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CAPITAL ASSET PRICING MODEL: REVISITING THE SIZE PREMIUM HYPOTHESIS

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ABSTRACT

The declining performance of the Nigerian capital market has increased the demand for research into the capital asset pricing model. Portfolios are typically used to evaluate the capital asset price model. Similar to this, a size premium variant of the concept is predicated on the idea that smaller-sized businesses are intrinsically riskier than larger-sized businesses. However, this study used the individual stock returns of listed companies in the Nigerian capital market to empirically assess the capital asset pricing model. The size assumption made by Frank and Goyal, according to which larger enterprises are riskier than smaller ones, was also used to modify the model. 177 companies that are listed on the Nigerian stock exchange market make up the study's population. The sample included 106 publicly traded enterprises. The study was conducted between December 2011 and January 2018. The study employed multiple regression, cross-sectional regression, and time series regression. According to the report, market risk premiums significantly affect how much share prices fluctuate in the Nigerian capital market. Additionally, it was discovered that firm-specific variables affect how share values fluctuate on the capital market. The study also discovered that size premiums affect how share prices fluctuate on the stock market. The study's advice to market participants is to acknowledge the impact of market risk premiums on traded assets and encourage investors to place more money into risky assets and less into safe ones in order to improve the performance of the Nigerian capital market. The report also advised investors to take non-systematic risks, including firm size, into account when making decisions about trading assets on the Nigerian capital market.

Keywords: CAPM, Market Risk Premium, Size Premium.

1. INTRODUCTION

The Nigerian capital market has gone through ups and downs during the last few years. According to the Nigeria Stock Exchange (2018), the stock market price index has experienced highs and lows ranging from 45092 points to

19785.03 points since 2011. Prior to the surge in 2017, the prices of trading in securities were generally declining (Bloomberg, 2018). Additionally, the World Bank reports that the market capitalization to GDP ratio for Nigeria is among the lowest globally (World Bank, 2021). Because of this, the Nigerian All Share Index was deemed one of the least performing indices by Bloomberg in 2018. Despite the poor return environment, several stocks traded on the stock exchange between April 2016 and May 2017 saw substantial returns, including FCMB and Diamond Bank, while others saw losses, like AG Leventis and Airservice (Nigeria Stock Exchange, 2018).

Given that the capital market is a semi-strong, efficient capital market, prices ought to represent prior and current public knowledge, and share prices ought to abide by the market's overall trend. The aforementioned discrepancy, however, makes one wonder whether share values in the Nigerian capital market can be predicted. This study uses the Capital Asset Pricing Model (CAPM) to analyze the fluctuation in stock prices on the Nigerian capital market in light of this salient point. By far, the most significant model that practitioners and scholars use to examine price variance in assets in capital markets is the capital asset pricing model. Sharpe (1964), Linter (1965), and Mossin (1966) independently created it. Since CAPM's debut, more than 3000 peer-reviewed studies from 128 countries have been written about it, underscoring its significance (Kumar *et al*., 2023). According to the CAPM, beta, a systematic risk, is the only reason why assets traded on the capital market fluctuate. Beta is a type of market risk that optimizes all risky portfolios alongside safe assets. Non-systematic risk does not contribute to the explanation of volatility in stock values, according to CAPM.

Even though the CAPM has been studied by a number of academics, including Black *et al.* (1972), Fama and French (1992, 1995, and 2015) in the advanced capital market, and researchers in emerging markets like Taofeek and Ayodeji (2019) in Nigeria, additional research is still required due to the limitations identified in those studies. One of the drawbacks of the research carried out in advanced capital market analysis by CAPM is that they mostly used portfolios rather than individual securities to increase the accuracy of beta calculations. This is due to the fact that prior investigations using individual securities by Fama and Macberth (1973) and Black *et al.* (1972) produced dismal results. The issue with using portfolios to enhance beta measurement, though, is that systematic risk has been diversified out of portfolios. As it contradicts the CAPM theory that only market risk (systematic risk) matters, diversifying

away from systematic risk has important theoretical ramifications (Kumar *et al.*, 2023). As a result, this study uses individual securities to provide a sufficient analysis of the model.

Regarding the emerging market studies, there is incredibly little research on CAPM, as the US (37%) and China (14%) have produced the majority of the field's output over the past six decades (Kumar *et al.*, 2023). Additionally, Africa's small body of literature suffers from the following shortcomings: After arriving at a low adjusted R-square, studies like those of Ogiugo *et al.* (2020), Taofeek and Ayodeji (2019), Herbert *et al.* (2017), and Adedokun and Olakojo (2012) failed to add variables outside beta that explain variations in stock return. The entire theory behind the CAPM must therefore be examined in order to conduct a thorough analysis of it, from the linearity of the beta-expected return relationship to the explanatory capacity of the beta. This is especially important because Hearn (2014) found that in smaller capital markets, size and illiquidity are the main factors influencing asset values. Therefore, this study examined the effect of the size factor, a non-systematic risk, on share prices, but from an unusual angle proposed by Frank and Goyal (2002), according to which larger firms are riskier than smaller ones as opposed to the traditional size effect theory. The collapse of larger-sized businesses in Nigeria, including Diamond Bank, Arik Air, and African Petroleum, made it necessary to take Frank and Goyal's argument into account when changing the CAPM. The empirical investigation conducted by this study was justified by the dearth of significant empirical evidence suggesting that smaller-size enterprises had higher risks and returns than larger-size firms.

