

# SYSTEMIC RISK AND STOCK MARKET PERFORMANCE IN NIGERIA

**ODOGU, LAIME ISAAC  
DR. TONYE OGIRIKI &  
DISU, BABATUNDE SULAIMAN**

- 1. DEPARTMENT OF ACCOUNTANCY SCHOOL OF MANAGEMENT  
SCIENCE, BAYELSA STATE  
COLLEGE OF ARTS AND SCIENCE, ELEBELE, YENAGOA, BAYELSA STATE  
EMAIL: ODOGULAIME61@YAHOO.COM, 08037200871**
- 2. DEPARTMENT OF FINANCE AND ACCOUNTANCY, NIGER DELTA UNIVERSITY  
WILBERFORCE ISLAND,  
BAYELSA STATE.**
- 3. DEPARTMENT OF ACCOUNTANCY SCHOOL OF MANAGEMENT SCIENCE,  
BAYELSA STATE  
COLLEGE OF ARTS AND SCIENCE, ELEBELE, YENAGOA, BAYELSA STATE**

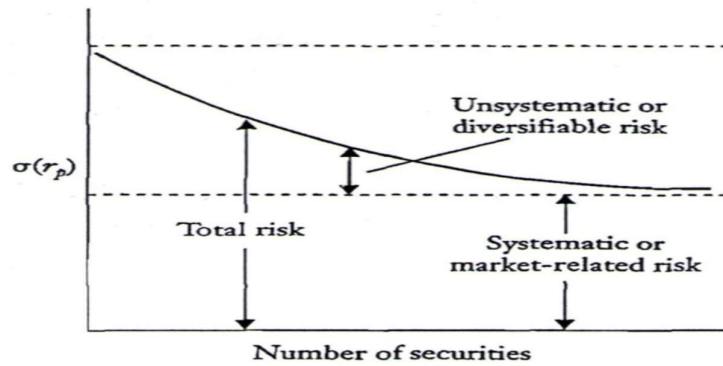
## **1. Introduction**

No investment in the stock market can thrive without an associated risk and returns. Risk is the variability that is likely associated with future returns from an investment. Basically, there are two types of risk: the systematic and the unsystematic risk. However, the former is an undiversifiable/market/unavoidable risk compared to the latter which is a diversifiable/avoidable risk. According to Bartov and Bodnar (1994), the systematic risk principle states that the reward for bearing risk depends only on the systematic risk (interest rate risk, inflation rate risk, Political risk, exchange rate risk etc.) of an investment. This is because unsystematic risks such as poor management, competition, custom tariff are diversifiable. The implication of this for investors is that according to Capital Asset Pricing Model (CAPM), they only need to bother themselves about systematic risk of a security. Systematic risk affects the prices of financial asset traded in the market.

It is common to argue that the expected return on an asset should be positively related to its risk. Individuals will hold a risky asset only if its expected return compensates for its risk (Ansi & Ouda, 2009). Several investors in the Nigerian stock market are basically concerned with the returns without emphasis on impending risk and overall market volatility; such as in the study of Dickson and Muragu (1994) which is encumbered with unassessment or undiversified or market risk with a predominant focus on the efficiency of the market among selected firms in Nairobi Stock Exchange (Muiruri, 2014). This study is expected to rekindle the importance of establishing the relationship between risks and returns that has been proposed by CAPM, while taking into consideration the systematic risk of security investments within stock market. To this end, the study was concerned with the examining the relationship between market risk and security returns in the Nigerian capital market.

## **2 Review of related literature**

The concept of risk could be examined in relation to an asset or portfolio. In the financial topics, risk can be divided into systematic risk (undiversifiable risk) and non-systematic risk (diversifiable or unique risk). Systematic risk (market risk), Interest rates, recession and wars all represent sources of systematic risk because they affect the entire market and cannot be avoided through diversification. Whereas this type of risk affects a broad range of securities, unsystematic risk affects a very specific group of securities or an individual security. Systematic risk can be mitigated only by being hedged. Non-systematic risk: Company or industry specific risk that is inherent in each investment. The amount of unsystematic risk can be reduced through appropriate diversification. Also known as “Business Risk”, “Liquidity and Marketability Risk”, “financial risk”, “credit risk” and “political risk” (Anderson & McKay, 2008)



