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Modelling the Real Estate Investment Performance of Insurance Companies in Curbing Housing Deficit in Nigeria

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Abstract- ***To simulate how insurance firms in Nigeria perform while investing in real estate to reduce the country's housing shortage as required by the NHF Act. To conduct this research, 37 insurance firms' information on yearly gross premiums, annual real estate investment premium, and annual real estate investment returns for the years 2000 to 2019 were used. The research will recommend an appropriate permitted maximum rate of return than the 4% in the Act for insurance firms investing in real estate in Nigeria. Normality test and a Monte Carlo simulation utilising a capitalization model were conducted in this research to validate the performance's results. The distribution is a non-normality distribution. The return rate is within the range of 1.60% to 135.63% and the standard deviation is 11.78. The returns have a 5% chance of being less than N3,810,750 (USD 8.386 million), a 90% chance of being in the range of N3810,750 (USD 8.386 million), and N33,091,020 (USD 72.822 million), and a 5% chance of being more than N33,091,020 (USD 72.822 million). The study recommends a 5.60% maximum allowable return; this would aid in enhancing the NHF Act-mandated real estate investment performance of insurance firms in Nigeria. This study also recommended that a database be created for real estate investments made by insurance companies in Nigeria in order to promote further study on this topic.***

Keywords: Insurance Companies; Real estate investment; Housing Deficit; National Housing Fund Act; Performance.

I. INTRODUCTION

It is impossible to understate the contribution that insurance companies make to the global economy of every country. According to Anyetei (2020), insurance companies supply the methods utilised in investing by directing the premiums received from the insured to the stock markets and other investments to ensure there are sufficient funds accessible in the event of loss and unforeseen circumstances. Since the 1991 implementation of the housing policy, insurance companies have been involved in real estate investing. This resulted from the significance of real estate to human existence.

One cannot ignore the significance of housing as a necessary good for human survival and existence. The most constant source of disruption for an individual, a family, a society, and a state is housing. In most African nations, a person's ability to have a home has always been a mirage. The majority of people always feel compelled to spend money on housing. property affordability is becoming more difficult in many countries due to rising property costs, stagnant earnings, demographic pressures, and reduced state investment in housing (OECD, 2020).
According to the real estate Lagos industry report (2021), Nigeria currently has a housing shortage of 28 million units, which is the highest in Africa (World Bank 2018, NBS 2020, and IHRC 2022). This housing shortage is estimated to be worth N12 trillion (USD 2.9 billion) (Paul & Ezeanah, 2021). Additionally, according to Adenuga & Chijiutomi (2002), Nigeria has a $3 trillion infrastructure deficit, ranking 114th out of 141 nations in the world (Italy, 2021). There are currently 900 million people without access to shelter or clean water in the world, which is anticipated to rise to 1.6 billion by 2025 (Florida, 2017).

In most developed countries, government and institutional investors like banks, insurance firms, and pension fund managers are the main sources of funding for housing development. However, in Nigeria, the government and private sector provide the majority of the funding for housing, with little to no contribution from banks, insurance firms, or pension fund managers.
It has become a significant issue for governments at all levels to find measures to reduce this deficit since the annual housing deficit has been steadily rising.

Since the county's insurance companies hold premiums worth billions of naira in their possession, they were required to engage in real estate investment (Housing Policy 1991). To affect this, laws were enacted at various periods and times, such as the National Housing Fund Act (NHF) Act of 1992. But despite the involvement, the deficit increases annually.

These problems seem to be spreading and becoming more complicated than the government can address. Nigerians must understand that the mounting problems necessitate taking quick action. This problem served as the inspiration for the study, which sought to model the performance of insurance firms' real estate investments in Nigeria from 2000 to 2019. To encourage insurance companies in Nigeria to invest in real estate, it is necessary to forecast the potential return.

II. LITERATURE REVIEW

2.1. Performance of real estate investment in Nigeria
In Nigeria, it is not new to examine the results of real estate investments. In a variety of studies, including Odu (2011), Oyewole (2013), Udoekanem, et al. (2014), Dabara (2014), Umeh & Oluwasore (2015), Udoekanem, et al (2015), and Umeh, et al (2016), the performance of various types and classes of real estate investment has been evaluated, analysed, and compared using various goals and evaluation metrics. To determine how commercial real estate investments have performed over time under macroeconomic conditions, Udoekanem et al. (2015) examined the performance of such assets in Wuse and Minna. Oyewole (2013) contrasts investments in residential and commercial real estate in Ilorin to ascertain which of the investments offers a superior investment option in terms of performance. In terms of real estate capacity to hedge against inflation, Umeh & Oluwasore (2015), Dabara (2014), Umeh & Adilieme (2019a), and Odu (2011) assess the performance of real estate investments in Lagos, Akure, and Ibadan. Furthermore, Umeh, Otegbulu, and Anule (2016), as well as Umeh and Adilieme (2019b), evaluated the potential advantages of diversifying commercial real estate investments in particular areas of Lagos.

