RISK-RETURN RELATIONSHIP OVER MARKET PHASES IN NIGERIAN STOCK MARKET

OMOROJOR, Joy Ejighomegba
Department of Business Education
College of Vocational and Entrepreneurship Education,
Lagos State University of Education, Lagos, Nigeria.
omorojorje@lasued.edu.ng

AREWA, Ajibola
Department of Finance
Faculty of Management Sciences,
Lagos State University, Lagos, Nigeria.
ajibolaarewa@yahoo.com

OGUNLANA, Fatai Olarewaju
Department of Economics
Faculty of Management Sciences,
Lagos State University, Lagos, Nigeria.
olarewaju.ogunlana@lasu.edu.ng

UGWUKA, Nkechi
Department of Finance,
Faculty of Management Sciences,
Lagos State University, Nigeria
ugwukankechi@gmail.com

ABSTRACT

Investment decisions depend basically on risk and return analysis. This study seeks to investigate the risk return relationship of selected stocks over two different phases in the Nigerian stock market. The main objective of this study is to identify stock market phases and assist investors in making rational decision in a period of up and down market. Data is collected from 70 listed companies for a period of 10 years. Data collected is used to analyze the risk return relationship using descriptive analysis. Capital Asset Pricing Model (CAPM) was used to determine the expected return of the companies. The results reveal that the single-factor CAPM is valid in the bullish period and void in the bearish period of Nigeria stock market. The overview suggests that the explanatory variable (Beta risk factor), using the F-statistics, has 15.88747 (F-statistic) and a corresponding P-value of zero (0). This simply means that, the beta factor has a significant influence on average return of securities in the Nigeria stock market for the period. Thus, investors are recommended to consider the trend of price movement in the market before venturing into any investment.
Keywords: Average return, Capital Asset Pricing Model, Nigerian stock market, risk-return,

INTRODUCTION

In practice, asset return and risk are linearly related. The explanation for this is traceable to Sharpe (1964) who introduced the Capital Asset Pricing Model (CAPM). CAPM is a foremost general model of asset pricing. This model is a single factor model which provides a simple explanation on the relationship between return of an asset or portfolio and the risk factor involved in the return. However, it has been argued that a single systematic risk (beta) cannot entirely explain the cross-section of stock average return. Sharpe (1963), Lintner (1965), Mossin (1969), and Black (1972), have legitimized risk and return as two determinants of any investment decision on a financial security (Mabrouk, 2020). Adopting CAPM, they concluded that the level of return of a security is determined by that of its risk in a positively correlated movement and intensity. A high risk must correspond to a high return and vice versa.

However, this response seems unsatisfactory with regard to new research opened up by the existence of financial market anomalies and cognitive biases of market players (Thaler, 2005). There are countless

studies on the single factor model with the aim to test empirically if this factor could explain variations in average return in developed economy and very scanty in emerging economies like Nigeria. Nonetheless, the few studies in this aspect focus on inclusion of multiple variables such as financial ratios, and macroeconomic factors. Also, after the global financial crises of 2008, not much have been documented on the relationship between risk and return, as determinants of attractiveness of this market and the validity of the theoretical models, specifically the CAPM. Thus present a new empirical view to researchers or practitioners thereby increasing the frontier of knowledge.

The Nigerian capital market is considerably illiquid and in a very alarming state, since most of the securities frequently traded recorded zero or very low returns. In other word, these securities are inactive when compared to those in developed markets. The purpose of this paper therefore, is to investigate the link between risk and return in Nigeria's stock market by using the least square regression model, auto-regression moving average (ARMA) and the two pass regression model between the level of risk taken by investors and the average return obtained. The study is based on the CAPM and seeks to understand how well CAPM can explain broad cross-section of realized stock returns over market phases for the period under review.

Thus, the main objective of the study is to test the validity of CAPM and its ability to explain average excess returns on the Nigerian Stock Market (NSM). While the specific objectives are to:

a) Evaluate the risk and return of the selected securities from Nigerian stock market.
b) Examine the risk and return relationship during the bullish period of the market.
c) Investigate the correlation between risk and return during the bearish period of the market.

