Arbitrage Pricing Theory and Sectorial Stock Return: A Multi-Dimensional Data Evidence of Nigeria Manufacturing Sector

Chukwuemeka Anyamaobi
Department of Banking and Finance, Faculty of Management Sciences
Rivers State University, Port Harcourt
and
Celestine Okaro
Department of Banking and Finance
Nnamdi Azikiwe University, Awka, Anambra State

Abstract

This study examined the effect of arbitrage pricing model on stock return of quoted manufacturing firms in Nigeria. Time series data were sourced from Central Bank of Nigeria Statistical Bulletin, Nigeria Stock Exchange Reports from 1987-2019. Stock market return of the manufacturing firms was modeled as the function of real gross domestic product, inflation rate, exchange rate, Treasury bill rate, money supply and interest rate. The study employed multiple regression models to estimate the relationship that exists between arbitrage pricing model and sectorial stock return. Ordinary Least Square, Augmented Dickey Fuller Test, Johansen Co-integration test, normalized co-integrating equations; parsimonious vector error correction model and pair-wise causality tests were used to conduct the investigations and analysis. The model found that 72.2 percent variation in stock return of the manufacturing sector was explained by arbitrage pricing model. From the model the study conclude that Treasury bill rate, inflation rate and exchange rate have positive relationship on the manufacturing sector stock return. The study concludes that the variables were stationary at first difference and integrated in the order of 1(1). Findings of the study further conclude that the variables are linearly co-integrated while there were causal relationships among the variables in the estimated model. The study recommends that interest rate management and reactions to the stock market return should be factored into the management and transmission of monetary policy in Nigeria. The regulatory authorities, the monetary policy committee and operators of the capital market should strengthening the design and implementation of the objective of the interest rate variation with the operational objective of the capital market investment. Efforts should be made by government to ensure appropriate policy mix to ensure harmony and enhancing coordination in economic and financial policies in view of the observed nexus between arbitrage pricing model and sectorial stock market return in Nigeria.

Keywords: *Arbitrage Pricing Theory, Sectorial Stock Return, Nigeria, Manufacturing Sector*

Introduction

Quoted firms in Nigeria stock exchange is classified into sectors. According Nigeria Stock Market Reports (2020). Stock prices are classified base on sectors where the market have the financial sector, the manufacturing sector, the service and the commercial sector. Variation in macroeconomic variables such as the interest rate and money supply can have greater effect on some sectors than others. For instance the financial sector is the transmission mechanism for monetary policy and stock prices and return can react to variation in the macroeconomic variables. The Nigeria stock market is classified among the emerging financial market of world and one of the fast growing in Africa. In a deregulated financial market like Nigeria, stock market return depends on both monetary and macroeconomic policies. Nigerian stock market was established in 1960 for the purpose of bridging savings and investment gap and simplifies the sourcing long term fund (Anyamaobi, 2018). It constitute a network of financial institutions and investors interact to mobilize and allocate long term funds to productive investment and funds are exchanged for financial assets issued by borrowers or traded by stock holders which in turn offers access to a variety of financial instruments that enable economic agents to pool, price, and exchange risk (Akani and Imegi, 2017).There has been aged long point of departure among financial economists and behavioral finance scholars on factors that determine stock market return. There are five schools of thought on stock price behaviour. These are the fundamentalist schools, the

technical school, the random walk hypothesis school, the Bahavioural School of finance and macro-economic hypothesis school. The fundamentalist believe that the value of a corporation's stock is determined by expectations regarding future earnings and by the rate at which those earnings are discounted. The fundamentalists apply present value principles to the valuation of corporate stock, using dividends, earnings, assets and interest rate to establish the price of stock. The technical school opposes the fundamentalists' arguments, and claims that stock price behaviour can be predicted by the use of financial or economic data. They submit that stock prices tend to follow definite pattern and each price is influenced by preceding prices, and that successive prices depend on each other. According to Smith (1990) technical analysts engage themselves in studying changes in market prices, the volume of trading and investors' attitude. Both the "technical" and "fundamental" analyses have been challenged by scholars who subscribe to the random-walk hypothesis, which sees stock price movements in terms of a probability distribution of different possible outcome.

The random-walk hypothesis is based on efficient market assumption that investors adjust security rapidly to reflect the effect of new information. Believers in the efficient capital market hypothesis argue that stock prices are essentially random and therefore, there is no chance for profitable speculation in the stock market. An interesting feature of random walk is the persistence of random shocks. While the theories are very appealing, they failed to capture the problem of the developing financial market like Nigeria and the application of the theories in developing financial market can be misleading. Morel (2001) observed that the most disappointing feature of Arbitrage pricing theory is that it does not identify the common factors or even their number. Empirical studies of arbitrage pricing theory have well been documented in literature. Some authors tested the validity of the theory (Waseem, Iram, and Habib, 2012; Uwubanmwen and Obayagbona, 2012, Monogbe, Edori&Iki, 2017; Arewa and Nwakanma, 2013). Study on the effect of arbitrage pricing theory on stock market return is lacking in theory. Therefore this study examined the effect of arbitrage pricing theory and sectorial stock market return in Nigeria.

