study area.

Ekwebelem and Emoh (2020) examined the effect of macroeconomic factors on residential real estate performance in Abuja metropolis. The study employed a survey approach to collect data on rent and sale prices from 2001 to 2015 of selected residential properties in the portfolios of registered estate surveying and valuation firms in Abuja. The result of the analysed data revealed that Gwarimpa residential property market outperformed other selected property markets in Abuja. Only the macroeconomic variables affecting the performance of 3- and 4-bedroom residential property types were studied thus, there is need to broaden the scope of the study.

Research Methodology

This study adopted a survey research design using quantitative data. The study population comprised of residential properties that have been built for investment purpose as contained in portfolios of estate surveying and valuation firms operating in Abuja and Lagos. The sampling units were the target residential property categories and the estate surveying and valuation firms in the study areas with records of residential property transaction data on rental and capital/sales values ranging from 2008 to 2022. Stratified and simple random sampling techniques were used for the selection of the neighbourhoods included in the survey across the selected cities. Using these techniques, each of the cities was divided into four strata of high density, medium density, low density and suburb neighbourhoods, using the respective street maps of Abuja and Lagos metropolis. Thereafter, a neighbourhood was randomly picked from each stratum across the cities. Thus, four neighbourhoods were selected from each city making a total of eight neighbourhoods in all.

While the simple random sampling technique was used to select the estate surveying and valuation firms (ESVFs), the purposive sampling technique was on the other hand used to select the residential properties with the required characteristics as contained in the property management files of the sampled ESVFs in the study areas. From the Nigerian Institution of Estate Surveyors and Valuers (NIESV) firms directory 2022 update, there was a total of 184 registered ESVFs in Abuja and 418 registered ESVFs in Lagos. This formed the sampling frame. The Frankfort-

Nachmias sample size model given in Equation 1 was used to determine the sample size of estate surveying and valuation firms in Abuja and Lagos where the required data were collected.

$$n = \frac{Z^2pqN}{e^2(N-1)+ Z^2pq} \qquad (1)$$

Where:

n = required sample size; N = population size; p = sample population estimated to have the characteristics being measured (in this study, 95% confidence level of the target population);

q = 1 – p; e = margin of error and Z = 1.96 (being the standard normal deviation at 95% confidence level).

Using the above sampling formula, 58 ESVFs were randomly sampled in Abuja and 64 ESVFs were sampled in Lagos. Primary and secondary data types were used for this study. The specific primary data required were the annual rental values and capital values or sales prices. The primary data were sourced from the sampled ESVFs in the study areas using structured questionnaires. At the end of the questionnaire administration, a total of 417 residential properties with the required characteristics were purposively sampled in Abuja while 502 residential properties were sampled in Lagos. The combined total number of residential properties sampled in all was 919 comprising of different categories of residential apartments such as a-room-self-contained, 1-bedroom, 2-bedroom, 3-bedroom (bungalow and duplex), 4-bedroom (bungalow and duplex) and terrace house. These property transaction data (rental and capital values) retrieved were then reduced to value in Naira per square metre to account for differences in property designs, configurations and other features.

The required secondary data were the major macroeconomic variables that influence residential real estate investment returns identified in the literature reviewed for this study. They are inflation rate, exchange rate, interest rate, unemployment rates, gross domestic product (GDP), and real GDP per capita. These secondary data were retrieved from the archives of the Central Bank of Nigeria (CBN) and National Bureau of Statistics (NBS) data bases.

The property transaction data were used to construct property values indices for the period under assessment. These indices are the rental value index (RVI) and capital value index (CVI). The RVI model is given as:

$$RVI = \frac{RV_t}{RV_{by}} \; x\, 100 \qquad (2)$$

Where RV_t is the rental value of period t (the year under consideration) and RV_{by} is the rental value of the adopted base year (2008)

On the other hand, capital value index was computed using the following model:

$$CVI = \frac{CV_t}{CV_{by}} \; x\, 100 \qquad (3)$$

Where CV_t is the capital value of period t (the year under consideration) and CV_{by} is the capital value of the adopted base year (2008)

The annual (year-to-year) rental value growth was calculated using

$$RG_t = (\frac{RV_t}{RV_{t-1}} - 1)x100 \qquad (4)$$

Where RG_t is the rental growth in period t, RV_t is the rental value of period t and RV_{t-1} is the rental value of the preceding year.

