

## **The Risk-Return Relationship in the Nigerian Stock Market in the Presence of Structural Break**

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### **Abstract**

*This study estimated the risk-return relationship in the Nigerian stock market between January 2000 and December 2016 while taking into account the presence of structural break. The structural break period identified by the Bai-Perron breakpoint test is March 2008, hence the overall sample period is divided into the before-break period and after-break period. This study adopted the Generalized Autoregressive Conditional Heteroskedasticity-in mean (GARCH-M) model estimated with the Maximum Likelihood estimation method. It found that the risk-return relationship is not statistically significant in the before-break period while it is negative and statistically significant in the after-break period. In the overall period, risk is not significantly related to return. This study concluded that risk-return relationship in the Nigerian stock market is sensitive to structural break. Therefore, there may be need to account for structural break when determining the risk-return relationship.*

**Keywords:** Risk-return relationship, Structural break, Capital Asset Pricing Model, GARCH-M model, Nigerian stock market.

### **1. Introduction**

Risk and return are two inseparable concepts in financial asset markets. The relationship between risk and return is a major area of interest for investors because it assists in making investment decisions. León, Nave and Rubio (2007) note that the relationship between risk and return is the basis of financial economics. Investors expect more return as they assume more risk. The risk-return relationship, also referred to as risk-return trade-off has been theoretically explained by the Capital Asset Pricing Model (CAPM) developed by Sharpe (1964), Litner (1965) and Mossin (1966) posits that expected return on financial assets held by risk averse investors is positively related to risk. Fama and French (2004) argue that CAPM is a powerful tool to measure risk and the relationship between risk and expected return. An extension of the CAPM is the

intertemporal CAPM proposed by Merton (1973) which states that expected excess return is directly related to risk.

There is a strand of literature showing that there is a positive (direct) relationship between risk and return in the stock market (Mollik & Bepari, 2015; Cheng and Jahan-Parvar, 2014; Dorfman & Park, 2010; Bali, 2008; Guo & Whitelaw, 2006; Ghysels, Santa-Clara & Valkanov, 2005; French, Schwert & Stambaugh, 1987). Another strand of literature document that negative (inverse) relationship (Aslanidis, Christiansen & Savva, 2016; Chiang, Li & Zheng, 2015; Abdalla, 2012; Dimitriou & Simos, 2011; Li, Yang, Hsiao & Chang, 2005; Glosten, Jagannathan & Runkle, 1993). Therefore, the risk-return relationship in the stock market remains a debatable issue.

Prior studies on the risk-return relationship in the Nigerian stock market (for example, Nwidobie, 2013; Nwude, 2012; Adedokun & Olakojo, 2012; Olowe, 2009) may offer an ambiguous view due to failure to account for structural break. Structural break produces incorrect inferences and portfolio decisions (Turtle & Zhang, 2015). Malik (2015) argues that ignoring the presence of structural break produces inaccurate estimates when estimating the risk-return relationship. Structural break tends to occur in the stock market due to a number of reasons, among which are changes in institutional arrangements, policy changes, regime shift, economic/political events and financial crisis. Investors are most likely to respond to structural break in the stock market because it causes structural change in the dynamics of returns. Structural break is capable of limiting the growth of stock markets (Narayan, Narayan & Mishra, 2013). It can lead to an inverse relationship between investment horizon and the amount of investor's fund allocated to financial assets, thus limiting the optimal allocation of funds (Pettenuzzo & Timmermann, 2011). The Nigerian stock market has experienced the occurrence of structural break. Recent studies identify structural break in the Nigerian stock market returns, notably occasioned by the global financial crisis (Aluko, Adeyeye & Migoro, 2016; Uyaebbo, Atoi & Usman, 2015). Thus, this study is motivated by the need to understand the risk-return relationship in the Nigerian stock market in the presence of structural break. With respect to Nigeria, the main contribution of this study is that it confirms that the nature of relationship between risk and return is sensitive to structural break. The rest of this paper is structured as follows. Section 2 provides the literature

review, Section 3 focuses on the methodology, Section 4 empirical analysis and Section 5 provides the conclusion.

