Is Capital Asset Pricing Model a Shibboleth? New Evidence from NSE Real Estate Common Stocks

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Abstract

Over the last four or five decades, Capital Asset Pricing Model (CAPM) has been widely acknowledged in the investment community as a useful technique for computing company cost of equity capital, using beta coefficient as a measure of systematic risk, such as that of global recession and oil price dynamics. The underlying assumption of the model is that the average investor is risk averse; that, intuitively, investors like return and dislike risk. The CAPM is however regarded by some authors as probably outmoded and its applicability to emerging markets has been questioned in other quarters. We were thus confronted by a disconcerting question as to whether the CAPM truly explains investment risk-return behaviour, especially in less-developed markets. This research contributed to the literature by using public stock-market data for emerging real estate-backed equities, spanning 2000-2011 in the Nigerian Stock Exchange (NSE), to further test the CAPM. T-test statistics and regression analysis were employed to determine how well annual asset returns correlated with systematic risk during the period. The major finding of the study suggested that there was no relationship between the level of systematic risk and real estate equities return on the NSE, thus revalidating the portfolio risk-diversification value of certain asset classes as predicted by the CAPM. The work’s significance lies in keeping open the debate on the utility of the CAPM as a framework for analysing and building optimal portfolios in emerging markets like Nigeria. The positive implications for corporate finance theory and practice in increasingly random and uncertain market conditions were highlighted.

Keywords: Beta, CAPM, Global Financial Crisis, Real Estate Equities, Systematic Risk
Field of Research: Applied Corporate Finance (JEL Class: C52, G1, G3, & L85)
1. Introduction

The trend towards liberalization and globalization has promoted such a free flow of capital within and across international borders that an investor considering investment in securities is increasingly faced with the problem of choosing from among a larger number of securities, stocks or shares in the financial markets. Each set of securities or asset class puts investor’s money to work in different ways by posing particular risks that may not be characteristic of other asset classes. In this context, intelligent asset allocation will invariably depend on the investor’s risk appetite and the risk-return behaviour of individual securities, thus making proper investment analysis an imperative in corporate finance practice (Graham, 2004; Ekundayo, 2010). In this regard, an age-long challenge for investors, particularly in developing markets like Nigeria, has been, finding valid and reliable performance approaches for ascertaining the risk-return nature of their portfolios in uncertain and rapidly changing conditions. The gap in knowledge leads many investors to maintain a higher than desired risk concentration level in their investment portfolios because of the tendency to apply the traditional diversification strategy to securities rather than to risk (Kiyosaki, 2011). The disproportionate investment streams presently in favour of the developed markets such as the USA and Northern Europe has led to the belief that there is probably an inadequate knowledge of the investment peculiarities and potentialities in some emerging markets particularly with respect to real estate asset classes (Ernst & Young, 2014). Capital Asset Pricing Model (CAPM) is thought by many authors and practitioners to provide the helpful analytical tool for enhancing an understanding of the risk-return behaviour of capital assets for optimal portfolio design, but this view has remained the subject of lengthy (Michael, 2014; Nel, 2011).

In the midst of the on-going debate, research has suggested that real estate common stocks - publicly traded real property-backed financial instruments of organisations whose core business activity is investment in real estate either through direct property development or collective investment schemes – broadly possess risk-diversification potentials that offer the asset class as strategic to building a healthy, sustainable, optimal financial portfolio (Lohmeier, 2003). Although there is a growing body of literature in the field, research has been mostly based upon data prior to the 2008 global financial crisis and it is unclear if the conclusions from past studies are still valid. Contributing to the debate through the lens of emerging real estate securities market in Nigeria, the present study is expected to be a step further than the previous studies by testing the validity of the CAPM.

One of the perplexing questions is whether CAPM assumptions truly explain risk-return investment behaviour, particularly in a developing economy like Nigeria. To what extent could we use the CAPM to reliably determine the market risk (systematic, non-diversifiable,
uncontrollable risk) of the emerging capital assets such as the real estate-backed common stocks in the Nigerian financial landscape? Is real estate still a good diversifier? (Ebrahim & Hussain, 2010; Oteh, 2011; Lynn, 2011) More specifically, using the standard CAPM in the context of the Nigerian Capital Market, is there any significant correlation between real estate common stock’s rate of return and the market’s overall rate of return? Answering these questions is not purely an academic exercise; it has significant implications for effective investing in uncertainty. The importance of these questions particularly towards utilising the capital market for housing industry development in developing markets (Osamwonyi, 2006; BGL Research, 2011), and the lack of well-defined and authoritative views therein motivated revisiting the debate in this study. To this end, we analysed public annual financial data of sampled Nigerian real estate-backed common stocks spanning 12 years, 2000 to 2011. The choice of the study period was predicated on the need to expand relevant data beyond the pre-2008 knowledge while including other variants of real estate securities that were not researched in previous studies.

An essence of the CAPM is to help in deriving an asset’s intrinsic value and cost of capital which, is pivotal to any investment process worthy of the name (Graham & Dodd, 2009). Thus, the significance of the present contribution lies in keeping open the debate on the use of the CAPM and highlighting positive implications for portfolio risk management theory. The recommendations made towards necessary improvements in current investment management policy and practice in Nigeria, as well as suggestions for future research will avail researchers, local and international investors, pension and sovereign wealth fund managers, financial institutions, valuers, developers, professional managers and other stakeholders, with further insights into the investment character of the evolving property-backed financial instruments.