The literature on the performance measurement of investments in Nigeria is important because it has an academic bias towards the advantages of diversification, how they relate to macroeconomic indicators, how to compare assets that offer the best chances, and how to hedge against inflation. Predicting investment performance based on total returns has not received much attention. Oni (2009) employs a polynomial regression model to estimate the rental prices of properties in Ikeja's main thoroughfares, whereas Iroham et al. (2013) utilise a straightforward linear regression approach to forecast the rental values of houses in Akure. While Udoekanem, et al (2015) use a regression approach to anticipate the rent of offices in Abuja, Oni, et al. (2012) focus on forecasting the demand for office spaces in Ikeja using the moving average method. The fundamental constraints on the use of real estate forecasting in Nigeria are the subject study of Emele, et al. (2014)

The overall return on investment idea hasn't been taken into account in many studies, though. Total returns, one of the most often used metrics for measuring investment performance, includes capital gains and income returns (Crosby & Devaney, 2019). It provides an investor with a picture of how well their money is performing both in terms of capital gains and income returns.

The challenges affecting real estate investment analysis in Nigeria must be quickly identified in light of the aforementioned. This could shed light on the reasons why insurance companies in Nigeria have been unable to deliver as required by the NHF Act when it comes to real estate investments due to a lack of investigation into the forecasting of acceptable returns.

2.2. Real Estate Investment Performance of Insurance Companies in Nigeria as Required by the National Housing Fund Act No 3 Cap 45 of 1992.
The insurance industry in particular must provide sufficient and long-term financial support for real estate investment, which serves as the structural basis for overall national development. To make sure of this, consideration must be given to the picture of insurance companies' involvement in real estate investment as well as to the variables that influence investment and fund allocation choices, which are determined by the maximum percentage of return allowed. The NHF Act required each insurance firm to invest 40% of their yearly gross premium in real estate at a 4% interest rate if they were a life or composite insurance company and 20% of their

annual gross premium if they were a non-life insurance business.

Oloke et al. (2015) found that 73% of insurance companies in Nigeria invest between 1% and 5%, 23% between 5% and 10%, and only 4% between 11 and 20%. This demonstrates that more of these businesses are hesitant to dedicate resources to real estate at the 20% to 40% level that the NHF Act requires of them. This has a connection to perceptions and other crucial elements that influence real estate investment choices among Nigerian insurance companies. Oloke et al. (2015) proposed that the insurance sector handles real estate as income-generating, profit-making assets, converting their somewhat passive position into a very active direct investment in real estate, to strengthen the sector's involvement in real estate. While Inuwa et al. (2018) found that insurance firms in Nigeria may only spend 3% to 5% of their yearly gross premiums on real estate, which is far less than what the NHF Act required (20% for non-life and 40% for life and composite insurance). Additionally, insurance firms charge more than the Act's authorised return of 4%.

Several institutional investors, such as insurance companies and life insurers, may be considering investing in real estate. Real estate makes up 0.7 percent and 2 percent of the investment portfolios of Poland's life, property, and personal insurers, respectively (Wolski & Zaleczna, 2011). The study demonstrates that Polish insurance companies' real estate investments are not always successful. The study shows that despite better returns and technical activity, Polish insurance companies' real estate investments are not always profitable. Additional data demonstrated that real estate investments made by insurance companies in Poland are not constrained by a shortage of capital but rather by a lack of enthusiasm (Walski & Zaleczna, 2011).

2.3. Some problems affecting Nigerian investment analysis

Numerous problems with Nigerian real estate investment analysis have made it difficult to predict the performance of real estate investments of insurance companies in Nigeria in curbing the housing deficit as required by the NHF Act. First off, the Nigerian real estate market is opaque, and information on real estate transactions is rarely accessible to the general public. (JLL, 2020) classified the Nigerian real estate sector as having poor transparency (68 out of 99 markets under review) in its Global Real Estate Transparency Index report. Aversion to data sharing and assemblage by real estate practitioners, the ability of estate businesses to retain data, and the length of time that data is retained are other concerns that are frequently encountered (Olapade & Olaleye, 2018; Olapade & Olaleye, 2019). The confluence of these issues has also reduced the availability of real estate investment finance from American and European investors, who have evaluated the market as high-risk (Lim, McGreal, & Webb, 2006).

The absence of high-quality data that is available to the general public is one of the problems mentioned. The lack of both a real estate index and a central real estate database, which have an impact on real investment analysis, emphasises this. Independent and publicly verified data sources will be more useful for real estate investment analysis and forecasts, in particular. In addition, it has been noted that real estate investment performance indices are created on a monthly or quarterly basis in developed countries such as Australia, the United States, the United Kingdom, etc. to provide reliable data collection (Higgins, 2015; MSCI, 2020). This enables the real estate market cycle or an outlier event within a year to be captured; the real estate market cycle may not be adequately captured by annual averages. However, it is customary in Nigeria, and Lagos State in particular, to record rental values only once a year, which prevents the establishment of a reliable data set for studying and predicting real estate investment success in the Lagos Metropolis. In addition, the problem of the lack of a data bank has also led to the direct sourcing of capital values and rental values from real estate practitioners.

The entire return on investment performance metric has also received little attention. However, the main goal of this study is to anticipate real estate investment returns that are sufficient to meet NHF Act requirements. The research techniques used for this paper's research are covered in the following section.