Therefore, the specific objectives of the study are:

- Assessing the linearity of the beta and expected return relationship
- Assessing the presence of non-systematic risk as an explanation of expected returns
- Assessing the effect of market risk and firm size on expected returns

2. LITERATURE REVIEW

2.1. Conceptualizing the Capital Asset Pricing Model

The capital asset pricing model is the most popular model for explaining how share values are set on the stock market. The model was created using the portfolio theory of Markowitz. According to the model, investors only receive

compensation for taking systematic risks, which are represented by beta in the world of risk. As a result, the connection between beta and the expected return is linear. The capital market line for portfolios and the security market line for individual stocks serve as representations of the relationship, respectively (Taib & Benfeddoul, 2023). Therefore, proving a positive and substantial link between beta and expected return, having a regression line intercept close to zero, and having a statistically negligible regression residual are necessary to support the validity of the CAPM. Additionally, CAPM makes the assumption that investors prioritize investment risk and projected returns. Investors also have similar expectations and limit their investments to financial assets that are traded openly to avoid paying taxes or other transaction fees. Additionally, when investing in the capital market, investors are price-takers that seek out the efficient frontier. Investors can also change the risk-return mix of their portfolio by lending or borrowing risk-free assets at a risk-free rate without restriction (Fernandez, 2019).

Numerous academics have disputed the main presumptions of the CAPM, leading to changes to the model. Due to the uncertainty surrounding inflation, Black (1972) proposed lowering the assumption of unrestricted risk-free lending and borrowing, which gave rise to the Zero-Beta CAPM. In addition, Litzenberger and Rawaswamy (1979) claimed that taxes on security returns are pertinent. As a result, we added taxation to the fundamental CAPM model. A similar claim that security returns over the long run are not regularly distributed was made by Kraus and Litzenberger in 1976. There are non-traded assets in the capital market, according to Mayers (1972). Merton (1973) promoted intertemporal CAPM and opposed single-period investment. Zhang (2017) argued in favor of a net present value-based investment-based CAPM. Rubinstein (1976), Breeden (1979), and Lucas (1978) modified the CAPM to a consumption-based CAPM. Despite the above modifications to the standard CAPM, the results from the modification still provide support for the standard CAPM. However, support is yet to be found for the postulation that no other risk factor besides beta explains the variation of stock returns. Hence, this study adopts the standard CAPM and provides a multi-factor model with firm size incorporated as part of the model.

2.2. Conceptualizing Firm Size

In 1937, Coase became the first to recognize the idea of firm size. Firm borders, their definition, and how they affect the distribution of firm resources were all

topics covered by Coase (1937). Since that time, business size has become a topic of study in both finance and economics. Studies by Crawford and Alchian (1978) and Williamson (1975, 1986) are a couple of the earlier ones that postulated firm size. Later, empiricists in corporate finance, including Rajan and Zingales (1995) and Frank and Goyal (2003), began to consider business size to be a crucial concern. In the literature on company size, both empirical and theoretical, there isn't a clear definition. Frequently, proxies are used to define company size. Researchers disagree over the interchangeability of proxies used to describe business size, including market capitalization, the number of employees, net assets, and total assets. Boyes and Peseau (1975) suggested that, provided certain technical requirements are met, several company size measures can be used interchangeably. However, Dang *et al.* (2017) stressed that each measure's divergence has its own advantages and disadvantages and that no single measure can encompass all of the characteristics of "firm size". They stated that when a researcher is interested in evaluating total assets, using a total asset proxy as a proxy for business size is relevant. While market capitalization serves as a good proxy when considering equity market conditions and firm growth opportunities, it was not considered in this study.

2.3. Size effect in the Capital Market

The non-systematic risk variable that has received considerable attention is the size proxy. Banz (1981) initially uncovered the size effect but was unable to provide a theoretical explanation; hence, it was considered an anomaly. The size effect is the negative relationship between expected returns and size. However, Berk (1995) dismissed the notion of an anomaly and provided a theoretical explanation. The summary of this is that small-size firms tend to possess more risk than large-size firms; thus, they should possess higher returns than large-size firms. The sources of small-size firms risk are attributed to high information uncertainty (Zhang, 2006), illiquidity (Amihud, 2002), and negative profitability shocks (Elton, 1999). However, subsequent empirical examinations of the size effect rarely confirmed the phenomenon. Rather, large firms were found to have higher returns than small firms (Horowitz, 2000). A plausible explanation by Rozeff and Kinny (1976) was that the size effect only occurs during a specific period of the year. Furthermore, Frank and Goyal (2002) revisited the size argument using the pecking order theory. They argued that large firms tend to have higher returns than small firms because of their reputation in the market. Hence, they can have access to huge amounts of funding, thereby using the funding to pursue investment opportunities, leading

to a higher return. Consequently, the low information asymmetry of large firms results in high debt financing as opposed to equity financing; therefore, the presence of huge debt serves as an indicator that large firms are more levered than small firms, thus possessing higher returns. Hence, this study incorporated firm size into the CAPM, as large-sized firms were smaller than small-sized firms.

2.4. Review of Empirical Studies

2.4.1. Review on Capital Asset Pricing Model

Empirical studies on CAPM have been conducted from two perspectives: single-factor CAPM and multi-factor CAPM. With single-factor CAPM, researchers aimed to find only linearity in the relationship between beta and the expected rate of return. Whereas, the multi-factor CAPM considers the role of other factors in the explanation of share price variations in capital markets. Below is a review of some studies conducted on the model.