## **2. Review of Literature**

### **2.1 Theoretical Framework**

The theoretical foundation for the risk-return relationship lies in the Capital Asset Pricing Model (CAPM). The CAPM is an equilibrium based model where the price mechanism equates demand for securities and supply of securities. The model establishes a formal link between risk and return and it is used in estimating the required rate of return of a risky asset or portfolio. The proponents of this model classified risk into systematic and unsystematic risk. They assert that the market only rewards investors for undertaking the systematic risk. The systematic risk as measured by beta in CAPM explains the risk inherent in a security due to its covariance with the market return. According to Pandey (2010), the CAPM is based on the following assumptions: investors can lend and borrow at the risk free; the market is efficient; investors are risk averse; investors have homogeneous expectation; and there is a single time horizon.

The CAPM is limited by the joint hypothesis problem (Oludoyi, 1999). The joint hypothesis problem means that it is impossible to reject market efficiency. The CAPM is an incorrect model to estimate when the market is not efficient due to its assumption of market efficiency. Estimating the CAPM to determine the risk-return relationship in the Nigerian stock market may not be appropriate because the market is characterised by inefficiency as shown by recent studies such as Adeyeye, Aluko and Migoro (2018); Obayagbona and Igbinsosa (2015) and Nwani and Okogbue (2015). In order to overcome the joint hypothesis problem, this study adopts the Generalized Autoregressive Conditional Heteroskedasticity-in-mean (GARCH-M) model proposed by Engle, Lilien and Robins (1987) because it does not assume that the market is efficient.

### **2.2 Empirical Review**

Evidence on the relationship between risk and return in the stock market has been well-documented in literature by estimating either the CAPM, ICAPM or factor models as well as examining the relationship between returns and volatility in the stock market through variants of

GARCH models. These studies have been conducted at either firm-level, industry-level or market-level.

### **2.2.1 Evidence from international stock markets**

Aslanidis *et al.* (2016) test for the risk-return trade-off in 13 stock markets in Europe with the aid of augmented factor models and find that the trade-off is negative in general. It also find that the risk-return is time-varying which is caused by the state of the economy, rather than business cycles. Ndwiga and Muriu (2016) use the GARCH-M model to show that risk is positively associated with return in the Kenyan stock market. Ghysels, Plazzi and Valkanov (2016) determine the risk-return relationship in the US stock market taking into account financial crises periods. Estimating the ICAPM following the Mixed Data Sampling (MIDAS) approach, they demonstrate that the relationship between risk and return is positive in non-crisis periods only.

Using the bivariate GARCH-Dynamic Conditional Correlation (DCC) model, Chiang *et al.* (2015) estimate an extended ICAPM for industry portfolio returns of 7 developed markets and 7 emerging markets and establish a positive risk-return trade-off in most markets, mostly during tranquil periods. Christensen, Nielsen and Zhu (2015) apply the fractionally integrated GARCH-M model to reveal that a positive risk-return tradeoff is only evident during periods of financial crisis and otherwise during non-financial crisis periods. Mollik and Bepari (2015) examine the risk-return relationship in the Dhaka Stock Exchange and find a positive relationship at individual security and portfolio levels.

Hammami, Ghenimi and Bouri (2015) assess the relationship between risk and return in the Tunisian stock market during the recent period of political instability (2011-2014) using a multi-factor model. Applying Generalized Method of Moments (GMM) estimation method, they document a direct relationship between risk and return. Orabi and Alqurran (2015) show that positive risk-return trade-off exists in the Jordanian stock market using GARCH-M model. Cheng and Jahan-Parvar (2014) estimate the ICAPM for 14 Pacific basin stock markets using binomial GARCH (BiN-GARCH) modelling, rolling estimator and MIDAS approaches. The BiN-GARCH modelling approach shows that risk-return relation is positive in majority of the markets. However, other approaches do not produce positive risk-return relation. The study also offer evidence to reject the proposition of linear risk-return relationship by CAPM.

