

# The Inflation-Hedging Performance and Risk-Return Characteristics of Residential Property Investments in Gombe, Nigeria

Daniel Ibrahim Dabara<sup>1\*</sup>

<sup>1</sup>Department of Estate Management, Federal Polytechnic, Ede, Osun State, Nigeria.

## Author's contribution

The study was designed, analyzed and discussed by the author. The author takes full responsibility for the whole study including data collation, manuscript drafting and editing.

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## ABSTRACT

**Purpose:** This study aims at investigating the inflation-hedging performance of residential property investments in Gombe metropolis Nigeria.

**Design/Methodology/Approach:** Questionnaire survey was conducted to obtain primary data on rental and capital values of residential properties from branch managers of Estate Surveying and Valuation Firms in the study area, this was subsequently translated to total returns. Similarly, secondary data with respect to the Nigerian Consumer Price Index (CPI) which was used as a proxy for actual inflation and the 90-day Treasury bill rates (used as proxy for unexpected inflation) for the period between 2003 and 2012 were also collected from the National Bureau of Statistics (NBS) and the Central Bank of Nigeria (CBN) respectively. The unexpected inflation was calculated as the difference between the actual and expected inflation. The 3 groups of data obtained for the study were subjected to Phillip-Perron unit root test as well as the Ordinary Least Square Regression analysis.

**Findings:** The study revealed that the inflation-hedging performance of residential property

\*Corresponding author: E-mail: [dabara2000@yahoo.com](mailto:dabara2000@yahoo.com);

investments in Gombe metropolis vis-à-vis the actual inflation provides a partial hedge (with beta 0.061), vis-à-vis the expected inflation provides a complete hedge (with beta 0.678) and vis-à-vis the unexpected inflation provides a perverse hedge (with beta -0.454).

**Practical Implications:** Inflation-hedging performance of investment asset classes is of particular interest to investors. The results of this study can be useful for investment forecasts as well as investment decisions on asset types to include in portfolios as a measure for protecting investors' earnings from erosion by inflation.

**Originality/Value:** Research work on the subject of inflation-hedging capabilities in Nigeria majorly focused on commercial real estate and stocks in the Southwestern region of Nigeria. This study expanded the scope of the inflation-hedging literature by empirically investigating the inflation hedging performance of residential real estate investments in Northern Nigeria (Gombe metropolis).

*Keywords: Hedge; inflation; investment; portfolio; residential.*

## 1. INTRODUCTION

In the investment circle, rational investors seek to invest in portfolios that have reliable degree of certainty in protecting the purchasing power of investors' funds, as well as the provision of a continuous stream of positive rate of returns with minimal risk. However, it has been observed that during periods of inflation, certain financial instruments not only do not protect the investors' funds from erosion by inflation, but also demonstrates: perverse hedging behaviour, negative return profile and high level of risk [1-3]. Hence, investors need to first ascertain the hedging potential of an asset class as well as its risk-return characteristics before investing in such asset(s) to avoid loss. All over the world inflation is among one of the worst nightmares bedeviling investors because it has the capability to erode the value of corporate earnings and devalue the purchasing power of investors' funds [4]. Similarly, inflation can greatly impact on the risk-return profile of an investment asset class [5]. It is therefore necessary for investors to be conversant with reliable and up-to-date information with regards to inflation in relation to investments, so as to guide them in making informed investment decisions. In the light of the foregoing, and to adequately address their concerns, investors and researchers all over the world are re-examining the capacity of various asset classes to offer inflation-hedge.

Previous research works in the field of inflation-hedging in both developed and developing economies included the examination of the inflation-hedging performance of: direct investments in real estate, indirect investments in real estate, investments in stocks, bonds, equities, commodities, gold, and shares [6-11]. The results of these studies have shown a varying pattern, indicating that there is no

consensus on the hedging ability of various asset classes. Specifically, the inflation-hedging performance of real estate was particularly observed to have divergent results across different inflation components (actual, expected and unexpected) as well as real estate types (commercial, residential, industrial, agricultural etc) even in the same country [10,11,12]. Odu [1] asserted that lack of consensus on the findings of various researchers with respect to inflation-hedging performance of real estate could be attributed to 'varying timeframes, fluctuating economic conditions and differences in microeconomic and macroeconomic indicators among other issues'.