Similarly, the annual (year-to-year) capital value growth (CG) was computed using the following model:

$$CG_t = (\frac{CV_t}{CV_{t-1}} - 1)x100 \qquad (5)$$

Where CG_t is the capital growth in period t, CV_t is the capital value of period t and CV_{t-1} is the capital value of the preceding year.

The average annual rental and capital value growths for the study period were calculated using Geometric mean (GM) = $[(1+g_1)*(1+ g_2)*(1+ g_3)*\ldots*(1+ g_n)\text{^}(1/n)] - 1$ (6)

Where $g_1, g_2, g_3,\ldots,g_n$ are the annual growth values for years 1, 2, 3, … n; where n =15 for this study.

Total returns on residential real estate investment were computed from the weighted average rental and capital values obtained through the questionnaire survey using the Holding Period Return model as follows:

$$TR_t = \frac{RV_t+(CV_t-CV_{t-1})}{CV_{t-1}}\ x\ 100 \qquad (7)$$

Where TR_t is the total return for period t, RV_t is the rental value of period t (year under consideration), CV_t is the capital value of period t and CV_{t-1} is the capital value of the preceding year.

To evaluate the risk and risk-adjusted return performances of residential real estate investment in the study areas, the modified value at risk and modified Sharpe ratio were used respectively as against the use of standard deviation and the traditional Sharpe ratio. The rationale for the adoption of mVaR and mSR as measures of risk and risk-adjusted return performance respectively are based on the submissions of the following authors:

Amedee-Manesme et al. (2017) argued that the traditional Sharpe ratio approach presents some limitations that make it tricky to use despite its popularity among practitioners. Accordingly, possible non-normality of returns is ignored in the traditional Sharpe ratio, and this can cause

investors to invest inappropriately in risky assets. Thus, the statistical properties of real estate returns are mostly non-normal and often unknown, which render many statistical measures useless.

To address the non-normality issue, Favre and Galeano (2002) and Gregoriou and Gueyie (2003) introduced a modification of the traditional Sharpe ratio, the modified Sharpe ratio (mSR), one that takes the Value-at-Risk (VaR) as the risk measure, as was adopted by the Basel II regulation directive. The modified Sharpe ratio makes it possible to overcome the limitations of ordinary Sharpe ratio. In particular, it relies on modified value-at-risk (mVaR), a risk metric that considers the entire distribution of the returns since its computation is based on third and fourth moments of the distribution. Besides, Favre and Galeano (2002) and Gregoriou and Gueyie (2003) concluded that real estate investment risk is usually associated with higher moments such as skewness and kurtosis whereas the standard deviation is calculated based on the first second moment (variance).

The modified Sharpe Ratio (mSR) is given as:

$$m\text{SR} = \frac{(R_a - R_f)}{mVaR_\alpha} \qquad (8)$$

Where: R_a is the average return of the asset or portfolio; R_f is the risk-free rate, and $m\text{VaR}_{\boldsymbol{\alpha}}$ is a modified way of computing value at risk, taking into account skewness and kurtosis of the returns distribution. The geometric mean of the Nigerian 364-days Treasury Bill rate for the study period was taken as the risk-free rate (Rf).

The modified value at risk (mVaR) is computed using a Cornish-Fisher asymptotic expression as follows:

$$\text{mVaR} = R_a + [Z_c + \frac{1}{6}(z_c^2 - 1)S + \frac{1}{24}(z_c^3 - 3z_c)K - \frac{1}{36}(2z_c^3 - 5z_c)S^2]\sigma \qquad (9)$$

Where Z_c = 1.65 with 95% confidence level; R_a = expected total return on asset; S and K are skewness and kurtosis respectively and σ = standard deviation.