Mehrara, Falahatii and Zahiri (2014) use CAPM to determine the relation between systematic risk and returns in the Tehran Stock Exchange and discover that systematic risk is positively and nonlinearly related to return. Salvador, Floros and Arago (2014) analyze the risk-return trade-off in 11 European stock markets in regime-switching models. The study observe that there is positive risk-return trade-off in low volatility periods while the risk-return trade-off diminishes or not evident in periods of high volatility. It also show that the assumption of a linear risk-return trade-off leads to non-significant estimates. Abdalla (2012) examined the trade-off between risk and return in the Saudi Arabian and Egyptian stock markets. The GARCH-M and Exponential GARCH-M model estimation results show that there is risk-return trade-off in both markets.

De Mendonça, Klotzle, Pinto and Montezano (2012) assess the relationship between idiosyncratic (unsystematic) risk and return in the Brazilian stock market based on the Fama and French three-factor model. Using the EGARCH model, the study reports that idiosyncratic risk has a positive effect on stock returns. Darrat, Li and Wu (2012) do not find evidence that risk is significantly associated with returns in the South African stock market but observe that the global financial crisis has significant implication for the risk-return relation.

Dimitriou and Simos (2011) investigate the relationship between expected stock market returns and volatility in 17 international stock markets based on the GARCH-M model and semi-parametric estimation approach. The GARCH-M model shows that expected market returns and volatility are weakly related in most markets while the semi-parametric estimation approach reveals a negative relationship in majority of the markets. Darrat, Gilley, Li and Wu (2011) determine the risk-return tradeoff in 11 stock markets in the Asia Pacific region within the GARCH model framework and find a positive tradeoff between risk and return in most markets. They discover that structural breaks and model specifications affect risk-return trade-off.

Employing a bivariate GARCH-M model, Dorfman and Park (2010) estimate the ICAPM to show a positive risk-return trade-off. Raputsoane (2009) analyzes the ICAPM for the South African stock market using the GARCH-M model and reveals a strong positive risk-return trade-off. Bali (2008) explores the intertemporal risk-return relationship of a broad set of portfolios, including industry and size/book-to-market portfolios in US using an augmented factor model. The bivariate GARCH model results show a positive risk-return relationship.

Employing the MIDAS approach, León *et al.* (2007) adopts the ICAPM to determine the relationship between risk and expected return in selected European stock market indexes (Eurostoxx50, CAC, DAX, Ibex-35 and FTSE100). The study shows that positive association between risk and expected return is evident in most indexes. N'dri (2007) explores the relationship between return and volatility in the regional stock market of the West African Economic and Monetary Union. The EGARCH-M model estimation results showed that expected stock return is not significantly related to risk. Guo and Whitelaw (2006) estimate the ICAPM for the US stock market using the GMM estimation method and find that the risk-return relation is positive.

Using the MIDAS approach, Ghysels *et al.* (2005), based on ICAPM, find that the US stock market exhibits a positive relationship between risk and expected return. Li *et al.* (2005) examine the relationship between stock market returns and volatility in 12 international markets. Using the EGARCH-M model, the study finds that the relationship is not positive in most markets. However, a negative relationship is discovered in half of the markets with the use of a semi-parametric estimation approach.

### **2.2.2 Evidence from Nigerian stock market**

Arewa and Ogbulu (2015), employing the Ordinary Least Squares (OLS) estimation method, investigates the trade-off between risk and return in the stock market. The estimated CAPM and CAPM with higher order co-moment show that there is no risk-return trade-off while the Fama and French three-factor model reveals a negative risk-return trade-off. Nwude (2012) examines the risk-return relationship for agricultural/agro-allied firms listed on the Nigerian Stock Exchange and observe that there is a positive relationship between their beta (systematic risk) and return. Adedokun and Olakojo (2012) test the CAPM for 16 most capitalized firms in the stock market. Using the OLS estimation method, they find that the beta of each firm is positively related to return. However, in general, they study find that beta is not significantly related to return after estimating the ex-post Security Market Line (SML), thus providing evidence to invalidate CAPM. The OLS estimation results show that the relationship between beta and return is mixed among the firms.