The paper is divided into five sections. The first section is this introduction. The next section reviews the relevant literature and some highlights of the Nigerian Stock Exchange (NSE) and the emerging real estate capital markets. The third section focusing on the methodology and model used for the study is followed by the fourth section presenting the research findings. The paper is concluded in section five with some implications of the study.

2. Literature Review

2.1 Conceptual Framework

Current thinking as outlined by Graham and Dodd (2009) is that an investment operation is one which upon thorough analysis, promises safety of principal and satisfactory returns; operations not meeting those requirements are deemed speculative. Investment risk, in broad sense, thus lies in the fluctuations of business vagaries and fluctuations in the earnings of a company. Risk and return variables thus remain ageless drivers of investment decisions; if
you have two portfolios offering the same percentage rate of return, you are more likely to choose the less risky one because it is thought to create more value over time (Merton, 2014; Girotra & Netessine, 2014). Portfolio theory distinguishes between two main types of risks: (i) company-specific (diversifiable) risk — the risk specific to a particular asset; and (ii) market/systematic (non-diversifiable) risk — the amount by which the asset increases the variance of a diversified portfolio when it is added to that portfolio (Myles, 2003; Brealey, Myers, & Allen, 2014). In a market that is in equilibrium, market participants will be compensated only for bearing the market risk inherent in the cash flows (Iyiegbuniwe, 2007).

The market risk principle states that the reward for bearing risk depends only on the systematic risk of an investment, that is, the degree to which the asset’s rate of return correlates with the market portfolio as proxy for such macroeconomic dynamics as effects of globalization, interest rate, inflation and political factors (Blaaw, 2009; Brealey et al, 2014). Systematic risk is thus contrasted from company-specific risks derived from internal business management issues such as earnings, dividend policy, and net asset values that are peculiar to the asset in question. Consequently, Modern Portfolio Theory (MPT) suggests that the basis for optimal portfolio management is to utilize the unique or diversifiable sources of variability of different securities to offset one another in a potpourri of assets (Sigman, 2005).

The CAPM doctrine would thus seem to rest particularly on the pillar of ‘market portfolio’ and one of persisting criticisms of the model is that the market portfolio should contain all risky investments, including commodities and human capital; whereas most market indexes contain only a sample of risky assets (Damodaran, 2014). Market portfolio refers to all the common stocks traded on a stock exchange; hence it is conceived in this study as a benchmark or proxy for overall financial market developments, accommodating all the dynamics in the global markets (Onyema, 2013; Kiley, 2004). It is perhaps unrealistic to expect that an average investor will retain in his portfolio all risky assets. Consequently, our view is that while the nature of benchmark portfolios would in practice vary according to operating portfolio size and investment strategy, the fundamental CAPM premise upon which this study is based, is that assets, firms and industries respond differently to market movements (Olowe, 2011). In effect, while these multitudinous factors may play important roles in the investment character of capital assets, the central argument in this paper is that the nature or degree of their impact on stock prices will vary from stock to stock as postulated by the CAPM (Brealey et al, 2014).

2.2 Theoretical Framework of CAPM

The very act of investing is by definition a risk-taking venture which is why intelligent investment demands rigorous analysis and the common sense of “looking before you leap” (Graham & Dodd, 2009). In other words, because the return on investments is not known with
certainty when a capital asset is bought, the multiplicity and complexity of business environmental factors makes risk-taking a basic function of the business enterprise, and therefore managers cannot avoid coping with the phenomenon of time and uncertainty with a great deal of clear-headedness offered by analytical models. It is in this regard that the CAPM as probably the aptest device measuring the relationship between expected return of a security and its risk relative to the market portfolio is well-rooted in the literature (Markowitz, 1952 & 1959; Lintner, 1962 & 1965; Sharpe, 1964; Mossin, 1966). The CAPM states that the proportion of wealth held in each stock is equal to the ratio of a stock’s market value relative to the market value of all securities (Olowe, 2011). CAPM has thus been found useful to studies attempting to answer the critical question as to a stock’s market risk (denoted by beta), which estimates the extent to which stock prices are liable to be affected by a general market rise or decline. This is because the CAPM theory collapses all externalities into a well-defined factor – entire stock market return (Brigham & Gapenski, 2004; Iyiegbuniwe, 2007).

2.3 Applicability of CAPM in Emerging Markets: Empirical Evidence

Critics of the beta theory express doubts as to whether variability really equals risk, whether a single number (β) reflecting past price fluctuations could be thought to completely describe the risk in an investment, whether past portfolios with beta really help to build future portfolios; and whether price behaviour can be equated with people’s behaviour, since human beings (investors) do not necessarily ‘behave’ according to thermodynamic laws. The CAPM is also thought to have failed to take into consideration other specific business fundamentals or economic developments, ignoring inflation and the influence that investors themselves can exert on the riskiness of their holdings through such efforts as proxy contests, shareholder resolutions, communications with management, or the ultimate purchase of sufficient stock to gain corporate control and with it direct access to underlying value. There is also the concern that beta might not work in low swings and portfolios with short histories; the possibility that the difference between high-beta stocks and low-beta stocks is not as ‘steep’ as portrayed by CAPM; the likelihood that intrinsic risk differences may be due to other factors like the size of the firm; and whether it is not more preferable to individually weight and test the effect of key externalities (for example, inflation, exchange rate, and interest rate) on stock prices, instead of collapsing all these factors into market portfolio. The other cited CAPM weakness is the relative impracticability of including all risky assets (plus bonds, commodities, properties, and human resources) in the market portfolio (Merton, 2014). Authors like Kiyosaki (2011) claim that the idea of a diversified portfolio is an oxymoron because stock markets mostly comprising “paper assets” is more accurately homogenous. Also, the CAPM emphasises expected returns as against observable actual returns, while assuming that
investment in government’s Treasury bills is risk-free when we know that there is always a risk, even if a negligible and the bills do not promise a real return when we factor inflation (Brealey et al., 2014; Capinski & Zastawniak, 2007).