To examine the causal effect of macroeconomic factors on residential property investment returns in the study areas, the Granger Causality (GC) test model was adopted. Before carrying out the Granger Causality test analysis, the property returns and macroeconomic data sets to be used were tested for stationarity using the Augmented Dickey Fuller (ADF) test of stationarity models. The ADF assumes that the time series data are stationary and if this is not the case, differencing, de-trending or other techniques must first be used before using the Granger Causality test. The GC test is based on the following ordinary least square (OLS) regression model:

$$y_i = \alpha_0 + \sum_{j=1}^{m} \alpha_j y_{i-j} + \sum_{j=1}^{m} \beta_j x_{i-j+\varepsilon_i} \qquad (10)$$

Where α_0 is the intercept of the regression line, α_j and $\boldsymbol{\beta}_j$ are regression coefficients and $\boldsymbol{\varepsilon}_i$ is the error term.

Results and Discussion

This section presents the results of the data analysis and discussion of the research findings based on the research objectives. The trend in the average rental and capital values as well as the total return performances of the residential property categories were analysed and discussed. The effect of macroeconomic factors on total return for the period under assessment was evaluated.

Rental and capital value performances of residential real estate investment

To examine the rental and capital value performances of residential real estate investment in the study areas, the rental and capital value indices were computed from the weighted rental and capital values, using 2008 as the base year. The results of the analyses are given in Table 1.

Table 1: Rental and capital value indices for residential real estate investment

	Abuja				Lagos			
Year	Weighted Average Rental Value (₦'000/m^2)	Rental Value Index	Weighted Average Capital Value (₦'000/m^2)	Capital Value index	Weighted Average Rental Value (₦'000/m^2)	Rental Value Index	Weighted Average Capital Value (₦'000/m^2)	Capital Value index
2008	3.3340	100	42.0830	100	4.4444	100	48.8850	100
2009	3.5340	106	45.8705	109	4.6700	105	51.3293	105
2010	3.6825	110	48.9897	116	4.9233	111	55.4356	113
2011	3.9402	118	53.3497	127	5.1449	116	59.3161	121
2012	4.2476	127	57.3511	136	5.4536	123	63.4089	130
2013	4.5740	137	60.6773	144	5.7699	130	69.1791	142
2014	5.0000	150	64.1966	153	6.0526	136	73.8141	151
2015	5.4203	163	70.0385	166	6.3733	143	77.8000	159
2016	5.7943	174	77.7427	185	6.8514	154	81.6123	167
2017	6.3042	189	85.5170	203	7.0912	160	86.7538	177
2018	6.6761	200	92.9570	221	7.3748	166	92.8266	190
2019	7.1568	215	101.1372	240	7.7141	174	99.1388	203
2020	7.6220	229	105.6884	251	8.0998	182	109.0563	223
2021	8.2394	247	112.0297	266	8.6019	194	117.3407	240
2022	9.0469	271	123.7928	294	9.1008	205	129.0748	264

Source: Field survey, 2022

These indices were used as proxies for rental value and capital value movements for the fifteen-year period. The result of the analysis revealed a progressive upward increase in both rental and capital value within the study period. Residential properties in Abuja recorded the higher rental and capital value growths compared to Lagos. The all-time rental value increases were 171% and 105% for Abuja and Lagos respectively while all-time capital value increases were 194% for Abuja and 164% for Lagos. This finding is in tandem with the findings of Oyewole (2013); Udoekanem et al. (2014) and Udoekanem et al. (2015).

To determine the rental and capital value growth of residential real estate investment for the period, the year-to-year rental and capital growths were analysed and the results presented in Table 2.