However, despite the divergent results, opinions and findings of researchers on real estate' performance as a hedge against inflation, there are compelling reasons to invest in real estate. One of such reasons is tied to its risk-return characteristics. The risk-return characteristics of real estate, specifically residential property investments, provides a buffer through annuitized cash flow, this will equip shrewd and well informed investors in the real estate cycle to be able to deliver attractive returns from such investments by taking advantage of appropriate risk-return strategy to be adopted for a particular portfolio at a particular time [5]. Giliberto [13] asserted that real estate' investment' risk-return characteristics depend on: the type of property, the location of the property, and the status of the property in terms of its development. In addition, Steinke [14] revealed that in real estate investments, characteristics of market, tenancy and the property influences the expectations regarding risks and returns of the investments. Mughees [5] and Steinke [14] identified and distinguished real estate' risk-return strategies

as: Core/Core plus; Value Add and Opportunistic strategies. Mughees [5] posited that the size of the allocation among the real estate risk-return profile depends on an investor's risk-return appetite, but can generally be in the range of 5% - 15%.

The aim of this study is to investigate the relationship between residential real estate investment returns and inflation with a view to determining its inflation-hedging performance in Gombe metropolis, Nigeria. To this end, the researchers intend to find answers to the following questions: What were the risk-return profile of residential real estate investments in Gombe metropolis, Nigeria between 2003 and 2012? What was the inflationary trend in Nigeria within the study period? And what is the inflation hedging-performance of residential real estate investments in the study area? The remaining part of the study is presented as follows: the next section presents review of related literature, section three presents the methodological approach adopted for the study, the result/discussion was presented in section four, while section five presented summary of findings, conclusion and policy implication.

## **2. LITERATURE REVIEW**

Generally, the Fama & Schwert's [6] regression framework is the most widely applied method for assessing the inflation hedging capabilities of various asset classes. Their approach boils down to an empirical test of the earlier Fisher hypothesis. Fisher [15] in his famous pioneering work in this field 'Theory of Interest Rates', which is the foundation for much of the analysis of the effects of inflation on asset returns, holds that expected nominal return on an asset is equal to its expected real return plus expected rate of inflation. Fama & Schwert [6] modified the Fishers' [15] model (by incorporating the unexpected component of inflation) in one of the earliest studies conducted in the field of inflation-hedging. The authors in a comparative analysis investigated the inflation-hedging performance of residential real estate, government debt instrument, human capital, and common stock in the US between 1953 and 1971. Findings from this study showed that only private residential real estate was a complete hedge against both expected and unexpected inflation, while government debt instruments were only complete hedges against expected inflation, human capital was seen to be a partial hedge against expected and unexpected inflation, while common stocks

were shown to be perverse hedges to both expected and unexpected inflation. However, the study did not test for the stationarity properties (using the unit root test) of the data sets used. Their regression based results should therefore be treated with caution as recent studies [8,10,11,15,16] have shown that such results could produce spurious regression results. In the light of the foregoing, recent studies carried out in this field usually first test for the stationarity properties of data series used for such studies to determine the most appropriate research model to use in analysis of the data sets used for the study. Unlike the Fama & Schwert' [6] research work, this study concentrated on direct investments in real estate in a developing economy (Nigeria).

Payton [4] and Arnason & Persson [17] asserted that intuitively, real estate has been perceived to be a good hedge against inflation all over the world. To justify or refute this notion, different studies have been carried out in both developed and developing economies, these studies included: Fama & Schwert [6]; Sing & Low [18]; Bello [7]; Quingping [19]; Liu & Zhou [20]; Voigtlander, & Demary [21]; Ma & Liu [22]; Zhe [16]; Payton [4]; Arnason & Persson [17]; Fraundorf [2]; Akinsola [3]; Ogunba, et al. [12]; etc. The results obtained from studies conducted in developed economies were observed to be far from having consensus. Fama & Schwert [6] for instance, submitted that private residential estates in the U.S. were the only form of investments that provided a complete hedge against expected and unexpected inflation when compared with government debt instruments and returns on human capital. In Singapore, commercial properties were found to establish not only a perfect one-to-one correspondence relationship with inflation rate, but also to increase at a faster rate than the increase in inflation rate [18]. Quingping [19] found that in Taiwan, residential property investments were able to hedge against inflation in the long-run. Voigtlander & Demary [21] studied the inflation hedging performance of real estate in Canada, USA, Finland, France, Germany, Ireland, the Netherlands, Sweden and the UK, the authors found that investment in real estate equities did not protect the investors against inflation. Similar tests had been conducted in other developed economies such as: Hong Kong [16,20,23], Switzerland [24], China [8], Sweden [17] and Korea [9]. All these studies, showed divergent findings with respect to real estates' performance as an inflation-hedge.

