DOI: https://doi.org/10.68128/jocrebe.2023.h48jjhzo

Journal of Contemporary Research in the Built Environment ISSN: 2636-4468
Volume 7, Number 1, March 2023 © Department of Building, University of Uyo

INFLUENCE OF INFLATION ON COMMERCIAL REAL ESTATE RETURNS IN NIGERIA

Nwosu A.E [1], Thomas O. J [2] and Gbadebo O. A [3]

Department of Estate Management, Federal University of Technology, Akure, Ondo State, Nigeria.

ABSTRACT

Purpose: This research paper examines the influence of inflation hedging status on commercial property holding returns of property market in Akure, Ondo state. The study analyses the holding period returns generated from commercial property in the selected areas in Akure.

Design/methodology/approach: The selected study area comprises of commercial property type developments in Oba Adesida, Ijoka, Oke-Aro, Alagbaka, and Arakale. The data used for this research paper is the total return derived from the income and capital return sourced from the property and valuation companies. Treasury bill rates provided by the Nigeria central bank served as a proxy for actual inflation, while data on consumer price index from the bureau of statistics served as a proxy for anticipated inflation. The gap between actual and anticipated inflation was used to compute the unexpected inflation. The returns of the commercial properties were examined using descriptive analysis, and the Philip-Perron unit root test was employed to determine whether the data was stationary. Regressing the returns versus actual, anticipated, and unexpected inflation rates was done using ordinary least square model that Fama and Schwert postulated.

Findings: The ability of commercial real estate to hedge against inflation varies depending on the location. It was discovered that the income returns of commercial properties in all the locations considered entirely hedged against anticipated inflation and unexpectedly hedged against actual and unforeseen inflation (Income return variable is a short-term component). The capital and total return are not been hedged against any of the inflation components (Capital and total return is a long-term component).

Implication: The findings of this study implies that commercial real estate returns is a hedge against inflation in the short-term but not a good hedge against inflation in the long-term. Domestic and foreign investors (individual and institutional) interested in investing in Nigeria's real estate market will find this study beneficial. It can assist investment forecasts as well as decisions about which asset types to include in portfolios to protect the value of investors' earnings from inflationary erosion. Also, academics and researchers studying the Nigerian real estate market will have useful and up-to-date references.

Originality/value: This paper examines the influence of inflation hedging status on selected commercial property holding returns in Akure by extending the time frame to 2020 and also considers the existing variation amongst the selected areas. Furthermore, this study will help prospective investors and real estate practitioners that are interested in commercial property investment in Nigeria to understand the influence of inflation on commercial real estate holding returns.

Keywords: Performance; Inflation; hedging; Commercial; Real estate; Returns.

[1] Email: nwosuaku@yahoo.com

1. INTRODUCTION

Typically, the term ‘commercial property’ refers to structures that accommodate businesses, however, can be described as larger residential residences and land that is meant to be profitable. Kuye (2003) and James (2018) suggest that the term "commercial property" is too elaborate to be defined. However, it was described as real estate that is utilized for commercial purposes. They can be a complex combination of rooms for public interaction, spaces for commercial activity, classrooms, and workspaces. The classification of a property as a commercial entity affects how the property is financed, how taxes are handled, and which laws are applicable to it. According to Ustaoglu (2003), noted that three main elements can be linked to commercial property. Firstly, as a production site which offers space for commerce and industry, secondly, as a monetary asset, commercial real estate establishes an important portion of asset markets, which significantly contributes to real GDP growth. Thirdly, it generates value-based revenue for its holders as an investment medium. One of the risks impeding the achievement of the investment goal has been identified as inflation risk (Peyton, 2011). According to Ola (2001), inflation is a long-term increase in the real prices of services and goods in an economy. It is a natural occurrence in an economy that causes hike in price of goods and services. It also reduces the procuring influence of money, which has an effect on the request and quantity of such goods and services. Inflation can wear away trust in a nation's money, transactions, and eventually lead to the economy's demise (Sing and Low, 2000). Inflation, according to Zhou, Gong, and Zeng (2022), can cause fiscal syndrome and social and monetary volatility. Certain investment assets do not protect the procuring influence of their investment returns during inflationary phases (Donovan, 2017).

Real estate has over time been observed as a vital inflation hedge, but recent research has produced diverse results regarding real estate investment's strenght to hedge inflation. Voigtlander and Demary (2009), Bello (2004), Umeh and Omisore (2015,) and Wahab, Ola, Sule, Adepoju, and Dodo (2018) perceived that real estate asset did not offer an inflation hedge, while Zhou and Clement (2010), Aqshia and Mashia (2018), Quingping (2008), Anonhaemanon, Ceuster, Annaeert and Long (2013), Fleischman, Fritz and Sebastain (2019) proposed an optimistic inflation hedge. Bello (2005) discovered that real estate is not an unending inflation hedge, Amidu and Aluko (2006), Odu (2011), and Dabara (2014) demonstrate that real estate is an inflation hedge However, the findings of these studies differ in terms of the ability of inflation hedging.

Given the above, this current study intends to fill the existing gap that has been identified by the authors in the Nigerian context. Umeh and Omisore (2015) investigated residential and inflation hedging in Ibadan, whereas Wahab et al (2018) investigated residential and inflation hedging in Abuja. However, Dabara (2014) investigated the connection between inflation and commercial property returns in Akure. However, this current study fills the existing gap by extending the time frame of the study to 2020, which Dabara (2014) stopped in 2013. The current study identified the major commercial areas in Akure that Dabara (2014) failed to do. This current study has also extended the base of the literature review to 2022. This paper examined the inflation-hedging status of commercial property in the selected areas. The findings of the current study will add to the existing literature on the subject matter of this study. The findings will also help prospective investors in commercial property in Akure to understand the term of real estate as a hedge against inflation.

This paper is designed along the following line of objectives: to examine the return profile of commercial property types in the selected locations within the period of 2010 to 2020; identify the inflation components in the Nigerian commercial property market, and scrutinize the inflation hedging status of commercial asset type returns in the chosen area. Consequently, this paper is structured as follows: the first section is an introduction, while the second, third, fourth, fifth, and sixth sections are literature reviews; research methods; data analysis; discussion of results; conclusion; and policy recommendations, respectively.