Table 2: Trend in rental and capital value growths in the study areas

	Abuja		**Lagos**	
Year	Rental Value Growth	Capital Value Growth	Rental Value Growth	Capital Value Growth
2008	0.00	0.00	0.00	0.00
2009	6.00	9.00	5.08	5.00
2010	4.20	6.80	5.42	8.00
2011	7.00	8.90	4.50	7.00
2012	7.80	7.50	6.00	6.90
2013	7.68	5.80	5.80	9.10
2014	9.31	5.80	4.90	6.70
2015	8.41	9.10	5.30	5.40
2016	6.90	11.00	7.50	4.90
2017	8.80	10.00	3.50	6.30
2018	5.90	8.70	4.00	7.00
2019	7.20	8.80	4.60	6.80
2020	6.50	4.50	5.00	10.00
2021	8.10	6.00	6.20	7.60
2022	9.80	10.50	5.80	10.00
GM	**6.18**	**6.62**	**4.48**	**6.00**

Source: Computed from weighed average rental and capital values in Table 1

The average rental and capital growth rates of residential real estate investment in the study areas were calculated by taking the geometric mean of the growth rates for period under investigation (2008 to 2022). This was considered appropriate since each annual growth rate created a compounding process for the study period. The average rental growth rate for residential real estate in Abuja was 6.18% while the average capital growth rate was 6.62%. These were higher compared to the average rental and capital growth rates for residential real estate in Lagos estimated at 4.48% and 6.0% respectively. The analysis was extended further to visualise the movement in rental and

capital value growths of residential real estate investment from 2008 to 2022 in the study areas. The trend lines are shown in Figures 1 and 2 for Abuja and Lagos respectively.

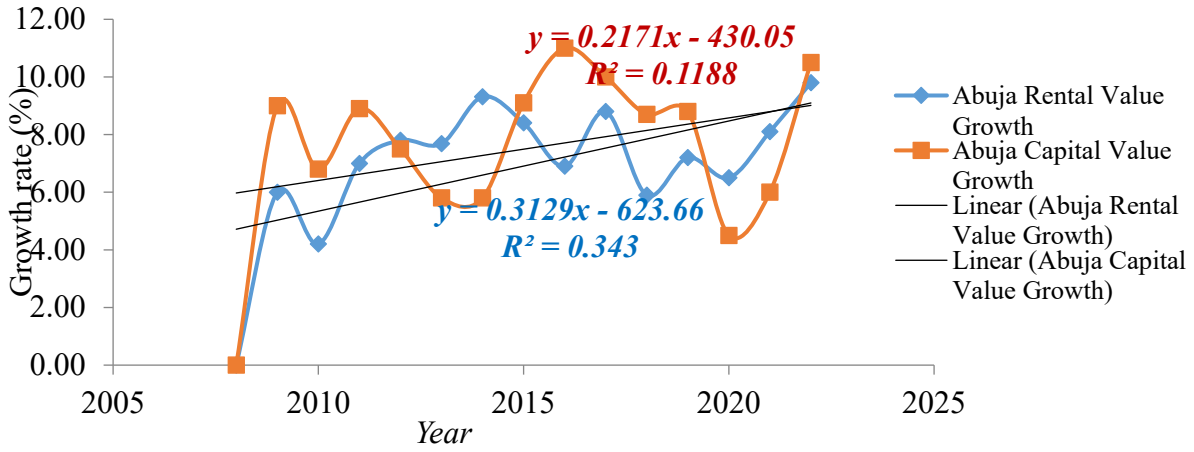

Fig. 1: Rental and capital growth rates for residential real estate investment in Abuja