Some of the often-cited CAPM assumptions - such as infinite asset divisibility and liquidity; investors’ rationality, homogenous expectation and price-taking; zero trading/taxation costs; information-perfect market; and borrowing and lending at risk-free rates - can be unrealistic, particularly in emerging markets (Arnold, 2005). The arguments against the inapplicability of CAPM in less-developed markets include the overreactions of emerging markets to movements of stock prices in the developed world, as witnessed in the 2008 global financial crisis and the suggestions that historical data tend to be limited and noisy; also, the normal distribution of asset returns assumed by CAPM is not valid in these markets (Kewalramani, 2008). It is noteworthy that some of these criticisms tend to ignore the positive impact of capital market reforms (such as VAT and stamp duty exemptions for stock market transactions in Nigeria) on some of the emerging markets’ efficiency trajectory and the investment peculiarities of certain asset types such as real estate.

Even when CAPM is applied in more developed markets like the US, the beta of an asset is estimated relative to the local stock market index rather than a portfolio that is diversified across asset classes (Damodaran, 2014). The often-cited multi-beta or multi-factor alternatives such as Arbitrage Pricing Model (APM), and others like inter-temporal CAPM, consumption CAPM, Fama-French three-factor model are rather prone to a lot of practical difficulties in their usage, due to the fact there is no consensus among scholars as regards its testability, the appropriate methodology, and which factors should be employed (Olowe, 2011; Nawalka, 2007; Bhatnagar & Ramlogan, 2012; Fama & French, 2004). This means that there is probably no perfect model anywhere in the world; only the depth and range of application could differ from country to country, hence, perhaps, the suggestion by Damodaran (2014) to include, in the CAPM equation, a country’s risk premium and long-term bond rate, among other modifications. However, in this context, the problem may arise as to the utility of a country’s risk premium to the average investor who has no global portfolio.

Brealey et al (2014) suggest that many analysts and economists find CAPM convenient to use in estimating cost of capital and unlocking deep insights and value of portfolios without having to make heavy investments in technology. The authors provide a 1931-2011 Wall Street illustration of ten investors on the New York Stock Exchange that broadly supports the CAPM while alluding to Graham and Harvey (2001)’s finding that 73 percent of the managers surveyed used CAPM. Black (1972) had shown that the assumption on borrowing restrictions would not nullify the applicability of CAPM. In computing US stock and indices
database, Centre for Research in Security Prices [CRSP] (2009) largely used the method \textit{beta} calculations, incorporating, inter alia, value-weighted market return, 3-day moving average market window, and summations over all days on which a particular security traded, beginning with the first trading day of the year and ending with the last trading day of the year.

There seems to be mixed findings on the impact of systematic forces on the rate of return of real estate equities in the Nigerian context. While the weight of empirical evidence so far appears to tilt towards the prospects that real estate-backed securities have limited correlation with market portfolio, this position is probably not conclusive, especially in the light of the market developments following the 2008-2009 stock market crash. Using the annual open and closing market prices of shares and dividends of seven listed companies including the country’s premier publicly traded real estate equity, UAC Property Development Company Plc (UAC-Prop) in addition to data on all-share index (ASI), consumer price index (CPI) and yield on 91-day T-Bill spanning seven years, 1999-2005, Amidu, Aluko, Nuhu, & Saibu (2008) show that real estate common stock tends to be uncorrelated with the stock market, and therefore a good choice for inclusion in investment portfolios. Using OLS (Ordinary Least Squares) and Pearson Correlation, Michael (2014) found a positive relationship between $\beta$ and $R_i$ (returns) of 24 actively traded stocks on the Nigerian Stock Exchange (NSE) between 2009 and 2012 with mutual funds used for the $R_m$ (market portfolio), perhaps as earlier suggested by Sigman (2005). Recent empirical studies of forty-five actively traded stocks on the NSE over the period 2000 to 2009 suggest results that are consistent with CAPM’s postulation that the only real risk in investment is systematic risk (Aruma & Jingudo, 2013). The findings from the past studies would have been more useful if the authors had included emerging real estate businesses such as Real Estate Investment Trusts (REITs). Expectedly, more recent research points to the prospects of real estate equities being uncorrelated with the market portfolio, a behaviour that is not too divergent from the tendencies in more developed markets (Appraisal Institute, 2001; Dauda & Aro-Gordon, 2014).

Overall, a good deal of research have proven the simplicity and utility of the CAPM in determining cost of equity and asset pricing dynamics in several emerging markets across the world (Zubairi & Farooq, 2011; Hassan, Kamil, Mustafa, & Baten, 2011; Damodaran, 2007; Magni, 2005; Perold, 2004; Rhaiem, Ammon & Mabrouk, 2007; Michailis, Tsopoglou, Papanastasion & Mariola, 2006). The diversities in the reported results from CAPM applications, particularly in terms of beta and risk premiums, perhaps underscore the varying idiosyncrasies or peculiarities in investment markets across the world. The CAPM application
to the emerging real estate equities in Nigeria attempted in this paper is expected to provide further insights into the utility of the CAPM in an increasingly globalised world.