Theoretical Foundation

Arbitrage Pricing Theory (APT)

An important body of research in financial economics has been the behaviour of assets prices, and especially the forces that determine the prices of risky assets. There are also a number of competing theories of asset pricing. These include the original capital asset pricing models (thereafter CAPM) of Sharpe (1964), Lintner (1965) and Black (1972), the Inter-temporal models of Merton (1973a), Long (1974) Rubinstein (1976), Breeden (1979), and Cox, Ingersoll & Ross (1985), and the arbitrage pricing theory (hereafter APT) of Ross (1976).The theory of asset pricing is concerned with explaining the price of financial assets in an uncertain world. Qian (2011) stated that the uncertainty is described by probability distributions, which can be understood as beliefs of economic agents. According to him, the theory of asset pricing studies both the valuation of risk and the structure of these beliefs themselves, which are disciplined by market arbitragers. The earliest theory to receive widespread support as an alternative to the CAPM was the Arbitrage Pricing Theory (APT), developed in the mid-1970s by Stephen Ross (1976, 1977). Mathematically, and intuitively more challenging than the CAPM, the APT begins with the notion that financial markets are frictionless. Investors can buy or sell short any of a large number of assets that trade in this market. Short-selling is a transaction in which an investor sells borrowed assets that must be returned to the lender of the asset at a later date. In the simplest case, short sales are made in an attempt to profit from an expected decline in a given asset's value.

However, asset pricing theory seeks to describe the relationship between risk and expected return. It is refer to asset pricing models to mean the expected return investors require given the risk associated with an investment. In a well-functioning capital markets,' an investor would be rewarded for accepting the various risks associated with investing in an asset. It is express an asset pricing model in general terms based on risk factors as follows:

$$E(R_i) = f\ (F_1, F_2, F_3, \dots F_N) \qquad (1)$$

Where $E(R_i)$ is the expected return for asset$i$,

$F_N$is the risk factor k,

$N$is the number of risk factors.

In the world of APT, each asset can be affected by each risk factor. That is, each firm has its own set of "factor betas", and each risk factor is associated with a risk premium. For example, if fluctuations in the price of Premium Motor Spirit (PMS) represent a source of systematic risk, then stocks that are sensitive to that factor will have to pay investors higher returns as compensation. This relationship can be summarized as follows:

$$R_i - R_f = \beta_{i1}(R_1 - R_f) + \beta_{i2}(R_2 - R_f) + \beta_{i3}(R_3 - R_f) + \cdots + \beta_{in}(R_n - R_f) \quad (2)$$

The left-hand side of this equation represents the risk premium on a particular asset.By investing in an asset other than such securities, investors will demand a premium over the risk-free rate. That is, the expected return that an investor will require is:

$$E(R_i) = R_f + \text{Risk premium;} \quad (3)$$

Where R_f is the risk-free rate.

The risk premium or additional return expected over the risk-free rate, depends on the risk factors associated with investing in the asset. Thus, we can rewrite the general form of the asset pricing model given in equation (2) as:

$$E(R_i) = R_f + f(F_1, F_2, F_3, \ldots F_N) \quad (4)$$

This risk factor can be divided into two categories. The first category is risk factors that cannot be reduced with diversification. The theory assumes an asset's return is dependent on various macroeconomic, market and security-specific factors. Arbitrage pricing theory is an alternative to the capital asset pricing model. Stephen Ross developed the theory in 1976.The Arbitrage Pricing Theory formula is:

$$E(r_j) = r_f + b_{j1}RP_1 + b_{j2}RP_2 + b_{j3}RP_3 + b_{j4}RP_4 + \cdots + b_{jn}RP_n \quad (5)$$

Where:

$E(r_j)$ = the asset's expected rate of return

r_f =the risk-free rate

b_f =the sensitivity of the asset's return to the particular factor

RP= the risk premium associated with the particular factor

Capital Asset Pricing Model (CAPM)

The first asset pricing model, the capital asset pricing model (CAPM), was derived from economic theory formulated by the individual works of William Sharpe (1964), John Lintner(1965), Jack Treynor (1962) and Jan Mossin (1965). The theory of asset pricing is concerned with explaining the price of financial assets in an uncertain world. The uncertainty is described by probability distributions which can be understood as "beliefs" of economic agents (Qian, 2011). The theory studies both the valuation of risk and the structure of these beliefs themselves, which are disciplined by market arbitragers.

The classical asset pricing models are Capital Asset Pricing Model (CAPM) and Arbitrage Pricing Model (APM). The CAPM and the APM has emerged as the two models that have tried o successfully measure the potential for asset to generate a return or a loss. Both of them are based on the efficient market hypothesis (EMH) (Fama, 1965; 1970), and are part of the Modern Portfolio Theory (Markowitz, 1952, 1959).

The CAPM has only one systematic risk factor - the risk of the overall movement of the market, which we refer to as market risk. So, in the CAPM, market risk and systematic risk are interchangeable terms. The market risk means the risk associated with holding a portfolio consisting of all assets; that is, the market portfolio. In the market portfolio, an asset is held in proportion to its market value. For example, if the total market value of all assets is N100 and the market value of asset i is N10, then asset i comprises 10/100 of the market portfolio.

In the CAPM, the expected return on asset i is

$$E(R_i) = R_f + \beta_i\left[E(R_M) - R_f\right] \quad (6)$$

Where $E(R_M)$ is the expected return on the market portfolio.

$\beta_i$is the measures of systematic risk of asset i relative to the market portfolio.

The CAPM implies that as individuals attempt to optimize their personal portfolios, they each arrive at the same portfolio, with weights on each asset equal to those of the market portfolio.

$$R_i = \alpha_i + \beta_i R_M + e_i \quad (7)$$

$$R_i = \alpha_i + \beta_i F + u_i \quad (8)$$

$$R_i(t) = \alpha_i + \beta_i R_M(t) + e_i(t) \quad (9)$$

The intercept of this equation (denoted by the Greek letter alpha, or α) is the security expected excess return when the market excess return is zero. The slope coefficient β is the security beta. Beta is the security's sensitivity to the index: it is the amount by which the security return tends to increase or decrease for every 1% increase or decrease in the return on the index, i.e. is the zero-mean, first-specific surprise in the security return in time t, also called the residuals.