2. LITERATURE REVIEW

According to Ojo (2000), Inflation is defined as a sustained increase in the general price of goods and services in an economy. It is calculated using the percentage variation in the price index. Inflation is usually thought to be an increase in real value, but it is actually an upsurge in the volume of money and credit, raising general prices and eroding procuring power (Appraisal Institute, 2008). Between 1953 and 1971, Fama and Schwert were the first to provide empirical evidence on the inflation-hedging capabilities of several assets such as common stocks, government bonds, treasury bills, labor income, and private residential real estate. The Consumer Price Index was used as a proxy for actual inflation, and the nominal rate of 90-day US Treasury bills was used as a proxy for expected inflation. The Ordinary Least Square regression model was used to assess the assets' ability to hedge against inflation. According to the findings, private residential real estate returns were the only asset that perfectly hedged in contradiction of both expected and unexpected inflation, whereas labor income only partly hedged in contradiction of both expected and unexpected inflation. Furthermore, government debt instruments provided a comprehensive hedge in contradiction of expected inflation, whereas common stock returns provided a awkward hedge against both expected and unexpected inflation.

Limmack and Ward (1988) The 1977 Fama and Schwert model was applied to a set of quarterly data in the United Kingdom's property sector from 1976 to 1986, using Treasury bill rates as a measure of expected inflation. They discovered that, with the exception of the industrial sector, all commercial property sectors hedge against inflation. Bond and Webb (1989) investigated commercial, residential, and farmland's ability to hedge against inflation. The consumer price index was employed as a proxy for the actual rate of inflation. To regress the inflation components against the returns, the ordinary least squares model was used. Residential property returns are a complete hedge against both actual and unexpected inflation, but not against expected inflation, according to the findings. Commercial property returns, on the other hand, are hedged in contrast to expected inflation but not actual or unexpected inflation. Farmland returns hedged in contradiction of expected inflation but not against unexpected inflation and unsuccessful hedge against actual inflation.

Inflation hedging and equity investment in real estate was investigated by Voigtlander and Demary (2009). The study employed Panel Data Augmented Fama and Schwert Regression. The dataset includes total return indices for residential, commercial, and retail property. According to the findings, investing in real estate equities does not safeguard in contradiction of inflation. However, various levels of inflation defense are available for residential, commercial, and retail real estate. Returns and inflation have a statistically significant adverse relationship. From 1996 to 2000, Bello (2004) examined the inflation-hedging characteristics of residential property investment, ordinary shares, and savings accounts in Nigeria using the Ordinary Least Square (OLS) regression model. Actual, expected, and unexpected inflation were all classified. Ordinary shares have a high capacity for inflation hedging, whereas savings accounts have a low capacity for inflation hedging, and residential property does not hedge in contradiction to actual inflation but is a strong hedge against expected inflation. The study was conducted in 2004, and the study area was limited to residential property. Odu (2011) investigated the relative inflation hedging strength of commercial properties (offices) in three leading Lagos state locations (Victoria Island, Ikoyi, and Ikeja). In the study, the ordinary least squares model recommended by Fama and Schwert (1977) was used to regress real estate returns against inflation rates components. Commercial properties in leading locations around Victoria Island and Ikoyi, according to the study's findings, provide a perverse hedge against actual inflation, whereas commercial properties in Ikeja and the adjoining areas provide a complete hedge against actual inflation. Odu (2011) focused its efforts on three commercial leading centers in Lagos. The current study will broaden the research's scope to include Akure.

Osagie, Gambo, Anyakora, and Idowu (2012) investigated the inflation hedging strength of returns from office and retail properties in the Lagos Metropolis from 1998 to 2008. They focused on five neighborhoods: Lagos Island, Ikeja, Surulere, Ikoyi, and Lekki. Their research used descriptive statistics to display the trend of returns on commercial real estate investments versus the change in inflation over the study period, with rental values being substitutes for real prices. According to their findings, while

office and retail properties do not offer a hedge against inflation in the short run, only office properties do so in the long run. In determining the inflation hedging abilities of property investments, no statistical (analytical) methods were used in the study. Thus, Ogunba, Obiyomi, and Dugeri (2013) investigated the inflation hedging potentials of office and retail real estate assets in Nigeria's Ibadan metropolis. Actual inflation was represented by the Nigerian Consumer Price Index, while expected inflation was represented by 91-day Treasury bill rates in Nigeria. Data for rental and capital values of commercial property were obtained from property valuation firms in Ibadan between 2000 and 2010. The data was also analyzed using the Ordinary Least Squares (OLS) method proposed by Fama and Schwert (1977). Commercial real estate returns were discovered to be a meager hedge against actual inflation, a limited hedge against unexpected inflation, and nearly a comprehensive hedge against expected inflation. This study, on the other hand, only examined office and retail property investments in Ibadan, whereas the current study will focus on Akure. In order to determine the inflation-hedging characteristics of commercial property investments, Dabara (2014) investigated the relationship between inflation and commercial real estate assets returns in Akure, Nigeria. The study found that the inflation hedging potentials of commercial property investments provide an awkward hedge for income, capital, and total returns respectively. Similarly, it provides a perverse hedge for expected inflationary income, capital, and total returns, while providing a partial hedge for unforeseen inflation for income, capital, and total returns. The findings of Odu (2011) were hypothetically corroborated by Dabara (2014), who posited that there is no mutual ground in terms of the inflation-hedging characteristics of commercial real estate investment due to the localized nature of the property market. From 2002 to 2014, Umeh and Oluwasore (2015) probed the inflation-hedging competences of returns on residential property assets in selected areas of Ibadan, Nigeria. Their study regressed the rates of return (capital, income, and total return) of the considered residential property assets against three components of inflation rates employing Fama and Schwert's (1977) ordinary least squares. It was discovered that the ability of property assets to hedge against inflation differs across geographical sub-markets. Property assets did not hedge against actual inflation in any of the areas studied. In terms of expected inflation, however, the capital and total returns of residential properties in the Akobo submarket were absolutely hedged, whereas income and total returns in the Bodija estate were partly hedged.

Nwosu (2019) investigated the ability of private student hostels in the vicinity of the Federal University of Technology Akure to hedge against inflation. The data was analyzed using an Ordinary Least Squares model. The findings revealed that, while private student hostel investment is not always a good hedge against inflation, with a few exceptions, it provides a perverse hedge against inflation. Chibuikem and Obinna (2019) investigated the ability of commercial real estate investments in Lagos to hedge against inflation. The study used total returns of commercial real estate investments calculated from the average annual capital and rental values of the investments. The CPI was used as a proxy for actual inflation, while Treasury bill rates were used to forecast inflation. The information was gathered between 2007 and 2018. The ability of the investments to hedge against inflation was determined using a Fama and Schwert (1977) regression analysis. The total returns from commercial real estate assets in the study area, according to the study's findings, did not offer a hedge against the three inflation components. In Akure, Nigeria, Nwosu (2020) investigated the association between hostel investment returns and inflation rates. Rental and capital income data were gathered from the study area's Estate Valuation property Firms. Descriptive and inferential statistics were used to analyze the survey data. The Phillip Perron unit root test demonstrated that the data sets had a combination of integration orders. The rate of return on hostels and the rate of inflation had a varying relationship. Some hostels, however, had a positive relationship with the inflation components, while others had a negative relationship with the inflation component. The disparity in the results of the preceding studies suggests the need to investigate the inflation-hedging potentials of real estate assets regularly and across diverse regions.