III. METHODOLOGY

This study’s aim is to Simulate the performance of insurance firms' real estate investments under the NHF Act from 2000 to 2019. The study initially planned to go beyond 2019, but due to the National Housing Fund (Establishment) Act of 2018, which

was meant to take effect, the president declined to sign the measure, delaying its implementation, and all authentic records available were stopped in 2019. Secondary data from 37 insurance companies with operating licences in Nigeria that were found to have transaction records spanning at least 12 years was used for this investigation. Recent relevant research from Umeh & Adiliema (2020); Ekemode & Olaleye (2016) supports the reasoning behind this decision. These data, which come from the annual book of transactions, include the premium amount used for real estate investment and the return on real estate investment. While the gross premium was taken from the annual publication of the Nigerian Insurers Association from 2000 to 2019, this study also used a direct capitalization rate to run a Monte Carlo Simulation (MCS) to forecast the potential acceptable maximum percentage of return needed to support the insurance firms in Nigeria's active and successful real estate investment performance.

3.1 Direct Capitalisation Rate

To calculate the yearly returns of the annual real estate investment of insurance firms in Nigeria for this study, the data on the gross annual premium and the annual premium for real estate investment are used as the input. The method for calculating the annual returns on real estate investments made by insurance firms in Nigeria as required by the NHF Act in this study was obtained from the direct capitalisation rate and is as follows:

Capitalization Rate = NOI/comparable sale price (Epley, 2002).

Net operational income = direct capitalization rate X investment cost, i.e.,

direct capitalization rate = net operational income / investment cost.

Therefore, Return = Direct Capitalization Rate X % (gross Premium).

Where:

Direct Capitalization Rate is in % = interest permitted (%) and

% (gross premium) = premium for the real estate investment.

The simulation was modelled based on the rate of return calculated using the following equations modified from Abu Bakar and Rosbi (2019) and Adilieme and Umeh (2020):

$$r_i = \frac{R_i - R_{i-1}}{R_{i-1}} \times \frac{100}{1} \text{ ----------}$$

Equation (1)

Where:

r_i : annual rate of return at time *t;*

R_t: Return at time *t;* and

R_{t-1}: Return at time *t-1*

To test the volatility of the return, Equation (2) was used.

$$\delta = \sqrt{\frac{\sum_{i=1}^{N}(r_i - \overline{r})^2}{N-1}} \text{ ----------}$$

Equation (2)

Where:

δ = Standard deviation of the sample

r_i: Return

$\overline{r}$: Mean return

N: size of the sample

The normality of the data was tested using the probability density function as given in Equation (3) as follows:

$$f(x|\mu, \sigma^2) = \frac{1}{\sqrt{2\pi\sigma^2}} e^{-\frac{(x-\mu)^2}{2\sigma^2}} \text{ ----------}$$

---Equation (3)

Where:

σ^2: Variance of the sample

x: Observed variable (return, premium)

μ: Mean of observed variable

e: Constant (2.718281828459).

3.2 Monte Carlo Simulation

A probabilistic method called the Monte Carlo method is based on creating a lot of random samples. Simulations are especially helpful for tracking output variables when working with huge datasets. Monte Carlo Simulation (MCS) can regulate a complicated system's statistical behaviour and variability.

To replicate data for a certain mathematical model and assess the results, Monte Carlo simulation employs repeated random sampling. At the same time, the Monte Carlo Simulation (MCS) method involves leveraging probability and random numbers to address issues.

MCS falls within the category of a sampling method since the inputs are created at random using probability distributions to mimic the process of selecting samples from a real population. The Monte Carlo Simulation process flow is shown in Figure 1. All input variables are first set to follow probability distribution in the first phase. The normal distribution is chosen for all variables in this investigation. After

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that, the output variable will be calculated using the input variable and model function. In the third stage, a statistical test must be used to examine the outcome variable. The processing capability is used in this study to assess how well Monte Carlo Simulation performs in terms of improving the alpha coefficient (an output variable).

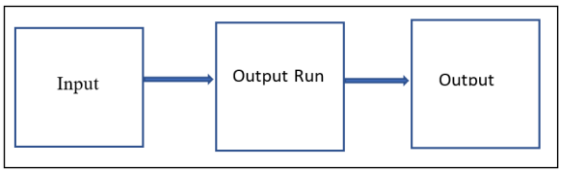

Figure 1 Montel Carlo Simulation Process

IV. RESULT AND DISCUSSION

The annual average return, standard deviation, skewness, and kurtosis statistics of the data gathered from the 37 insurance firms are displayed in Table 1 below as the outcome of the distributional characteristic of the real estate investments of insurance companies. The outcome showed that the average values for skewness and kurtosis are greater than ±2 and ±3 respectively. This suggests that the average annual returns are very skewed and that they fluctuate greatly. Because of this, it is acceptable to say that most returns do not exhibit typical distributional characteristics. The findings of Lausberg, Lee, Müller, Oertel, and Schulthei (2020), who discovered that the average yearly returns on real estate investments were regularly distributed, conflict with this finding. The nature of the data and the period that the data covers may be related to the return distribution's non-normality. If the data are from a shorter period and a whole dataset is used, this irregularity can be overcome. This is crucial since it takes the real estate market cycles longer to recover from shocks (Adilieme & Umeh, 2020; Lausberg et al., 2020). Similar to this, real estate's inherent characteristics may account for the annual return distribution's non-normality. Heterogeneity, indivisibility, illiquidity, and lot size are some of the probable characteristics that may cause returns from real estate to exhibit significant kurtosis and skewness, according to earlier studies like Lizieri and Ward (2001) and Lausberg et al. (2020).