Nevertheless, the general approach to this present study will differ slightly from previous efforts, in the Nigerian context, on at least one ground. The first is its wider data coverage: longer-term beyond the pre-2008 (global financial crisis) knowledge and going beyond the traditional Real Estate Operating Companies (REOCs) to include Real Estate Investment Trusts (REITs).

2.4 An overview of the NSE and Real Estate Sector

The Nigerian publicly traded real estate equities market currently has an aggregate market capitalisation of ₦60 billion (NSE, 2010). Publicly traded REITs are relatively new investment vehicles in the country for which the Securities and Exchange Commission (SEC) has provided some regulatory framework (Investment & Securities Act, 2007). While the market index has declined by 25 percent, N-REITs (Nigerian REITs introduced in 2008) grew by 121 percent while the REOCs declined by 20 percent at a time when the nation’s entire stock market had fallen 70 percent from its peak in March 2008 (Owolawi, 2014). The mortgage sub-sector however showed the greatest decline of 34 percent (NSE, 2010). After the ₦2.3 billion Skye Shelter Fund was introduced as the first REIT publicly listed on the Nigerian Stock Exchange on 28 February 2008, the REIT market received further boost with ₦13.5 billion Union Homes Savings and Loans Hybrid (portfolio consists of property investments and mortgages) REIT launched in September 2008 as a vehicle to an alternative investment outlet, within a transparent and tradable structure to investors having a medium to long-term appetite for real estate. The ₦28.5 billion UPDC Real Estate Investment Fund floated in 2013 completes the three current N-REITs on the NSE (SEC Nigeria, 2014).

It is noteworthy that, with the humongous opportunities in the real estate sector, this important business sector only represents a minute fraction (less than 1 percent) of the value of the Nigerian public equities market, based on market capitalization as at the end-year 2010. Admittedly, the N-REITs are confronted with a lot of challenges, such as limited awareness of REITs market opportunities and liquidity risk arising from relatively low trading activities that lead to questioning the applicability of CAPM’s efficient market assumptions. Most of the country’s publicly traded real estate companies and REITs are focused on the Nigerian market with business model aligned with their core competencies, delivering mostly to the top-end and middle-class markets, in terms of sales and rentals. Nevertheless, it is anticipated that, with the ongoing mortgage reforms, the Nigerian market could be poised for greater diversification into social housing that could generate interest from more foreign and local investors.
By the middle of 2011, global economy had started to recover from the 2008/2009 global financial crisis; at that time global wealth had matched or surpassed the pre-crisis levels in all regions except Africa (O’Sullivan & Kersley, 2013; Durden, 2013). In the long run, the gradual recovery of the global economy is expected to impact positively on the Nigerian economy that has been growing steadily in recent years at an annual GDP growth rate of over 6 percent. Up from its ranking as 52nd in 2000, the country is currently ranked 26th in the world in terms of GDP purchasing power parity, and now (post-rebased GDP of $509.9 billion as of 2013) Africa’s biggest economy (National Bureau of Statistics, 2014). Currently having about 258 listed securities with a total market capitalisation of about US$ 114 billion, and member of the United Nations’ Sustainable Stock Exchanges (SSE), the NSE is Africa’s second largest financial centre after the Johannesburg Stock Exchange, a 35.5 percent return in 2012, and 47.2 percent in 2013, its best performance since 2008 and the best in Africa (UNCTAD, 2013; Moyela, 2014). An Economic Transformation Agenda is on-going under which the Government plans to establish an efficient and transparent land title transfer system, simplify existing land title procedures for effective title and consent delivery, develop an efficient national land information system, and establish a national housing data bank. Also, the newly established Nigeria Mortgage Refinance Company (NMRC) is expected to grow the country’s critical housing sector by introducing secondary mortgage market activities that could lead to more affordable mortgages, thereby reducing the huge national housing deficit particularly within the middle- and lower-income earning groups. Informed by the need for ensuring safety and security of investors’ funds, efforts are also ongoing to strengthen operators’ global competitiveness through SEC-driven new minimum capital requirements for market operators expected to become effective from January 2015 (SEC Nigeria, 2014b). Year-to-date inflation at 7.99 percent remains more benign than previous double-digit era (Vetiva Research, 2014). Foreign investments in NSE hit N733 billion in 2012 and expected to grow over time in line with positive market regulatory regime (Onyema, 2013). One question however looms as to how real estate-backed equities can be said to be immuned from the market dynamics and whether investors can count on the real estate asset class to survive major policy or market changes. An application of CAPM to a real sector asset class like real estate undertaken in the present study is expected to provide some insights in this regard.