3. METHODOLOGY

The study area is Akure which was made the capital of Ondo State in 1976. Akure was used as study area because of the relative vibrancy of the property market in the city compared to other cities in Ondo

State and based on the fact that the research focused on commercial property, a location where there is high presence of commercial activities is one of the prime importance to be considered. Akure has a strong commercial base because a large number of businesses mostly commercial and service-based businesses operate there. Most of these commercial activities can be found on Oba Adesida Road, Ijoka, Oke-Aro, Alagbaka, Oyemekun Road, Ilesha Garage, Arakale Road and adjoining streets. Commercial property represents the second largest land use in Akure, Ondo State and shopping centres and offices are part of commercial property investment because it is an avenue for profit maximization for both the owner and occupier. The need to consider the benefit of investing in commercial property in a low inflation environment and the particular risks in investing in a high inflation environment is important because Akure being the commercial nerve centre of Ondo State is seen to be a very profitable place for an investment to take place. The study focuses on commercial properties in Akure (Oba Adesida, Ijoka, Oke-Aro, Alagbaka, and Arakale) because investment in these areas is typically more appealing to investors than in other areas of the city. The study looked at commercial property spaces per square metre (office and shopping centers). The sampling frame for this study is the property and valuation companies in Akure. As obtained from the authorized website of the Nigerian Institution of Estate Surveyors and Valuers (New Directory of NIESV Members and Registered Firms, 2021 Edition), the total number of property and valuation companies practicing in Akure is 25. The number of property and valuation companies is within manageable size and hence, census was adopted whereby all of them were involved in the study. Structured questionnaires were designed and distributed to the principal partners/branch managers of the companies in the study area to source for data on rental and capital values extracted from their records. This was used to compute the income, capital, and total returns. Secondary data (inflation rates and treasury bills rates) were obtained from statistical bulletins published by the National Bureau of Statistics and the Central Bank of Nigeria (2020). The Nigerian Bureau of Statistics calculated the Nigerian Consumer Price Index (CPI), which was used to determine the actual inflation rates. Unexpected inflation was calculated by subtracting the expected inflation from the 90-day Treasury bill rate. Which was obtained from the CBN records. The rental and capital value data were used to compute the total returns for the various commercial properties in the selected locations. The data for this study ranged from 2010 to 2020. The total return is expressed as:

$$\mathrm{TR_t} = \frac{\mathrm{NIt}+(\mathrm{CV_t} - \mathrm{CV_{t-1}})}{\mathrm{CV_{t-1}}} \qquad \ldots eqn.1$$

Where; TRt is Total return, CVt-1 is the Capital value of direct property at the beginning, CVt is the Capital value of commercial property at the end and NIt is Income of commercial property received during the holding period

An initial test for the stationarity properties of data sets in a time series is essential. The Philip Perron Unit root test was used to accomplish this. This was necessary to avoid erroneous results in subsequent analysis and to efficiently capture the long-term information or relationship of the data sets. The Philip Perron unit root equation used is expressed as:

$$CYt = \alpha + \mathrm{bYt} - 1 + \varepsilon\mathrm{t} \qquad \ldots eqn.2$$

Where εt is a zero-mean k-variate stationary time series process, $alpha\ is$ a *k*-vector of drift parameters, ΔY is (trend) stationary.

The hypothesis is:

H_o:δ=0 (Unit Root)

If t*>PP critical value, = not reject null hypothesis, that is, unit root exists.

If t*<PP critical value, = reject null hypothesis, that is, unit root does not exist.

We fail to reject the null hypothesis of a unit root in the series at conventional significance levels if p-value less than our level of significance otherwise we accept the null hypothesis.

Following the determination of the data sets' stationarity properties, the dependent variable, returns, was regressed against the independent variables, inflation rates, using the Fama and Schwert Ordinary Least Square Regression Model.

The regression equation for actual inflation is given as:

$Rcpt=\alpha cp+\beta cp(AIt)+\varepsilon cpt$ … eqn. 3

The regression equation for expected inflation is given as:

$Rcpt=\alpha cp+\beta cp(EIt)+\varepsilon cpt$ … eqn. 4

The regression equation for unexpected inflation is expressed as:

$Rcpt=\alpha cp+\beta cp(AI-EI)\ t+\varepsilon cpt$ … eqn. 5

Where:

$Rcpt$ = the total return on the commercial property cp, at time t,
αcp= the intercept term, is the actual rate of return on the commercial property p,
βcp = the coefficient of actual inflation of the commercial property,
AIt = the actual inflation rate at period t-1 to t,
EIt =the expected inflation rate at period t-1 to t,
$(AI-EI)\ t$ = the unexpected inflation rate from period t-1 to t, and
εcpt represents the error term,

4. PRESENTATION AND DISCUSSION OF RESULTS

This section of result is structured into descriptive and inferential statistics. The descriptive statistics entails the returns of commercial properties and components of inflation hedging, while the inferential statistics is the unit root test to examine the stationarity of the data sets and the ordinary least square test is to regress inflation rates against the holding period returns. Table 1 shows the returns of commercial properties in the study areas. The rental and capital values in naira was converted to returns in percentage. The details of the returns in Table 1 are as shown in appendices III, IV and V.

Table 1 depicts the income, capital, and total returns of commercial properties in the five locations. Appendix III shows the income returns of commercial properties in the five locations. It is noticeable that properties in Alagbaka have the highest return in 2011 with a return of 3.40% and the lowest return was seen in 2015 with a return of 3.02% while properties in Oba Adesida have the highest return in 2013 with a return of 3.29% and the lowest return in 2011 with a return of 3.02%. Also, properties in Ijoka have the highest return in the year 2016 with a return of 3.01% and the lowest return in the year 2014 and 2015 with return of 2.53%. Properties in Oke Aro have the highest return in 2019 with a return of 2.82% and lowest return in 2018 with return of 2.57%. The properties in Arakale have the highest return in 2013 with return of 3.36% and lowest return in 2012 with return of 3.05%. The high return could be connected to a high demand in the property type in the location during the period. According to the table, properties in Arakale, Oba Adesida, and Alagbaka produced the highest income returns during the study year, while properties in Oke Aro produced the lowest. The high return in these areas might be attributed to the area's high demand for commercial real estate during the study period.