The summary statistics for the companies' yearly returns are shown in Table 1. The analysis indicates that for African Alliance Insurance and Standard Alliance Insurance, the least average annual return is N135 million (USD 294,300 thousand) and the greatest average yearly return is N1,127,562 billion (USD 2.458 million) respectively. Every return was positive, showing that every company made gains throughout the reviewed time.

Table 1: Descriptive statistics and distribution of average annual returns

Descriptive Statistics										
	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis		Shapiro-Wilk test
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error	
African Alliance	20	135	252826	24695.2500	55301.21682	4.073	.512	17.403	.992	0.430
Capital Express	15	3413	22621	10159.4000	5938.85938	.883	.580	-.247	1.121	0.901*
ARM Life	17	560	39453	8153.5882	10606.14541	2.150	.550	4.402	1.063	0.692
Unic ins	15	318	28475	9791.0667	7570.50856	1.343	.580	1.515	1.121	0.853
Mutual Benefit	19	8188	92079	23110.8421	19086.46060	2.873	.524	9.880	1.014	0.680
NEM Ins	19	1438	78643	12407.2632	17170.58193	3.509	.524	13.672	1.014	0.549
Sovereign trust	19	1370	86141	18277.7895	21936.23197	2.066	.524	4.397	1.014	0.740
Royal Exchange	19	2376	116918	40697.8947	34269.34535	.922	.524	.060	1.014	0.898
International Energy	18	250	49000	10254.3333	12186.17244	2.111	.536	5.325	1.038	0.752
Staco Ins	17	2592	63683	18137.0588	17759.19726	1.162	.550	1.027	1.063	0.829
Consolidated Hallma	19	256	38450	5145.0000	8322.01495	3.926	.524	16.370	1.014	0.470*
Law Union & Rock	20	200	38140	13270.5500	10590.97607	.873	.512	.327	.992	0.929

Sanu (Equity)	20	2023	236783	22234.1000	53598.43405	3.811	.512	15.151	.992	0.400
Wapic Ins	20	2400	207523	22785.4500	46761.01827	3.673	.512	14.234	.992	0.441
Regency Ins	20	662	15995	6066.2500	4621.82284	.776	.512	-.066	.992	0.914
Linkage ins	20	790	29830	9072.7500	7824.96924	1.435	.512	1.825	.992	0.844
Unitrust Ins	16	570	234000	29551.1875	58836.64021	3.205	.564	10.921	1.091	0.493
Veritas (Unity)	20	813	42537	13414.5000	11645.32312	1.384	.512	1.250	.992	0.844
Prestige	19	1555	147558	18459.0000	32396.93526	3.881	.524	16.027	1.014	0.471
Sterling	17	517	22591	8692.5882	6021.07038	.872	.550	.410	1.063	0.926*
Anchor	15	2001	41130	13763.4667	11105.44332	1.098	.580	1.103	1.121	0.900*
KBL	17	3004	64335	16479.0000	16893.74180	2.059	.550	3.927	1.063	0.729
FNB (Oasis)	18	273	62566	12919.0000	15542.84450	2.521	.536	6.378	1.038	0.660
Fin	20	500	32000	7927.9000	7102.16061	2.239	.512	6.575	.992	0.783
Guinea Ins	18	1417	14438	7007.3889	3985.93102	.429	.536	-.922	1.038	0.943*
Universal Ins	19	440	24300	7825.2105	6215.64915	.991	.524	1.197	1.014	0.916*
NSIA Ins	16	800	26560	9104.7500	7107.18067	1.062	.564	.973	1.091	0.914*
Aiico Ins	16	2231	88000	25644.0000	28805.74263	1.403	.564	.628	1.091	0.757
Cornerstone Ins	19	2006	64480	12261.0526	15033.53354	2.648	.524	8.027	1.014	0.666
Goldlink Ins	17	1250	79655	13750.6471	18220.09122	3.279	.550	12.008	1.063	0.590
Lasaco	19	280	38250	10620.5789	11327.60357	1.290	.524	.847	1.014	0.828
Leadway	18	2025	173722	37647.5556	45687.66791	2.029	.536	3.996	1.038	0.731
Mansard	12	3000	17044	8070.2500	4318.70659	.717	.637	.119	1.232	0.939*
Niger Ins	19	460	90070	24509.1579	26862.58379	1.537	.524	1.675	1.014	0.802
Allianz Nig (Union)	19	956	61399	15663.3158	17209.47364	1.901	.524	3.284	1.014	0.755
Alliance & General	20	209	41490	14716.6000	12162.53405	.970	.512	-.032	.992	0.889
Standard Alliance	18	2000	1127562	84178.6111	264341.33641	4.052	.536	16.745	1.038	0.339

The correlation between the two input variables used in the simulation (Premium and rate of return) is shown in Table 2. The table demonstrates that the relationship between premium and rate of return is r = -.511.