Investors are considered to maintain diversified portfolios, as the market does not reward investors for bearing diversifiable risk. The Capital Asset Pricing Model (CAPM) attempts to explain the relationship between the systematic risk of an asset and its corresponding expected return. The capital asset pricing model based on simplifying assumptions, of which can be expressed as follows: The first assumption is that Investor purpose is the maximizing of expected utility from final wealth. Second, all investors have homogeneous expects about the risk/reward trade-offs in the market. The third assumption is that Information simultaneously and freely available to all investors and investors cannot be affected stock prices by buying and selling stock. The fourth assumption is that Taxes, transaction costs, there is no limit to short sell or other market constraints. Consequently, the CAPM implies that if a security's beta is known, it will be possible to calculate the parallel expected return. The relationship is known as the Security Market Line (SML) equation and the measure of systematic risk in the CAPM is called Beta.

The CAPM and the concept of beta as a measure of systematic risk have a number of practical uses in both portfolio management and corporate finance. These include the followings:

- 1- The construction of investment portfolios with the desired risk and return characteristics.
- 2- The evaluation of investment portfolios' performance.
- 3- The discounted cash flow valuation models.
- 4- The estimation of companies' cost of equity capital.

Beta is a risk metric employed primarily in the equity markets which measures the systematic risk of a single instrument or an entire portfolio. It is the sensitivity of a stock's return to the return on the market portfolio (Berkley *et al.*, 2001). Sharpe's work suggests that the expected return on a portfolio should increase proportionally with beta. The beta measure has two basic characteristics that we need to keep in mind during estimation.

The capital asset pricing model illustrates with essentially graph that called SML and in this graph The x-axis represents the risk (beta), and the y-axis represents the expected return.

The market risk premium ( $R_m - R_f$ ) is determined from the slope of the SML. The CML is derived by drawing a tangent line from the intercept point on the efficient frontier to the point where the expected return equals the risk-free rate of return. The CML is considered to be superior to the efficient frontier since it takes into account the inclusion of a risk-free asset in the portfolio. The capital asset pricing model (CAPM) demonstrates that the market portfolio is essentially the efficient frontier. This is achieving visually through the security market line.

In the Capital Asset Pricing Model (CAPM), market risk of a risky asset or stock is measured by beta ( $\beta$ ) which when multiplied by the Equity Market Risk Premium yields the total risk premium for a risky asset. That is, total equity risk premium for a risky asset ( $R_p$ ) is equals to its beta multiplied by the equity risk premium (ERP) for the entire equity stock market portfolio (i.e.  $R_p = \beta(R_m - R_f)$ ).

Hence, from our definition of expected return, that for a risky asset at any point in time is represented by  $R_e = R_f + \beta(R_m - R_f)$ . That is, ERP for the entire equity market is  $R_m - R_f$  while that of a specific equity stock is  $\beta_i(R_m - R_f)$ . Therefore, expected return on any risky investment = Risk-free Rate + Beta of the risky asset (ERP)

Following a constant risk CAPM, an unconditional beta for an asset or portfolio can be estimated based on the regression:

$$R_{it} = \alpha + \beta_j(R_{mt} - R_{ft}) + \epsilon_{it} .$$

Where  $R_{it}$  is the return on asset or portfolio  $i$ , for period  $t$ ,  $R_{mt}$  is the return on the market index for period  $t$ ,  $R_{it} = \text{expected return for } i \text{ share}$  and  $\epsilon_{it}$  is disturbance term which is assumed to follow a white noise process. The coefficient  $\beta$ , is the market risk for the asset/portfolio in question and is computed as  $Cov(R_{it}, R_{mt})/\sigma_{mt}$ . The formulation in equation (1) assumes that  $\alpha$  and  $\beta$  are constants over time. The model is therefore known as Constant Risk Model (CRM).