Table 1: Returns of Commercial Properties in the Study Area

YEAR	OBA ADESIDA	IJOKA	OKE ARO	ALAGBAKA	ARAKALE
Average Income Return					
SUM	31.69	26.83	26.76	31.84	32.18
STDEV	0.10	0.17	0.08	0.15	0.12
AVERAGE	3.169	2.683	2.676	3.184	3.218
MIN	3.02	2.53	2.56	3.02	3.05
MAX	3.31	3.01	2.82	3.4	3.42
RANK	3rd	4th	5th	2nd	1st
Capital Return					
SUM	56.3	73.31	69.59	61.22	72.05
STDEV	3.17	6.77	3.38	5.14	3.98
AVERAGE	5.63	7.331	6.959	6.122	7.205
MIN	0.83	1.18	2.27	0.59	1.57
MAX	10.23	20.56	12.63	13.46	13.92
RANK	5th	1st	4th	3rd	2nd
Total Return					
SUM	87.99	100.14	96.33	93.05	104.2
STDEV	3.26	6.94	3.47	5.30	4.10
AVERAGE	8.799	10.014	9.633	9.305	10.42
MIN	3.85	3.71	4.83	3.61	4.61
MAX	13.53	23.57	15.44	16.86	17.34
RANK	5th	1st	4th	3rd	2nd

Source: Field Survey, 2021

Appendix IV shows the capital returns of commercial properties in the five locations. It is noticeable that properties in Alagbaka have the highest return in 2011 with a return of 13.46% and the lowest return was seen in 2015 with a return of 0.59%. properties in Oba Adesida have the highest return in 2013 with a return of 9.78% and the lowest return in 2011 with a return of 0.83%. Also, properties in Ijoka have the highest return in the year 2016 with a return of 20.56% and the lowest return in the year 2015 with return of 1.18%. Properties in Oke Aro have the highest return in 2019 with a return of 12.63% and lowest return in 2018 with return of 2.63%. The properties in Arakale have the highest return in 2013 with return of 11.99% and lowest return in 2012 with return of 1.57%. The high return could be connected to a high demand for commercial properties in the area during the period of study. The capital returns of commercial properties in the five locations are as follows: Ijoka has the highest capital return, while Oba Adesida has the lowest capital return.

Appendix V shows the total returns of commercial properties in the five locations. It is noticeable that properties in Alagbaka have the highest return in 2011 with a return of 16.86% and the lowest return was seen in 2015 with a return of 3.61%. properties in Oba Adesida have the highest return in 2016 with a return of 13.53% and the lowest return in 2011 with a return of 3.85%. Also, properties in Ijoka have the highest return in the year 2016 with a return of 23.57% and the lowest return in the year 2015 with return of 3.71%. properties in Oke Aro have the highest return in 2019 with a return of 15.44% and lowest return in 2018 with return of 4.83%. The properties in Arakale have the highest return in 2016 with return

of 17.34% and lowest return in 2017 with return of 7.03%. The high return could be connected to a high demand in the property type in the location during the period. Property in Ijoka had the highest total return, while property in Oba Adesida had the lowest total return. The high return could be attributed to the location's high demand for the property type at the time. The most volatile property is Ijoka, followed by Alagbaka and Oba Adesida

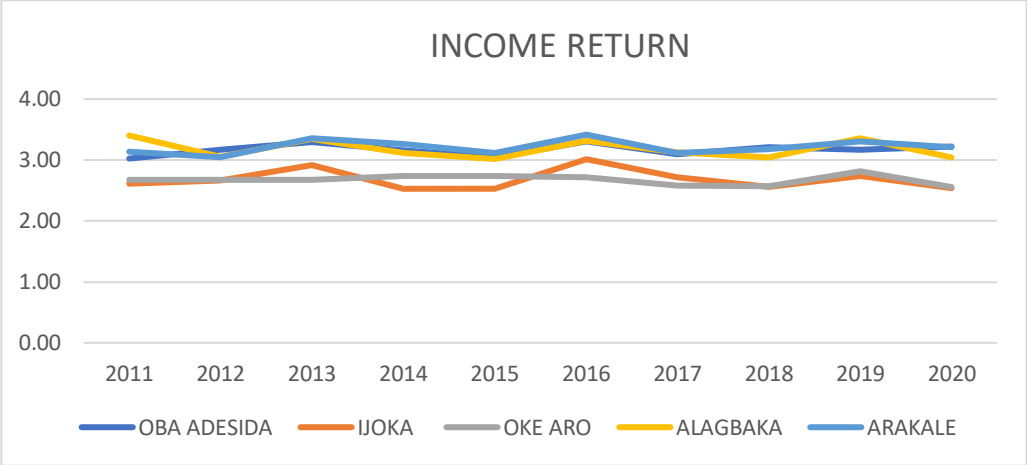


Figure 1: Trend Analysis of Income Return of Commercial Properties in the study areas
Source: Field Survey, 2022

Arakale = 0.0089x -14.631, R^2 = 0.0504 Oke-Aro = -0.0068x + 16.287, R^2 = 0.0584

Alagbaka = -0.0143x + 31.995, R^2 = 0.0788 Oba-Adesida = 0.0082x - 13.292, R^2 = 0.0678

Ijoka = -0.0054x + 13.546, R^2 = 0.0093

Figure 1 a trend analysis of the income returns on commercial properties in the selected locations. The outcome demonstrates a consistent fluctuation in income return over the period of the study. The coefficient of income returns of commercial properties in Arakale and Oba Adesida is positive, implying that over time, there is an increase in the rate of income returns of commercial properties in these locations, whereas the coefficient of income returns of commercial properties in Oke Aro, Alagbaka, and Ijoka is negative, implying that unit change in time will decrease the rate of income return of commercial properties in these locations. The R^2 indicates the predictability of the prediction, 0.93% for Ijoka, 7.88% for Alagbaka, 6.78% for Oba Adesida, 5.04% for Arakale and 5.84% for Oke Aro. This is very low for the five locations, implying that other factors are at work in explaining the variation in income returns from these locations. Furthermore, the graph revealed that, in general, the income return tends to decrease over time.