Table 2: correlation between input variables

	Premium	Rate of Return
Premium	1.000	-.511
Rate of Return	-.511	1.000

The stopping conditions used during simulation execution are shown in Table 3. 10000 simulated instances were produced in all, which is the adequate minimum simulation for running any simulation (Welvaert, & Rosseel (2014). The algorithm was set to produce cases up to the point when the target variable's mean (return) was within 1% of the defined confidence interval (95%) while maintaining the required accuracy.

Table 3: Stopping Criteria

Maximum cases		100000
Mean within a specified precision	Target Threshold	Return 1.0%
	Confidence level	95.0%

Simulation Run

Using the data premium and return data of the companies obtained, the simulation was run using the formula:

$$\text{Return} = i \times P_R \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\text{Equation (4)}$$

Where:

$P_R = (P_A - P_N)$

i = capitalisation rate $((1+r)^n)$;

r = interest rate

n = years

P_R = Real Estate Investment Annual Premium (REIP)

P_A = Total Annual Premium;

P_N = Non-Real Estate Investment Annual Premium

Thus,

Average Total Annual Premium = N3, 978, 655. 19

Average Non-Real Estate Investment Annual Premium = N 3, 870,487.44

Average Annual Real Estate Insurance Premium (REIP) = N108,167.75

% of REIP to Total Annual Premium = 2.8%

Average Return for REIP = N15,554.43

Therefore, using Equation (4):

15,554.43 = *i* x N108,167.75
This implies that:
i = 14.40
Hence, the simulation was run using the equation:
Return = $(1+0.143)^n$ x R_t as the base equation.

Table 4 displays the summary of the simulation. The stopping requirements for the provided confidence interval of the mean were met after 15735 examples were created, as shown in Table 4. This means that enough examples were produced to provide a target distribution with a trustworthy estimate of the sample mean.

Table 4: Simulation Summary

Maximum cases	100000
Total simulated cases	15735
Stopping criteria achieved	Yes

The Tornado chart illustrating the relationship between the inputs (premium and capitalization rate) and the target (return) is shown in Figure 2. The Pearson correlation between the desired return and its simulated input premium and capitalization rate produces good results, as illustrated in the figure. According to Pearson correlation values of.53 and.19, respectively, return is favourably connected with both premium and capitalization rates. The outcome amply demonstrates that the return and premium are significantly connected.