The capital asset pricing model (CAPM) begins with an analysis of how investors construct efficient portfolios and the theory has its basis in mean-variance analysis. The CAPM provides a method for determining the expected return, $E(R_i)$, for any asset i, not just for portfolios on the efficient frontier. In words CAPM can be expressed as: the expected return on asset i = risk-free rate + systematic premium for asset i. A key variable in the CAPM is β which is specified as:

$$\beta_i = \frac{Cov(R_i R_M)}{\sigma_M^2} = \frac{\sigma_{iM}}{\sigma_M^2} \quad (10)$$

Where σ_M^2 is the variance of the return on the market portfolio.

The CAPM indicates that the expected return on a specific asset, $E(R_i)$, equals the risk-free rate plus a premium that depends on the asset's beta, β_i and the expected risk premium on the market portfolio, $E(R_m) - R_f$.

According to portfolio theory, the expected return from a portfolio comprises risk-free return (reward for waiting or for time value of money) and risk premium (reward for risk). Thus,

$$E(R_p) = R_f + b(R_M - R_f) \quad (11)$$

Where, $E(R_p)$ = Expected rate of return from the portfolio

R_f = Risk-free return

R_M = Market return

$b = \beta$ (Systematic risk or market risk)

The purpose of the CAPM is to deduce how to price risk assets when the market is in equilibrium. The CAPM is based on a concept f market equilibrium in which the expected return on any single risky asset is proportional to the expected excess return on the market portfolio. Thus,

$$E(R_i) - R_f = \beta(E(R_M) - R_f \quad (12)$$

For all returns R_i on risky asset $i = 1, 2, \ldots n$

On the left-hand side of (eq. 12) we have the expected return on the risky asset, and the CAPM equilibrium states that this must be proportional to the systematic risk of the asset, β_i. The coefficient β_i represents the asset return's sensitivity to changes in the market return: If the expected excess returns on the market portfolio increases by 1% then the expected excess return on the i^{th} risky asset increases by $\beta_i^{\%}$. So β_i is a sensitivity risk measure relative to the market risk factor.

The Concept of Arbitrage Pricing Theory

Ross (1976) developed the arbitrage pricing theory (APT) as an alternative model that could potentially overcome the CAPM's problems while still retaining the underlying message of the later. The core idea of the APT is that only a small number of systematic influences affect the long term average returns of securities. The first ingredient of Ross's APT is a factor model. Multi-factor models allow an asset to have not just one, but many measures of systematic risk. Each measure captures the sensitivity of the asset to the corresponding pervasive factor. If the factor model holds exactly and assets do not have specific risk, then the law of one price implies that the expected return of any asset is just a linear function of the other assets' expected return. If this were not the case, arbitrageurs would be able to create a long-short trading strategy that would have no initial cost, but would give positive profits for sure. The intuition for the result when assets have no specific risk, is that all asset prices move in lockstep with one another and are therefore just leveraged 'copies' of one other.

Arbitrage pricing theory requires less and more realistic assumptions to be generated by a simple arbitrage argument and its explanatory power is potentially better since it is a multifaceted model. The Arbitrage Pricing Theory relates the expected rate of return on a critical importance in asset pricing (Gilles & Leroy, 1990). It tries to capture some of the non-market influences that cause securities to move together. Arbitrage pricing theory rests on the hypothesis that the equity price is influenced by limited and non-correlated common factors and by a specific factor totally independent from the other factors. The main empirical strength of the Arbitrage Pricing Theory is that it permits the researcher to select whatever factors provide the best explanation for the particular sample at hand (Groenewold& Fraser, 1997).

The Concept of Stock Market Return

Stock market return is the returns that the investors generate out of the stock market. This return could be in the form of profit through trading or in the form of dividends given by the company to its shareholders from time-to-time.Stock market returns can be made through dividends announced by the companies. Generally at the end of every quarter, a company making profit offers a part of the kitty to the shareholders as dividend. This is one of the source of stock market return one investor expect. The most common form of generating stock market return is through trading in the capital market. In the capital market an investor could earn stock market return by buying a stock at lower price and selling at a higher price. Isenmila and Erah(2012) opined that in stock market, the investors' invest their savings with an expectation of earning some income. This income may be termed as "stock returns" which may be in the form of profits earned from trading of shares or the dividends received. These dividends may be paid to the shareholders out of the profits earned; may be quarterly, half yearly, yearly. The stock prices or returns are bound to be affected by various risks occurring within a country and also events occurring across the world. Stock returns are very sensitive to political unrest in the country, economic crises, natural disasters like earthquake, cyclones and floods movements in international oil prices, inflation effects, changes in Government policies, norms and regulations and so on. It is known that stock prices or returns follow a random walk. It is a difficult task to predict or forecast the future returns.

Empirical Review

Budonyefa (2020) applied the multi factor Arbitrage Pricing Theory to explore the relationship between investment performance and selected macroeconomic variables in the Nigerian Capital market. Thus, the general purpose was to test the applicability of the Arbitrage Pricing Theory on investment performance in the Nigerian Capital market while the specific objective was to examine the effect of inflation rate risk, interest rate risk, exchange rate volatility risk, money supply rate of change, real gross domestic product and treasury bill rate on investment performance in the Nigerian Capital market. They extracted thirty-year (1988-2017) panel data from Central Bank of Nigeria Statistical Bulletin and published annual reports of five quoted companies in the Nigerian Stock Exchange for the dependent variable earnings per share which is proxy for investment performance. Five models were specified to express the relationship between the independent variables and the dependent variable for five quoted companies in the Nigerian Stock Exchange. The models were estimated using the Ordinary Least Square Regression analysis and the global utility of the models were evaluated. On the basis of our analysis, we found that investment performance for the Nigerian Capital market does not toe the line of the objectives of the arbitrage pricing theory as the selected macroeconomic risk factors not strongly explain investment performance. The study recommended vibrant and stable macroeconomic policies aimed at managing market realities in the capital market, good governance free of corruption, interest rate stability, among others as panacea for investment performance in the Nigerian Capital Market. Isenmila and Erah (2012) examined the suitability of the Arbitrage Pricing Theory in explaining stock returns in Nigeria. Specifically, their study examines the significance of money supply, exchange rate, inflation and oil prices in explaining stock returns in the Nigerian stock market. The study adopts a time-series research design while Secondary data in quarterly estimates for All share index, oil prices, money supply, Gross Domestic Product, Exchange rate, inflation and interest rate for the period 2000Q1- 2010Q4 were used for the analysis. The method of data estimation is the co-integration and error correction methodology. They concluded that though the arbitrage pricing theory macroeconomic variables can explain stock returns, not all the variables are significant both in the long run and in the short run. The recommendation was that there is the need for sensible