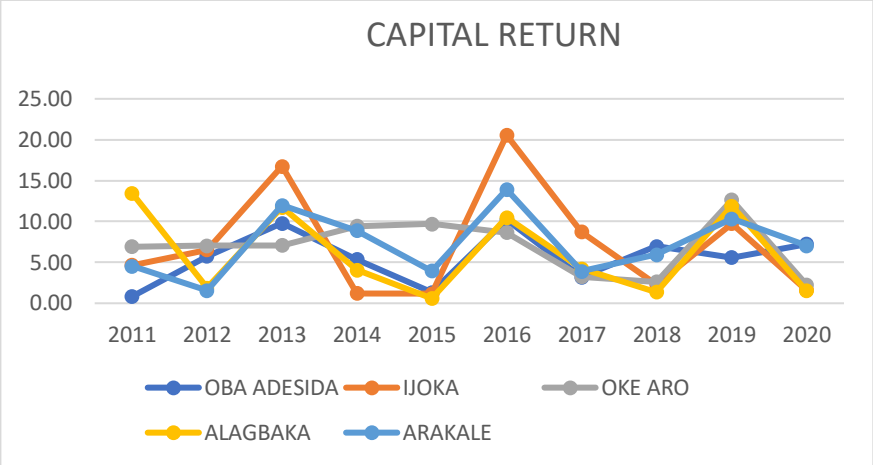


Figure 2: Trend Analysis of Capital Return of Commercial Properties in the study area
Source: Field Survey, 2022

Oke-Aro = 0.0191x - 30.976, R^2 = 0.0003 Oba Adesida = 0.2395x - 477.12, R^2 = 0.0394

Ijoka = 0.1821x - 359.05, R^2 = 0.0053 Arakale = 0.4203x - 839.65, R^2 = 0.0743

Alagbaka = -0.2736x + 557.93, R^2 = 0.0209

A trend analysis of commercial property capital returns in the selected locations is depicted in Figure 2. The outcome demonstrates a constant variation in capital return. The results show that, except for Alagbaka, the coefficient of capital returns for commercial properties in all locations is positive, implying that a unit change in time will cause increase in capital return on commercial properties in these locations. The R^2 shows the level of reliability of prediction, 0.53% for Ijoka, 2.09% for Alagbaka, 3.94% for Oba Adesida, 3.94% for Arakale and 0.03% for Oke Aro. Each of the five locations has an extremely low R^2 implying that there are other factors that contribute to the variation in capital value of these locations. Furthermore, the figure revealed that generally, the capital return tends to decrease over time.

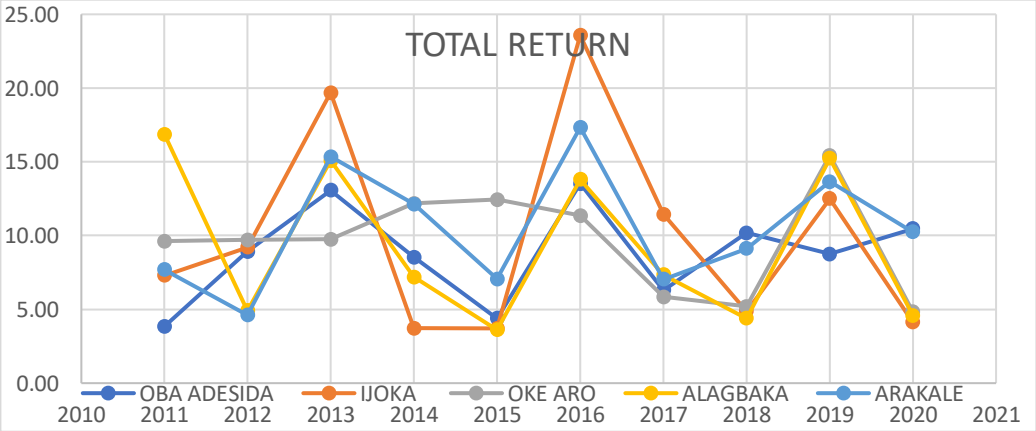


Figure 3: Trends of Total Returns of Commercial Properties in the study area

Source: Field Survey, 2022

Oba Adesida = 0.2804x - 556.36, R^2 = 0.0678 Ijoka = -0.221x + 455.37, R^2 = 0.0093

Arakale = 0.304x - 602.34, R^2 = 0.0504 Oke-Aro = -0.2769x + 567.75, R^2 = 0.0584

Alagbaka = -0.4908x + 998.48, R^2 = 0.0788

A trend analysis of commercial property capital returns in the selected locations is depicted in Figure 3. The outcome demonstrates a consistent fluctuation in total return increases and decreases. Except for Alagbaka, the results show that the coefficient of total returns on commercial properties in all locations is positive only in Arakale and Oba Adesida, implying that a unit change in time decreases the rate of total returns in most of the locations except in Arakale and Oba Adesida. The R^2 shows the level of reliability of prediction, 0.93% for Ijoka, 7.88% for Alagbaka, 6.78% for Oba Adesida, 5.04% for Arakale and 5.84% for Oke Aro. Each of the five locations has an extremely low R^2 which implies that there are other factors that contribute to the variation in total returns of commercial properties in these locations. Furthermore, the graph revealed that, in general, the total return decreases over time.

Table 2: Inflation Component within the study period

YEAR	ACTUAL	EXPECTED	UNEXPECTED
2010	13.76	3.85	9.91
2011	10.85	10.07	0.78
2012	12.24	14.11	-1.87
2013	8.52	11.6	-3.08
2014	8.06	10.93	-2.87
2015	9.01	9.65	-0.64
2016	15.63	10.44	5.19
2017	16.55	14.36	2.19
2018	12.15	11.02	1.13
2019	11.39	11.37	0.02
2020	12.18	14.12	-1.94

Source: Nigerian Bureau of Statistics/CBN Statistical Bulletin and Official Report

Inflation rates from 2010 to 2020 are shown in Table 2. Based on the research of Fama and Schwert, inflation was decomposed into three components in this study (actual, expected, and unexpected). The table investigates the rate of volatility in Nigeria's inflation rate. The table shows that actual inflation rates are volatile, indicating the Nigerian economy's insecurity. From 2009 to 2012, annual actual inflation was in the double digits; from 2013 to 2015, it was in the single digits; and from 2016 to 2020, it was in the double digits. As a result, the Nigerian economy faces a significant challenge in maintaining a single-digit growth rate. The findings are consistent with the findings of Dabara (2015) study, which found that Nigerian monetary authorities have struggled to keep inflation in the single digits.

Tables 3 present the Philip Perron unit root test of the rate of return and rate of inflation components. At 5% significance levels, the calculated Philip Perron test analysis was performed. If the probability value for a unit's null hypothesis (H0) is greater than 0.05, it is rejected; otherwise, it is accepted. The unit root test results indicate that the time series variables are integrated in two orders: level (I (0)) and first difference (I (1)). Based on the unit test results, Fama and Schwert's proposed Ordinary Least Square Regression was used to assess the inflation hedging capability of commercial property returns in the study area between 2010 and 2020.

