Performance Evaluation on Aggregate Bases of Real Estate in a Mixed Asset Portfolio in Lagos

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Abstract

This paper evaluates the performance of direct real estate in a mixed asset portfolio, to ascertain whether the inclusion of real estate in the portfolio helps it perform better or not. Annual Transaction prices of government bonds, treasury bills, development stocks and commercial papers for a ten year period (2005-2014) were retrieved from the CBN bulletin. Annual rental values for commercial offices were collected through questionnaires administered on 220 out of 309 estate firms within the study location using simple random sampling technique. 165 questionnaires were returned and analyzed. The portfolio risk and returns were calculated with and without real estate to check performance at both levels. Correlation analysis was used to compare the strength of relationship and co-movement of assets. Findings show that real estate performed better than other assets giving higher returns though with higher risk. This can be attributed to the 2009 crash in the Nigerian stock market which made investors turn to real estate on the basis of security. However correlation analyses of the assets revealed a moderately positive correlation indicating little or no diversification benefit. This paper recommends further study using direct and indirect real estate only to determine the level of performance on a risk and return basis.

Keywords: Mixed Asset, Portfolio, Performance Evaluation, Real Estate.

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INTRODUCTION

The recent poor performance of the equity market around the world particularly the global economic meltdown has meant that real estate is increasingly being seen as an attractive addition to the mixed-asset portfolio (1). Performance as defined by (2) refers to 'achievement relative to targets and objectives', while (3) defines performance measurement as a mathematical means of assessing the effectiveness of an investment decision. Performance measurement quantifies the achievement of the investment relative to targets and objectives, while performance analysis involves the subsequent scrutiny and analysis of the results achieved, providing reasons for good performance and drawing appropriate conclusions for the purpose of correcting lapses, planning future strategies and taking decisions for better future performance. Investment is the giving up of a capital sum now in exchange for benefit to be received in the future which usually takes the form of an income flow and or capital gain (4).

Academic studies have examined real estate returns from many perspectives, both empirically and theoretically (5-9). A common area of interest is the investment performance of real estate viz-a-viz other assets. Often these studies find mixed results on the returns generated by real estate relative to other asset classes. Other studies have examined the optimal level of real estate to hold in a diversified portfolio (6). These divergent views held by different studies around the world present the need to provide evidence as to whether or not the inclusion of direct real estate in a mixed asset portfolio will enhance

portfolio performance in a state like Nigeria. In order to achieve this, the following objectives were set and pursued;

- To determine the performance based on the portfolio risk-return profile.
- To compare the performance of the portfolio with and without the real estate assets.
- To determine the level of correlation between returns of all the assets.

LITERATURE REVIEW

While many similar researches have been conducted in this area internationally in recent times, only a few have been conducted in Nigeria, perhaps due to the fact that it is still an evolving field in the country. Internationally, (7) researched on the performance of securitized real estate in a mixed asset portfolio focusing on the case of Malaysia. They sought to examine the role of Malaysian property shares and REITs in a mixed –asset portfolio from 1991-2006. Their results show that property shares do not provide any diversification benefits nor portfolio return enhancement. Whereas equally-weighted REITs portfolio does provide diversification benefits and return enhancement under the mean-variance and downside risk framework. (8) looked at direct and indirect real estate in a mixed asset portfolio. This research shows that during the period 2000-2010 securitized real estate still outperformed direct real estate. The spread during the period is as much as 762 basis points per annum. The highest risk-adjusted

return is given to the investor who invests between 21% - 30% depending on the specifics of the real estate. In Nigeria, (9) investigated the performance and diversification benefits of real estate equities and some selected common stocks in Nigeria. They used the mean variance and correlation to test the correlation of real estate equities with those of selected common stocks. Their findings indicated that real estate equities did not perform any better than stocks; and also suggested that real estate equities offered no diversification benefits. This study still had limits in that it did not use direct real estate but rather used equities and stocks only. (10) carried out a comparative analysis of commercial property and stock market investment in Nigeria focusing on commercial properties in South-western Nigeria. The study showed that stock-market offered a higher return than commercial property although with higher risk but there could be diversification benefits in combining commercial-property with stock investment. Therefore there is a dare need for information on performance of real estate amongst other classes of investment assets to guide investor's decision.