Similarly, in developing economies particularly Nigeria, such studies were conducted by: Bello [7], Odu [1], Akinsola [3], Oluwasegun & Dabara [10], Dabara et al. [11] and Ogunba et al. [12]. Bello [7] found that residential real estate provides a complete hedge against inflation in Lagos; Odu' [1] study suggested that commercial real estate' investments in prime locations of Lagos around Victoria Island and Ikoyi, provides a perverse hedge against actual inflation, whereas, commercial properties within Ikeja and environs have been seen to present a complete hedge against actual inflation; Akinsola [3] compared the performance of commercial real estate and Nigerian stocks. The study concluded that stocks provides a better hedging capability than commercial real estate; Oluwasegun & Dabara [10] posited that the performance of real estate investments as inflation-hedges in Nigeria differs considerably across inflation components as well as real estate types. Dabara et al. [11] found that investments on farmlands do not effectively hedge against inflation in Tula, Gombe. Findings from the study of Ogunba et al [12] indicated that investments in office/shop properties were found to be a poor hedge against actual inflation, a partial hedge against unexpected inflation and a complete hedge against expected inflation in Ibadan metropolis.

From literature, return data were obtained for various asset classes from both primary and secondary sources. The inflation rate variables mostly used consisted of the actual inflation proxied mostly by Consumer Price Index (CPI); the unexpected component of inflation is usually derived from any of the following: Livingston survey, Autoregressive Integrated Moving Average (ARIMA), and Treasury bill rates. The unexpected inflation rate is mostly derived by obtaining the difference between the actual and the expected inflation [2,6,9,16,17,22,25]

Different methodologies have been employed in examining the hedging capability of real estate investments. The models included majorly: The Linear Regression (OLS) Model [6,7,17] and Cointegration Model [8,9]. Findings from these studies revealed that there is no consensus on the ability of real estate to hedge against inflation. While some studies showed that real estate performed excellently as a hedge, others showed that it does not, in fact in some cases; it even showed that it serves as a perverse hedge. The hedging potential of real estate across inflation components (actual, expected and unexpected) was also found to differ

considerably. Most of the earlier studies did not carry out the initial stationarity test to establish the unit root status of the data series used.

### 3. RESEARCH METHODS

Primary data required for this study was obtained through questionnaire survey. The questionnaire was designed in such a way as to elicit for information on the average capital and rental values of selected residential properties consisting of majorly flats (per square meter) in Jeka-dafari, Sabon-layi, Federal Lowcost, Checheniya and Tunfure in Gombe metropolis between 2003 and 2012 (this was subsequently translated to total returns). The capital and rental values of residential properties were collected from branch managers who are registered estate surveyors and valuers, through a total enumeration survey of all the five private practicing Estate Surveying and Valuation firms in Gombe metropolis (this is because the Estate Surveyors and Valuers are the only professionals in Nigeria that are empowered by the law i.e Decree No 24 of 1975 to determine the value of properties and their interest). The sample size was considered adequate by the researcher because it's the aggregate averages of all the respondents' responses per square meter that was used for analysis in this study. However, a larger sample size would have been more desirable.

The secondary data required for the study was obtained from the records of Nigerian National Bureau of Statistics (NBS) and the Central Bank of Nigeria (CBN). The actual inflation rates were derived from the Nigerian Consumer Price Index (CPI) which is computed by the NBS. The 90-day Treasury bill rate was used as a proxy for expected inflation. This was sought from the records of CBN. The unexpected inflation was derived by subtracting actual inflation from expected inflation.

Two statistical approaches were applied in this study. The first approach was the descriptive statistics while the second was the inferential statistics. The parametric interval scales was used to measure rental and capital values of the selected residential properties which was further used to calculate for the total returns (TR).

The Total Return is expressed as

$$r = \frac{P_1 - P_0 + a_1}{P_0} \dots \dots \dots (1)$$

Where

$r$  = Total Return

$P_0$  = Capital value of direct property at the beginning

$P_1$  = Capital value of direct property at the end

$a_1$  = Income of direct property received during the holding period

To assess the inflation-hedging performance of residential property investments in the study area, an initial test for the stationarity properties of the data (using the Philip-Perron unit root test) was undertaken. This is important in order for any subsequent analysis to not produce spurious results and to efficiently capture the long-run information or relationship of the data sets used. The Philip-Perron unit root test equation used is expressed as

$$\Delta Y_t = \alpha + bY_{t-1} + \varepsilon_t \dots\dots\dots (2)$$

Where

$\varepsilon_t$  is a zero-mean  $k$ -variate stationary time series process

$\alpha$  is a  $k$ -vector of drift parameters,

$\Delta Y_t$  is (trend) stationary.

The hypothesis is:

$H_0: \delta = 0$  (Unit Root)

$H_1: \delta \neq 0$

Decision rule:

If  $t^* >$  PP critical value, = not reject null hypothesis, i.e., unit root exists.