Utilising the EGARCH-M model, Olowe (2009) reveals that risk has a positive but no significant impact on return in the stock market. Oludoyi (1999) finds that the risk-return relationship changes from positive in regimes 1 and 2 to negative in regime 3, thus suggesting that the risk-return relationship varies with time.

### 3. Methodology

#### 3.1 Data

Monthly data on All-Share Index (ASI) of the Nigerian stock market are obtained from the Nigerian Stock Exchange (NSE) database between January 2000 and December 2016. Market returns ( $R_m$ ) are calculated by taking first difference of natural logarithm ( $\ln$ ) of the monthly ASI which is mathematically expressed as:

$$R_m = \Delta \ln(\text{ASI}) \times 100 \quad (1)$$

#### 3.2 Model

The GARCH-M (p,q) model is adopted and estimated with the Maximum Likelihood estimation method. The GARCH-M modelling approach has been commonly used to estimate the relationship between risk and return in the stock market (for example, Ndwiga & Muriu, 2016; Christensen *et al.*, 2015; Abdalla, 2011; Dimitiou & Simos, 2011). The GARCH-M (p,q) model is expressed as:

$$R_{m,t} = \lambda + \gamma_m \sqrt{h_{m,t}^2} + \varepsilon_{m,t}, \varepsilon_{m,t} | \varphi_{t-1} \sim N(0, h_t^2) \quad (2)$$

$$h_t^2 = \omega + \sum_{i=1}^p \alpha_i \varepsilon_{m,t-i}^2 + \sum_{j=1}^q \beta_j h_{m,t-j}^2 \quad (3)$$

Equation (2) is the conditional mean equation where  $R_{m,t}$  is market returns at month t,  $\lambda$  is the constant parameter and  $\gamma_m$  is the coefficient of the market risk aversion parameter and it is theoretically expected to be positive and significant. Equation (3) is the conditional variance

equation where  $\omega$  is the constant parameter and  $\alpha_i$  and  $\beta_j$  represent the coefficients of the ARCH and GARCH terms respectively.

#### 4. Empirical Analysis

##### 4.1 Structural Break Test

Structural break in market returns is determined by employing the Bai-Perron breakpoint test. The test is performed to account for one structural break in market returns at 5% significance level with Unweighted max-F (UDmax) and 15% trimmed data while allowing for heterogeneous error distributions across breaks. The Bai-Perron breakpoint test identifies March 2008 as the structural break period. Based on the structural break period, the sample period is split into before-break and after-break periods. Therefore, the before-break period is January 2000-February 2008 and the after-break period is April 2008-December 2016.

##### 4.2 Descriptive Analyses

The descriptive analyses provide some statistical information and graphical representation of the return series in the after-break, before-break and overall periods

**Table 1. Descriptive Statistics**

| Statistic          | Before-break | After-break | Overall   |
|--------------------|--------------|-------------|-----------|
| Mean               | 2.509969     | -0.835288   | 0.747114  |
| Maximum            | 19.18789     | 32.35158    | 32.35158  |
| Minimum            | -12.95291    | -36.58828   | -36.58828 |
| Standard Deviation | 5.528525     | 7.753782    | 6.956240  |
| Skewness           | 0.233472     | -0.350221   | -0.402397 |
| Jarque-Bera        | 1.432902     | 178.3558*   | 273.9011* |
| Observations       | 98           | 105         | 204       |

Note: \* implies that hypothesis of normal distribution is rejected at 1% significance level.

Source: Authors' computation

Table 1 shows that returns on the average is positive in the period preceding structural break but negative after structural break. This implies that the market became largely unfavourable subsequent to structural change in the dynamics of returns. In the overall period, the average market return is below 1%. The after-break period records the highest and lowest returns in the market as indicated by the maximum and minimum statistics respectively. The standard deviation statistic indicates that returns appear to be more volatile in the after-break period than

the before-break period. This implies that the market returns are associated with more risk after the occurrence of structural break and this further confirms the negative mean return recorded in the market in the after-break period. The skewness statistic indicates positively and negatively skewed distributions for returns in the before- and after-break periods respectively. This implies that it is possible to obtain more positive extreme values in the before-break period compared to the after-break period. Overall, returns are negatively skewed in the market. As shown by the Kurtosis statistic, returns has a moderately-tailed distribution in the before-break period while it has a fat-tailed distribution in the after-break and overall periods. The Jarque-Bera statistic indicates that returns are normally distributed in the before-break period only.