The first empirical study conducted on CAPM was by Lintner (1965). Lintner examined CAPM on the New York stock exchange market using annual stock data for individual stocks from 1954 to 1963 using two-pass regression. The results from Lintner's regression appeared to be completely inconsistent with CAPM's findings. This is because the regression output produced a beta with low explanatory power, suggesting that other variables explained the variation in stock return more than the market risk premium. Lintner empirically argued that the variables that explain the variation of stock returns are largely non-systematic risks. Also, the regression result had an intercept that was greater than the risk-free rate, which is in contrast to CAPM's proposition that in order to generate a security market line, the intercept has to be zero. However, Lintner did not provide unsystematic risk proxies that could explain the variations in stock returns. To overcome the limitation in Lintner's study, this study provides size as the unsystematic risk that explains stock return variation.

Black *et al.* (1972) examined CAPM on the New York Stock Exchange from 1926 to 1965 using monthly stock data. The objective of their study was to see whether the beta-expected return relationship found by CAPM holds true using two-pass regression as used by Linter, but in their own context, they made use of portfolios to get a better outcome than Lintner. The result from their test was inconsistent with CAPM in the following areas: the intercept was not zero, and the relationship was negative. However, they were able to obtain

a high R-square of 98% to confirm that beta explains the variation of stock returns in the capital market. The problem with Black-Scholes-Jones' study is that they did not bother about the linearity outcome or the impact non-systematic risk had on stock returns. However, this study considers the impact of non-systematics as core to its theoretical contribution.

Consequently, Fama and French (1992) took another dimension in examining CAPM by developing a model that incorporates other variables for the explanation of the variation of stock returns. This model is referred to as the three-factor model. The other variables considered were size, measured by the market value of equity, and book value, divided by the market value of equity. Fama and French (1992) conducted their study on the New York stock exchange from 1941 to 1990 using similar methodology to Fama and MacBeth (1973), but with cross-sectional data. However, their findings were not in line with CAPM. This is because they found no relationship between beta and the average stock return for the period of the study. Instead, they found out that the other two variables have a strong relationship with the average stock return. They further argued that those two variables can be viewed as a common risk factor for all securities due to the strength of their relationship with average stock return, as well as the relationship between the variables and the firm's profitability and growth. The implication of their finding is that small stocks and stocks with high book-to-market value have higher returns than large stocks and stocks with low book-to-market value as a result of their riskiness. The weakness in their model is that their data is too noisy to invalidate CAPM (Black, 1993). Hence, this study makes use of monthly data to overcome the noise issue stemming from using daily data.

Subsequently, Fama and French (1995) later examined CAPM using time series data. They examined the relationship between stock returns and returns of portfolios designed based on book-to-market equity ratio and size. The outcome of the study was that size and book-to-market equity ratio significantly serve as good risk proxy and explain variation in stock return. However, the two proxies will not stand without CAPM's market portfolio because the market portfolio largely explains the variation of stock returns and Treasury bills more than the other risk proxies. Also, another limitation of their study is that it was conducted using portfolios to improve beta estimates, whereas this study makes use of individual stock returns to provide evidence for the multi-factor CAPM.

Nyangara *et al.* (2016) used cross-sectional stock returns to study CAPM on the Zimbabwean stock exchange market from March 2009 to February 2014.

No significant correlation between beta and the anticipated return was discovered by the study. Additionally, other non-systematic characteristics considered, such as size, were unable to yield a substantial association between stock performance and them. Their work is refuted by the possibility of sample bias as a result of the poor representation (35 stocks) of stocks trading on the Zimbabwean capital market, especially in comparison to other studies on the stock exchange, including Mazviona and Nyangara (2013), which used all 64 trading stocks. The sample chosen may be the cause of the findings' discrepancy with CAPM. To eliminate representation bias, this study takes into account all stock transactions on the Nigerian capital market.

Jegadeesh *et al.* (2018) used individual assets to test the CAPM on the New York Stock Exchange from 1956 to 2012. Using an instrumental variable approach, the study followed a methodology similar to that of Linter (1956) and Black, Scholes, and Johnson (1972), but it produced results that were consistent with CAPM. Despite employing the methodology, the study did not offer additional explanations for the variation in stock returns on the capital market, as this study did.

Regression analysis was used by Taofeek and Ayodeji (2019) to investigate the CAPM on the Nigerian capital market from January 2007 to January 2017. They discovered that the association between beta and anticipated return is valid for a number of capital market sectors in Nigeria. However, rather than investigating the accuracy of the CAPM hypothesis, their study concentrated on analyzing the sectoral performance of businesses employing the model.

Similar to this, Ogiugo *et al.* (2020) evaluated CAPM for 26 listed businesses in the Nigerian capital market from 2010 to 2016. Although the study showed evidence for the relationship between beta and expected return, it did not find evidence for additional factors that would account for variances in stock returns. Additionally, the study used only 26 equities as opposed to the entire capital market in this analysis.

The fluctuation in stock returns in the Tadawul All Share Index is also explained by CAPM and non-systematic risk, according to findings gathered by AlJasser (2020). The type of non-systematic risk that directly influences share price volatility was not examined by the study, though.

A modified CAPM with a shariah framework was evaluated on the Jakarta capital market by Subekti *et al.* in 2021. According to the study, the modified CAPM explains how stock returns fluctuate on the capital market. However,

the study's drawback is that CAPM was modified using a variable that was not associated with risk, whereas this study alters CAPM with a variable that is related to risk.