If  $t^* <$  PP critical value, = reject null hypothesis, i.e., unit root does not exist.

After the determination of the stationarity properties of the data sets, the dependent variable (total returns) was regressed against the independent variables (actual, expected and unexpected inflation rates) using the Fama & Schwert (1977) regression model. The regression equation is expressed as:

$$R_{jt} = \alpha_j + \beta_j E(\Delta_t | \sigma_{t-1}) + \gamma_j [\Delta_t - E(\Delta_t | \sigma_{t-1})] + \varepsilon_{jt} \dots\dots (3)$$

Where:

$R_{jt}$  is the nominal return (could be measured in income return or capital return term) on real estate type  $j$  from period  $t-1$  to  $t$ ;

$\alpha_j$  is the intercept term in the regression model, it reflects the real return on real estate type  $j$  from period  $t-1$  to  $t$ ;

$\beta_j$  is the slope coefficients for expected inflation for real estate type  $j$  with respect to income return or capital return;

$E(\Delta_t | \sigma_{t-1})$  is best estimation of the expected value of inflation rate in time  $t$   $\Delta_t$  based on the information set available up to time  $t-1$ , denoted as  $\sigma_{t-1}$ ;

$\Delta_t$  is the true value of observed inflation rate from period  $t-1$  to  $t$ ;

$\gamma_j$  is the slope coefficients for unexpected inflation for real estate type  $j$  with respect to income return or capital return;

$\Delta_t - E(\Delta_t | \sigma_{t-1})$  is used to measure shocks after acknowledgement of true inflation rate  $\Delta_t$ , or rather the unexpected or unanticipated inflation rate, which is known in time  $t$ ;

$\varepsilon_{jt}$  is the error term for return of real estate type  $j$  from period  $t-1$  to  $t$ .

Decision rule:

The decision rule for  $\beta$  is as follows: An asset is a complete hedge against inflation if the value of  $\beta$  is not significantly less than 1. An asset is a partial hedge against inflation if the value of  $\beta$  is significantly less than 1. An asset has zero hedge against inflation if the value of  $\beta$  is not significantly different from zero. An asset has a perverse hedge against inflation if the value of  $\beta$  is negative.

#### 4. FINDINGS/DISCUSSIONS

This section presents the results from analysis of data obtained from the field and discusses same. First, the rental and capital values obtained were used to calculate the total returns (using equation 1) obtained from the study area between 2003 and 2012, this was presented in Table 1. Similarly, the risk profile of the asset class in question was also presented and analyzed in Table 2. Second, the actual, expected and unexpected inflation rates realized within the study period was accordingly presented in Table 1 and analyzed subsequently. Finally, the section concluded with presentation of the regression results which revealed the hedging performance of residential property investments in the study area and within the study period vis-à-vis the actual, expected and unexpected inflation rates.

**Table 1. Total Returns (TR) and inflation rates between 2003 and 2012**

Year	Total returns (%)	Actual inflation	Expected inflation	Unexpected inflation
2003	29.40	14.00	15.02	-1.02
2004	16.30	15.00	14.21	0.79
2005	10.90	17.90	7.00	10.90
2006	17.60	8.20	8.80	-0.60
2007	19.90	5.40	6.90	-1.50
2008	21.10	11.60	9.00	2.60
2009	27.90	12.50	9.20	3.30
2010	13.80	13.70	6.60	7.10
2011	19.50	10.80	8.90	1.90
2012	15.50	12.20	12.90	-0.70

Source: C.B.N Statistical Bulletin and Author's survey 2013

**Table 2. Descriptive statistics of inflation rates and rates of returns on residential real estate investments (2003-2012)**

Total returns/Inflation	Minimum	Maximum	Mean	Std. deviation
Total Returns	0.109	0.694	0.231	0.16877
Actual Inflation	5.400	17.900	12.130	3.50271
Expected Inflation	6.600	15.020	9.473	2.89477
Unexpected Inflation	-1.500	10.900	2.657	3.85527

Source: Analysis of Survey Data, 2012

As mentioned earlier Table 1, presents the total returns as calculated from the rental and capital values of investments in residential properties in Gombe metropolis and inflation rates obtained in the study area between 2003 and 2012.

Table 1 showed the total returns on residential property investments in Gombe metropolis and the inflation rates (actual, expected and unexpected) covering the study period. It can be seen from Table 1 that investments in residential properties in the study area provides total returns ranging between 10.9% and 29.4%, this showed that for investors who are particularly interested in profitability as a yardstick for their investment decisions, investing in residential properties in Gombe metropolis could be a good option. The positive returns values demonstrated in this study is congruent with the findings of earlier studies conducted in the Southwestern region of Nigeria by Bello [7] and Ogunba et al. [12]. Similarly, the inflation rates in the study area were seen to be mostly within the double digit range, which indicates high volatility and instability in the economy. This is found to be inconsistent with the findings of studies conducted in developed economies such as Fama & Schwert [6] and Arnarson & Persson [17].