To achieve these specific objectives, the following hypotheses were formulated in the null form:

Ho_1: There is no relationship between risk and return in the NSM.
Ho_2: There is no connection between risk and return during the bullish period of the NSM.
Ho_3: There is no correlation between risk and return during the bearish period of the NSM.

LITERATURE REVIEW

Concept of Risk

Every investment opportunity contains an element of risk and return. Risk is the probability that possible future outcome may deviate from an expected outcome. The greater the extent of deviation, the greater the risk involved. Possible future outcomes can be predicted with some degree of confidence from past knowledge of the event. Risk can be categorized into several components depending on the source of the risk. Market risk; credit risk; liquidity risk; operational risk; business risk; strategic risk; legal and regulatory risk; strategic risk; reputation risk, modal risk are common types of risk (Hull, 2015). Kungwani (2014) asserts that financial risk is the possibility of negative or positive deviation from planned result in any financial activity.

Concept of Return

The foundation of every investment action is the anticipation of proceeds over and above the usual average return. The core ambition of an investor is to make a maximum yield. This is a key indicator of the effectiveness of any investment. To compute the return, the log of the present stock price is divided by the log of the previous stock price. These prospects are rather vague- they may or may not come true. Thus, the business is constantly allied with risk.

Capital Asset Pricing Model

CAPM is rooted on certain assumption, including single period, perfect market notion, absent of taxes nor transaction costs, homogeneity in anticipations, unlimited short selling, risk-free loans and borrowing with no limitation, mean-variance preferences based on restrictions relating to the return or the utility function, investor aversion to risk, competition and market efficiency (Mabrouk, 2020). In reality, these assumptions might not accepted concurrently. To remedy this weakness Mabrouk (2020) identified some solutions that have been proposed. These include CAPM with taxes (Brennan, 1973), (Litzenberger and Ramaswamy 1979), CAPM with transaction costs (Levy, 1978), CAPM in continuous time (Merton, 1973) and CAPM with non-homogeneous anticipations (Sharpe, 1970).

Risk-Return Relationship

The risk-return relationship is one of the fundamental concepts in the study of finance. The risk-return relationship determines the efficient frontier. When the market portfolio is on mean-variance efficient frontier, there is an exact linear relationship between return and risk (Roll & Ross, 1994). Many previous studies have evaluated the risk-return relationship using various empirical frameworks. Using the Sharpe-Lintner-Black model, Pettengill et al. (1995) posits that there is strong positive relationship between risk and return. However, Nelson (1991) argued that risk-return relationship is negative. Notwithstanding, several studies conducted in the past have found positive risk-return relationship. Using the GARCH Model, Cheng and Jahan-Parvar (2014) studied 14 Pacific basin markets and found positive and significant risk-return relationship. Terregrossa and Eraslan (2016) found systematic relationship between risk and portfolio return.

Conceptual Framework of relationship between risk and return

Theoretical Review

David (2009) opined that, theories are developed to validate, forecast and help in assimilating an event and also test and increase existing knowledge. This study is anchored on CAPM (Sharpe, 1964) which explained beta as the only risk factor that influences average return of an asset or portfolio. As defined in this model, the expected rate of return is a function of: the risk-free rate of return, the expected return of the market, and the sensitivity of the expected excess asset return to the expected excess market return. This model postulate that the company risk and the market risk are related by a variable called "Beta". This relationship can be expressed using the following linear equation:

$E[Ri] = Rf + \beta i (E[Rm] - Rf)$

Where:

E[Ri] = Expected return of security I, Rf= Risk free rate of return,

Bi= Beta of the security i

E [Rm]= Expected return on market, [Rm –Rf] = Market premium.

CAPM argue that expected return of a security or a portfolio equals the rate of return on a risk-free rate plus a risk premium. This model offers a simple tool for investors to evaluate their investments. If this expected return does not meet or beat the required return, then the investment should not be undertaken.