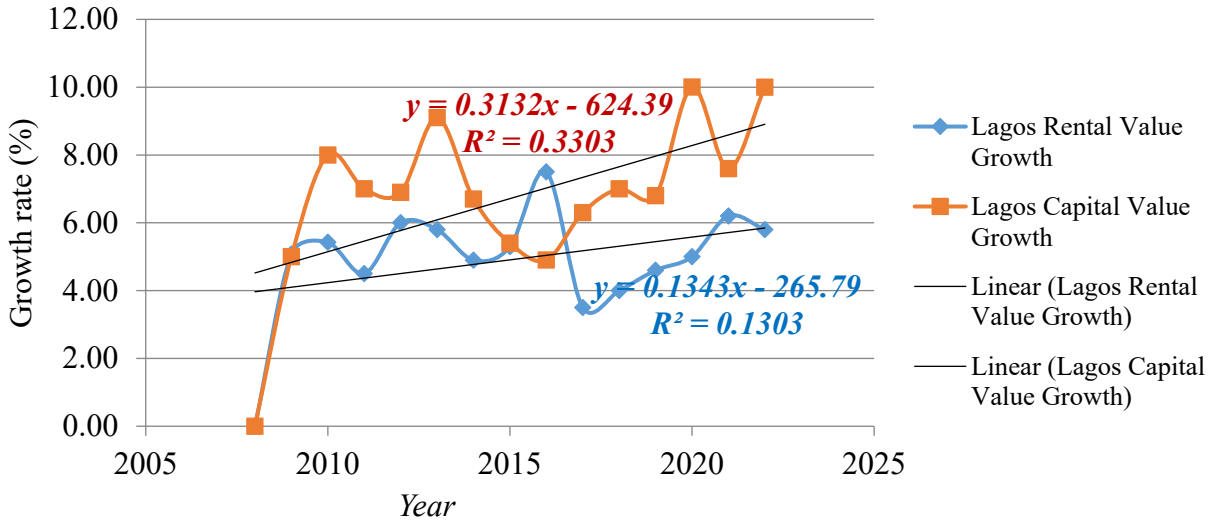

Fig. 2: Rental and capital growth rates for residential real estate investment in Lagos

From the trend analysis, the graphs showed upward trends in both rental and capital growth for residential real estate investment in the two cities. The equations of the smoothed trend line help to predict the future growth in rental and capital values of residential real estate investment in the study areas. The level of reliability of the trend and accuracy of the forecast was determined by the R square values. These were estimated to be 11.8% and 34.0% for rental and capital value growths in Abuja respectively and 13.0% and 33.0% for rental and capital value growths

respectively in Lagos. The OLS regression equations were used for the purpose of predictions. Thus there was evidence of intermittent increase and decrease in the growth of residential real estate rental and capital values within the study period.

Total return, risk and risk-adjusted return performances of residential real estate

The results of the mean total return, risk and risk-adjusted return performances of residential real estate investment in Abuja and Lagos for the study period are presented and discussed in this subsection. Table 3 presents the nominal total returns, associated risks and risk-adjusted returns of residential real estate investment in Abuja and Lagos for the period under assessment.

Table 3: Total return, risk and risk-adjusted return performances.

		Abuja	Lagos
Year	**Treasury Bill Rate (%)**	**Total Return (%)**	**Total Return (%)**
2008	8.2	7.92	9.09
2009	3.8	17.40	14.55
2010	3.8	14.83	17.59
2011	9.7	16.94	16.28
2012	13.6	15.46	16.09
2013	10.8	13.78	18.20
2014	10.5	14.04	15.45
2015	9.4	17.54	14.03
2016	10.1	19.27	13.71
2017	12.3	18.11	14.99
2018	10.1	16.51	15.50
2019	9.6	16.50	15.11
2020	1.6	12.04	18.17
2021	2.2	13.80	15.48
2022	10.6	18.58	17.76
GM	7.22	15.20	15.28
mVaR		9.87	11.05
mSR		0.81	0.73

The average total returns for residential real estate investment in the two cities within the study period were determined using geometric mean (GM) model. On the basis of average total return, Lagos residential real estate market outperformed Abuja residential real estate market with a higher average total return of 15.28% per annum as against 15.20% per annum recorded for Abuja. The modified value at risk (mVaR) was used to gauge the level of risk associated with this type of investment. The higher the mVaR, the higher the risk associated with an investment asset. The

computed mVaR indicated that Abuja had the lower mVaR of 9.87 compared to 11.05 recorded for Lagos. This implied that investing in residential real estate in Lagos attracted more risk compared to Abuja.