The concept of portfolio performance measurement.

A portfolio in more technical terms is a combination of assets held to enable an investment company to spread risk and achieve it's investment objectives with maximum efficiency (11). Portfolio investments are usually a varied bundle of investments ranging from cash, fixed interest securities (bonds), varied interest securities (equities) and real property. Portfolio management, therefore, is the administration of the property assets within the fund, not including the cash or gearing, but taking account of the structure of the portfolio as a whole (12). Mixed asset portfolio simply refers to the combination of different classes of investment assets in a single portfolio.

(12) distinguished between performance measurement, portfolio analyses and portfolio strategy. He referred to performance measurement as a science which deals only with the past, while portfolio analysis is relevant to the present, and portfolio strategy is relevant to the future. According to Baum, return measures may describe the future, the present or the past. Measures describing the future are always expectations. They will cover certain periods of time and may, if that period begins immediately, be called ex ante measures. Examples are expected internal rate of return (IRR) or equated yield and required return. Measures describing the present do not cover a period, but describe relationships existing at a single point in time (now). An example is the initial yield on a property investment; while this may imply something about the income return likely to be produced by an investment in the future, it is simply the current relationship between the rental income and the capital value or price. Other examples are Yield on reversion (UK), Equivalent yield (UK) and Reversionary potential (UK). While measures describing the past, or ex post measures, are measures of (historic) performance. Examples are Income return, Capital return, Time-weighted rate of return etc.

METHODS OF PERFORMANCE MEASUREMENT

Means and Standard Deviation (SD)

These are calculated to provide a relative comparison of the different asset classes on both a risk and return basis. Correlation coefficients are then calculated to describe the co-movement between each asset class. The asset with the lowest correlation would usually be a better choice for risk reduction in a portfolio through increased diversification. Based on return and risk variables performance measurement techniques can be grouped as follows; those that measure risks only, those that measure return only and those that measure both risk and returns.

Return Measurement Techniques

INCOME RETURN

This is the net income of a portfolio received over the measurement period divided by the beginning portfolio capital value and any net contributions (additional investments) made during the period.

CAPITAL RETURN

This measure the increase in capital value (capital appreciation) over the measurement period divided by the beginning portfolio capital value and any contributions (additional investments) period.

MONEY-WEIGHTED RATE OF RETURN (MWRR)

This is the addition of the income return and capital return. It measures the total return earned on a beginning portfolio capital value and any net contributions made during the period. It is also a lower version of internal rate of return (IRR) and measures the return on the investor's (the portfolio fund's) money rather than the portfolio manager's performance.

TIME-WEIGHTED RATE OF RETURN (TWRR)

TWRR measures the performance of the portfolio manager. To do this, the amount of funds invested is 'neutralized' in the calculation of TWRR because contributions and withdrawals by the client are not under the control of the fund manager. TWRR calculates the return in the periods up to the capital injections and then chain-links or compounds these separate period returns to calculate the average return over the longer period (11). In other words, it equally weighs the different time periods. Since the time-weighted return over these periods depends only on the length of the period and not on the amount invested, the return is termed 'time-weighted'. The resulting figure is a good measure of how well the investment manager did with managing the portfolio.

INTERNAL RATE OF RETURN (IRR)

The internal rate of return is actually a more sophisticated version of the MWRR because it takes more accurate account of the timing of cash flows, income and expenditure.

FINANCIAL MANAGEMENT RATE OF RETURN (FMRR)

The Financial Management Rate of Return (FMRR) was developed by (13) to take care of problems with the implicit reinvestment assumption of the IRR. The IRR assumes that interest that is earned every year is reinvested in the business. However, this is not always the case. Sometimes, the interest earned on principal is withdrawn and reinvested elsewhere, and moreover, it may be reinvested at a rate of interest that is higher than that of the asset being appraised. These criticisms of the IRR assumptions are taken into account in the FMRR. Accordingly, the FMRR assumes a safe realistic rate of return (different from the rate of return of the IRR) which is applied to the cash flow of year 1. The resulting accumulation at the end of year is used to defray any negative expenses in year 2. The net balance is carried forward to accumulate again at the realistic rate to year 3, where it is again applied to the cash flow (positive or negative) of year 3. If we assume that the asset cash flow terminates in year 3, then the total effective cash flow can then be discounted to present value at a rate which is the FMRR.