The validity of this model is based on the star line fact that market risk significantly captured average return. This implies that, if market risk fails to capture average return, then CAPM has failed in its track. However, some researchers are in concord with the validity of the model (Lee et al., 2016; Bajpai & Sharma, 2015; Bjuggren & Eklund, 2015; Novak, 2015) while others concluded that the model is invalid in estimating the expected rate of return on financial security (Chaudhary, 2017; Wu et al., 2017; Alqisie & Alqurran, 2016; Alrgaibat, 2015; Blitz et al., 2013). CAPM has been subjected to several theoretical and empirical investigations (Gupta et al., 1999).

With a view to smoothening to earlier named weaknesses of CAPM, scholars have developed models that are essentially extensions of CAPM. The inter-temporal CAPM model (Merton, 1973) is one of them. The inter-temporal CAPM of Merton is based on the assumption that the price process follows a Geometric Brownian Motion (GBM) with time-varying expected return and volatility. Thus, Merton's model is derived under the assumption of exogenously specified price process or dynamic present value computations with time-varying discount factors. Solnik (1974) created the international capital asset pricing (ICAPM) by replicating CAPM on a global market.

Black (1972) developed the Zero-CAPM as a substitute to primary CAPM. Zero-CAPM examined a two-factor style, according to which traders could not lend at a risk-free rate but at a rate, Rz, described as the return on a portfolio with zero-beta value. This is achieved in comparison with a portfolio whose covariance with the industry portfolio's return is zero.

$Rj = Rz + (Rm - Rj) \times \beta j$

The two-factor models achieved a zero-beta portfolio with a predicted return, Rz surpasses the risk-free rate of interest, Rf. Despite further variations to the unique style, the CAPM in its conventional guise continues to entice critique, particularly with regard to its basic assumptions. For instance, although we assume that all traders can lend or offer at the risk-free rate, this does not mean that Rf represents a risk-free investment commitment in real conditions. Upcoming inflation prices are neither predetermined, nor do they affect people similarly (Hill, 2010).

Empirical Review

Pinto et al. (2020) examined impact of risk anomalies on the pharmaceutical sector of the Indian stock market. The main goal of the study was to investigate the existence of risk anomaly in the India national stock exchange as well as comparative analysis on the behavior of the nation's pharmaceutical sector. The study utilized a sample size of 12 stocks for a period of 10 years running from 2005 to 2015 totaling 120 months stretch. The research discovered that low risk anomaly gives opportunity to earn higher returns with low risk over a long period of time. This then confirms a negative relationship between risk and returns as a result of the anomaly.

Kauppinen (2020) evaluated impact of the U.S. presidential elections on stock market risk - return dynamics. The findings revealed that, U.S. presidential election has a significant impact on market and that there is a positive and direct correlation between risk and return. Also, Arewa and Ogbulu (2015) examined factors that command risk premium in Nigerian stock market. The study utilizes conventional factors model such as CAPM, Fama-French 3-Factor Model, CAPM with higher co-moment and APT models. The sample consists of monthly stocks data from 2003 to 2011 of listed company in the Nigerian stock market. The results reveal that the CAPM risk factor is insignificantly valued; however, it is positively related to return. That is, the higher the risk, the higher the return.

Nurwulandar (2021) analyzed the relationship between risk and return using CAPM method at Kompas 100". The findings confirm that the relationship between market risk and expected return is robust and positive. This means that both beta risk and expected returns increases or decreases proportionally. Furthermore**,** Soni (2017) evaluated classes of asset returns and comparing them with the risk related to the returns, in order to attest if risk and return are always positively related in all groups of assets. And to determine which group of portfolios will yield the expected return and risk involved. The findings disclosed that between risk and return of individual asset classes lays a significant and positive association. On the other hand, when the asset is considered separately, the level of risk diminishes and return is more.