The following is the decision rule for inflation hedging capability: if the coefficient beta is between 0.4 and 0.1, the asset is considered a partial inflation hedge. If the coefficient beta is less than zero, i.e., the value of beta is negative, it is a perverse hedge against inflation; otherwise, it is completely hedged (Odu (2011); Dabara) (2015). In terms of income return, Table 4 depicts the inflation-hedging characteristics of commercial real estate. The table shows that all study areas' properties are completely hedged against expected inflation, with betas of 0.822, 0.796, 0.783, 0.788, and 0.788, respectively. The findings of this study contradict those of Odu (2011), who found that commercial property investments in Lagos provide a complete hedge against actual inflation. This could be as a result of different study times or other unknown factors. This finding is consistent with Sing and Low's (2000) review of studies on the inflation-hedging characteristics of real estate in many countries, which discovered that real estate hedges against expected inflation but not against unexpected or actual inflation.

Table 3: Philip-Perron Unit Root Test for Data Sets (2010-2020)

Return		**t-Statistic 5%**	**Prob.**		**t-Statistic 5%**	**Prob.**	**Order of Integrat.**
Income	ALAGBAKA	-0.54467	0.8423	D(ALAGBAKA)	-10.5911	0	I(1)
Return	ARAKALE	4.634832	1	D(ARAKALE)	-3.22535	0.0425	I(1)
	IJOKA	0.465917	0.9744	D(IJOKA)	-6.17623	0.0012	I(1)
	OBA_ADESIDA	5.527677	1.0000	D(OBA_ADESIDA	-4.18987	0.0137	I(1)
	OKE_ARO	0.971211	0.9913	D(OKE_ARO)	-6.41641	0.0009	I(1)
Capital	ALAGBAKA	-13.3436	0.0000	D(ALAGBAKA)	-14.7408	0.0000	I(1)
Return	ARAKALE	-6.74569	0.0006	D(ARAKALE)	-8.42977	0.0002	I(1)
	IJOKA	-5.45667	0.0027	D(IJOKA)	-6.2032	0.0017	I(1)
	OBA_ADESIDA	-11.1571	0.0000	D(OBA_ADESIDA)	-9.81042	0.0001	I(1)
	OKE_ARO	-3.4659	0.0374	D(OKE_ARO)	-6.14479	0.0018	I(1)
Total	ALAGBAKA	-16.2334	0.0000	D(ALAGBAKA)	-14.7408	0.0000	I(0)
Return	ARAKALE	-8.70554	0.0006	D(ARAKALE)	-8.42977	0.0002	I(0)
	IJOKA	-7.34551	0.0037	D(IJOKA)	-6.2032	0.0017	I(1)
	OBA_ADESIDA	-9.12301	0.0000	D(OBA_ADESIDA)	-9.81042	0.0001	I(0)
	OKE_ARO	-5.23652	0.0475	D(OKE_ARO)	-6.14479	0.0018	I(1)
Inflation	**Actual**	**-0.54467**	**0.2763**	**D(Actual)**	**-3.25981**	**0.0331**	**I(1)**
Rates	**Expected**	**4.63483**	**0.0002**	**D(Expected)**	**-3.25981**	**0.0026**	**I(1)**
	Unexpected	**0.4659**	**0.0405**	**D(Unexpected)**	**-3.25981**	**0.0422**	**I(1)**

Source: Field Survey, 2021

Table 4: Inflation-Hedging Characteristics of Commercial Properties (Income Return)

Income Return	Inflation	standardized coefficient				Type of hedge
Location		Constant	Beta	R-square	P-value	
Oba_Adesida	Actual Inflation	3.776	-0.216	0.046	0.524	Perverse
	Expected	-0.104	0.822	0.676	0.002	Complete
	Unexpected	3.034	-0.772	0.596	0.005	Perverse
Ijoka	Actual	-0.047	0.099	0.025	0.645	Partial
	Expected	-0.044	0.796	0.634	0.003	Complete
	Unexpected	2.56	-0.711	0.506	0.014	Perverse
Oke_Aro	Actual	3.374	-0.268	0.072	0.425	Perverse
	Expected	0.033	0.783	0.612	0.004	Complete
	Unexpected	2.564	-0.78	0.608	0.005	Perverse
Alagbaka	Actual	3.863	-0.231	0.053	0.495	Perverse
	Expected	0.039	0.778	0.605	0.005	Complete
	Unexpected	3.045	-0.749	0.561	0.008	Perverse
Arakale	Actual	3.916	-0.235	0.055	0.487	Perverse
	Expected	0.013	0.788	0.622	0.004	Complete
	Unexpected	3.079	-0.76	0.578	0.007	Perverse

Source: Field Survey, 2021

Table 5: Inflation-Hedging Characteristics of Commercial Properties (Capital Return)

Capital Return	Inflation	standardized coefficient				Type of hedge
Location		Constant	Beta	R-square	P-value	
Oba_Adesida	Actual	5.061	0.004	0	0.991	Partial
	Expected	-1.096	0.476	0.227	0.139	Partial
	Unexpected	5.372	-0.356	0.127	0.282	Perverse
Ijoka	Actual	-1.172	0.267	0.071	0.428	Partial
	Expected	0.533	0.239	0.057	0.48	Partial
	Unexpected	0.016	0.009		0.979	Partial
Oke_Aro	Actual	-0.63	-0.45	0.202	0.165	Perverse
	Expected	3.672	0.183	0.033	0.59	Partial
	Unexpected	6.688	-0.456	0.208	0.158	Perverse
Alagbaka	Actual	7.77	-0.098	0.01	0.775	Perverse
	Expected	3.764	0.091	0.008	0.789	Partial
	Unexpected	5.714	-0.138	0.019	0.686	Perverse
Arakale	Actual	9.427	-0.153	0.023	0.654	Perverse
	Expected	2.699	0.234	0.055	0.489	Partial
	Unexpected	6.806	-0.284	0.081	0.397	Perverse

Source: Field Survey, 2021

Table 5 illustrates the inflation-hedging characteristics of commercial properties in terms of capital return. According to the findings, properties in the chosen study areas partially protect investors returns against expected inflation while also being perversely hedged against actual and unexpected inflation. Generally, Oke-Aro, Alagbaka and Arakale mostly provide perverse hedge against the various components of inflation while Oba Adesida provides mostly partial hedge and Ijoka provides a better partial hedge against inflation components.