coordination of macroeconomic policies in Nigeria. However, we found the number and nature of macroeconomic variables (oil prices, money supply, Gross Domestic Product and exchange rate) adopted in their study not adequate for an extensive Arbitrage Pricing Theory research. The exclusion of inflation rate and interest rate in their model is a major concern for us. The multi-collinearity test carried out by the authors is quite impressive, but they failed to support their result with theoretical backgrounds on the interaction of the affected variables. The high collinearity value recorded for Gross Domestic Product may be because inflation was not accounted for in the computation of Gross Domestic Product data. Accounting for inflation in Gross Domestic Product data would have resulted in the use of real Gross Domestic Product, which is a better variable in this case. In our own opinion, the inclusion of oil price and exchange rates, which are both subsets of foreign activity, may foretell multi-collinearity (Ferraro, Rogoff& Rossi, 2015).

Iwegbu and Adeoye (2020) examined the effect of inflationary expectations on stock market returns during the financial crisis era and the post-financial crisis era in Nigeria. The study built its argument using Fisher's effect to examine the objective. The study employed quarterly data spanning through the periods of first quarter 2007 till the fourth quarter of 2018. Using Autoregressive Distributed Lag estimation technique after the stationarity of the variables have been confirmed by ADF and its long-run stability confirmed by Bounds co-integration test, the study found that inflationary expectations are key determinants of stock market returns in Nigeria. The study concludes that stocks do not hedge over inflation as expectations built up by agents in the economy affects stock returns. The study, therefore, rejects the Fisher hypothesis for the case of Nigeria in the post-global financial crisis era. Khudoykulov (2017) verified the arbitrage-pricing model and examined if the Arbitrage Pricing Model is valid for the Greek capital market. They examined 31 companies listed on the Athens stock exchange with the highest market capitalization. The Arbitrage Pricing Theory estimates that the macro-economic factors influence the Athens stock return. Their model was tested by performing principal factor and regression analysis. The principal factor analysis identifies the macro-economic factors, which will be used in the regression analysis. The regression analysis indicates the macro-economic factors influence on the expected stock return. The finding of the study is that the arbitrage pricing theory model is invalid for the Athens Stock Exchange market.

Mogire (2014) examined the effect of inflation on stock market returns of the Nairobi Stock Exchange. Sixty-five listed firms in the Nairobi Securities Exchange were examined. The study employed the Granger Causality test as well as the ordinary least squares estimation technique to investigate the objective. From the Granger Causality test, the result shows that there is a bi-directional relationship running from stock returns and inflation and vice versa. The result, however, found that stock market returns are positively correlated with the inflation rate. However, from the study, there is a negative relationship between the interest rate and stock returns. Monogbe, Edoriand Iki (2016) attempted to capture the application of Arbitrage pricing theory in the Nigerian Capital Market using macroeconomic variables as the determinants of returns of the companies chosen. In pursuance of this objective, five companies were chosen which include Okitipupa oil palm, Mobil oil plc. , Forte oil plc, Fidelity bank Plc and aluminum extrusion industry plc. The data collected include, returns on security which constitutes the dependent variable, Interest rate, Exchange rate, and Inflation rate which constitute the independent variables for the period (1986-2014). The data collected were subjected to Ordinary Least Square (OLS) regression analysis, Arch and Garch model. The output of our findings shows that Interest, Inflation and Exchange rate were not statistically fit in explaining returns on investment in the Companies studied. This puts a question mark on the applicability of Ross theory (APT) in justifying returns on stocks in the Nigerian context of the capital market. Muhammad (2019) investigated the influence of exchange rate on the stock returns of Shenzhen stock exchange from January 2008 to December 2018 by utilizing ARDL model for checking the short run and the long run association between the study variables. The estimated ARDL results indicate that exchange rate has a negative and significant influence on the stock returns of Shenzhen stock exchange. Inflation and interest rate results indicate a negative and statistically significant effect on the stock returns. Based on the estimated results of this study it is recommended that the policy makers in Central bank needs to make such policies that helps to stabilize the exchange rate.

Oyetayoand Adeyeye (2017) employed the error-correction model and the fully modified ordinary least squares methods for the short-run and long-run regressions in testing the Arbitrage Pricing Theory. Their short-run results seem to agree with existing theories on Arbitrage Pricing Theory thus confirming that Arbitrage Pricing Theory is relevant in Nigeria testing macroeconomic variables which include inflation, exchange rate, interest rate, Gross Domestic Product and domestic credit. However, the long-run relationship of stock returns and Real Gross Domestic Product was found to be contentious. Even though their result runs contrary to predictions on the relationship between the two, they found peculiar events and circumstances within the Nigerian macroeconomic context that provides logical reasons for the deviation. Radulescuand Pele (2014) estimated the relation between the equity risk premium and the fundamental macroeconomic and financial variables in the United States during the period 1964-2012 by applying the standard OLS regression and the Hodrick-Prescot filter. Consequently, based on these results and applying the ARIMA models, they forecast the evolution of the equity risk premium in the United States for the period 2013-2016. According to their results, the equity risk premium in the United States is gradual increase in the following years, an evolution determined by FED monetary policy perspectives, but also by the narrowing of the private consumption gap.