MATERIALS AND METHODS

CAPM and time series regression models are employed in the computation of average return. The study adopted time series empirical data on the variable to examine the CAPM model in the NSM. These involve risk free rate and beta factor of companies in the NSM. The expected stock return is considered the dependent variable while the systematic risk is the independent variable. However, the research design involving two-pass regression model. This is in tandem with the general approach to testing the prepositions of the CAPM. Apparently, the empirical tests of these models involve two distinct stages in which this study follows succinctly.

The population of the study is 175 companies, quoted in the NSM; utilizing their monthly stock prices to compute actual returns for the period 2013 to 2022. The study utilizes panel data made up of raw prices of selected quoted companies in NSM. Apart from individual securities prices, other data such as, market share index, and Treasury bill rate would be sourced from the Website (www.investment.com). The study took a sample size of 70 quoted companies and covered a period of 120 months (January 2013 to December 2022).

The choice of monthly sampling was in relation to the conclusion of Kothari and Shanken (1995), that Fama and French`s results should hinge on monthly returns rather than yearly returns because the use of annual returns to estimate beta helps to circumvent measurement problems caused by non-synchronous trading, seasonality in returns and trading frictions. The estimation techniques employ Ordinary Least Square (OLS) estimation techniques to estimate parameters in statistics such as time series, cross-sectional and panel data.

CAPM is tested in two stages of regression. The first stage of regression is the time series regression (one-pass regression), in which beta of the individual security will be calculated by regressing the excess return of security on the excess return of the market. And it's specified thus: In one-pass regression equation

$R_t - R_{ft} = a_i + \beta i(R_{mt} - R_{ft}) + \mu_t$ 1

Where: $R_t$is the return on security (i) at time (t)
R_{ft} is the risk free rate at time (t)
$R_t - R_{ft}$is the excess return on security (i) at time (t)
a_i is the constant return earned in each period from security (i)
R_{mt} is the return on market portfolio at time (t)
β_i is the estimate of beta for security (i) representing the systematic risk
$(R_{mt} - R_{ft})$ is the market premium
μ_t is the residual or error term.

The estimated beta i.e. β_i is then used as the independent variable in the following two-pass regression equation: $\overline{R_i} = a_0 + a_1\hat{\beta}_i + w_i$ 2

Where: $\overline{R_i}$ is the average returns of ith securities.
a_0 is the intercept term
a_1 is the regression parameter
$\hat{\beta}_i$ is the estimated beta for ith securities
w_i is the random variable

On the ground of a-priori: The estimate of the intercept term (Ea_0) is not expected to be significantly different from zero (i.e. $Ea_0 = 0$). This means that the intercept term or Jensen alpha is expected to be the same with risk free rate.

DATA ANALYSIS, RESULTS AND DISCUSSION

Table 1: Result of Descriptive Analysis on Average Return and Beta

	Average Return	Beta
Mean	-0.00787	0.979061
Median	-0.00611	0.987896
Maximum	0.043937	1.167926
Minimum	-0.04719	0.82686
Std. Dev.	0.016883	0.065891
Skewness	-0.02342	0.110237
Kurtosis	3.938314	3.50665
Jarque-Bera	2.6111	0.890466
Probability	0.271023	0.640675
Sum	-0.55855	68.53425
Sum Sq. Dev.	0.019953	0.299569
Observations	70	70

Source: Author's Computation (2023) Using E-views 10.0

Table 1 shows the descriptive analysis of returns of selected companies listed in NSM between 2013 and 2022 with components of average return and Beta (Non diversifiable risk). The mean values between 2013 and 2022 for return and beta factor for the period of this study are-0.00787 and 0.979061 respectively. The non-diversifiable risk (beta), span from 0.82686 to 1.167926. Average return has a minimum value of -0.04719, this implies that there are possibilities of making minimal losses on the market and the maximum value of return is 0.043937 which is greatly lower than the beta risk of 1.167926.