Table 6: Inflation-Hedging characteristics of commercial properties (Total Return)

Total Return	Inflation	standardized coefficient				Type of hedge
Location		Constant	Beta	R-square	P-value	
Oba_Adesida	Actual Inflation	8.861	-0.049	0.002	0.886	Preserve
	Expected	-1.197	0.596	0.356	0.053	Complete
	Unexpected	8.407	-0.484	0.234	0.131	Preserve
Ijoka	Actual	1.827	0.232	0.054	0.492	Partial
	Expected	0.78	0.314	0.099	0.346	Partial
	Unexpected	9.213	-0.073	0.005	0.832	Preserve
Oke_Aro	Actual	17.154	-0.443	0.196	0.173	preserve
	Expected	0.458	0.304	0.093	0.363	Partial
	Unexpected	9.25	0.317	0.294	0.085	Partial
Alagbaka	Actual	11.634	-0.128	0.016	0.708	preserve
	Expected	3.811	0.214	0.046	0.528	Partial
	Unexpected	8.758	-0.251	0.063	0.456	preserve
Arakale	Actual	13.335	-0.179	0.032	0.599	Preserve
	Expected	2.711	0.357	0.128	0.281	Partial
	Unexpected	9.882	-0.396	0.157	0.228	Preserve

Source: Field Survey, 2021

The inflation-hedging characteristics of commercial property total return are shown in Table 6. Only properties in Oba Adesida offer a complete hedge against expected inflation while other property types are perverse and partial hedging. This implies that inflation is having a negative influence on commercial total returns values in the Ijoka, Oke Aro, Alagbaka and Arakale respectively.

5. POLICY IMPLICATIONS AND CONCLUSIONS

The study looked at the inflation-hedging characteristics of commercial property values in a few Akure neighborhoods. From 2010 to 2016, the study showed a gradual increase in the capital values of office properties and a consistent increase in rental value. It was also discovered that properties had the highest total return in 2013 and the lowest total return in 2011. Properties also had the highest capital return in 2013 and the lowest capital return in 2011. Actual, expected, and unexpected inflation are broken down in terms of the consumer price index and Nigerian treasury bills as proxies for actual and expected inflation, with the unexpected resulting from subtracting the actual and expected inflation. Property returns in different geographical sub-markets react differently to individual inflation components, necessitating the decomposition of inflation rates into various components. According to the study's findings, returns on commercial property investments in the study area react differently to inflation. Property income returns in the study areas were completely hedged against expected inflation but poorly hedged against both actual and unexpected inflation. Capital returns are hedged perversely against both expected and unexpected inflation, as well as partially against actual inflation. This study has important implications for both domestic and foreign investors (individual and institutional) interested in investing in Nigeria's real estate market. The findings of the study can be used to make investment forecasts as well as decisions about which asset types to include in portfolios to protect the value of investors' earnings from inflationary erosion in Akure and other state capitals in Nigeria. As a result, academics and researchers studying the Nigerian real estate market will have a useful and up-to-date reference.

REFERENCES

Amonhaemanon, D., Ceuster, M. J., Annaert, J. M & Long, L.H., (2013). The Inflation Hedging Ability of Real Estate Evidence in Thailand. *International conference on Applied Economics (ICOAE) in Procedia Economics and Finance (5) 40-49.*

Amidu, A. & Aluko. B.T., (2006). 'Performance Analysis of Listed Construction and Real Companies in Nigeria'. *Journal of Real Estate Portfolio Management* 12(2), 177-185

Appraisal Institute. (2008). The appraisal of real estate, Chicago: Appraisal Institute.

Aqshia, N.S., & Masih, M., (2018). Is Residential Property the Ultimate Hedge against Inflation?

New Evidence from Malaysia Based on ARDL and Nonlinear ARDL, Working Paper No. 91508, MPRA, available at: https://mpra.ub.uni-muenchen.de/91508/ (accessed 2 February 2020).

Bond, M., & Webb, J., (1989). Inflation-Hedging Effectiveness of Real Estate. *Journal of Real estate Research* 4(2), 45-56.

Bello, M.O., (2005). The inflation-hedging attributes of investment real estate, ordinary shares, and naira denomination deposits between 1996 and 2002. *Journal of banking, 1-28.*

Bjorklund, K., (1999). Real Estate Performance: Five Essays. Doctoral dissertation, Department of Real Estate and Construction Management, Royal Institute of Technology, Stockholm.

Central Bank of Nigeria. (2020). Statistical Bulletin Abuja. Central Bank of Nigeria. http://www.nigeriastat.gov.ng

Chibuikem, M., & Obinna, L., (2019). Inflation-hedging capabilities of commercial real estate investments in metropolitan Lagos. *The Lagos journal of environmental studies.* 10(1).

Dabara, D.I., (2014). Inflation Correlation with Commercial Real Estate Investment in Akure, Nigeria. *Journal of Scientific Research and reports, 3*(23), 2998 – 3017.

Dabara, D.I. (2015). Inflation-Hedging Performance and Risk-return Characteristics of Residential Property Investment in Gombe, Nigeria. *Advances in research*, 3(1), 71-83.

Donovan, S., (2017). "The inflation hedging properties of South African asset classes", Master Commerce Thesis, Department of Finance and Tax, University of Cape Town, South Africa.

Fama E. F, & Schwert GW. (1977) Asset returns and inflation. *Journal of Financial Economics. 1977; 5(2), 115–146.*

Fleischmann, B., Frit, C., & Sebasstain S., (2019) Real Estate, Stock and Bond as a Deflation Hedge. *International Real Estate Review* 22(1), 1-26

Hoesli, M. (1994). Real estate as a hedge against inflation: lessons from the Swiss case. *Journal of Property Valuation and Investment*, 12 (3), 51-59.

Limmack, R., & Ward, C., (1988). Property Returns and inflation. *Land development studies, 5, 47-55.*

James, C., (2018). Alternative investment in real estate commercial properties. Retrieved from: https://www.investopedia.com/term/c/commercial property.asp

Kuye, O., (2003). Principle and Practice of Valuation, General principle. Climax communication limited, Lagos.

National Bureau of Statistics. (2020, October 18). Consumer Price Index: September 2020. Retrieved October 25, 2020 from National Bureau of Statistics: http://www.nigerianstat.gov.ng/uploads/latestRelease/2b4c61e6f58a11c191a72bd215e2ec420bf660e3.pdf

Nwosu, A.E., (2020). A Study on the Relationship between Hostel Investment and Inflation in Akure, Nigeria. *International Journal of Real Estate Studies 14(2), 156-164*

Nwosu, A.E., (2019). Inflation hedging characteristics of real estate hostel investment in Nigeria. *Journal of contemporary Research in the Built Environment*, 3(2), 45-60.

Odu T., (2011). Analysis of relative inflation hedging capacities of prime commercial properties in Lagos. *Global Journal of Human Social Science. 2011. 11(10), 42-51*.