Tobira&Agbam (2017) investigated the suitability of the Pre-specified macroeconomic Arbitrage Pricing models in explaining the behavior of stock returns and the number of risk factors that command risk premiums in the Nigerian Equity Market. The study employed the Ordinary Least Squares technique for pre-specified macroeconomic variable, using monthly data on the macroeconomic factors over the period January 2002 to December 2014. The results of the empirical validity of the pre-specified macroeconomic variable model show that all the eight (8) factors: capitalization, lending rate, deposit rate, interest rate differentials, inflation rate, exchange rate, premium motor spirit and treasury-bill significantly influence the variations in average stock return. However, some of these risk factors (inflation rate, capitalization, deposit rate, and interest rate differentials risk premium) are inversely related to average return. Conversely, an increase in Treasury bill, Premium Motor Spirit, exchange rate, and lending rate affects average return positively. The mean of these variables are all positive implying that their first difference displays increasing tendency like the stock return; significantly different from zero, implying that investors are rewarded for assuming these macroeconomic risks. Premium Motor Spirit popularly called petrol, has the highest maximum change over time and appear to be the most volatile among the macroeconomic variables. It is also observed that investors are exposed to macroeconomic risk factors which can neither be reduced nor eliminated through diversification. So, no matter the level of diversification, investors cannot reduce these risks and therefore, they must be rewarded for taking these risks. Zakri (2013) investigated the effects of exchange rates of four of the trading partners of the U.S. on the U.S. stock market and on ten sectors of the U.S. economy, from 2000 to 2012. The Chinese yuan was the least volatile of the four currencies and the euro was the most volatile; however, the euro appreciated the most during the study period. The author also found the nondurable sector the least volatile and the energy sector, which happened to have the highest average return, the most volatile. On average, the association between the Japanese yen and the U.S. stock market was significantly and consistently negative while euro and the pound were positively and significantly associated with U.S. stocks. Moreover, U.S. stocks were positively but insignificantly associated with the yuan, which is surprising considering U.S. concern about Chinese government's direct interventions in the foreign exchange market designed to depreciate the yuan and give competitive advantage to Chinese exporters in the international export market.Zhu and Zhu (2013) introduced a regime-switching combination approach to predict excess stock returns. The findings revealed that two-regimes are related to the business cycle. Based on the business cycle explanation of regimes, excess returns are found to be more predictable during economic contractions than during expansions. The study also provided insights on the economic sources of return predictability.

Zubair, Okorie and Sanusi (2013) investigated the exchange rate pass-through to domestic prices in Nigeria by employing the impulse response from an estimated SVAR model of the inflation process using quarterly data for the period 1986-2010. The results suggest that the exchange rate pass-through is incomplete, low and fairly slow. In addition, the authors report that the elasticity of inflation to exchange rate changes is about 0.02, and that it takes about eight quarters to reach its full-impact of only 0.26. The authors further argue that given the large share of imports in Nigeria's consumption basket, this surprisingly low pass-through indicates that

importers practice the so-called pricing-to-market strategy of price setting for the Nigerian market. The variance decomposition analysis suggests that money supply has contributed more to Nigeria's inflation process relative to the exchange rate. This suggests that policy makers must beep up efforts at achieving monetary stability.

Methodology

The study adopted ex-facto research design to study the effect arbitrage pricing model on stock return of the quoted manufacturing sector. This study employed secondary data sourced mainly from the Central Bank of Nigeria (CBN) statistical bulletin, Nigerian Stock Exchange Factsheet.

Model Specification

The original model is specified as;

$SMRMS = f(INF, INT, EXCH, MS, RGDP, TB)$ (13)

The model is written mathematically as:

$Y_1 = f(x_1, x_2, x_3, x_4, x_5, x_6)$ (14)

Where:

Y = Sectorial Stock Market Return indicators which include (Dependent variables)

Y_1 = Stock Market Return for Manufacturing Sector (SMRMS)

x_1 = Inflation Rate (INFR)

x_2 = Interest Rate (INTR)

x_3 = Exchange Rate (EXCR)

x_4 = Money Supply Rate (MOSR)

x_5 = Real Gross Domestic Product Rate (RGDPR)

x_6 = Treasury bill Rate (TRBR)

Transforming this equation into a testable firm, we have the following econometric model estimated in a linear form as follows:

$$Y_1 = f(x_1, x_2, x_3, x_4, x_5, x_6)$$

$Y_1 = \beta_0 + \beta_1 x_2 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + \beta_5 x_5 + \beta_6 x_6 + \mu$ (15)

Where:

$\beta_0, \alpha_0, \mathrm{d}_0$ = Intercept or Constant Term

$\beta_1 - \beta_6$, $\alpha_1 - \alpha_6$, $\mathrm{d}_1 - \mathrm{d}_6$ = Coefficients of the Independent variables

μ = Error Term

A-priori Expectations

The a-priori expectation or reasoning of the model is the identification of individual theory (which is the theoretical link) between the dependent variable and the independent variables stated as follows:

A-priori $\beta_1 < 0$ $\beta_2 < 0$ $\beta_3 < 0$ $\beta_4 < 0$ $\beta_6 < 0$

$\alpha_1 < 0$ $\alpha_2 < 0$ $\alpha_3 < 0$ $\alpha_4 < 0$ $\alpha_5 < 0$ $\alpha_6 < 0$

$\mathrm{d}_1 < 0$ $\mathrm{d}_2 < 0$ $\mathrm{d}_3 < 0$ $\mathrm{d}_4 < 0$ $\mathrm{d}_5 < 0$ $\mathrm{d}_6 < 0$

$\beta_1 < 0$ = Means inflation rate is negatively related to stock market return of manufacturing firms.