Table 2 presents the minimum and maximum values of inflation rates and total returns on residential property investment in Gombe,

Nigeria. From Table 2 it can be seen that the mean value of total returns from residential property investments in the study area has positive return values of 0.2319 indicating an average of 23.19% returns on investments in the asset class in question within the study period (it was observed that this is tied to the regular upward rent reviews exercises carried out in the study area by property owners as well as the high demand for residential properties experienced in Gombe metropolis). This indicates that investment in residential real estate in the study area provides a positive return profile (it is not advisable to invest in any asset class which turns in negative return profile). The Standard Deviation in Table 2 measures the volatility of returns on residential property investments in the study area; this primarily reveals the level of risk involved in such investment. Investment in residential property in Gombe indicates a low risk profile by the standard deviation value of 0.16877. This finding is consistent with the findings of an earlier study conducted by Olaleye & Aluko [26].

Fig. 1 showed the trend analysis of total returns obtained from residential property investments in Gombe metropolis between 2003 and 2012. From 2005 to 2009 there was a consistent slight increase in the rate of returns on residential property investment in the study area (from 10.9% to 27.9%). There was a decrease in 2010 (13.8%), while 2011 showed a slight increase in

the total returns (19.5%). It can be seen that the rate of returns from residential property investments in Gombe metropolis is not stable but rather fluctuates with time.

Fig. 2 showed the trend of actual inflation (using the Nigerian CPI as a proxy) between 2003 and 2012. The Actual inflation is measured as the rate of change in the Nigerian Consumer Price Index on an annual basis. The annual inflation rate maintained a double digit from 2003 to 2005. In 2006 the inflation figure dipped to a single digit and the single digit was maintained in 2007, however, the inflation figures soar up to double digits again in 2008 and despite all measures to bring it back to a single digit, the inflation figures remained in the double digit figures to 2012. It is obvious that the Nigerian government is finding it difficult to bring down and maintain inflation figures within a single digit range. Even though that was achieved in 2006 and 2007 it was not sustained. However, the trend line indicates gradual and consistent decrease in the actual rate of inflation within the study period.

Fig. 3 showed the trend analysis of the expected inflation rates in the study area between 2003

and 2012. The expected inflation rate is based on the 90 day Nigerian Treasury bill rates, which is used as a proxy for the expected inflation rate.

The expected inflation rate was seen to be highest in 2003 and kept decreasing over the years with slight increase experienced in 2009 and 2012. Like the actual inflation, the unexpected component of inflation also kept decreasing with time (as indicated by the trend line) over the study period.

Fig. 4 showed the trend analysis of unexpected inflation rates in the study area between 2003 and 2012. The Unexpected inflation is calculated as the difference between actual and expected inflation. This component of inflation has witnessed the highest level of volatility in Nigeria when compared to the other inflation components. Contrary to what was observed with the actual and expected inflation rates, the unexpected component of inflation kept increasing gradually with time within the study period.