Wu *et al.* (2022) evaluated the CAPM's flexibility in accounting for fluctuations in the bond returns of Chinese corporate bonds by examining the effects of liquidity and credit risk. The variation in bond returns was found to be explained by the modified CAPM. The study's drawback, however, is that it was conducted on bonds rather than stocks, which were mostly employed in this study and the majority of investigations.

From 2002 to 2020, Taib and Benfeddoul (2023) evaluated the CAPM on the Moroccan capital market. The association between beta and projected return as well as the size effect on stock returns could not be proven in the study. The Nigerian capital market is used in this study's analysis of the model since it is a comparable African capital market.

Overall, throughout the past six decades, there hasn't been an agreement about the beta-expected relationship hypotheses as a result of empirical analyses of CAPM. Additionally, some studies' assessment of non-systematic risk factors that affect share prices and their use of portfolios is constrained by their nature. To account for the importance of non-systematic risk, this study modifies CAPM by utilizing individual securities and firm size.

2.4.2. Empirical Review of Firm Size and Stock Returns

The impact of business size on stock returns of listed stocks in the New York stock exchange market was examined by Astakhov *et al.* in 2019. Instead of using individual stock returns, the analysis used portfolio returns. By contrasting the size premiums of small and large enterprises, the size effect was studied. The study's findings showed a substantial inverse link between stock returns and firm size, indicating that tiny enterprises are more risky and have higher returns than large firms. The study is limited since a developing market was not used for the empirical investigation of the size effect. Additionally, during the assessment, portfolios rather than individual equities were used. The size premium that was used was similar: small size less big size returns. However, this study used individual stocks to analyze the impact of size on stock returns in an emerging market (the Nigerian capital market). Additionally, the premium of size taken into account in this study is the difference in returns on large and small-cap stocks.

In their 2017 study, Mohseni and Jamshidi looked at the impact of business size on the stock returns of listed companies in Tehran between 2008 and 2016. The analysis was conducted using a portfolio of stock returns, and market capitalization was employed as a stand-in for firm size. The study's findings revealed that the relationship between business size and stock returns is an inverted U-curve. The study recommended that while assessing stock returns, analysts and researchers in the capital markets take size into account. The study's drawback is that it used stock portfolios rather than single stocks. Additionally, the size premium that was used in the study is modest as opposed to huge. However, individual stocks are used in this study's analysis since portfolios and individual stock returns should both be used to achieve capital market equilibrium. Additionally, the premium produced by this study favors large size as opposed to small size, which is consistent with Frank and Goyal's (2002) pecking order theory theorization.

From 1983 to 2014, Cheema *et al*. (2021) looked at how firm size affected predicted stock returns on the Japanese capital market. The premium was the difference between small and large firms, and market capitalization was employed as a stand-in for company size. The study made use of portfolios. Weak size premiums and expected returns were found in the study. However, after controlling for profitability shocks, the study discovered evidence of the size impact, suggesting that size should be taken into account when examining projected returns. The study is limited by the fact that the company size premium is based on the conventional size effect theory. The study also focused on stock portfolios rather than single stocks. In addition, business-size evidence was obtained after accounting for profitability shocks. However, the empirical examination of business size in this study was done using individual stocks, and the premium for firm size was based on both large (big) and small enterprises. Additionally, the study's evidence of how firm size affects stock returns is not adjusted for other factors.

Between 2007 and 2013, Intariani and Suryantini (2020) looked into how firm size affected private banks' stock returns in the Indonesian capital market. For the investigation, a deliberate sampling strategy was used. The study's findings showed a strong positive correlation between business size and profitability. The study revealed that large firms produce larger returns than small enterprises because they use their assets more effectively. The study's main drawback is that it didn't consider size in terms of danger. Additionally, the study used a biased sampling strategy called purposive sampling. Additionally, the study

employed private banks rather than publicly traded companies, which are included in capital market assumptions for asset pricing models. The adjusted pecking order theory of Frank and Goyal (2002) is used to conceptualize the positive link between firm size and stock returns in this study in order to overcome the study's shortcomings. Additionally, this study used the full population of listed stocks as a unit of analysis to combat representation bias.

2.4.3. Theoretical Underpinnings

A theoretical model based on the risk-return trade-off is the capital asset pricing model. As such, it provides the study's theoretical foundation. Incorporating size into the CAPM is supported by the pecking order hypothesis as well. By Myers (1984), the pecking order theory had been developed. According to Myers (1984), corporations prefer retained earnings as a source of financing over debt and equity because of knowledge asymmetry. As a result of minimal information asymmetry and higher returns for large organizations, Frank and Goyal (2002) used the pecking order theory to support their claim that large firms have higher debt than small enterprises.

3. METHODOLOGY

3.1. Population and Sample of the Study

The population of the study is all 177 listed publicly traded companies in the Nigerian capital market. The study used a filter to arrive at an adjusted population of 106 companies. The basis for the caveat is that companies have to be listed in the Nigerian stock exchange market and not delisted within the period of the study (2011–2018). The share prices of the companies have to be available within the period. The period of study is from December 2011 to January 2018. This is because the period reflects the decline and rise in the Nigerian All Share Index, which makes it suitable to carry out an investigation as to the reason and basis for the fluctuation in stock prices. Companies were grouped into small and large companies. The procedure for the grouping was as follows: market capitalization as of December 2011 was added to market capitalization as of January 2018. The sum will then be divided by two to arrive at the average size of the companies. The average sizes of all the companies were arranged in ascending order, and the median average was obtained. Companies that fall below the median were categorized as small companies, while companies that are above the median were categorized as large companies. A similar procedure

was adopted for financial leverage. The approach was adopted from Sharifzadeh's (2006) methodology. The premium was generated by subtracting large returns from small returns.