$\beta_2 < 0$ = Means interest rate is negatively related to stock market return of manufacturing firms.

$\beta_3 < 0 =$ Means exchange rate is negatively related to stock market return of manufacturing firms.

$\beta_4 < 0 =$ Means money supply rate of change is negatively related to stock market return of manufacturing firms.

$\beta_5 < 0 =$ Means real gross domestic product is negatively related to stock market return of manufacturing firms.

$\beta_6 < 0 =$ Means treasury bill rate is negatively related to stock market return of manufacturing firms.

Description of Variables of the Study

Studying the effects of monetary policy transmission mechanisms to ascertain the relationship between the different variables discussed earlier becomes easy with the various theories, indices, and the hypotheses intended to be tested in the study. The variables include dependent and independent variables.

Dependent Variables

Stock Market Return of the Manufacturing Sector

This refers to aggregate stock prices of all quoted manufacturing firms. Stock market return of manufacturing firmsis the growth rate of annual average stock market index measured by aggregate stock prices of all quoted manufacturing firms. Annual average stock market index is constructed by taking the average of the daily stock market indexes available at Nigeria Stock Exchange.

Independent Variables

Inflation Rate: This index measured the change over time in the general price level of goods and services that households acquire for the purpose of consumption, with reference to price level.

Exchange rate: The exchange rate will be measured as the domestic currency (the Nigeria naira) per United States dollar (US$) and the annual exchange rate used for the study.

Real Interest Rate: A real interest rate is an interest rate that has been adjusted to remove the effects of inflation to reflect the real cost of funds to the borrower and the *real* yield to the lender or to an investor.

Treasury bill Rate

The Treasury bill is a money market and monetary policy instruments that is used to influence the quantity of money supply that affect the rate of interest rate, domestic credit and investment. The rate measures the Central Bank of Nigeria discounting rate for Treasury bill holders. The theoretical relationship is built on the Keynesian's speculative theory of holding money.

Data Analysis Procedure

The main tool of analysis is the Ordinary Least Squares (OLS) using the multiple regression method for a period of 36 years, annual data covering 1987– 2020. Statistical evaluation of the global utility of the analytical model, so as to determine the reliability of the results obtained were carried out using the coefficient of correlation (r) of the regression, the coefficient of determination (r^2), the student T-test and F-test.

Stationarity (Unit Root) Tests

The study investigates the stationarity properties of the time series data using the Augmented Dickey Fuller (ADF) test. According to Nelson and Plosser (1982), Chowdhury (1994) there exist a unit root in most macroeconomic time series. The Null hypothesis of a unit root is rejected against the one sided alternative if the t-statistic is less than the critical value. Otherwise, the test fails to reject the null hypothesis as a unit root at 5% significance level. Thus, test for stationarity is also called test for integration. It is also called unit root test. Stationarity denotes the nonexistence of unit root. We shall therefore subject all the variables to unit root test using the augmented Dickey Fuller (ADF) test specified in Gujarati (2004) as follows.

$$\Delta y_t = \beta_1 + \beta_2 + \delta y_{t-1} + \alpha i \sum_{i-1}^{m} \Delta y_{t-1} + Et \qquad (16)$$

Where:

Δy_t = change time t

Δy_{t-1} = the lagged value of the dependent variables

Σ_t = White noise error term

If in the above δ =0, then we conclude that there is a unit root. Otherwise there is no unit root, meaning that it is stationary. The choice of lag will be determined by Akaike information criteria.

Co-integration Test (The Johansen' Test)

Test for co-integration enables us to avoid spurious regression situation. This study employed Johansen Multivariate Co-integration Test to ascertain if there is the existence of a long run equilibrium relationship among time series variables. If the residual is found to be stationary at level, we conclude that the variables are co-integrated and as such as long-run relationship exists among them.

$$SMRM_t = w_0 + \sum_{i=1}^{i} \vartheta_t INF_{t-i} + \sum_{i=1}^{j} \varpi_i INT_{jt-i} + \sum_{i=1}^{j} \varpi_i EXCH_{jt-i} + \sum_{i=1}^{j} \varpi_i MS_{jt-i} + \sum_{i=1}^{j} \varpi_i RGDP_{jt-i} + \sum_{i=1}^{j} \varpi_i TB_{jt-i} + \mu_{1t} \quad (17)$$

Granger Causality Test

Granger causality test helps in adequate specification of model. In Granger causality test, the null hypothesis is: no causality between two variables. The null hypotheses is rejected if the probability of F* statistic given in the Granger causality result is less than 0.05. Therefore, in this study, we will carry out granger causality between an independent variables monetary policy transmission mechanism and the dependent variable stock market return in Nigeria from 1987 – 2020.The pair-wise granger causality test is mathematically expressed as:

$$Y_t \pi_o + \sum_{i=1}^{n} x_1^{\ y} Y_{t-1} \sum_{i=1}^{n} \pi_1^{\ x} x_{t-1} + u_1 \quad (18)$$

and

$$x_t dp_o + \sum_{i=1}^{n} dp_1^y Yt-1 \sum_{i=1}^{n} dp1^x x_{y-1} + V_1 \quad (19)$$

Where x_t and y_t are the variables to be tested white u_t and v_t are the white noise disturbance terms. The null hypothesis $\pi_1^y = dp_1^y = 0$, for all I's is tested against the alternative hypothesis $\pi_1^x \neq 0$ and $dp_1^y \neq 0.$ if the co-efficient of π_1^x are statistically significant but that of $dp1y$ are not, then x causes y. If the reverse is true then y causes x. however, where both co-efficient of π_1^x and dp_1^y are significant then causality is bi – directional.