Measures of Risk

MEASURES OF TOTAL VOLATILITY

Standard deviation is a major measure of a portfolio's total volatility (risk), that is, systematic plus unsystematic risk. For single assets, it is calculated by measuring the disparity of an asset's periodic returns versus its mean return over the same time period.

MEASURES OF SYSTEMATIC RISK

The Beta coefficient is the major measure of systematic risk. It measures the performance of a portfolio's historical returns versus a chosen market benchmark. For stocks, the benchmark is usually the S&P 500 Index. The beta of the benchmark is always 1.00.

Risk-Adjusted measure of Portfolio performance.

These are measurement techniques that take into account both risk and return at the same time in the analysis of portfolio return. They are often referred to as the composite (risk-adjusted) measures. They were developed by three researchers; (14-16). They include

- The Reward-to-Variability Ratio (RVAR) or Sharpe Ratio
- The Reward-to-Volatility Ratio (RVOL) or Treynor Ratio
- The Differential Return Measure (Alpha) or Jensen's ratio

This study employed both the measure of return (mean) and total volatility (standard deviation) to measure performance of individual assets as well as entire portfolio.

RESEARCH METHODOLOGY

The data used for this study comprise both secondary and primary data. The secondary data used were treasury bills, development stocks, government bonds and commercial papers which were sourced from (17), while the primary data was average annual rental values of commercial office properties within five areas of Lagos metropolis namely, Victoria island, Lagos island, Ikoyi, Ikeja and Yaba to represent the whole of Lagos State. Both of which were over a 10 years period. There have been arguments on whether the combination of secondary and primary data can produce realistic portfolios. (18) argues that though such portfolios are optimal in the statistical sense, the results would be unacceptable to any prudent portfolio manager.

These unrealistic portfolio combinations usually arises when the returns of direct real estate are appraisal rather than market based and there is a strong view that as a consequence the volatility of real estate has been considerably underestimated (19). To account for such bias and ensure a one on-one tie between the individual data set, market based direct real estate data was used along with market based securities in the study.

Population sampled includes 220 out of 309 registered firms of The Nigerian Institution of Estate Surveyors and Valuers [NIESV] in Lagos State. About 65-70% of the firms are located within the study area. 220 questionnaires were administered to estate firms within the study location out of which 165 were returned and analyzed, giving an overall response rate of 75%. The firms were sampled using the simple random sampling technique.

The research adopted the descriptive statistics (mean and standard deviation) as tools to measure total volatility (risk) and returns of the different assets in their various proportions as well as portfolio risk, returns and risk-adjusted ratio with and without real estate using the model in, (11). Correlation analysis was also used to check the relationship between assets in the portfolio. First, primary data on the average rental values of office properties (per square meter) of both prime and medium income class areas of Lagos were obtained through questionnaire survey. The sampled estate firms have over 50 commercial properties within their management portfolios. There are other types of commercial properties such as retail shops, ware houses etc but for the purpose of this study only office properties were considered.

Second, the mean and standard deviations of all the individual assets were calculated and adopted as a measure of their return and risk levels. Using the following formulas:

Asset return

$$\text{Mean} = \sum_{i=0}^n (i=0)^n X \dots\dots\dots 1$$

Where X_i = asset period return and N = number of observations

Portfolio return:

$$R_p = \sum W R_i \dots\dots\dots 2$$

Where R_p = Return of the portfolio, W = The proportion of investment in each asset, R_i = Return on each asset

Risk is measured by the standard deviation given by:

$$\text{Asset risk : } S = \sqrt{\sum (X_i - \bar{X}) / N} \dots\dots\dots 3$$

where, s is the standard deviation; x_i is periodic return of each value in the sample; $\bar{x}$ is the mean of the values, and N is the number of observations.