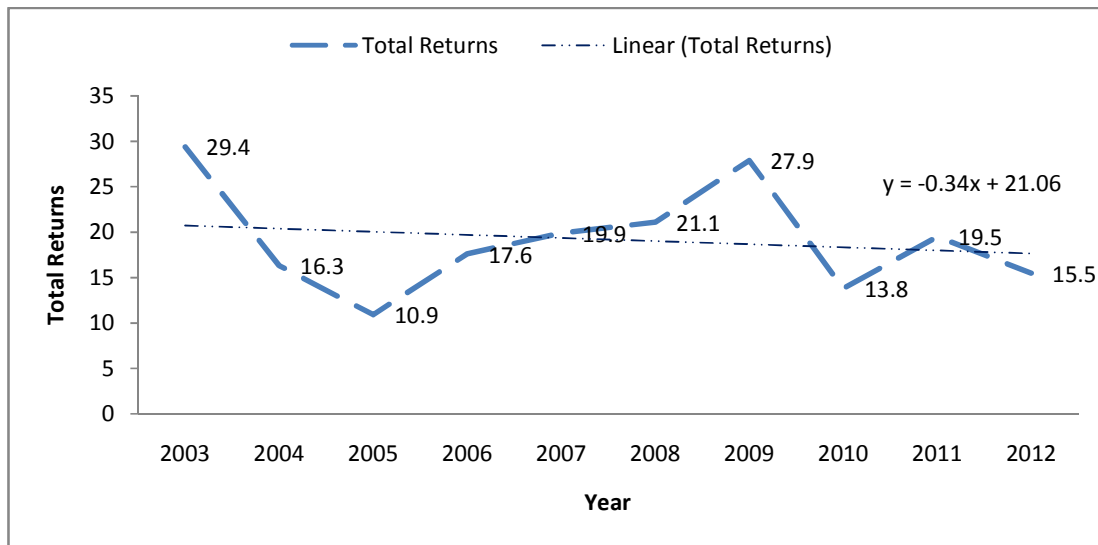


Fig. 1. Trend analysis of total returns in the study area between 2003 and 2012

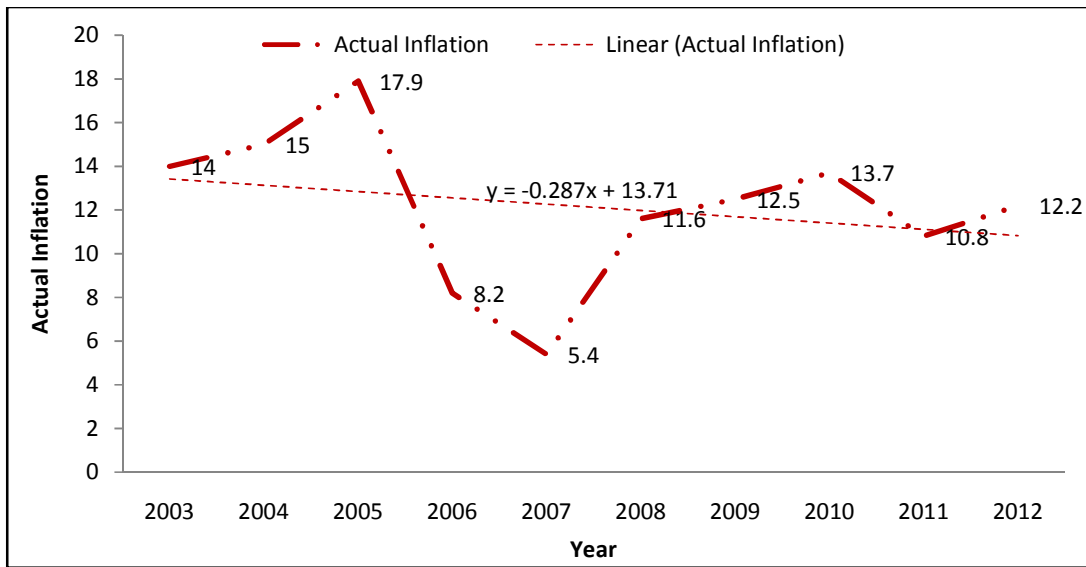


Fig. 2. Trend analysis of Actual Inflation in Nigeria between 2003 and 2012

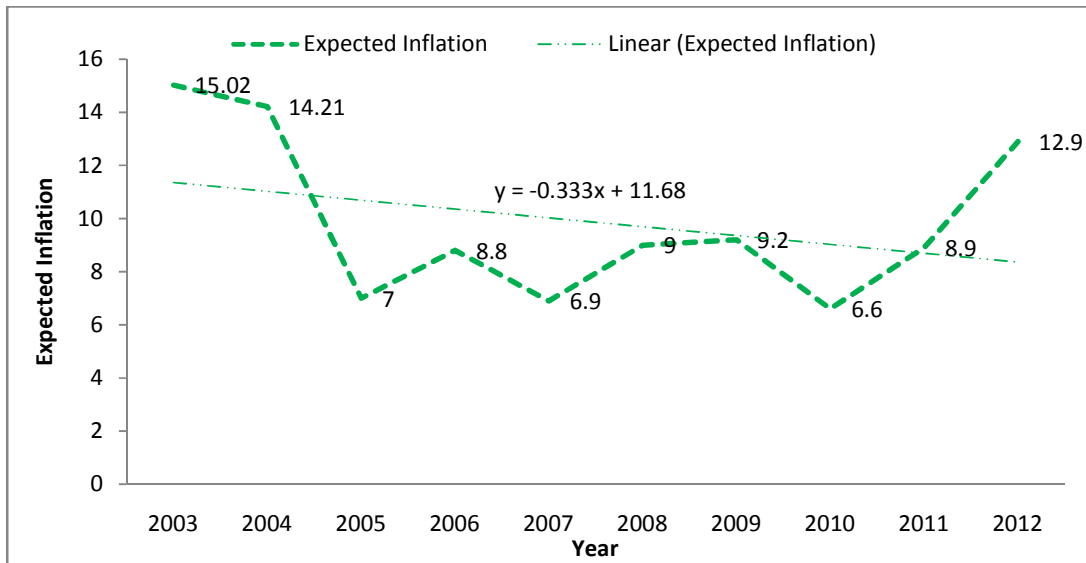


Fig. 3. Trend analysis of expected inflation in Nigeria between 2003 and 2012



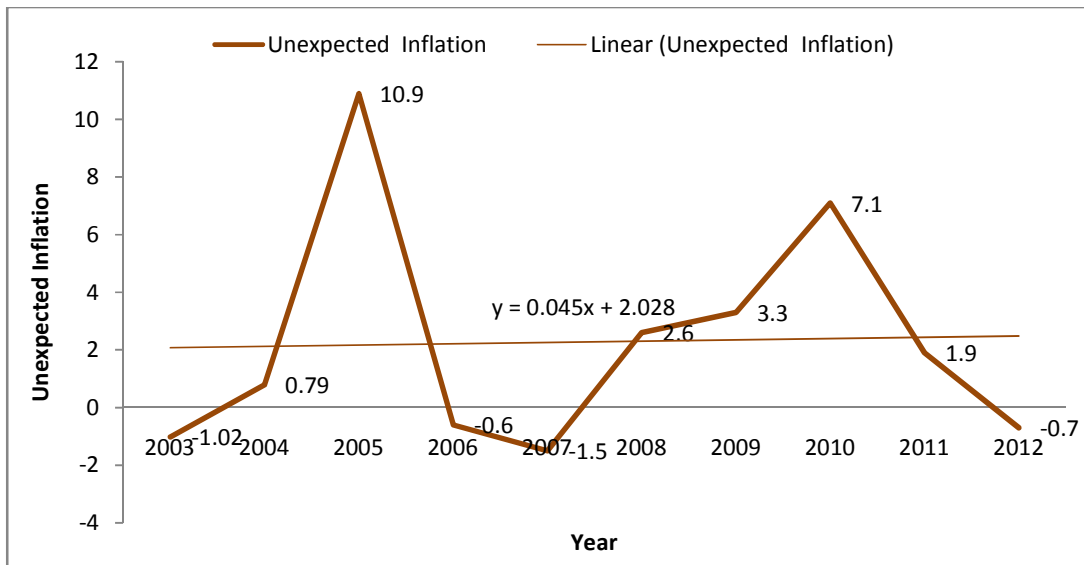


Fig. 4. Trend analysis of Unexpected Inflation in Nigeria between 2003 and 2012

#### 4.1 Unit Root Test for Residential Property Returns in Gombe and Inflation Rates

The Philip-Perron unit root analysis was used to test the null hypothesis of a unit root (stationarity properties) for the entire data sets. The results from the test are reported in Tables 3 and 4.

The computed Phillips-Perron test-statistics as seen in Table 3 are integrated of order I(1) and I(2) and is generally smaller than the critical values - "tau" at 10%, 5%, and 1% significant levels for returns and inflation rate series respectively, therefore we can reject Ho. It means that both the total returns and inflation rate series doesn't have a unit root problem and are determined as stationary series at 10%, 5% and 1% significant levels. This shows that the most appropriate model for further analysis to ascertain the hedging performance of the asset class in question is the regression model.

The relationship between total returns on investments in residential property in the study area and inflation rates was assessed by regressing returns and inflation rates. This is with a view to establishing the inflation-hedging performance of residential property investments

in the study area. The regression results are presented in Tables 4, 5, and 6.

Table 4 showed the result of regressing total returns on investments in residential properties against actual inflation in the study area. The result showed a positive Beta coefficient of 0.061, we can infer from the analysis in Table 4 that investment in residential properties in Gombe metropolis provides a partial hedge in relation to actual inflation. This finding is inconsistent with the findings of earlier studies conducted in Ibadan metropolis Nigeria by Ogunba et al. [12], as well as the study conducted by Odu [1] in Lagos metropolis Nigeria, but was however found to be congruent with the study of Bello [7].

Table 5 shows the result of regressing total returns from investment in residential properties against expected inflation in the study area. The result showed a positive Beta coefficient of 0.678, we can infer from the analysis in Table 5 that investment in residential properties in Gombe metropolis provides a complete hedge in relation to expected inflation. This finding is congruent with a similar studies conducted in Korea by Park & Bang [9].