Vector Error Correction (VEC) Technique

The presence of co-integrating relationship forms the basis of the use of Vector Error Correction Model. E-views econometric software used for data analysis, implement vector Auto-regression (VAR)- based co-integration tests using the methodology developed by Johansen (1991,1995). The non-standard critical values are taken from (OsterwardLenun, 1992).Co-integration is a prerequisite for the error correction mechanism. Since co-integration has been established, it is pertinent to proceed to the error correction model. The VECM is of this form

$$\Delta y_t = \alpha\beta y_{t-1} + \sum_{i=1}^{j=1} \Gamma_j \Delta y_{t-1} + \pi + \varsigma_{t,} t = 1,.....,T \quad (20)$$

Where Y_t is a vector of indigenous variables in the model, α is the parameter which measures the speed of adjustment through which the variables adjust to the long run values and the β is the vectors which estimates the long run cointegrating relationship among the variables in the model. π is the draft parameter and is the matrix of the parameters associated with the exogenous variables and the stochastic error term.

Results and Discussion of Findings

Table 1: presentation of Unit Root Test

Variable	ADF Statistic	MacKinnon @ 1%	MacKinnon @ 5%	MacKinnon @ 10%	Prob.	Remark	Decision
			ADF at Level				
SRM	-1.821149	-3.653730	-2.957110	-2.617434	0.1738	1(0)	Not Stationary
TBR	-3.653730	-3.653730	-2.617434	-2.617434	0.1318	1(0)	Not Stationary
RGDP	-1.148783	-3.653730	-2.957110	-2.617434	0.1329	1(0)	Not Stationary
MS	-0.658098	-3.653730	-2.957110	-2.617434	0.8432	1(0)	Not Stationary
INTR	-2.024442	-3.679322	-2.967767	-2.622989	0.2753	1(0)	Not Stationary
INFR	-1.321533	-3.661661	-2.619160	-2.619160	0.2224	1(0)	Not Stationary
EXR	-0.914235	-3.653730	-2.957110	-2.617434	0.9944	1(0)	Not Stationary
			ADF at First Difference				
SRM	-5.629179	-3.699871	-2.976263	-2.627420	0.0001	1(1)	Stationary
TBR	-6.442825	-3.661661	-2.960411	-2.619160	0.0000	1(1)	Stationary
RGDP	-4.590748	-3.699871	-2.976263	-2.627420	0.0011	1(1)	Stationary
MS	-8.322692	-3.670170	-2.963972	-2.621007	0.0000	1(1)	Stationary
INTR	-4.411530	-3.711457	-2.981038	-2.629906	0.0019	1(1)	Stationary
INFR	-6.200429	-3.711457	-2.981038	-2.629906	0.0000	1(1)	Stationary
EXR	-7.096955	-3.670170	-2.963972	-2.621007	0.0000	1(1)	Stationary

Source: Extract from E-view 9.0

The time series properties of the variables used in the analysis was investigated using Augmented Dickey-Fuller test. The test was run with specification of trend and intercept in the model. The ADF statistics for the test are presented in the table 4.6. It can be seen from the table above that the unit root test results, using the ADF unit root test suggest that all series are stationary at order I (1) because they become stationary after being differenced once. Therefore, the Engle and Granger (1987) can be employed.

Table 2: Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.833195	170.3147	125.6154	0.0000
At most 1 *	0.720923	114.7960	95.75366	0.0013
At most 2 *	0.655749	75.23172	69.81889	0.0173
At most 3*	0.520941	52.17381	47.85613	0.0039
At most 4	0.324619	19.35992	29.79707	0.4673
At most 5	0.198702	7.193079	15.49471	0.5553
At most 6	0.010457	0.325866	3.841466	0.5681

Source: Extract from E-view 9.0

Also, from table2 the results of the Johansen co-integration test show that we adopt the alternate hypotheses of 3 co-integrating equation at the 5% level of significance. This implies that, there is linear combination of the variables that are stationary in the long run and also confirms the existence of a long-run relationship between arbitrage pricing model and manufacturing sector stock market return within the periods covered in this study.

Table 3: Presentation of Error Correction Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.432999	4.441202	0.097496	0.9232
D(SRM(-1))	0.315005	0.243009	1.296268	0.2083
D(TBR(-1))	-2.561880	0.941552	-2.720911	0.0125
D(RGDP(-1))	-2.003187	1.228556	-1.630521	0.1172
D(MS(-1))	-7.903078	2.427356	-3.255838	0.0036
D(INTR(-1))	1.995340	0.626782	3.183465	0.0043
D(INFR(-1))	0.777362	0.316934	2.452755	0.0226
D(EXR(-1))	0.317603	0.221603	1.433205	0.1659
ECM(-1)	-1.707801	0.428490	-3.985625	0.0006
R-squared	0.796437	Mean dependent var		0.380323
Adjusted R-squared	0.722414	S.D. dependent var		40.40643
S.E. of regression	21.28872	Akaike info criterion		9.191932
Sum squared resid	9970.611	Schwarz criterion		9.608251
Log likelihood	-133.4749	Hannan-Quinn criter.		9.327642
F-statistic	10.75931	Durbin-Watson stat		1.856233
Prob(F-statistic)	0.000005			

Source: Extract from E-view 9.0

Given that, a long–run equilibrium relationship has been established. Therefore, we estimate the error correction term using the vector error correction model to examine their speed and magnitude at which the long-run equilibrium corrects for disequilibrium.