3.2. Sources and Method of Data Collection

The study made use of secondary data extracted from Bloomberg terminal. Share prices, government bond and NSE All share index were extracted from the terminal. Also, market capitalization was extracted from the Bloomberg terminal.

3.3. Techniques for Data Analysis

Time series, cross-section regression, and multiple regression analysis were used for data analysis. The time series regression analysis was related to the first part of a two-pass regression stated in the model specification section. The two-pass regression analysis is a methodology used by Linter (1965) and Sharifzadeh (2006) for assessing the capital asset pricing model. The cross-section regression analysis relates to the second part of the two-pass regression analysis. The multiple regression analysis relates to the multi-factor CAPM provided by this study. The following table 1 presents variable definitions and their measurements:

3.4. Model Specification

The standard CAPM model was tested using Linter (1965) two pass regression methodology;

The first pass regression is a time series regression presented as;

$$(R_{jt} - R_{ft} = \alpha_j + \beta_j (R_{tm} - R_{ft}) + e_{jt}) \quad (3.1)$$

Where,

R_{jt} - R_{ft} is the stock return premium or excess return. The R_{jt}: is the stock's return, R_{ft} is the risk free rate. α_j is the intercept for the time series analysis. β_j is the beta or coeffcient of market risk premium. $R_{tm,}$ is the market return. The market return less the risk free rate is the market risk premium (also captured as NGSE monthly excess return, where NGSE stands for Nigeria All Share index). e_{jt} is the error term which can also serve as the regression residuals if squared. Also, as the time series regression relates to individual companies, summary of the regression outcome of each company is provided to gain an understanding of the capital market position (Sharifzadeh, 2006).

Table 1: Variable Definitions and Measurement

Variable name	*Type*	*Measurement*	*Source*
Monthly stock return (R_{jt})/Monthly stock return premium or excess stock return (R_{jt}-R_{ft}).	Dependent variable	$R_{jt} = \frac{(P_{jt} + D_{jt})}{P_{j\,(t-1)}} - R_{ft}$ The monthly stock return represented by R_{jt} is estimated byP_{jt}current period stockprices at the last trading day of the months plus current dividend per share D_{jt}, divide by previous month closing stock price $P_{j\,(t-1)}$. Adjusted closing prices was used to account for dividend effect. The monthly stock return premium is the stock return less risk free rate (R_{ft}).	Alquist et al. (2018). Sharifzadeh (2006).
Risk-free rate during the month *t*. (R_{ft})	Dependent/independent variable	Rate of return on Nigerian government bond divide by 12	Sharifzadeh (2006).
Market rate of return during the month (R_{tmt})/ Market risk premium or market excess return	Independent variable	Market return is generated by current month closing prices of the Nigerian stock exchange All share Index divide by previous month closing prices of the Nigerian stock exchange all Share index. The market risk premium is the market return less risk rate.	Babarinde (2020). Sharifzadeh (2006).
Firm size (s)/Firm size premium	Independent variable	Price * Total number of outstanding shares=market capitalization. The premium is estimated as Large firm size return less Small firm size return (LLS).	Alquist et al. (2018) Frank and Goyal (2002)

The second pass regression for the standard CAPM is a cross sectional regression presented as;

$$(\bar{R}_j - \bar{R}_f = \lambda_{-0-} + \lambda_1 b_j + \lambda_2 \sigma^2 (e_j) + e'_j) \qquad (3.2)$$

Where

$\bar{R}_j - \bar{R}_f$ is the average stock return premium or average excess return.

$\bar{R}_j$ is the monthly average stock return.

$\overline{R}_f$ is the monthly average risk free rate.

λ_0 is the intercept of second pass regression.

λ_1 is the coefficient of the beta coefficient from the first pass regression.

b_j is the beta from the first pass regression.

λ_2 is the coefficient of the residuals from first pass regression.

$\sigma^2(e_j)$ is the residuals from first pass regression (the residuals was generated as the square of standard error term from the first pass regression or the value MS Residuals from the ANOVA table in the first pass regression).

e'_j is the error term for the cross section regression.

The above first-pass regression test CAPM postulates that there is a linear relationship between beta (market risk) and expected return and that variation in expected return is only due to systematic risk. If the CAPM position is true, then the regression intercept should not be statistically significantly different from zero. The market risk premium should be statistically different from zero. The regression should yield a high R-square value.

The above second-pass regression test determines whether variation in expected returns is only due to market risk and whether non-systematic risks play no role in explaining expected returns. If the position is true, then the coefficient of the beta should be statistically significant, and the coefficient of the residuals should not be statistically significant. Also, Linter (1965) argued that, in support of the direct linearity relationship between market risk and expected returns, the average market risk premium should not be different from the coefficient of the market risk.

The multifactor model developed for the studies on the basis of the statistical significance of the residuals in the second pass regression of 3.2. The model is presented as follow;

$$(R_{jt} - R_{ft} = \alpha_j + \beta_j^m(R_{tm} - R_{ft}) + \beta_j^s(FS)) \quad (3.3)$$

The above model is the first pass regression that entails examination of the relationship between expected return and the following risk premiums; market risk, and size. Where the result produce statistical significant and higher R-square than the first pass regression from equation 3.1, then it is an indication that expected return is influenced by market risk and size premium.