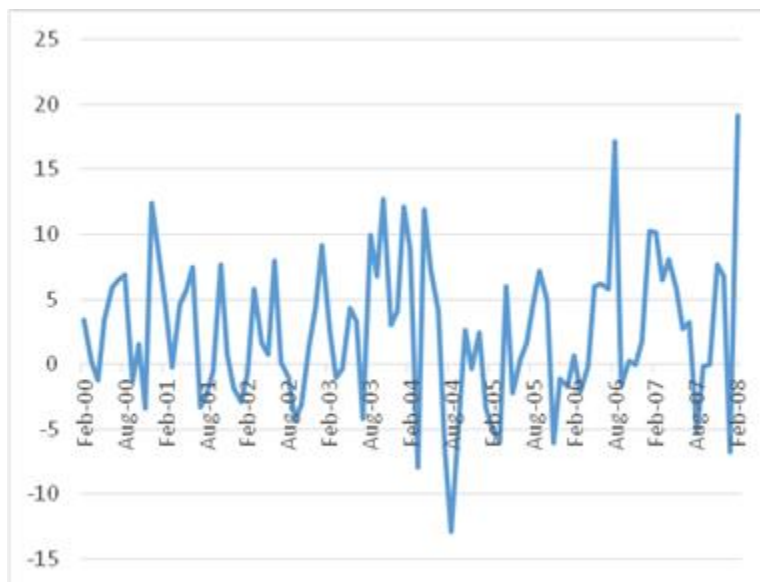


Figure 1: Graph of Nigerian stock market returns in the before-break period

Source: Authors' computation (2018)

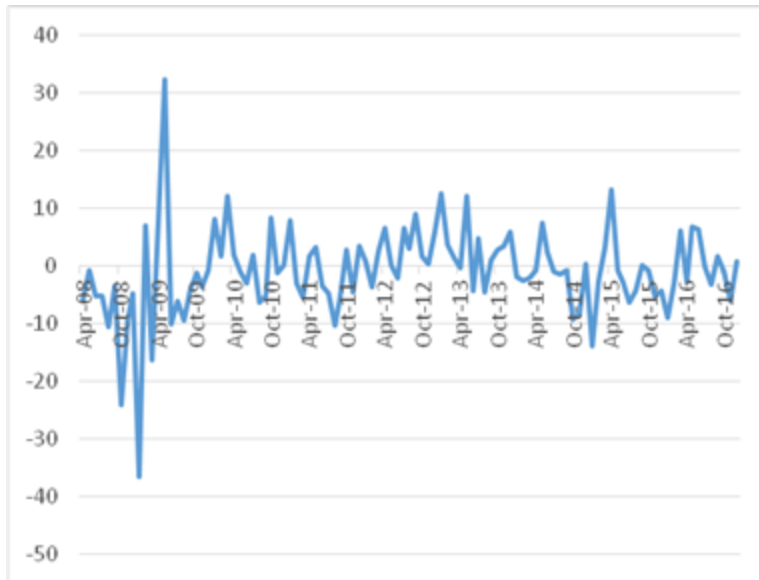


Figure 2: Graph of Nigerian stock market returns after-break period

Source: Authors' computation (2018)



Figure 3: Graph of the Nigerian stock market returns in the overall period

Source: Authors' computation (2018)

### 4.3 Model Estimation

According to Pandey (2010), returns are assumed to be normally distributed when explaining the risk-return trade-off. Therefore, the GARCH-M (p,q) model for the before-break, after-break and overall periods are estimated under the assumption of Gaussian (normal) distribution irrespective of whether returns are normally distributed or not in these periods. The Bollerslev and

Wooldridge (1992) quasi-maximum likelihood standard errors are applied in the estimated models to allow the normality conditions to hold.