Portfolio Risk Model Explained.

$$\text{Portfolio risk: } \sqrt{\sum (P_a + P_b + S_a + S_b + C_{ab})} \dots\dots\dots 4$$

Where P_a = Proportion of asset A,

P_b = Proportion of asset B,

S_a = Standard deviation of asset A,

S_b = Standard deviation of asset B,

C_{ab} = Correlation Coefficient of asset A and B

Model 5 below was created out of the five different classes of assets in the portfolio labeled a,b,c,d and e to calculate the portfolio risk. The larger the number of assets in the portfolio the more the calculations become unwieldy. To determine this, the standard deviations of the different assets were calculated along with the proportions of investment funds allocated to each asset as well as the coefficient of correlation between the assets. The model is used for calculating portfolio risk with and without real estate to check the performance of the both portfolios before concluding on which of them performs better. In calculating for portfolio risk without real estate, real estate is simply removed from the model.

Thus for the portfolio under study, we have assets a,b,c,d and e labelled as;

Let a = Treasury Bill,

b = Development Stock,

c = Commercial Papers,

d = Government Bond and

e = Real Estate, Substituting these variables in the formula we have

equation 5 below;

$$\sqrt{\{(P_a \times P_a \times S_a \times S_a) + (P_b \times P_b \times S_b \times S_b) + (P_c \times P_c \times S_c \times S_c) + (P_d \times P_d \times S_d \times S_d) + (P_e \times P_e \times S_e \times S_e) + 2(P_a \times P_b \times P_c \times P_d \times P_e \times S_a \times S_b \times S_c \times S_d \times S_e \times C_{abcde})\}} \dots\dots\dots 5$$

The assets were then correlated to measure the extent of relationship between the variables.

RESULTS AND DISCUSSIONS

Table 1 shows the returns from the various investment types for a period of ten years (2005-2014). From the table, it is quite clear that returns from real estate (RE) maintained a steady growth within the period under study without any fluctuations. There were continuous fluctuations in returns of development stocks all through the period to a zero mark while treasury bills also experienced a fluctuation from 2005 up to 2008 when it hit its lowest point and then began to rise dramatically in 2009 up till 2014. This steep fall can be attributed to the effect of the stock market crash of 2008-2009. Commercial papers enjoyed a steady increase from 2005 till 2008 and began to drop steadily till 2014. This can also be attributed to the stock market crash of 2008 which discourage investors from investing in them. Government bonds like real property also maintained a steady increase throughout the period under study.

Table 1. Annual Returns on Individual Investments in the Portfolio

Period	Treasury Bills (TB)	Development Stock (DS)	Commercial Papers (CP)	Government Bond (GB)	Real Estate (RE)
2005	871.6	1.3	80.1	72.6	12994.9
2006	854.8	1.0	194.6	250.8	13655.0
2007	701.4	0.7	193.5	643.9	15091.9
2008	574.9	0.6	363.4	1186.2	16536.6
2009	471.9	0.7	822.7	1445.6	17701.7
2010	797.5	0.5	509.1	1974.9	19340.0
2011	1277.1	0.2	189.2	2901.6	20960.0
2012	1727.9	0.0	203.0	3541.2	23673.4

2013	2071.9	0.0	50.0	3834.7	25815.0
2014	2479.9	0.0	13.9	4072.6	26568.3

Source: TB, DS, CP and GB represents Annual Averages of Money Asset transactions published by CBN Annual Bulletin [2008]. RE represents annual rental values.

Table 2 shows the average annual returns expressed as the mean, the average annual risk expressed as the standard deviation and the risk return ratios of all the assets. The risk return ratio is the return per unit risk. It is the mean divide by the standard deviation. Increase in risk return ratio is indicative of higher return per unit of risk.

Table 2. Performance of Individual Assets on Risk-Return basis

Period	Treasury Bills (TB)	Development Stock (DS)	Commercial Papers (CP)	Government Bond (GB)	Real Estate (RE)
2005	871.6	1.3	80.1	72.6	12994.9
2006	854.8	1.0	194.6	250.8	13655.0
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2012	1727.9	0.0	203.0	3541.2	23673.4
2013	2071.9	0.0	50.0	3834.7	25815.0
2014	2479.9	0.0	13.9	4072.6	26568.3
Mean	1182.9	0.48	261.9	1992.4	19233.6
Std. Deviation	686.3	0.4442	245.7	1506.7	4906.167
Risk-Return Ratio	1.724	1.080	1.070	1.322	3.920

Therefore, table 2 reveals that real estate had the highest mean (return) and the best risk return ratio amongst the five asset classes. Treasury bill is next to real estate, even though it yields lesser returns compared to government bonds. However on a risk adjusted basis treasury bills performs better than government bonds. Same situation applies to development stocks and commercial papers as commercial papers perform far better in terms of returns but on a risk-adjusted basis development stock slightly performs better.