Also, as the time series regression relates to individual companies, summary of the regression outcome of each company is provided to gain an understanding of the capital market position (Sharifzadeh, 2006).

Whilst the second pass regression is as follow;

$$(\bar{R}_j - \bar{R}_f = \lambda_0 + \lambda_1 b_j^m + \lambda_2 b_j^{fs} + e_j') \quad (3.4)$$

The second pass regression of the multi factor CAPM is representing the argument that the relation between the risk variables (market risk and size premium) and expected return is a direct relationship. Hence, the coefficients of the risk variables are regressed against excess stock returns. Where, λ_0 is the constant term of the model. $\lambda_1 + \lambda_2 + e_j'$ are the coefficient of the beta from the first pass regression of equation 3.3. e_j' is the error term. If the coefficients are statistically significant, it implies that the developed model hold true.

4. RESULTS AND DISCUSSION

4.1. Descriptive Statistic

The table 2 below offers a descriptive summary of the following variables examined: average returns, market risk, and firm size.

Table 2: Descriptive Statistics

Variables	*Obs*	*Mean*	*Standard deviation*	*Minimum*	*Maximum*	*Skewness*	*Kurtosis*
Average returns	106	0.3897%	0.014796	-3.22%	4.633%	0.1005	0.1143
Market risk or beta	106	0.9152991	0.128927	0.69	1.19	0.6346	0.0000
Firm size	106	105975	404318	198.8198	3629458	0.0000	0.0000

Source: Stata output (2021)

The above result provides a descriptive representation of some of the variables used in the study. The average stock return of the listed companies on the Nigerian capital market within the period of the study was 0.39 percent. The company with the highest average return has a return of approximately 5%, while the company with the lowest return has an average return of approximately -3%. The standard deviation of 0.01 is a figure not far away from the mean, thus reflecting the normality of the variable distribution. The normality of the variable can also be confirmed by the skewness and kurtosis levels, which were respectively not more than the 0 and 3 thresholds. The implication of the average stock returns

in the context of the performance of listed stocks in Nigeria is that it signals declining performance as the returns are not high. As regard the capital asset pricing model, the normality of the stock returns suggests that the stock returns fulfill the normality assumption posited by CAPM.

The average beta, which is an oscillator for market risk premium, has an average of 0.9152991. The highest beta is 1.19, and the lowest beta is 0.69. The standard deviation is 0.128927. The skewness value for beta is below 0 and the kurtosis levels are below 3, indicating that the variable is normally distributed. The implication of the average market risk of 0.69 is that it signals that firms in the Nigerian capital market are not taking risks, thus the average stock returns are low.

The average firm size of the listed stocks examined is N105,975 million. The lowest market capitalization is N198.8198 million, and the highest market capitalization is N3,629,458 million. The standard deviation of the observation is N404318 million, and the skewness and kurtosis level are zero, meaning that the variable has a normal distribution and there are no outliers. The implication of the average firm size figure is that on average, companies in the Nigerian capital market are big and valuable companies, as they are billion-naira companies. Also, to get listed, the least capital base a company is expected to have in any sector is N198,000,000.

4.2. Regression Results

4.2.1. Assessment of the Linearity of Beta-expected Return Relationship

The table 3 provides a summary of the regression outcome for the analysis of the linearity in the relationship between beta and expected returns of listed companies in the Nigeria capital market.

Standard CAPM Result

Table 3: Summary of Regression Results for the 106 Stocks : Statistical Significance of Regression Coefficients

	At 1% level	*At 5% level*
Percentage ofmarket risk premium (βj's) significantly different from zero	97%	3%
Percentage of intercept (αj's) significantly not different from zero	74%	0

Source: Stata output (2021)

Table 3 above represents the outcome of the time series regression analysis conducted for the 106 stocks. The outcome of the result was that all stocks have a significant positive market risk premium, as ninety-seven percent were significant at the 1% statistical level of significance and 3% were significant at the 5% level of statistical significance. Given that all the stocks have significant positive market risk, it implies that the relationship between market risk and listed stocks in Nigeria is positive. Similarly, in terms of the security market line, 74% of the stocks do not have a statistically significant intercept, which is in line with the CAPM hypothesis that posits that for a market risk and expected return relationship, the intercept of time series regression should not be statistically significant.

Subsequently, the implication of the above findings could be understood from the composition of the market risk premium. The market risk premium constitutes the market return and risk-free rate. The market return is the risky asset known as the market portfolio, which constitutes all risky and efficient portfolios. Investors in the capital market are compensated with high returns depending on their level of risk exposure, which is literally an investment in the market portfolio. Risk-seeking investors would have more of their stocks invested in market portfolios than risk-free assets. The risk-free asset is the government bond or Treasury bill. They are risk-free because they rarely default. And returns are provided for investment in risk-free assets because investors' resources are pooled to finance investment. In contrast, risk-averse investors would invest more of their resources in risk-free assets than in a market portfolio.

Consequently, the indicator for high-risk exposure has a beta value of more than 1. The indicator for low-risk exposure versus more investment in risk-free rates is a beta value of less than 1. Hence, as seen in Table 4.1 of the descriptive analysis, the average beta of the entire capital market is below 1, which explains why most companies trading in capital have lower returns. The reason could be the deteriorating performance of the Nigerian capital market and economy. Investors are not confident that they will be compensated for taking more risk (Okereke-Onyiuke, 2019). Another reason for the low beta is that the government is probably providing high returns for investment in their assets. Hence, investors prefer investment in government bonds as they guarantee returns with considerably lower to no risk. However, if the government bond rate is low, then investors would not be attracted and thus would invest more in the market portfolio. Over the period, the government provided a high rate of investment because of its fiscal policy reasons. The fiscal point of view is that

the country is suffering a deficit in its annual budget. Hence, the government had to raise money to finance the deficits in its budget (Okereke-Onyiuke, 2019). Therefore, to do so, it has to offer capital providers good returns to receive financing.