On the determinants of ERP are the risk aversions of investors, economic risk, information uncertainty, liquidity, and catastrophic risk. High risk aversion investors beget higher ERP. That is, the more the risk aversion the higher the ERP. As the risk aversion declines, ERP will fall. Investors risk aversion depends on age (Bakshi & Chen, 1994) and preferences for future or current consumption (Damodaran, 2011). The older the investors the more risk averse and the higher the ERP. The younger the investors the less risk averse and the lower the ERP. Investors' preference for current consumption over future consumption increases ERP. Conversely, Investors' preference for future consumption over current consumption decreases ERP. That is, ERP increases as savings rate decreases and decreases as savings rate increases (Bartov & Bodnar, 1994).

Investors base their investment decision on the expected return and risk of investments (Kevin, 2001). Risk is the variability that is likely to be future returns from an investment. Diversification helps to reduce risk, but even a well-diversified portfolio does not become risk free (Kevin, 2001). Each diversified portfolio is still subject to variability which is not diversifiable known as systematic risk (beta risk). A rational investor would expect the return on a security to be commensurate with this risk. Thus, the standard CAPM gives the relationship between the expected return and the systematic risk of a security (Vuolteenaho, 2002).

Osamwonyi and Asein (2012) examined the market risk as defined in the CAPM as an explanatory variable for security returns. Their findings do not support the theory's basic statement that "higher beta is associated with higher returns" and thus concluded that the CAPM does not hold for Nigeria. In other words, they found that the value-beta relationship was non-linear but failed to model the relationship in a non-linear manner, as they used OLS method with a constant beta.

In Nigeria, a number of studies have been conducted on the estimation of the stock market beta, most of which used the ordinary least squares (OLS) method with static beta. Some of the investigations include; Olakojo and Ajide (2010) studied the CAPM for Nigerian stocks. Osamwonyi and Asein (2012) also studied the beta of stocks of Nigerian firms.

Olakojo and Ajide (2010) examined the CAPM for the Nigerian stock market using monthly stock returns for 10 most capitalized stocks on the exchange, while Osamwonyi and Asein (2012) examined the market risk as defined in the CAPM as an explanatory variable for security returns. Their findings do not support the theory's basic statement that "higher beta is associated with higher returns" and thus concluded that the CAPM does not hold for Nigeria. In other words, they found that the value-beta relationship was non-linear but failed to model the relationship in a non-linear manner, as they used OLS method with a constant beta.

### 3.0 Data and methodology

The study adopts the CAPM, which posits that in a well-diversified portfolio of assets, the valuation of a security depends not only on its own returns, but on how it contributes to overall risk. The beta coefficient measures the relation between returns on a particular security and returns on the overall market portfolio. The CAPM is applied to the indices of the different sectors of the stock market over the period 2001 to 2012 to significant effect of market betas on returns.

Following a constant risk CAPM, an unconditional beta for an asset or portfolio can be estimated based on the regression:

$$R_{it} = \alpha + \beta R_{mt} + \varepsilon_{it} \quad (1)$$

where  $R_{it}$  is the return on asset or portfolio  $i$ , for period  $t$ ,  $R_{mt}$  is the return on the market index for period  $t$ , and  $\varepsilon_{it}$  is disturbance term which is assumed to follow a white noise process. The coefficient  $\beta$ , is the market risk for the asset/portfolio. The formulation in equation (1) assumes that  $\alpha$  and  $\beta$  are constants over time.

### 3.1 Research Data

The data used in this study are the daily stock prices of eight selected listed stocks on the Nigerian Stock Exchange (NSE). These companies are:

Livestock Feeds Plc., Presco Plc., DN Meyer Plc, Trans-Nationwide Express Plc., Dangote Flour Mills Plc., Flour Mills Nigeria Plc., John Holt Plc., and P Z industries Plc. The data span from 2nd January 2000 to 28<sup>th</sup> December 2014. The All Share Index (ASI) used are as compiled and published by the NSE. The portfolio/sector indexes were computed by the researchers in accordance with the NSE-ASI computation methodology. Altogether, 5 Portfolios/Sectors are represented based on availability of data as well as importance of such in the Nigerian market.