Ogunba, O., Obiyomi, O., and Dugeri, T., (2013). The Inflation Hedging Potential of Commercial Property Investments in Ibadan, Nigeria. West Africa Built Environment Research (WABER) Conference Accra, Ghana, 1101-1111.

Ojo, M.O., (2000). "The role of autonomy of the Central Bank of Nigeria (CBN) in promoting macroeconomic stability". Central Bank of Nigeria and financial reviews. 38(1).

Ola, C. S. (2001). Accounting for Inflation in Nigeria. Spectrum books, Lagos Nigeria.

Oner, C. (2010). What is inflation? *Finance and Development*. 44-45.

Osagie, J.U., Gambo, Y. L., Anyakora, M. I., & Idowu, O.B.A. (2012). Are Commercial Properties a Good

Hedge Against Inflation? Evidence from Selected Commercial Centres in Lagos. *ATBU Journal of Environmental Technology*. 5(1), 18-33.

Peyton, M., (2011), "Is commercial real estate an inflation hedge?", Real Estate Issues, 36 (3). 37- 44.

Quingping, N T., (2008). Can Real Estate Returns Hedge Against Inflation? Feng Chia University Business Institute Ph.D. Thesis.

Sing, T.F., & Low, H.Y., (2000). The Inflation Hedging Characteristics of Real Estate and Financial Asset in Singapore. *Journal of Real Estate Portfolio Management*, 6(4) 373-385

Umeh, O. L. & Omisore, O. A. (2015). Inflation Hedging Abilities of Residential Properties in Selected areas of Ibadan Metropolis. *ATBU Journal of Environmental Technology*. 8(2), 93-106.

Ustaoglu, E., (2003). Hedonic `Price Analysis of office Rents. A case study of the Office Market in Ankara. A thesis submitted to the Graduate School of Social Science of Middle East Technical University.

Voigtlander, M., & Demary, M. (2009). The Inflation Hedging Properties of Real Estate: A Comparison between Direct Investments and Equity Returns. Retrieved October 22, 2021, from ERES Conference 2009:

Wahab, M.B., Ola, O.S., Sule, A.I., Adepoju, A. S., & Dodo, Z.U., (2018). Inflationary Hedging The capacity of House Price Returns in Emerging Economy of Nigeria, *Journal of Social Sciences* 9(2), 152-166.

Zhou, X. & Clements, S. (2010), "The inflation hedging ability of real estate in China", *Journal of Real Estate Portfolio Management. 16(3), 267-277.*

Zou, H., Gong, L., & Zeng, X. (2011). Inflation Aversion. *Annals of Economics and Finance. 12(1) 1-11*

APPENDICES

Appendix I: Average Rental Value of Commercial Properties in Akure in Rent/ m^2

YEAR	OBA ADESIDA	IJOKA	OKE ARO	ALAGBAKA	ARAKALE
2010	3178.95	1605.00	1730.00	3305.26	2750.00
2011	3205.26	1680.00	1850.00	3750.00	2875.00
2012	3389.47	1790.00	1980.00	3820.00	2920.00
2013	3721.05	2090.00	2120.00	4268.42	3270.00
2014	3921.05	2115.00	2320.00	4442.11	3560.00
2015	3973.68	2140.00	2545.00	4468.42	3700.00
2016	4380.00	2580.00	2765.00	4936.84	4215.00
2017	4520.00	2805.00	2855.00	5145.00	4380.00
2018	4835.00	2870.00	2930.00	5215.00	4640.00
2019	5105.00	3150.00	3300.00	5835.00	5120.00
2020	5475.00	3200.00	3375.00	5925.00	5480.00

Appendix II: Average Capital Value of Commercial Properties in the Study Area

YEAR	OBA ADESIDA	IJOKA	OKE ARO	ALAGBAKA	ARAKALE
2010	105964.81	64200.00	69200.00	110175.33	91666.58
2011	106842.00	67200.00	74000.00	124999.88	95833.24
2012	112982.34	71600.00	79200.00	127333.21	97333.24
2013	124034.96	83600.00	84800.00	142280.56	108999.89
2014	130701.62	84600.00	92800.00	148070.03	118666.55
2015	132456.01	85600.00	101800.00	148947.22	123333.21
2016	145999.85	103200.00	110600.00	164561.24	140499.86
2017	150666.52	112200.00	114200.00	171499.83	145999.85
2018	161166.51	114800.00	117200.00	173833.16	154666.51
2019	170166.50	126000.00	132000.00	194499.81	170666.50
2020	182499.82	128000.00	135000.00	197499.80	182666.48

Appendix III: Average Income Return

YEAR	OBA ADESIDA	IJOKA	OKE ARO	ALAGBAKA	ARAKALE
2010					
2011	3.02	2.62	2.67	3.40	3.14
2012	3.17	2.66	2.68	3.06	3.05
2013	3.29	2.92	2.68	3.35	3.36
2014	3.16	2.53	2.74	3.12	3.27
2015	3.04	2.53	2.74	3.02	3.12
2016	3.31	3.01	2.72	3.31	3.42
2017	3.1	2.72	2.58	3.13	3.12
2018	3.21	2.56	2.57	3.04	3.18
2019	3.17	2.74	2.82	3.36	3.31
2020	3.22	2.54	2.56	3.05	3.21

Appendix IV: Capital Return of Commercial Properties

YEAR	OBA ADESIDA	IJOKA	OKE ARO	ALAGBAKA	ARAKALE
2010					
2011	0.83	4.67	6.94	13.46	4.55
2012	5.75	6.55	7.03	1.87	1.57
2013	9.78	16.76	7.07	11.74	11.99
2014	5.37	1.20	9.43	4.07	8.87
2015	1.34	1.18	9.7	0.59	3.93
2016	10.23	20.56	8.64	10.48	13.92
2017	3.2	8.72	3.25	4.22	3.91
2018	6.97	2.32	2.63	1.36	5.94
2019	5.58	9.76	12.63	11.89	10.34
2020	7.25	1.59	2.27	1.54	7.03

Appendix V: Average Total Return of Commercial Properties in the study area

YEAR	OBA ADESIDA	IJOKA	OKE ARO	ALAGBAKA	ARAKALE
2010					
2011	3.85	7.29	9.61	16.86	7.68
2012	8.92	9.21	9.7	4.92	4.61
2013	13.08	19.68	9.75	15.09	15.35
2014	8.54	3.73	12.17	7.19	12.13
2015	4.38	3.71	12.44	3.61	7.05
2016	13.53	23.57	11.36	13.8	17.34
2017	6.29	11.44	5.84	7.34	7.03
2018	10.18	4.88	5.19	4.4	9.11
2019	8.75	12.5	15.44	15.25	13.66
2020	10.47	4.13	4.83	4.59	10.24