Table 3: Return and Risk with and without Real Estate

	Without Real Estate	With Real Estate
Portfolio Return	912.982	6,085.36
Portfolio Risk	1,020.37	2,199.18
Portfolio Risk-Return Ratio	0.895	2.767

Table 3 presents results of comparing portfolio risk and returns both with and without real estate. Results show that portfolio returns were higher with inclusion of real estate with a difference of 5172.38, while portfolio risk was also higher with the inclusion of real estate with a difference of 1178.81. However, to validate the results, results were adjusted for risk by dividing portfolio mean by portfolio standard deviation. Results further confirmed that portfolio with real estate performed better than portfolio without real estate with a return difference of 1.872. The implication of this is that real estate has potential to increase the portfolio return but not necessarily reduce its risk.

Investors who are naturally risk-averse may not find it very encouraging to build a portfolio with real estate inclusive. However, investors who are risk-takers stand to make maximum returns on their investments.

Table 4. Correlation matrix of the portfolio.

	TB	DS	CP	GB	RE
TB	1				
DS	-0.71582	1			
CP	-0.65441	0.100375	1		

GB	0.856367	-0.95706	0.26949	1	
RE	0.871261	-0.94695	-0.26861	0.993755	1

From Table 4, the result of the correlation analysis showed that returns on real estate (RE) had positive correlation with treasury bill (TB) and government bonds with a correlation coefficient, (r) 0.871261 and 0.993755 respectively, and a negative correlation with development stocks and commercial papers with correlation coefficient (r) -0.9469 and -0.26861 respectively. This implies that a portfolio of real estate and stocks will yield more diversification benefits than a portfolio of real estate and financial assets. Thus, prospective investors are better off with a portfolio having a greater proportion of real estate and stocks. For this portfolio, there were little diversification benefits as the relationship between asset was more positive.

For the performance of each mixed asset in hierarchical order, we have GB→TB→CP→DS

CONCLUSION AND RECOMMENDATIONS

This paper evaluates the performance of direct real estate in a mixed asset portfolio, to ascertain whether the inclusion of real estate in the portfolio helps it perform better or not.

Results reveal that real estate had the highest return and the best risk adjusted performance amongst the five asset classes. Treasury bill is next to real estate, even though it yields lesser returns compared to government bonds. However on a risk adjusted basis it performs better than government bonds. Same situation applies to development stocks and commercial papers as commercial papers perform far better than in terms of returns but on a risk-adjusted basis development stock slightly performs better than commercial papers. Portfolio risk and returns both with and without real estate were also calculated to determine their performance. Results show that portfolio returns were higher with inclusion of real estate with a difference of 5172.38 about 51.7%, while portfolio risk was also higher with the inclusion of real estate with a difference of 1178.81 about 11.8%. However, results were adjusted for risk by dividing portfolio mean by portfolio standard deviation, after which results further confirmed that portfolio with real estate performed better than portfolio without real estate with a return difference of 1.872 about 0.02%.

Based on the findings, it could be deduced that real estate has potential to increase the portfolio return but not necessarily reduce its risk. These findings could be based on the recent crash in Nigerian stock market in 2009 which discouraged investors from investing in stocks and related assets. There was a shift of attention by investors to real estate as this is perceived to be more secure. Their positive correlation and co-movements indicate that their returns move in the same direction suggesting little or no presence of diversification benefits. It also confirms the fear that portfolio diversification may fail in terms of risk reduction during the period under study.

The empirical findings of this research should help both institutional and commercial office property investors build more efficient portfolios in order to maximize the benefits of diversification on investments. Further study is also recommended to be conducted using direct and indirect real estate only to determine the degree of correlation and the performance in terms of risk and returns.

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