The market risk premium-expected return relationship finding is consistent with the risk-return tradeoff established by the Markowitz Portfolio Theory and Capital Asset Pricing Model. It is also in line with the following empirical studies: Linter (1965), Fama and MacBerth (1973), Jegadeesh *et al.* (2018), Black, Scholes, and Jensen (1972), and Fama and MacBerth (1973).

4.2.2. Assessment of the Presence of Non-systematic Risk as an Explainer of Expected Returns

Table 4 and 5 below provide summary of the presence of non-systematic risk as an explainer of share price variations:

Table 4: Summary of Regression Results for 106 Stocks: Percentage Distribution of R-square Values

Adjusted R- square	*Percentage of stocks in range*
0-10%	1%
10%-20%	5%
20%-30%	3%
30%-40%	11%
40%-50%	19%
50%-60%	21%
Over 60%	41%
Average R -square	53%

Source: Stata output (2021)

Table 5: Regression Results: Stocks' Average (expected) Monthly Excess Returns versus Systematic and Nonsystematic Risks (Second Pass Regression)

Regression Statistics	
F statistics	0.0000
R square	37%
Adjusted R square	35%
Observations	105
ANOVA	

	SS	*df*	*MS*	
Model	0.008	2	0.004	
Residuals	0.015	103	0.0001	
Total				
	Coefficients	*Standard error*	*t-Stat*	*P-value*
Intercept	-0.00497	0.0084	-5.89	0.000
Market risk	0.038	0.0094	4.04	0.000
Residuals:	0.2195	0.044	4.97	0.000

Source: Stata output (2021)

In addition to that, Table 4 above provides a summary of the R-square level of all the 106 time series regression analyses conducted. Over 41% of the regression analyses conducted had an R-square above 60%. This implies that the majority of the variation in stock returns in the Nigerian capital market is due to systematic risk. As for other percentages, the breakdown is as follows: stocks with 0 to 10% R-square constitute 1% of the total stocks. Stocks with a 10% to 20% R-square constitute 5% of the total stocks. Stocks with 20% to 30% of R-square constitute 3% of the total stock. Stocks with 30% to 40% of R-square constitute 11% of total stocks. Stocks with a 40% to 50% R-square constitute 19% of total stocks. Stocks with a 50% to 60% R-square constitute 21% of total stocks. The average R-square of all the listed stocks is 53%, meaning that 53% of variations in stock returns premiums are explained by market risk premiums, and 47% are explained by other factors not captured in the standard CAPM analysis.

Owing to the above outcome of 53% average adjusted R-square, the second pass regression was conducted to empirically investigate the role of unsystematic risk in the explanation of the effect of variation in stock returns. The outcome from Table 4 is the outcome from the second-pass regression of the first hypothesis. As argued by Linter (1965), in order to demonstrate that a direct relationship exists between market risk and expected return and that non-systematic risk influences expected return, the regression output of the second-pass regression has to be statistically significant. The table revealed that the intercept of the regression model is statistically significant at the 1% level of statistical significance. It also revealed that systematic risk significantly influences the variation of stock returns because the coefficient of the beta is statistically significant at the 1% level of significance. The result further revealed that non-

systematic risk represented by the residuals also influences variation in stock returns at the 1% level of statistical significance.

4.2.3. Assessing the Effect of Market Risk Premium and Firm Size on Expected Returns

Tables 6, 7 and 8 below provide summary of the effect of market risk premium and firm size on expected returns:

Table 6: Summary of Regression Results for the 106 Stocks Insample: Statistical Significance of Regression Coefficients

	At 1%	*At 5%*	*At 10%*
Percentage of intercept (a_j's) significantly not different from zero	96%	88%	82%
Percentage of market risk premium (β^{m}_{j}'s) significantly different from zero	100%	0	0
Percentage of size premium (β^{fs}_{j}'s) significantly different from zero	42%	10%	5%

Source: Stata output (2021)

The above result in Table 6 is a summary of the statistical outcome obtained from the 106 regressions conducted related to the first-pass regression of the modified CAPM. Beginning with the regression intercept, which is paramount for CAPM analysis, the intercept is not statistically significant for 96% of the regression analysis conducted at the 1% level of statistical significance. At the 5% level of statistical significance, the intercept is not significant for 88% of the regression analysis conducted. At the 10% level of statistical significance, the intercept is not significant for 82% of the regression analysis conducted. The substantial insignificance of the intercept suggests that a security market line exists in the capital asset pricing model, meaning that there is a tradeoff between risk and expected return. Consequently, the market risk premium is statistically significant at 1% for all the regression analyses. This implies that there is sufficient evidence to support the argument that market risk significantly affects stock returns for all the listed stocks in the Nigerian capital market. As for the size premium, the coefficient for size premium is statistically significant at the 1% level of significance for 42% of the regression analysis. Furthermore, the coefficient for the premium is significant at 5% for 10% of the regression analysis conducted. The level of statistical significance of the size premium at the 10% level of statistical significance is 5% of the regression analysis

conducted. Overall, it can be seen that the percentage of significance of the coefficient of the size premium for all the regression analyses is 57%. Meaning that size premiums virtually affect expected returns for all the listed companies in Nigeria.