Analysis of variance ANOVA) was carried out to test if there was significance variation between the average total returns on residential real estate investment in the two cities. The result of the analysis is presented in Table 4. The p-value of 0.853 is not statistically significant at 0.05 significant level thus indicating that there was no statistically significant difference between the average total returns on residential real estate investment in Abuja and Lagos within the study period.

Table 4: **ANOVA between total returns in Abuja and Lagos**

Source of Variation	***SS***	***Df***	***MS***	***F***	***P-value***	***F critical***
Between Groups	0.109	1	0.109	0.034	0.853	4.195
Within Groups	88.542	28	3.162			
Total	88.651	29				

Source: Computed from Table 3

The total returns were adjusted for risk using the modified Sharpe ratio (mSR). Theoretically, the higher the value of the mSR, the better the performance of the investment and the converse is the case. The result of the risk-adjusted returns revealed again that residential real estate investment in Abuja performed better than in Lagos with an mSR of 0.81 as against 0.73 for residential real estate investment in Lagos. According to the Markowitz portfolio theory, investors are risk-averse and would only be ready to embark on an investment with high return with low associated risk. Therefore, the result of this analysis suggested that residential property investment in Abuja comparably performed better than in Lagos.

Effect of macroeconomic variables on residential real estate returns

This subsection presents and discusses the analysis of the effect of macroeconomic variables on the total returns of residential real estate investment in the study area. Table 5 shows the macroeconomic data used for this study.

Table 5: Macroeconomic variable data

Year	Inflation Rate (%)	Exchange Rate (%)	Interest Rate (%)	Unemployment rate (%)	GDP per capita ($)	real GDP (Billion ₦)
2008	11.5	121	15.1	3.6	2,259	46,320
2009	12.6	162	19.0	3.8	1,912	50,042
2010	13.8	153	17.6	5.1	2,280	54,612
2011	10.9	159	16.0	6.0	2,488	57,511
2012	12.2	161	16.8	10.6	2,724	59,930
2013	8.5	162	16.7	10.0	2,962	63,219
2014	8.1	171	16.5	7.8	3,099	67,153
2015	9.0	223	16.8	9.0	2,688	69,024
2016	15.6	373	16.9	13.4	2,176	67,931
2017	16.5	395	17.6	17.5	1,969	68,491
2018	12.1	361	16.9	22.6	2,028	69,800
2019	11.4	360	15.4	25.2	2,230	71,388
2020	13.2	434	13.6	30.2	2,097	70,014
2021	17.0	478	11.5	32.6	2,085	70,452
2022	18.8	770	18.75	37.7	2,184	74,639

Source: CBN & NBS, 2022

The macroeconomic data were transformed into their corresponding natural logarithms to remove skewness effect on the data and makes it fit for the analysis. Because these data were time series data, they were tested for stationarity for possible presence of unit root using the Augmented Dickey Fuller (ADF) model. The result of the ADF test is presented in Table 6.

Table 6: Stationarity test for macroeconomic variables and total returns

Variables	Computed ADF statistic	ADF critical value @ α =0.05	Prob.
ΔLnAbujaTR	-5.3225	-1.6623	0.002
ΔLnLagosTR	-4.8842	-1.6623	0.006
ΔLninfR	-6.3451	-1.7448	0.013
ΔLnExchR	-7.2109	-1.7448	0.000
ΔLnintR	-3.6780	-1.7448	0.021
ΔLnUnempR	-5.5103	-1.7448	0.007
ΔRealGDP_per_cap	-5.3492	-1.7448	0.001
ΔΔLnRealGDP	-4.0042	-1.7448	0.000

Sources: Authors' analysis, 2023

LnAbujaTR = Log of total return on residential real estate investment in Abuja, LnLagosTR = Log of total return on residential real estate investment in Lagos, LninfR = Log of inflation rate, LnExchR = Log of exchange rate, LnintR = Log of interest rate, LnUnempR = Log of unemployment rate, RealGDP_per_cap = Log of real GDP per capita, LnRealGDP = Log of real GDP

The result of the ADF revealed that with the exception of the log of real GDP which was stationary at the second-order difference, other variables tested were stationary at the first-order difference thereby suggesting that the data were fit for the Granger causality test. The result of the Granger Causality test conducted to examine the causal effect of the identified macroeconomic variables on the total returns on residential real estate investment in Abuja and Lagos are presented and discussed in Tables 7 and 8 respectively.