3. The Methodology and Model

We deployed the standard (Sharpe-Lintner-Mossin) CAPM parameters of stock return \( (R_i) \), investment return from risk-free asset \( (R_f) \), and market return \( (R_m) \), for the present study. Unlike the previous studies that seemed to have focused exclusively on the Real Estate Operating Companies (REOC) segment, we stratified all the listed real estate-backed
companies and funds on the NSE into two sub-sectors (REOCs and REITs) and the top rated stocks (in terms of length of shares trading and industry representativeness) selected as samples for the study, using annual year-end market prices of shares/units. This was expected to help in ensuring that the emerging business activities in the multi-faceted real estate sub-sector are as much as possible reflected in the present effort. Consequently, the first component, \( R_i \), utilized 12-year (2000 to 2011) public stock-market data obtained from the published Annual Accounts and Reports obtained from the researched REOC and REIT. The second component, \( (R_f) \), used published data on 91-day Federal Government of Nigeria T-Bills average rate of return sourced from the Central Bank of Nigeria (2011), while \( (R_m) \) used stock-market aggregate Price-Earnings Ratio (PER) obtained from the NSE (2010 & 2012). Quantitative historical documentary research method was thus used as an invaluable approach to meaningful capital market research, valuation and selection of securities (Seaman Jr & Smith, 2012; Graham & Dodd, 2009). Publicly traded companies, the realm of the present study, are particularly characterized by a high level of oversight by the NSE and SEC to ensure information revelation and good corporate governance. Objective financial data on publicly traded assets are thus more readily accessible than the privately held shares. The sample size (\( N < 30 \)) used in this study would be considered statistically too small for generalization, but this is due to the infancy of the Nigerian real estate securities market and the paucity of actively traded sample stocks in the sector. However, the data set of four to twelve years is, in our view, still sufficient to provide some measure of information about the viability of the CAPM within the Nigerian stock market; it is instructive that Rhaiem et al (2007) finds CAPM applicable at different time horizons, whether short-term or long-term. In any case, 100 percent of the researchable population was selected for REOCs, while one-third was selected from N-REITs based on FTFS (“first traded, first selected”). In effect, the resultant samples for analysis comprise the following: UACN Property Development Company Plc (UAC–Prop): \( REOC \), and Skye Shelter Funds Plc (SkyeShelt): \( REIT \).

Assisted by the Microsoft Excel, we analysed data using descriptive, correlation and regression models. We employed the t-test statistic to ensure internal data validity at 95 percent (0.05) confidence level, based on N-1 degree of freedom.

The systematic risk question was addressed using the CAPM cost of equity equation:

\[
E(R_i) = R_f + \beta_i (R_m - R_f)
\]  

... (1)

Where,

\( E(R_i) \) is the expected return on the capital asset.
\( R_f \) is arithmetic average of historical risk-free rates of interest

\( R_m - R_f \) is the market risk premium, that is, the difference between the average return from the market portfolio and the risk-free rate of return.

\( \beta_i \) is the sensitivity of the expected excess asset returns to the expected market returns, that is,

\[
\beta_i = \frac{\text{Cov}(R_i, R_m)}{\text{Var}(R_m)}
\]

... (2)

or,

\[
\beta_i = \frac{\text{Covariance with the market}}{\text{Variance with the market}} = \frac{\sigma_{im}}{\sigma^2 R_m}
\]

... (3)

Statistically:

\[
\beta = \frac{1}{N-1} \sum (R_i - \bar{R}_i)(R_m - \bar{R}_m) \overline{\sigma^2 (R_m)}
\]

... (4)

Where,

\( R_i \) = Average return of the capital asset

\( R_m \) = Average return from the market portfolio

\( \sigma^2 \) = Mean deviation or variance measure

\( N \) = Number of observations

The mean deviation or variance measure, \( \sigma^2 \), in (4) follows standard statistics in its computation as follows:

\[
\sigma^2 = \frac{\sum (x - \bar{x})^2}{N}
\]

... (5)

Where,

\( \sigma^2 \) = Variance

\( N \) = the number of items or observations

\( \bar{X} \) = the respective values of \( R_m \)

Extensive financial analysis was conducted on both securities, examining the financial variables for the combined years of 16 years. The analysis included the following CAPM basics:
(a) The dependent variable: stock-market price \( (S) \)
Stock price, \( S \), is the year-end market price of the security as published in the NSE’s Daily Official List relating to the study period.

(b) Market returns \( (R_m) \)
This represents the aggregate return on the market portfolio, determined as a derivative of the sourced data on market PER, over the study period, that is:

\[
R_m = \frac{1}{\text{Market PER}} \quad \ldots (6)
\]

Only common stocks (ordinary shares) were included in the computation of the benchmark portfolio that cuts across the country’s key economic sectors – food and agriculture, consumer goods, construction, healthcare, energy, and financial services, among others.

(c) Risk-free rate \( (R_f) \)
Following standard practice (Aruwa & Jingudo, 2013), we took the risk-free rate to be the average discount rate from investment in the Federal Government of Nigeria 91-day T-Bills.

(d) Earnings per Share (EPS) and asset returns \( (R_i) \)
Return performance for each asset was represented by its average Earnings per Share (EPS). To obtain this ratio, net earnings after tax, was divided by the total number of shares outstanding, that is,

\[
EPS = \frac{\text{Net Profit (Available to Stockholders)}}{\text{Number of Ordinary Shares}} \quad \ldots (7)
\]

Earnings yield (that is, \( EPS/S \)) was computed to determine the stock’s actual return performance during the period.

(e) Test of hypotheses
The statistical tools employed for testing the CAPM-based hypothesis formulated for this study was the paired Student’s \( t \)-ratio and the regression model \( R \) Squared \( (R^2) \). This was used to test the significance of the coefficients individually. The hypotheses are:

\( H_0 \): There is no significant correlation between real estate stock’s rate of return and market portfolio’s rate of return.

\( H_A \): There is a significant correlation between real estate stock’s rate of return and market portfolio’s rate of return.