### 4.0 Results and Discussions

The Market Portfolios/Sectors examined are: Agriculture, Chemical and Paints, Commercial services, Food/Beverages & Tobacco and Conglomerate. The main objective of the study is to examine the relationship between market risk and security returns in the Nigerian capital market using the Capital Asset Pricing Model (CAPM)

Table 1: Regression result for eight companies and five sectors

Dependents( $R_{it}$ )	Independent( $R_{mt}$ )	Coefficient( $\beta$ )	t-statistic	Probability	$R^2$
$R_{i1}$	B <sub>1</sub>	8.927	7.352*	.000	.819
$R_{i2}$	B <sub>1</sub>	0.171	2.53*	.034	.753
$R_{i3}$	B <sub>2</sub>	0.258	2.629*	.015	.542
$R_{i4}$	B <sub>3</sub>	7.418	6.263**	.000	.757
$R_{i5}$	B <sub>5</sub>	0.430	4.468**	.000	.162
$R_{i6}$	B <sub>4</sub>	-0.286	-3.742**	.000	.264
$R_{i7}$	B <sub>5</sub>	-0.294	-3.897**	.000	.762
$R_{i8}$	B <sub>6</sub>	-0.071	-1.620	.106	.514

\*: Significant at 5%; \*\*: Significant at 1%

Result from table 1 reveal  $R_{i1}$  to  $R_{i8}$  representing eight of the selected companies and B<sub>1</sub> to B<sub>5</sub> for the five sectors where the selected companies are domicile. Our result shows that for almost all the companies except for  $R_{i8}$ , there are significant relationships between market risk and security returns in the Nigerian capital market. Our R-square also shows that the explanatory power for almost all the companies were good. However, out of the seven companies that had a significantly relationship, two companies ( $R_{i6}$  and  $R_{i7}$ ) were inversely related. In all seven of the companies confirmed our a priori expectations that beta (market risk) significantly affect returns. However, this was not the case with Olakojo and Ajide (2010) who discovered that beta is not associated with higher returns” and thus concluded that the CAPM does not hold for Nigeria.

### 5. Conclusion and recommendation

Our study empirically examines systemic risk and stock market performance proxy as security returns in Nigeria. The study revolves around the CAPM used in establishing purported relationship between systematic risk (market risk) and security return. It is well known that systematic risk are undiversifiable risk which cannot be ignored for good effect. Our result has proven that systematic risk significantly affects stock market performance and must be adequately managed through other means like hedging against the effect of such market risk. It can therefore be recommended that government should take proactive economic measures to address the high inflationary and exchange rate volatility. Investors should ensures they make the most of the market through optimization of their portfolio.

## REFERENCES

- Anderson, R. W. & McKay, K. (2008). *Derivatives markets in Freixas*, X, P Hartmann and C Mayer (eds), Handbook of European financial markets and institutions, Oxford University Press, Oxford, UK.
- Ansi, A. & Ouda, B. (2009). How Option Markets affect price discovery on the spot markets: A survey of the empirical literature and synthesis. *International Journal of Business and Management*, 4 (8), 155-169.
- Bartov, E. & Bodnar, G.M. (1994). Firm valuation, earnings expectations, and the exchange-rate exposure effect. *Journal of Finance*, 49 (5), 1755-1785.
- Muiruri, P. M. (2014). Effects of Estimating Systematic Risk in Equity Stocks in the Nairobi Securities Exchange (NSE) (An Empirical Review of Systematic Risks Estimation). *International Journal of Academic Research in Accounting, Finance and Management Sciences*, 4(4), 228-241
- Bickley, J. H. (2001). Public Utility Stability and Risk. *Journal of Insurance* 26(2),35–58.
- Bakshi, G. S. & Chen, Z. (1994), Baby Boom, Population Aging, and Capital Markets, *The Journal of Business*, LXVII, 165-202.
- Vuolteenaho, T., (2002). What drives firm level stock returns? *J. Financ.*, 57(1): 233-264.
- Olakojo, S. A & Ajide, K. B. (2010), Testing the Capital Asset Pricing Model (CAPM): The case of the Nigerian Securities Market. *Journal of International Business Management*. 4(4):239-242
- Oludoyi, S. B. (2003). An Empirical Analysis of Risk Profile of Quoted Firms in the Nigerian Stock Market. *Ilorin Journal of Business and Social Sciences*, 8:9-19
- Osamwonyi, I. O. and Asein, E. I. (2012). Market Risk and Returns: Evidence from the Nigerian Capital Market. *Asian Journal of Business Management*, 4(4):367-372.