This shows that the presence of inactive securities in the market is high; and implies that the market premium paid on risk does not compensate for the level of risk taken. The standard deviation on the table shows that beta is 0.065891 and return 0.016883. In addition, the value of skewness indicated in the table is significantly different from zero; while return is negatively skewed, beta is positively skewed. The analysis of all the two variables shows a leptokurtic distribution, which is heavier than normal kurtosis. However, the Jarque-Bera value ranges from 0.8905 to 2.6111 with probability value of 0.2710 and 0.6407 in both

variables. Therefore, the null hypothesis is accepted as the series are normally distributed because the p value is higher than 5% level of significance.

Table 2: Result of the Overall Stocks for 120 months

Variable	Coefficient	Std. Error	t-Statistic	Prob.
BETA	0.112246	0.028161	3.985908	0.0002
C	-0.117832	0.027632	-4.264271	0.0001

Source: Author's Computation (2023) Using E-views 10.0

The results of hypothesis testing revealed the single-factor capital asset pricing model has a positive but weak relationship with average return. The result is in line with the work of John Ross, which says CAPM has just little contribution to average return and its considered dead in its track. Notwithstanding, the P-value of 0.0002 that is 0.02 percent, a near 0%, which means that the un-diversifiable risk cannot influence average return of an investment in the Nigerian stock market.

Table 3: Result of the Stocks for Bullish Period

Variable	Coefficient	Std. Error	t-Statistic	Prob.
BETA	0.206876	0.029944	6.908844	0.0000
C	-0.063272	0.029294	-2.159901	0.0343

Source: Author's Computation (2023) Using E-views 10.0

The results of hypothesis testing revealed the single-factor capital asset pricing model has a positive and significant relationship with average return in the up or bullish period of the market. The result is in line with the work of (Pettengill et al. 1995), which says that there is a significant positive relationship between beta and risk premiums for periods with positive market risk premiums, and an inverse relationship for periods with negative market risk premiums. In line with the beta risk factor, the P-value of 0.0000 that is 100 percent confident interval, which means that the un-diversifiable risk can greatly influence average return of an investment at the time the market is rising in the Nigeria stock market.

Table 4: Result of the Stock for the Bearish Period

Variable	Coefficient	Std. Error	t-Statistic	Prob.
BETA	-0.080131	0.028885	-2.774138	0.0071
C	-0.078699	0.029366	-2.679926	0.0092

Source: Author's Computation (2023) Using E-views 10.0

The results of hypothesis testing revealed the single-factor capital asset pricing model has a negative but weak relationship with average return. The result is in line with the work of John Ross, which says CAPM has just little or no contribution to average return and its considered dead in its track. Notwithstanding, the P-value of 0.0071 that is 0.07 percent, which is far less than 5%, which means that the un-diversifiable risk cannot influence average return of an investment in the down or bear period of the Nigeria stock market.

CONCLUSION AND RECOMMENDATIONS

Findings from the cross-sectional regression tests showed that the slope and systematic risk hypotheses are rejected. The implication of this is that investors are not rewarded for taking risk that results from sensitivity of asset return to variation in market return. These tests also reveal that the linearity hypothesis is not rejected implying that risk and return of an investment are linearly correlated. The results of test of hypotheses revealed the single-factor capital asset pricing model is valid in the bullish period and void in the bearish period of Nigeria stock market. The overview suggests that the explanatory variable (Beta risk factor) when combine, has F-statistic of 15.88747 and a corresponding P-value of zero (0). This basically

means that, the beta factor has a significant influence on average return of securities in the Nigeria stock market for the period. In view of the results obtained, the study recommends that investors should consider trend of price movement in the market before venturing into any investment. This will enable them determine the momentum and direction of the market, thus, hedging their investment against avoidable risk.

REFERENCES

Arewa, A., & Ogbulu, O. M. (2015). Premium factors and the risk-return trade-off in asset pricing: Evidence from the Nigerian capital market. *Journal of Business & Economic Policy*, *2*(2), 30-38.