The Student’s \( t \)-Test statistical table was consulted for the given values and a decision was made using standard statistical parameters. The \( beta, \beta \), is a statistical variable and was considered with its statistical significance – \( R \) Squared \( (R^2) \) value of the regression line; \( R^2 \) is a statistical measure that represents the percentage of stock’s movements that can be
explained by movements in the market portfolio. $R^2$ test, whose values lie between 0 and 1, was thus employed in the present study to determine if the regression model was satisfactory. The closer R-squared is to 1.0, the better the fit of the regression line. A higher $R^2$ value ($R^2 \geq 0.70 - 1.00$) suggests that the stock behaviour has closely mirrored the behaviour of the market portfolio, while a stock’s beta with low $R^2$ value ($R^2 \leq 0.70$) would be inferred as exhibiting behaviour contrary to that of the market portfolio.

4. The Findings

This study was designed to test the usefulness of the standard CAPM in evaluating the systematic risk of emerging real estate equities in Nigeria’s financial landscape. Table 1 displays the return performance of the $Rm$ and $Rf$ in the Nigerian financial system during the study period, 2000 – 2011. One of the interesting findings to emerge from the present research is that the $Rm$ in the NSE has historically remained single-digit, averaging 6.21 percent per annum during the period, whereas the $Rf$ averages a double-digit level of 11.34 percent. This means that many investors consider the Nigerian stock market safe enough notwithstanding the numerous challenges such as unemployment and infrastructure deficit confronting the developing economy. The scenario also approximates the existence of a negative market equity risk premium (ERP) or macroeconomic environment under which investment in government debt securities (‘risk-free’ asset) has become higher-yielding and more attractive investment vehicle than otherwise viable economic opportunities in the real-sector represented by real estate-backed equities. The implication is that the persistently high T-Bills rate regime can be a major disincentive to the much needed deepening of the capital market, not only because it would discourage sustainable development finance and entrepreneurship, but also for its obvious implications in high debt-repayment burden on the part of the government. Thus, notwithstanding Nigeria’s relatively promising Gross Domestic Product (GDP) growth rate prospects in recent years, the presence of a pervasive negative ERP probably provides an evidence of the structural economic imbalance in the business environment that can impact negatively on the country’s quest for sustainable development finance and economic transformation (Ajao, 2014). The evidence from this study reinforces the expressed doubts regarding the usefulness of the so-called “risk-free” asset in the CAPM when, as discovered in the present case, the $Rf$ appears riskier than common-stock investment (Capinski & Zastawniak, 2007). However, it is noteworthy that the negative ERP in the Nigerian context does not seem to be peculiar to the emerging market alone as the same experience has also been reported in some more developed markets like Germany and Italy (Damodaran, 2014). This appears to reinforce the applicability of the CAPM to emerging markets as it would help investors to balance risk in international investing in the longer-term.

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Additionally, while the average PER during the 12-year study period remained within investment limit at 17.62x, the market portfolio experienced PER > 20x twice (2004 and 2007) pre-2008, thus validating the general inveterate tendencies of stock markets to exaggerate market prices (Graham & Dodd, 2009; Merton, 2014).

Table 1: Return performance of market portfolio ($Rm$) and Risk-free asset ($Rf$) in the Nigerian Stock Exchange, 2000 - 2011

<table>
<thead>
<tr>
<th>Trading year</th>
<th>Market PER (x)</th>
<th>Market Return $Rm$ (%)</th>
<th>Nigerian Treasury Bill Rate of return $Rf$ (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>12.25</td>
<td>8.16</td>
<td>15.25</td>
</tr>
<tr>
<td>2001</td>
<td>14.01</td>
<td>7.14</td>
<td>18.38</td>
</tr>
<tr>
<td>2002</td>
<td>12.52</td>
<td>7.99</td>
<td>18.35</td>
</tr>
<tr>
<td>2003</td>
<td>19.75</td>
<td>5.06</td>
<td>15.03</td>
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<tr>
<td>2004</td>
<td>29.02</td>
<td>3.45</td>
<td>14.25</td>
</tr>
<tr>
<td>2005</td>
<td>22.3</td>
<td>4.48</td>
<td>7.00</td>
</tr>
<tr>
<td>2006</td>
<td>17.92</td>
<td>5.58</td>
<td>8.80</td>
</tr>
<tr>
<td>2007</td>
<td>27.80</td>
<td>3.60</td>
<td>7.00</td>
</tr>
<tr>
<td>2008</td>
<td>15.9</td>
<td>6.29</td>
<td>4.50</td>
</tr>
<tr>
<td>2009</td>
<td>11.46</td>
<td>8.73</td>
<td>6.05</td>
</tr>
<tr>
<td>2010</td>
<td>14.24</td>
<td>7.02</td>
<td>7.50</td>
</tr>
<tr>
<td>2011</td>
<td>14.32</td>
<td>6.98</td>
<td>14.00</td>
</tr>
<tr>
<td>Average</td>
<td>17.62</td>
<td>6.21</td>
<td>11.34</td>
</tr>
</tbody>
</table>

Sources: NSE (2012) and authors’ computation results, 2014

The CAPM-based return performance of N-REOC and N-REIT variants of the Nigerian real estate common stocks, are displayed in Table 2. One interesting observation from the analysis in Table 2 is that the REOC’s Price-Earnings ratio (PER) rose to greater and greater heights, until reaching a rather vertiginous level of a distorted risk-return equation exemplified by a PER > 20x on the eve of the 2008 global financial crisis. The N-REIT also displayed similar tendency in 2011. This means that while investment in real estate equities may not be immuned from normal market vagaries, the PERs in the long-term would likely be within tolerable limits as indicated by the average levels of 10.83x and 15.36x for REOCs and REITs respectively.
Table 2: Return performance of Nigerian Real Estate Common Stocks, 2000 - 2011