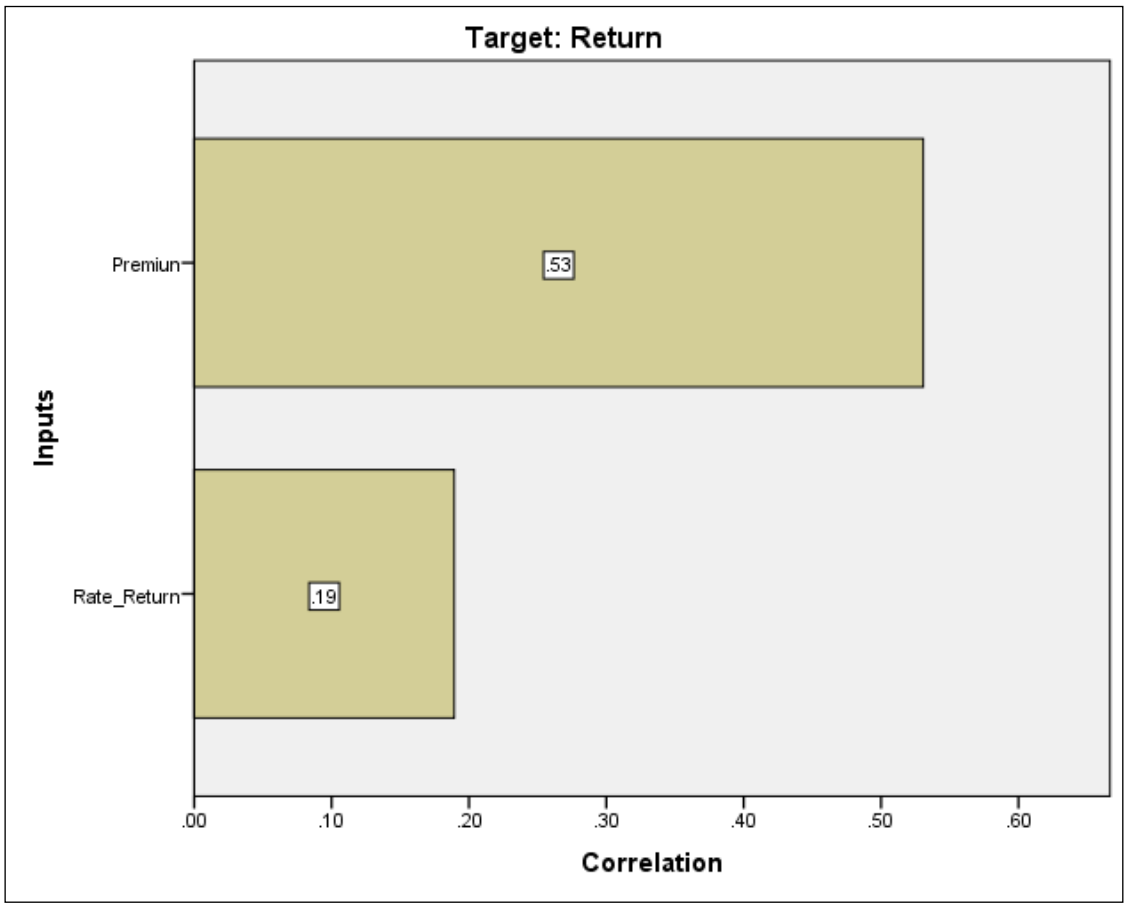

Figure 2: Tornado Chart

Scale Input Descriptive Statistics
The scale inputs' descriptive statistics are shown in Table 5. The outcome is shown in Figures 3 and 4, respectively, and demonstrates that the simulated values of the input variables (premium and rate of return) virtually cover the complete range for the inputs (premium and rate of return). The average, lowest, and highest premium and rate of return numbers are N104144299 (USD 229.185 million), N72,000 (USD 158,447 thousand), and N482,491,890 (USD 1.062 billion), respectively. These values correspond to 18.74%, 1.60%, and 135.63%.
The findings showed that the mean rate of return for the combined data from the 37 companies under analysis is 18.74%, with a standard deviation of ±11.78 and a rate of return range of 1.60% to 135.63%. This outcome somewhat concurred with

earlier conclusions from related investigations. For instance, according to Mfam and Kalu (2012), the average returns and standard deviations for investments in commercial and residential real estate were 23%, ±11.27, and 23.82%, ±10.06 respectively.

Table 5: Descriptive Statistics of Scale Inputs

	Mean	Std. Deviation	minimum	Maximum
Premium	104144.299	69559.736	72.73	482491.89
Rate of Return	18.738	11.781	1.60	135.63

The findings from Table 5 and Figures 3 and 4 show that the sample means for the two variables agreed with the theoretical means for the corresponding distributions of the variables. In essence, the distribution limits shown in Figure 3 are agreed upon by the premium value range, which ranges from N72,000 to N482,491,890. The distribution of the rate of return, as seen in Figure 4, was also matched by the lowest value of 1.60 and the highest value of 135.63.