Table 7: Summary of Regression Results for the 106 Stocks in Sample: Percentage Distribution of Adjusted R-squared Values

Adjusted R-square	*Percentage of stocks in the range*
0-10%	1%
10%-20%	2%
20%-30%	3%
30%-40%	8%
40%-50%	16%
50%-60%	20%
60%-70%	27%
Over 70%	23%
Average Adjusted R-square	58%

Source: Stata output (2021)

The above table 7 is a summary of the adjusted R-square from the multi-factor CAPM analysis conducted. It aims to assess improvements in the modification of the standard CAPM. The breakdown of the adjusted R-square is as follows: an adjusted R-square of 0 to 10% constitutes 1% of the regression analysis. An adjusted R-square of 10% to 20% constitutes 2% of the regression analysis. An adjusted R-square of 20% to 30% entails 3% of the regression analysis. An adjusted R-square of 30% to 40% constitutes 8% of the regression analysis. An adjusted R-square of 40% to 50% makes up 16% of the regression analysis. An adjusted R-square of 50% to 60% makes up 20% of the regression analysis. An adjusted R-square of 60% to 70% makes up 27% of the regression analysis. An adjusted R-square of over 70% constitutes 23% of the regression analysis. The average adjusted R-square of the entire regression analysis is 58%. The implication of the adjusted R-square breakdown is that, as seen in the table, the bulk of the regression analysis has been adjusted by over 50%, meaning that the variables selected substantially explain the expected return. Furthermore, in comparison between the average adjusted R-square of the standard CAPM of 53%, as seen in Table 6, with the developed multifactor CAPM average adjusted R-square of 58%, one can realize that the multifactor CAPM explains

the expected return better than the standard CAPM due to its higher adjusted R-square.

Table 8: Regression Results: Excess Stock Return vs Coefficient of Market Risk Premium, and Size Premium

	Regression Statistics			
F statistics	0.0000			
R square	33%			
Adjusted R square	30%			
Observations	106			
	Coefficients	*Standard error*	*t-Stat*	*P-value*
b^m	0.0518	0.0204	2.54	0.013
B^{fs}	0.0093	0.0017	5.54	0.000

Source: Stata output (2021)

The above table 8 is the outcome of the second-pass regression analysis for the multi-factor CAPM. The regression aims to examine whether the excess expected return is directly related to the market risk premium and size premium. The coefficients are the outcome of the regressed beta coefficient from the first-pass regression against the excess expected return. The table revealed that the coefficients of all the risk premia, systematic and unsystematic, have a direct positive and significant relationship with the excess expected return. Hence, the higher the risk, the higher the return. Therefore, there is sufficient evidence that market risk and size risk are expected returns of listed companies in the Nigerian capital market. This implies that the multifactor CAPM developed holds true for listed companies in Nigeria.

The implication of the finding is that in making investment decisions, consideration should be given to beta, as on average it has high statistical significance in terms of explaining stock variations, but they should also consider other factors, particularly factors that were examined in this study, such as size. Firms can always increase their size through policies such as mergers and acquisitions or cross-border acquisitions to increase their expected returns. Moreover, firms should recognize that higher debt does not lead to higher returns. Hence, they should only seek out a loan when there is clear detail that the amount generated with the borrowed fund will be greater than the cost of

the loan. Otherwise, it could lead to financial distress that might lead to a loss of corporate control should a company go into administration. Investors and companies relying solely on the beta to make strategic investment decisions could have a lower competitive advantage. The competitive advantage of the company would be reduced in the sense that competitors would be aware of the strategic investment choice of the company and adopt a better strategic option. Furthermore, it reinforces Markowitz's assertion that risks are undesirable, but the higher the risk, the higher the return. The outcome is also in line with similar empirical studies conducted by Sharifzadeh (2006) on the US capital market and part of other empirical literature like Cheema *et al.* (2021), Intariani and Suryantini (2020), Ali and Choudhary (2021), and Dai *et al.* (2020). However, this is in contrast with studies conducted by Lintner (1965), Black *et al.* (1972), and Fama and MacBeth (1973).

5. CONCLUSION AND RECOMMENDATIONS

The finding from the study is that both systematic risk and unsystematic risk influence the expected return. Evidence of that was found in the standard CAPM and multi-factor CAPM. The expected return was found to be positively influenced by the market risk premium. Similarly, firm size was found to influence the expected return in a positive manner. The following recommendation is proffered on the basis of the conclusion from the study: portfolio managers, investors, and regulators should always consider market portfolios as a risk factor in determining share price, as it constitutes the majority of the reason for stock return variation.

Therefore, they should increase investment in the market portfolio of the Nigerian capital market above the average beta level of 0.91, because in investment decisions, the tendency for higher losses of investment signifies higher returns on investment, and presently listed firms in Nigeria are not taking sufficient risk as the average risk is below the market risk of 1. The government should reduce the level of returns from the government bond below the current average of 0.12 basis points in order to stimulate risk-taking behavior by companies and discourage investment of investors' resources in safe, risk-free assets, as this will lead to an increase in the performance of the capital market. This is essential as the present government rate is still attracting a lot of investment from market participants. Firms willing to generate additional returns should increase their size above the average of N105,975 million of listed firms in the capital market through measures such as the issuance of new shares,

cross-border acquisitions, or increasing their performance by adopting profit maximization policies like cost control and revenue drive.

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