<table>
<thead>
<tr>
<th>Trading year</th>
<th>REOC</th>
<th></th>
<th></th>
<th></th>
<th>REIT</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>S (₦)</td>
<td>EPS (₦)</td>
<td>PER (x)</td>
<td>Ri (%)</td>
<td>S (₦)</td>
<td>EPU (₦)</td>
<td>PER (x)</td>
<td>Ri (%)</td>
</tr>
<tr>
<td>2000</td>
<td>1.52</td>
<td>0.49</td>
<td>3.10</td>
<td>32.24</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>2001</td>
<td>4.62</td>
<td>0.57</td>
<td>8.11</td>
<td>12.34</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>2002</td>
<td>4.00</td>
<td>0.74</td>
<td>5.41</td>
<td>18.50</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>2003</td>
<td>6.60</td>
<td>0.91</td>
<td>7.25</td>
<td>13.79</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>2004</td>
<td>8.90</td>
<td>0.45</td>
<td>19.78</td>
<td>5.06</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>2005</td>
<td>8.75</td>
<td>0.77</td>
<td>11.36</td>
<td>8.80</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>2006</td>
<td>13.80</td>
<td>0.88</td>
<td>15.68</td>
<td>6.38</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>2007</td>
<td>23.40</td>
<td>0.97</td>
<td>24.12</td>
<td>4.15</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>2008</td>
<td>26.8</td>
<td>3.23</td>
<td>8.30</td>
<td>12.05</td>
<td>111.10</td>
<td>5.73</td>
<td>19.39</td>
<td>5.16</td>
</tr>
<tr>
<td>2009</td>
<td>19.86</td>
<td>2.21</td>
<td>8.99</td>
<td>11.13</td>
<td>100.00</td>
<td>8.73</td>
<td>11.45</td>
<td>8.73</td>
</tr>
<tr>
<td>2010</td>
<td>16.51</td>
<td>1.69</td>
<td>9.77</td>
<td>10.24</td>
<td>97.00</td>
<td>11.75</td>
<td>8.26</td>
<td>12.11</td>
</tr>
<tr>
<td>2011</td>
<td>12.00</td>
<td>1.48</td>
<td>8.11</td>
<td>12.33</td>
<td>100.00</td>
<td>4.48</td>
<td>22.32</td>
<td>4.48</td>
</tr>
<tr>
<td>Average</td>
<td>12.23</td>
<td>1.20</td>
<td>10.83</td>
<td>12.25</td>
<td>102.03</td>
<td>7.67</td>
<td>15.36</td>
<td>7.62</td>
</tr>
</tbody>
</table>

Sources: Authors’ research and computation results, 2014
N/A: Data not available, N-REITs being a relatively new occurrence in Nigeria

The outcome of the beta coefficients and $R^2$ metrics of real estate equities’ rate of return correlation with the market portfolio in the Nigerian Capital Market during the study period is shown in Table 3.

Table 3: Beta and $R^2$ metrics of real estate common stocks’ rate of return correlation with the market portfolio in the Nigerian Capital Market (2000 – 2011)

<table>
<thead>
<tr>
<th>S/No</th>
<th>Asset</th>
<th>β</th>
<th>t-Test</th>
<th>Critical Value @ 0.05 significance level</th>
<th>$R^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>UAC- Prop</td>
<td>32.87</td>
<td>0.0016</td>
<td>1.80</td>
<td>0.42</td>
</tr>
<tr>
<td>2</td>
<td>SkyeShelt</td>
<td>3.73</td>
<td>0.2795</td>
<td>2.35</td>
<td>0.10</td>
</tr>
</tbody>
</table>

Source: Computational analysis of stocks’ public data using Excel analysis (2014)

The first column of Table 3 reveals information on the degree of market risk ($β$) of the respective assets, while the second column shows the respective Student’s t-Test statistic. The third column shows the critical values (t-table values) at 0.05 significance level, with the $R^2$ values shown in the last column of the Table. The results of the statistical tests show that neither REOC nor REIT common stock has a $β = 1$ that could have assured us of perfect correlation of the asset class with the market portfolio. Each of the calculated t-value is less
than the t-table value, leading to acceptance of the null hypothesis while the alternative hypothesis rejected. The validity of the test result was reinforced by the relatively low $R^2$ values, which were both less than the 0.70 minimum thresholds to assure us of significant positive relationship. Evidently, it can be concluded that real estate common stocks’ market risk tends to be relatively low as the present analysis reveals no significant correlation between the returns of the researched asset class and those of the market portfolio. Our finding is perhaps made clearer in Figure 1 that displays the CAPM $R_i/R_m$ behaviour of the real estate equities in the NSE during the study period. Besides lying above the $R_m$ curve for most of the time shown in Figure 1, the $R_i$ curves for both REOC and REIT common stocks demonstrated far more gyrations, sharper bends and reactions to market dynamics relative to the behaviour of the market portfolio, thus validating previous, pre-2008 observations on the Nigerian real estate equity stock (Bamiduro & Aro-Gordon, 2007).