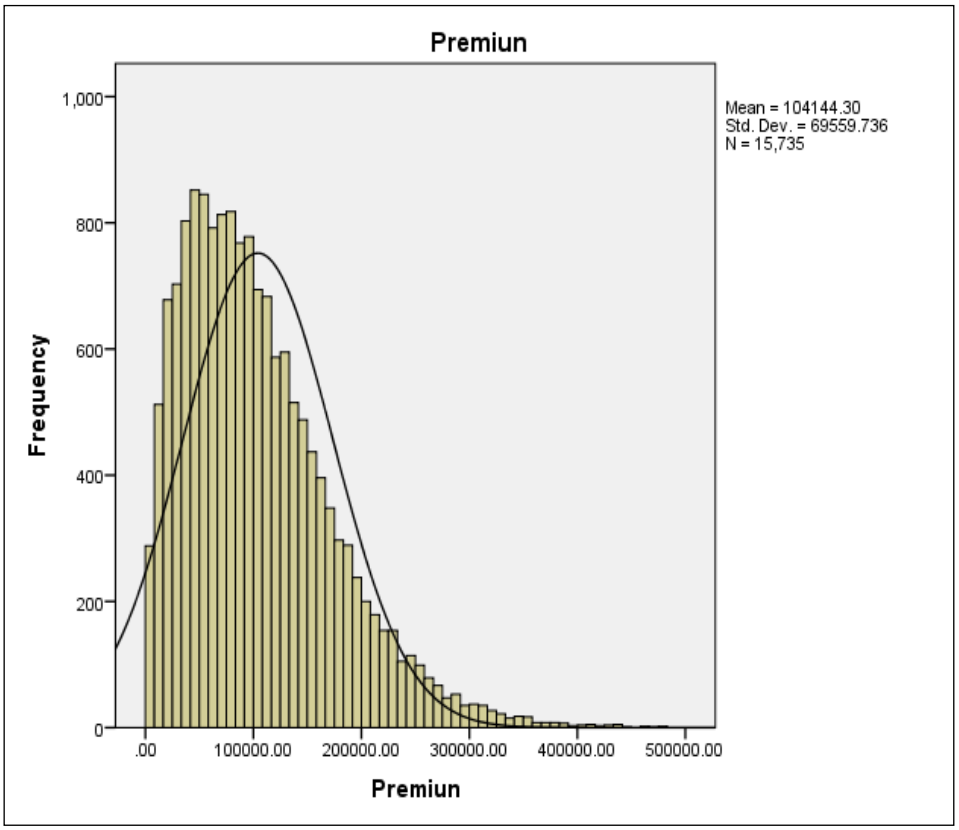

Figure 3: Simulated Values of Premium

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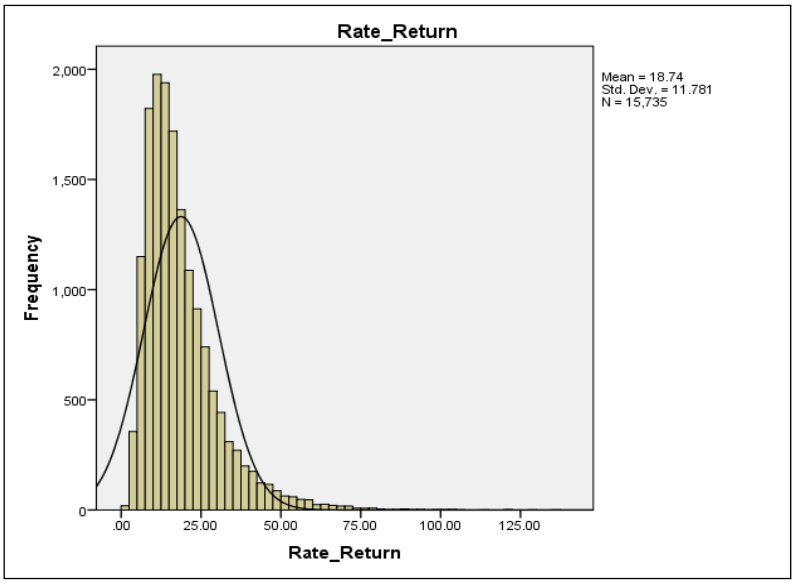


Figure 4: Simulated Values of Rate of Return

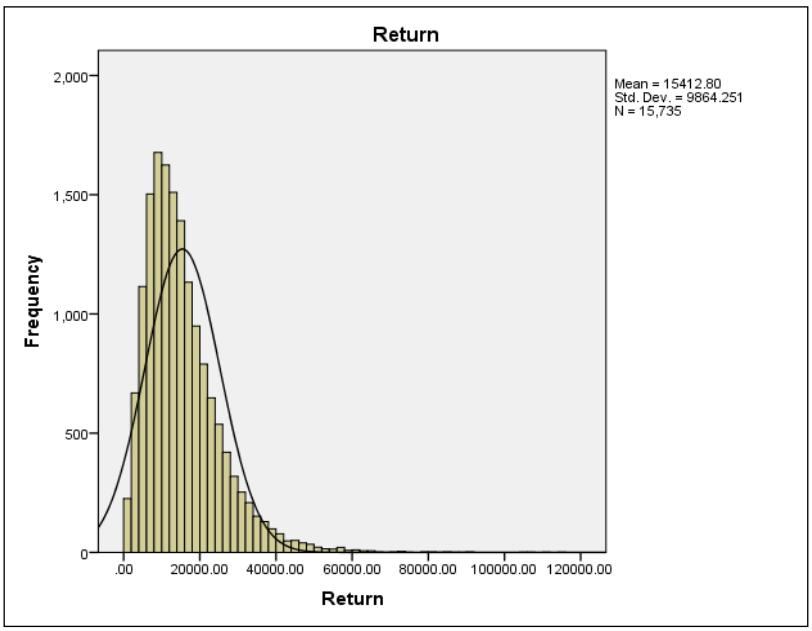
The distribution of the scale goal variable (return) is summarised in Table 6. The mean return is N15,412,796 with a standard deviation of N9,864,251, as indicated in the table. The lowest and largest realisable returns are N18,550 and N114,580,360, respectively. Figure 5, which shows the distribution of the simulated return values, further supported the conclusion.

Table 6: Descriptive statistics of scale targets

Descriptive Statistics of Scale Targets												
	Mean	Std. Deviation	Median	Minimum	Maximum	95% Confidence Interval for Mean		Percentiles				
						Lower	Upper	5.0%	25.0%	50.0%	75.0%	95.0%
Return	15412.796	9864.251	13315.875	18.55	114580.36	15258.669	15566.923	3810.749	8534.324	13315.875	19922.047	33091.017

Figure 6.5: Simulated values of return

Probability Density Chart



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The probability density chart illustrating the range of return values is shown in Figure 6.6. The likelihood of attaining a certain return is shown on the chart. The likelihood that at least the anticipated returns would be positive is shown by the two reference lines set at the 5% and 95% points of the distribution.

According to Figure 6.6, there is a 5% chance that the returns will be less than N3,810,750 (USD 8.386 million), a 90% chance that they would be between N3810,750 (USD 8.386 million) and N33,091,020 (USD 72.822 million), and a 5% chance that they will be higher.