For the before-break, after-break and overall periods, GARCH-M (1,1) and GARCH (2,1) models are estimated and the model that performed better for each sample period is selected based on the Akaike information criterion (AIC). The estimated model with a lower AIC is chosen as the model that performs better or the best-fit model. Table 2 reports only the estimation results of the conditional mean equations of the estimated GARCH-M models and their respective AIC.

**Table 2. Estimation Results of the GARCH-M Models**

|                                  | GARCH-M (1,1)       | GARCH-M(2,1)       |
|----------------------------------|---------------------|--------------------|
| <i>Before-break</i> <sup>†</sup> |                     |                    |
| $\lambda$                        | -0.140972[0.9998]   | 0.317156[0.9999]   |
| $\gamma$                         | 0.517111[0.9959]    | 0.281535[0.9996]   |
| AIC                              | 6.159777            | 6.198154           |
| <i>After-break</i> <sup>‡</sup>  |                     |                    |
| $\lambda$                        | 19.75034[0.0272]**  | 14.86695[0.0013]*  |
| $\gamma$                         | -2.665894[0.0277]** | -2.054680[0.0055]* |
| AIC                              | 7.000277            | 6.975178           |
| <i>Overall</i> <sup>‡</sup>      |                     |                    |
| $\lambda$                        | 4.601387[0.0163]**  | 4.873414[0.0444]** |
| $\gamma$                         | -0.515663[0.1247]   | -0.585458[0.1657]  |
| AIC                              | 6.532630            | 6.528185           |

Notes: \* and \*\* denote that parameter is significant at 1% and 5% significance level respectively and p-values are reported in [ ]. Also, <sup>†</sup> and <sup>‡</sup> indicate that the best-fit model is the GARCH-M (1,1) and GARCH-M (2,1) model respectively.

Source: Authors' computation

From Table 2, it can be seen that the coefficient of the market risk aversion parameter is positive but not statistically significant in the before-break period and this indicates that the absence of risk-return trade-off in this period. However, in the after-break period, the coefficient is negative and statistically significant which signify that an inverse risk-return relationship exists. This finding implies that risk-return trade-off manifested after structural break occurred in the market. It further implies that investors' reward from the market reduces as market risk increases. In the overall period, the coefficient of the market risk aversion parameter is negative but statistically significant, thus indicating that risk-return trade-off is non-existent in the market when structural break is jettisoned.

## 5. Conclusion

This study investigated the risk-return relationship in the Nigerian stock market in the presence of structural break. It found that risk is not significantly related to return prior to the occurrence of structural break. However, risk is significantly and negatively related to return subsequent to structural break in the market. This implies that the risk-return relationship in the market subsists after structural break. These findings indicate that the trade-off between risk and return in the Nigerian stock market tends to vary with time. In the overall period, it was revealed that the relationship between risk and return is not evident, thus implying that risk is not priced when the presence of structural break is ignored. This study concluded that the risk-return relationship in the Nigerian stock market is sensitive to structural break. Therefore, it suggests that there may be need to account for structural break when determining the risk-return relationship.