**Table 3. Unit root test of returns and inflation rates in gombe between 2003 and 2012**

Unit Root Test	TR	Inflation rates			Sample Period
		AI	EI	UEI	
Level	-7.2764	-1.4620	-2.9980	-2.4280	2003 to 2012
PP Test Statistic	-8.2606*	-3.4491*	-9.0833**	-5.2389*	
1% Critical Value	-5.7492	-3.2875	-6.1252	-4.8875	
5% Critical Value	-4.1961	-2.4239	-4.3535	-3.4239	
10% Critical Value	-3.5486	-2.8640	-3.6280	-2.8640	

Source: Analysis of Survey data, 2012; Note: \* 1<sup>st</sup> Difference, \*\* 2<sup>nd</sup> Difference

**Table 4. Inflation-hedging performance vis-à-vis actual inflation (2003 to 2012)**

Model	Unstandardized Coefficients		Standardized Coefficients		R Square	Type of Hedge
	B	Std. Error	Beta	t		
(Constant)	0.196	0.214		0.918		Partial hedge
Residential Properties	0.003	0.017	0.061	0.172	0.004	

Source: Analysis of Survey data, 2012

**Table 5. Inflation-hedging performance vis-a-vis Expected inflation (2003 to 2012)**

Model	Unstandardized Coefficients		Standardized Coefficients		R Square	Type of Hedge
	B	Std. Error	Beta	t		
(Constant)	-0.142	0.149		-0.952		Complete hedge
Residential Properties	0.040	0.015	0.678	2.607	0.459	hedge

Source: Analysis of Survey data, 2012

**Table 6. Inflation hedging performance vis-a-vis Unexpected inflation (2003 to 2012)**

Model	Unstandardized Coefficients		Standardized Coefficients		R Square	Type of Hedge
	B	Std. Error	Beta	t		
(Constant)	0.285	0.062		4.565		Perverse hedge
Residential Properties	-0.020	0.014	-0.454	-1.440	0.206	hedge

Source: Analysis of Survey data, 2012

Table 6 showed the result of regressing total returns from investment in residential properties against unexpected inflation in the study area. The result showed a negative Beta coefficient of -0.454, we can infer from the analysis in Table 6 that investment in residential properties in Gombe metropolis provides a perverse hedge in relation to unexpected inflation. This finding is contrary to the findings in an earlier study conducted by Zhou & Clements [8] in China. However, it was found to be congruent with the study carried out by Leung [25] in Australia.

## 5. SUMMARY AND CONCLUSION

This study expanded the scope of the inflation-hedging literature of real estate investments by investigating the inflation-hedging performance

and risk-return profiles of residential real estate investments in Gombe metropolis Nigeria. Rental and capital values of investments in residential properties (between 2003 and 2012) were collected from branch managers of 5 Estate Surveying and Valuation Firms in Gombe metropolis, this were subsequently translated to total returns. The inflation measure used for the study was divided into three components (actual, expected and unexpected). Actual inflation was obtained by using the Nigerian Consumer Price Index as a proxy. Expected inflation was proxied by the Nigerian 90-day Treasury bill rates, while the unexpected inflation was calculated as the difference between the actual and expected inflation. The study covered the period between 2003 and 2012; this time frame was informed by availability of data for the study. The returns and

inflation data series were regressed to ascertain the inflation-hedging performance of the investment asset in question.

The results obtained from the study showed that investments in residential properties in Gombe metropolis provide a positive return profile with low risk capacity. Similarly, the study showed that both actual and expected inflation kept decreasing with time, while the unexpected component kept increasing with time within the study period. Furthermore, the inflation-hedging performance of residential real estate investments varied across inflation components. The study revealed that residential property investment in Gombe metropolis provides a partial hedge with respect to actual inflation; a complete hedge with regards to expected inflation and a perverse hedge with respect to unexpected inflation.

By reason of the high inflation currently experienced in Nigeria, the inflation-hedging performance of real estate investments is attracting the attention of stakeholders than ever before. Contrary to the common perception that real estate is an all time inflation-hedge, findings from this study proves otherwise. These results are congruent with the studies of Bello [7], Odu [1], Ogunba et al. [12] and Dabara et al. [11]. However, the study was limited by the fact that the number of observations was collected from the 5 practicing estate firms in the metropolis; greater number of observations would have been more desirable. Similarly, the study period only covered 2003 to 2012 due to data constrain challenges.

The fact that Nigeria is presently considered the biggest economy in Africa and also with the reform agenda of the present government in place, the investment environment in Nigeria is experiencing great changes leading to a better atmosphere for investments in all ramifications (investment in real property market inclusive). Therefore, a study of this nature has great significant implications for both local and foreign investors (individual and institutional) desiring to invest in the Nigerian property market. The results of the study can be useful for investment forecasts as well as investment decisions on the asset types to include in portfolios as a measure for protecting the value of investors' earnings from erosion by inflation. The result will also be a good and updated reference for academics and researchers in studying the Nigerian property market.

## COMPETING INTERESTS

Author has declared that no competing interests exist.

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