Black, F. (1972), Capital market equilibrium with restricted borrowing. *The Journal of Business*, *45*(3), 444-55

Brennan, M. J. (1973). Taxes, market valuation and corporate financial policy. *National tax Journal, 23*(1), 417–427.

Cheng, A. R., & Jahan-Parvar, M. R. (2014). Risk–return trade-off in the pacific basin equity markets. *Emerging Markets Review*, *18*, 123-140.

Fama, E. F., & French, K.R. (2017). Choosing factors. *Chicago Booth Paper, 16*(17), 1-54.

Fama, E. F., & French, K.R. (2015). A five-factor asset pricing model. *Journal of Financial Economics, 116*(1), 1-22.

Fama, E. F., French, K. R. (2017). International tests of a five-factor asset pricing model. *Journal of Financial Economics*, *123*(3), 441-463.

Kauppinen, T. (2020).The impact of the U.S. presidential elections on the stock market risk returns dynamics. JAMK University of Applied Sciences, Bachelor's Thesis.

Levy, H. (1978). Equilibrium in an imperfect market: A constraint on the number of securities in the portfolio. *American Economic Association, 68*(1), 643–658.

Lin, X., & Falk, M. T. (2021). Nordic stock market performance of the travel and leisure industry during the first wave of Covid-19 pandemic. *Tourism Economics, 1*(1), 1–18.

Lintner, J. (1965). The valuation of risk assets and selection of risky investments in stocks portfolios and capital budgets. *Review of Economics and Statistics, 47*, 13-37.

Litzenberger, R. H., & Ramaswamy, K. (1979). The effect of personal taxes and dividends on capital asset prices: Theory and empirical evidence. *Journal of Finance & Economics, 7*(1), 163-195.

Lu, S., & Lu, C. (2018). Barra risk model based idiosyncratic momentum for Chinese equity market. Retrieved from https://www.ssm.com/abstract=3140113

Mabrouk, A. B., (2020). Wavelet-based systematic risk estimation: Application on GCC stock markets in the Saudi Arabia Market. *Quantitative Finance and Economics*, *4*(4), 542-

Markowitz, H. (1952). Portfolio selection. *Journal of Finance, 7*(1), 77-99.

Merton, R. C. (1973).An inter-temporal capital asset pricing model. *Journal of Econometric Society, 41*(1), 867-887.

Mossin, J. (1969). Security pricing and investment criteria in competitive markets, *American Economic Association, 59*(5), 749-756.

Pettengill, G. N., Sundaram, S., &Mathur, I. (1995). The conditional relation between beta and returns. *Journal of Financial and quantitative Analysis, 30*(1), 101-116.

Pinto, P., Hawaldar, I.T., Kemminje, G., Rohit, B., Spulbar, C.M., Birau, F.R. &Stanciu, C.V. (2020). The impact of risk anomalies on the pharmaceutical sector of the Indian stock market: A comparative analysis between pharmaceutical, FMCG and IT companies. Retrieved from https://www.doi.org/10.37358/RC.20.2.7892

Ross, S. (1976). The arbitrage theory of capital asset pricing. *Journal of Economic Theory, 13*(3), 341-360.

Roll, R., & Ross, S. A. (1994). On the cross-sectional relation between expected returns and betas. *The journal of finance, 49*(1), 101-121.

Sharpe, W. F. (1963) A simplified model for portfolio analysis. *Management Science, 9*, 277-293.

Sharpe, W. F. (1970). Stock market price behavior: A discussion. *Journal of Finance,* 25(1), 418-420.

Soni, R. (2017). Designing a portfolio based on risk and return of various asset classes. *International Journal of Economics and Finance, 9*(2), 142-149.

Tim, L. (2021). Reconsidering equity issue performance: A focusedcriticism of Fama and French French multiple factor models.

Terregrossa, S. J., & Eraslan, V. (2016).An analysis of the relation between return and beta for portfolios of Turkish equities. *Cogent Economics & Finance, 4*(1), 35-52.

Thaler, R. H. (2005). Advances in behavioral finance. *Economics & Finance, 2*(1), 54-70.