Table 7: Result of Granger Causality test among macroeconomic variables and residential real estate investment returns in Abuja

Null hypothesis	F-statistic	Prob.
ΔLninfR does not Granger Cause total returns in Abuja	15.1209	0.0215*
ΔLnExchR does not Granger Cause total returns in Abuja	0.7474	0.8736
ΔLnintR does not Granger Cause total returns in Abuja	5.9115	0.1017
ΔLnUnempR does not Granger Cause total returns in Abuja	1.8153	0.0302*
ΔRealGDP_per_cap does not Granger Cause total returns in Abuja	21.3002	0.0401*
ΔΔLnRealGDP does not Granger Cause total returns in Abuja	6.0081	0.0919

Sources: Authors' analysis, 2023

The Granger Causality analysis result presented in Table 7 suggested that inflation rate, unemployment rate and real GDP per capita are the only macroeconomic variable that have causal effect on real estate investment returns in Abuja that were statistically significant at $\alpha = 0.05$. The causal linkage between exchange rate, interest rate and real GDP and total returns on residential real estate investment in Abuja were not statistically significant.

Table 8: Result of Granger Causality test among macroeconomic variables and residential real estate investment returns in Lagos

Null hypothesis	F-statistic	Prob.
ΔLninfR does not Granger Cause total returns in Lagos	26.3983	0.0092*
ΔLnExchR does not Granger Cause total returns in Lagos	1.6754	0.5668
ΔLnintR does not Granger Cause total returns in Lagos	0.8482	0.0704
ΔLnUnempR does not Granger Cause total returns in Lagos	5.8941	0.6116
ΔRealGDP_per_cap does not Granger Cause total returns in Lagos	18.7263	0.0372*
ΔΔLnRealGDP does not Granger Cause total returns in Lagos	6.0812	0.8677

Sources: Authors' analysis, 2023

Granger Causality test was conducted to evaluate the causal linkage between macroeconomic variables and total return on residential real estate investment in Lagos. The analysis revealed that

only inflation rate and real GDP per capita have statistically significant causal linkages between real estate investment returns in Lagos at an Alpha level of 0.05. Thus the causal effect of exchange rate, interest rate, unemployment rate and real GDP on total returns on residential real estate investment in Lagos was not statistically significant. This finding is in consonant with the findings of Udoekanem et al. (2014) and Olatunji et al. (2017)

Conclusion and Recommendations

This study examined the performance of residential real estate investment returns in Abuja and Lagos as well as the effect of basic macroeconomic factors on such returns. The study found that residential real estate investment in Lagos recorded the higher average total return within the study period. It however, recorded the higher risk on investment as determined by modified value at risk. Residential real estate investment in Abuja on the other hand performed better on the basis of risk-adjusted return as indicated by the modified Sharpe ratio. With respect to the causal effect between residential real estate investment returns and macroeconomic variables, only inflation rate, unemployment rate and real GDP per capita had statistically significant effect on residential real estate investment returns in Abuja. In Lagos, only inflation rate and real GDP per capita had statistically significant effect on total return on residential real estate investment. However, the extent or degree of the effect was beyond the scope of this study.

Based on the findings of this study, it is recommended that real estate investors could take advantage of the positive rental and capital value growths in Abuja and Lagos and invest their money in residential real estate. The nominal total returns on residential real estate investment equally looked attractive to potential investors. Finally, this study recommends to the government to formulate and implement economic policies that would address the high unemployment rate and inflation rate in the study areas and Nigeria at large. These macroeconomic variables identified as having a negative causal effect on residential real estate investment returns deprive investors of their ultimate investment goal of maximising returns and minimising risk.

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