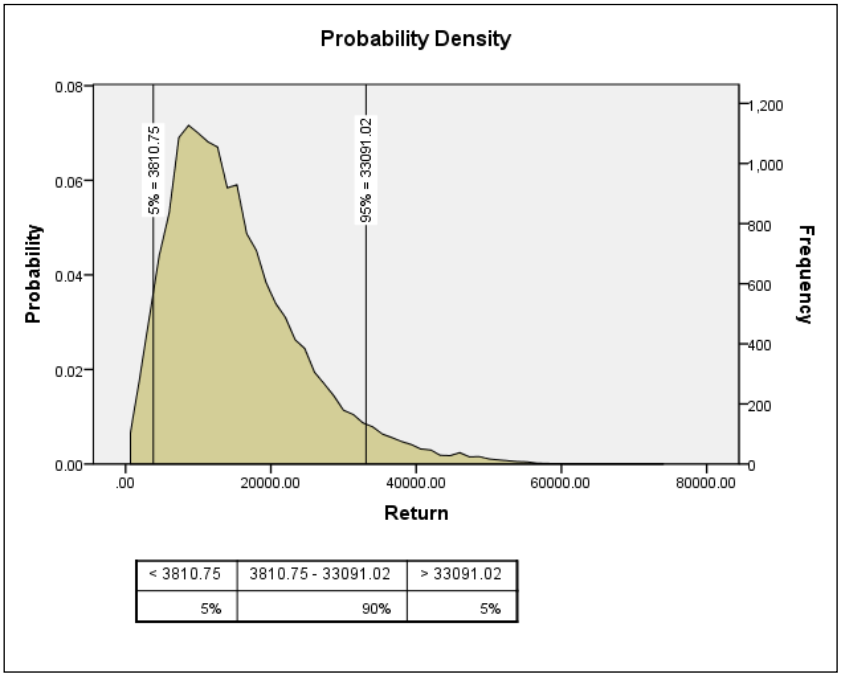

Figure 6: Density Function

Tornado Charts

The Tornado chart, shown in Figure 7, illustrates how the sensitivity of return is calculated about a change of one unit in the input variables (premium and rate of return). As seen in the figure, a change of 1 standard deviation in the premium leads to a change of ±N13,026,760 in the return. The return changes by ±N12,126,200 when the rate of return changes by 1 standard deviation. This shows that changes in premiums have a somewhat larger impact on returns than changes in return rate.

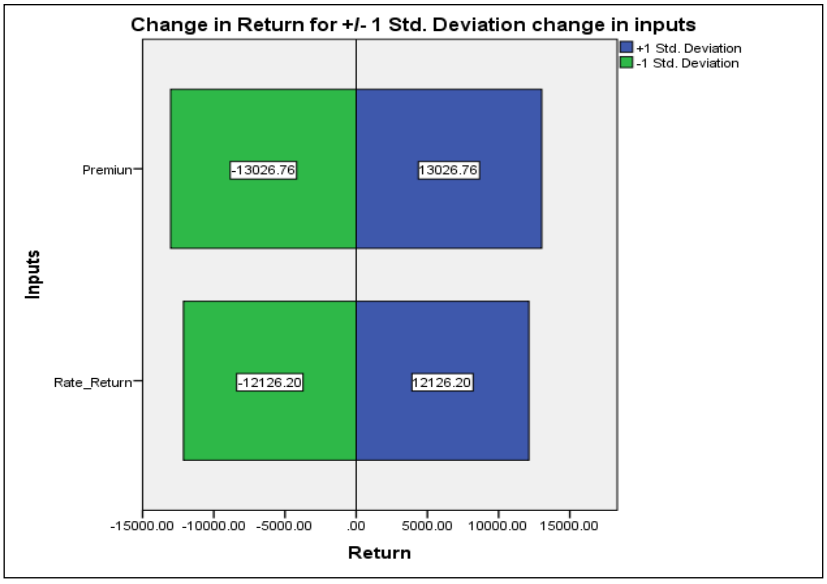

Figure 7: Tornado Charts

V. CONCLUSION AND RECOMMENDATION

It is impossible to overstate the significance of modelling the potential performance of insurance company real estate investment results in reducing the housing deficit as required by the NHF Act. It provides investors and the government with a likely overview of the reasons insurance firms in Nigeria's real estate investment, as required by the NHF Act, are performing below the minimum needed by the Act, pointing the government to better choices.

Therefore, using yearly total return data for real estate investments made by insurance companies from 2000 to 2019, this research aimed to predict the performance, in terms of maximum percentage for returns, of real estate investments to be allowed to insurance companies in Nigeria as required by the NHF Act. The direct capitalization model was utilised in the modelling to create an equation that was to run the simulation and showed positive returns for all insurance businesses, but the insurance companies did not abide by the Act's requirement that returns not exceed 4%. The percentage return fees levied by insurance firms throughout the research period revealed a higher charge between 1.60% and 135.63%. This shows that the NHF Act's shortcomings are the reason the insurance firms are not following the Act's requirements. Following the simulation, the report recommends a rise of 1.60% to the highest permitted rate of 4%, to 5.60%.

This research suggests raising the minimum return percentage permitted to 5.60% to get insurance firms to perform more consistently in reducing the housing deficit as mandated by the NHF Act. Additionally, it is important to let the insurance firms know that the NHF Act is a national policy to normalise the situation and that the housing deficit is a national catastrophe. Since no real estate investor has ever outperformed the market during a crisis, insurance firms should be aware that, if the Act is followed, the NHF Act will eventually pass into history and they will be free to set their rates. The government set the rate of return so low to allow the low-income people, who made up around 63% of the population, to buy their own homes. Insurance firms should be aware of this. In addition, the lack of easily available information on the real estate investments made by insurance firms in Nigeria continues to make it difficult for researchers and academics to make insightful recommendations on the sufficiency of the NHF Act. As a result, businesses and organisations that oversee real estate in Nigeria should strive towards establishing a trustworthy database. This will make it possible for insurance firms to save and centralise real estate investment data, which will turn, encourage data integrity and make performance analysis simpler.

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