Figure 1: CAPM $R_i/R_m$ Correlations: Market performance of the Nigerian real estate common stocks (2000 – 2011)

Source: Authors’ Research, 2014

At a time when the macroeconomic environment is full of uncertainties, the results of the statistical analysis presented in Table 3 suggest that the Nigerian real estate common stocks tend to be minimally impacted by externalities in the long-run. It can be deduced that a weak link may exist between real estate stocks’ returns and the benchmark market portfolio, thus revalidating the portfolio risk-diversification value of certain asset classes as predicted by the CAPM (Brealey et al, 2014). The degree of limited correlation with market portfolio appears to be more pronounced in the case of N-REIT with $R^2$ at 0.10 in consistency with the current
thinking on REITs, and implies that there may be more investment benefits to be derived particularly from REITs in mixed-asset portfolios (Sanya, 2011). This means that, in consistency with research across different emerging markets of the world, the CAPM $\beta$ remains an important element in determining the portfolio attractiveness of a security, notwithstanding the relatively high beta ($\beta > 3$) measures found in the Nigerian cases presented in this study (Michailis et al, 2006; Nikolaos, 2009; Hasan, et al, 2011). The higher risk (beta) level is nonetheless well connected to the relatively higher level of return generally associated with the Nigerian real estate industry (Ifediora, 2009; Mabogunje, 2008).

There are several possible explanations for real estate equity’s weak correlation with the general market, its apparent long-run immunity to the instability of the typical business, and its canonical hedge against by inflation. Almost every aspect of the underlying real estate investment process takes time – from the search for developable site, perfecting the title, to marketing and eventual delivery to the target buyer, mortgagor or tenant. The inherent permanence and growth of land values, rental housing’s recession-resistance, Man’s need for land and shelter is constant, regardless of the market or economic season, and the peculiar sluggishness of the underlying property investment holdings in adjusting to market changes, due to funding and construction lags typical of the property development industry, have also been cited (Appraisal Institute, 2001; Carricko, 2008; Graham & Dodd, 2009).

In a nutshell, an important finding from this study is that, in consistency with previous studies (Bamiduro et al, 2007; Amidu et al, 2008), Nigerian real estate common stocks have exhibited weak correlation with the market portfolio. Nigeria’s nascent REIT in particular showed relatively strongest disconnection or immunity from broad market movements to reinforce the high portfolio-risk diversification value of REIT investment vehicle in the country. The present study has shown that investors can leverage low market risk-real estate common stocks for building optimal portfolios, particularly during periods of heightened macroeconomic uncertainties of the kind witnessed over the recent years across the world. Additionally, perhaps the mind-set that real estate common stocks are like any ordinary shares may need to shift in order to accommodate the investment peculiarities of this asset class in emerging markets, so as to optimise international investment strategy.

5. Conclusions

This study was designed to determine the applicability of the CAPM to real estate-backed equities in a fast-growing emerging market like Nigeria. This paper has shown that the CAPM, despite its limitations, remains a fairly simple representation of rational investment behaviour of the emerging Nigerian real estate common stocks as established in the literature (Brealey et al, 2014). The finding from this study provides further evidence of the existence of a generally positive relationship between beta and asset return. At the same time, the study
also reinforces real estate equities’ weak correlation with the market portfolio, its price being minimally affected by the risk of the general market in the long-run, thus further revealing the portfolio-risk diversification nature of property-backed asset class in consistency with a growing body of literature in the field (Amidu et al, 2008). Clearly, the present study has gone some way to demonstrate the utility of the CAPM by so sharpening the focus of risk analysis as to be able to uncover the divergent investment attributes of capital assets even in the same real estate industry. Rather than adopt the traditional ‘wholesale’ approach, applying CAPM on a scenario or asset-class basis as attempted in this research, could prove to be more helpful to investors and analysts. This has managerial implications for capital budgeting process by valuers, institutional investors, banks, insurance and other financial institutions for which CAPM still offers a model input for robust quantitative analysis. This study should therefore prompt a rethinking of the traditional investment policies towards a more sustainable approach to asset valuation. Institutional investors like Pension Funds and the Sovereign Wealth Funds should give adequate recognition to the long-term portfolio-risk diversification value of the emerging real estate equities in the Nigerian capital market. A renewed motivation and mandate of pension fund administrators to invest in qualified property-backed securities could be a harbinger to increased floatation of REITs, while also helping to address the humongous finance deficit in Africa’s largest economy.

As an emerging market, the NSE has its limitations to free applicability of CAPM for improved security analysis. There are practical estimation issues such as relatively limited data and absence of a real ‘risk-free’ asset. This paper has not shown that the CAPM is the ultimate truth; it would be difficult for any single mathematical model to fully capture the human nature, greed, “irrational behaviour”, and emotions that are hard to quantify. Also, the EPS upon which a substantial part of the CAPM valuation rests are not only highly fluctuating but are easily subject to arbitrary accounting manipulations, despite increased regulatory controls. The search for acceptable modifications to the CAPM is therefore likely to continue. Future studies may need to complement the present findings by using long-term government bond-rate and less-generalised benchmark portfolios like NSE-30 Index or NSE Consumer Goods, so as to gain further insight into the model’s value.

References


www.globalbizresearch.org
Nigerian Stock Exchange (2012). *2011/12 Fact Book*, Lagos: NSE, ISBN 978 0262 – 1 – 6. [Additional data contributions received from Mr. Adeniyi Osoba (Deputy Editor, NSE Fact Book, e-mail: aosoba@nigerianstockexchange.com) on market PERs are gratefully acknowledged].