### References

- Abdalla, S. Z. S. (2012). The risk-return trade-off in emerging stock markets: Evidence from Saudi Arabia and Egypt. *International Journal of Economics and Finance*, 4(6), 11-21.
- Adedokun, A. J., & Olakojo, S. A. (2012). Test of capital asset pricing model: Evidence from Nigerian Stock Exchange. *Journal of Economic Theory*, 6(4-6), 121-127.
- Adeyeye, P. O., Aluko, O. A., & Migoro, S. O. (2018). The global financial crisis and stock price behavior: Time evidence from Nigeria. *Global Business and Economic Review*, 20(3), 373-387.
- Aluko, O. A., Adeyeye, P. O., & Migoro, S. O. (2016). Modelling volatility persistence and asymmetry with structural break: Evidence from the Nigerian stock market. *Journal of Economics and Behavioral Studies*, 8(6), 153-160.
- 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), 31-38.
- Aslanidis, N., Christiansen, C., & Savva, C. S. (2016). Risk-return trade-off for European stock markets. *International Review of Financial Analysis*, 46, 84-103.
- Bali, T. G. (2008). The intertemporal relation between expected returns and risk. *Journal of Financial Economics*, 87(1), 101-131.
- Bollerslev, T., & Wooldridge, J. (1992). Quasi-maximum likelihood estimation and inference in dynamic models with time-varying covariances. *Econometric reviews*, 11(2), 143-172.
- Cheng, A., & Jahan-Parvar, M. R. (2014). Risk-return trade-off in the Pacific basin equity markets. *Emerging Markets Review*, 18, 123-140.
- Chiang, T. C., Li, H., & Zhang, D. (2015). The intertemporal risk-return relationship: Evidence from international markets. *Journal of International Financial Markets, Institutions and Money*, 39, 156-180.
- Christensen, B. J., Nielsen, M. O., & Zhu, J. (2015). The impact of financial crises on the risk-return tradeoff and the leverage effect. *Economic Modelling*, 49, 407-418.
- Darrat, A. F., Gilley, O. W., Li, B., & Wu, Y. (2011). Revisiting the risk/return relations in the Asian Pacific markets: New evidence from alternative models. *Journal of Business Research*, 64(2), 199-206.

- Darrat, A. F., Li, B., & Wu, L. (2012). Revisiting the risk-return relation in the South African stock market. *African Journal of Business Management*, 6(46), 11411-11415.
- de Mendonça, F. P., Klotzle, M. C., Pinto, A. C. F., & Montezano, R. M. (2012). The relationship between idiosyncratic risk and returns in the Brazilian stock market. *Revista Contabilidade & Finanças*, 23(60), 246-257.
- Dimitriou, D., & Simos, T. (2011). The relationship between stock returns and volatility in the seventeen largest international stock markets: A semi-parametric approach. *Modern Economy*, 2, 1-8.
- Dorfman, J. H., & Park, M. D. (2010). Examining the risk-return relationship between agribusiness stocks and the market. Proceedings of the NCCC-134 Conference on Applied Commodity Price Analysis, Forecasting, and Market Risk Management, St. Louis.
- Engle, R. F., Lilien, D. M., & Robins, R. P. (1987). Estimating time varying risk premia in the term structure: The ARCH-M model. *Econometrica*, 55(2), 391-407.
- Fama, E. F., & French, K. R. (2004). Capital asset pricing model: Theory and evidence. *Journal of Economic Perspectives*, 18(3), 25-46.
- French, K. R., Schwert, G. W., & Stambaugh, R. F. (1987). Expected stock returns and volatility. *Journal of Financial Economics*, 19(1), 3-29.
- Ghysels, E., Plazzi, A., & Valkanov, R. (2016). The risk-return relationship and financial crises. Retrieved on March 18, 2017 from <http://dx.doi.org/10.2139/ssrn.2776702>.
- Ghysels, E., Santa-Clara, P., & Valkanov, R. (2005). There is a risk-return trade-off after all. *Journal of Financial Economics*, 76(3), 509-548.
- Glosten, J., Jagannathan, R., & Runkle, D. E. (1993). On the relation between the expected value and the volatility of the nominal excess return on stocks. *Journal of Finance*, 48(5), 1779-1801.
- Guo, H., & Whitelaw, R. F. (2006). Uncovering the risk-return relation in the stock market. *Journal of Finance*, 61(3), 1433-1463.
- Hammami, A., Ghenimi, A., & Bouri, A. (2015). Relation between risk and return in Tunisian's stock market after the revolution (during political instability). *Journal of Academic Finance*, 5, 1-20.
- León, A., Nave, J. M., & Rubio, G. (2007). The relationship between risk and expected return in Europe. *Journal of Banking & Finance*, 31(2), 495-512.
- Li, Q., Yang, J., Hsiao, C., & Chang, Y. (2005). The relationship between stock returns and volatility in international markets. *Journal of Empirical Finance*, 12(5), 650-665.
- Litner, J. (1965). The valuation of risk assets and the selection of risky investments in stock portfolios and capital budgets. *The Review of Economics and Statistics*, 47(1), 13-37.
- Malik, F. (2015). Revisiting the relationship between risk and return. *Review of Quantitative Finance and Accounting*, 44(1), 25-40.
- Mehrara, M., Falahati, Z., & Zahiri, N. H. (2014). The relationship between systematic risk and stock returns in Tehran Stock Exchange using the capital asset pricing model (CAPM). *International Letters of Social and Humanistic Sciences*, 21, 26-35.
- Merton, R. C. (1973). An intertemporal capital asset pricing model. *Econometrica*, 41(5), 867-887.
- Mollik, A. T., & Bepari, M. K. (2015). Risk-return trade off in emerging markets: Evidence from Dhaka Stock Exchange Bangladesh. *Australasian Accounting, Business and Finance Journal*, 9(1), 71-88.

- Mossin, J. (1966). Equilibrium in a capital asset market. *Econometrica*, 34(4), 768-783.
- Narayan, P. K., Narayan, S., & Mishra, S. (2013). Has the structural break slowed down growth rates of stock markets? *Economic Modelling*, 30, 595-601.
- N'dri, K. L. (2007). Stock market returns and volatility in the BRVM. *African Journal of Business Management*, 1(5), 107-112.
- Ndwiga, D., & Muriu, P. W. (2016). Stock returns and volatility in an emerging equity market: Evidence from Kenya. *European Scientific Journal*, 12(4), 79-98.
- Nwani, C., & Okogbue, C. (2015). Testing the weak-form efficiency of the Nigerian stock market in different market periods. *Journal of Global Economics, Management and Business Research*, 4(1), 15-22.
- Nwidobie, B. M. (2013). Capital asset pricing model and variable behaviour in the Nigerian capital market. *Journal of Business Research*, 7(1), 1-13.
- Nwude, E. C. (2012). Risk-Return Relationship in Nigerian capital market: Evidence from the agricultural/agro-allied sector (2000-2009). *International Journal of Innovative Research in Management*, 3(1), 11-27.
- Obayagbona, J., & Igbinosa, S. O. (2015). Test of random walk hypothesis in the Nigerian stock market. *Current Research Journal of Social Sciences*, 7(2), 27-36.
- Olowe, R. A. (2009). Stock return, volatility and the global financial crisis in an emerging market: The Nigerian case. *International Review of Business Research Papers*, 5(4), 426-447.
- Oludoyi, S. B. (1999). Understanding the risk in a regulated market: Evidence from the Nigerian stock market. *African Journal of Economic Policy*, 6(2), 59-76.
- Orabi, M. M. A., & Alqurran, T. A. (2015). Effect of volatility changes on emerging stock markets: The case of Jordan. *Journal of Management Research*, 7(4), 132-143.
- Pandey, I. M. (2010). *Financial management* (10<sup>th</sup> Edition). New Delhi: Vikas Publishing House Limited.
- Pettenuzzo, D., & Timmermann, A. (2011). Predictability of stock returns and asset allocation under structural breaks. *Journal of Econometrics*, 164(1), 60-78.
- Raputsoane, L. (2009). The risk-return relationship in the South Africa stock market. Paper presented at the 14<sup>th</sup> Annual Conference of the African Econometrics Society on Econometric Modelling in Africa, July, Abuja.
- Salvador, E., Floros, C., & Arago, V. (2014). Re-examining the risk-return relationship in Europe: Linear or non-linear trade-off? *Journal of Empirical Finance*, 28, 60-77.
- Sharpe, W. F. (1964). Capital asset prices: A theory of market equilibrium under conditions of risk. *The Journal of Finance*, 19(3), 425-442.
- Turtle, H. J., & Zhang, C. (2015). Structural breaks and portfolio performance in global equity markets. *Quantitative Finance*, 15(6), 909-922.
- Uyaebo, S. O., Atoi, V. N., & Usman, F. (2015). Nigeria stock market volatility in comparison with some countries: Application of asymmetric GARCH models. *CBN Journal of Applied Statistics*, 6(2), 133-160.