To further the analysis of the long run relationship, between arbitrage pricing model and manufacturing sector stock return under investigation is then specified in a VECM incorporating a two – period lag residual. The VECM is employed to capture the short-run deviations of the parameters from the long-run equilibrium. The autoregressive distributed lag techniques were used with a maximum lag of 1 to obtain an over parameterized result and then arriving at the parsimonious error correction result using the general to specific approach. From the, the vector error correction model (VECM) result shows that R^2 = 72.2 percent which indicates a good fit with an F- statistic value of 10.75931 and a probability value of 0.000005 and the error correction term. This is further analyzed by a Parsimonious. ECM is appropriately signed and statistically significant with a probability value of 0.0006 in the model.

Table 4 : Pairwise Granger Causality Tests

Null Hypothesis:	Obs	F-Statistic	Prob.
TBR does not Granger Cause SRM	31	2.96704	0.0691
SRM does not Granger Cause TBR		0.65050	0.5301
RGDP does not Granger Cause SRM	31	1.40620	0.2631
SRM does not Granger Cause RGDP		0.85171	0.4382
MS does not Granger Cause SRM	31	8.52016	0.0014
SRM does not Granger Cause MS		0.19325	0.8254
INTR does not Granger Cause SRM	31	1.12173	0.3410
SRM does not Granger Cause INTR		0.50718	0.6080
INFR does not Granger Cause SRM	31	1.74545	0.1944
SRM does not Granger Cause INFR		0.42201	0.6601
EXR does not Granger Cause SRM	31	0.74846	0.4830
SRM does not Granger Cause EXR		0.18547	0.8318

Source: Extract from E-view 9.0

Pair wise causality tests were run on the model with an optimal lag of 2. The results are presented in Table 4. The researcher's interest here is to establish the direction of causality between the dependent variables the percentage of long term investment and the independent variables. From the model, the study found a unidirectional causality from money supply to manufacturing sector stock return over the periods covered in this study.

Table 5: VAR Lag Order Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
1	-564.2559*	NA	2.73e+09*	38.72619*	40.39146*	39.26903*
2	-510.6251	65.74103	1.10e+09	37.58872	40.91927	38.67439

The result in the table 5showed a probability value greater than 0.05 and so; we cannot reject the null hypothesis which states that there is no serial correlation in the model. From the above, we select lag 1 the appropriate lag length.

Discussion of Findings

The estimated to examine the relationship between arbitrage pricing model and stock market return from the manufacturing sector. The estimated regression results proved that arbitrage pricing model proxies inflation rate, treasury bill rate, money supply, interest rate, real gross domestic product and exchange rate explains 72.2 percent variation in the stock return from the manufacturing sector within the periods covered in this study, this implies that 27.8 percent is explained by factors not captured in the model. The large explained variation confirms the applicability of arbitrage pricing model in the Nigeria financial market. Beta coefficient of the variables justifies that Treasury bill rate have negative and significant relationship with stock market return from the manufacturing sector such that a unit increase can on Treasury bill rate will lead to 2.56 percent decrease on stock market return from the manufacturing sector in Nigeria. The negative relationship found in this study confirms our a-priori expectation as the study expected a negative relationship between Treasury bill rate and stock market return. The positive findings of this study contradict the findings of Adebiyi, and Abeng (2019) that three sector stock returns, namely the NSE30, pension and banking indices, were significantly vulnerable to nominal effective exchange rate and bilateral exchange rates shocks and consistent with the findings of Xie (2011) for the Japanese economy. The findings contradict the findings of Adoo (2016) revealed that Treasury bill rate have weak negative relationship with stock market returns which supported the idea that Treasury bill rate has negative and weak predictive power on the stock return.

Coefficient of the variables justifies that inflation rate have positive and not significant relationship with stock market return from the manufacturing sector such that a unit increase on inflation rate will lead to 0.77 percent increase on stock market return from the manufacturing sector. The positive relationship found in this study contradicts our a-priori expectation as the study expected a negative relationship between inflation rate and stock market return. The positive effect of inflation rate on the stock market return could also be traced to effect of monetary policy on the economy such as contractionary monetary directed toward controlling inflation. the positive effect of inflation on stock market return from the manufacturing sector validates the Fishers Hypothesis. The positive findings of this study confirm the Arowohegbe&Imafidon (2010) that inflation rate, interest rate, money supply, gross domestic product and exchange rate were not significant for explaining earnings per share of the companies under review and confirm the findings of Ayaz, (2014) that in long-run each factor significantly contributed to the stock price while in shot run some factors were significant while some were not but the error correction term showed significant convergence toward equilibrium.

Coefficient of the variables justifies that exchange rate have positive and significant not relationship with stock market return from the manufacturing sector such that a unit increase can on inflation rate will lead to 0.36 percent increase on stock market return from the manufacturing sector. The positive relationship found in this study contradicts our a-priori expectation as the study expected a negative relationship between inflation rate and stock market return. The positive effect of inflation rate on the stock market return could also be traced to effect of monetary policy on the economy such as contractionary monetary directed toward controlling inflation. The positive findings of this study confirm the Arowohegbe&Imafidon (2010) that Inflation rate, Interest rate, money supply, Gross Domestic Product and Exchange rate were not significant for explaining Earnings per share of the Companies under review and confirm the findings of Ayaz, (2014) that in long-run each factor significantly contributed to the stock price while in shot run some factors were significant while some were not but the error correction term showed significant convergence toward equilibrium. The estimated regression results proved that real gross domestic product have negative and no significant relationship with stock market return from the financial sector such that a unit increase can on real gross domestic products will lead to 2.0 percent decrease on stock market return from the manufacturing sector. The negative relationship found in this study confirms our a-priori expectation as the study expected a negative relationship between real gross domestic and stock market return. The negative findings of this study confirm the Arowohegbe&Imafidon (2010) that Inflation rate, Interest rate, money supply, Gross Domestic Product and Exchange rate were not significant for explaining Earnings per share of the Companies under review and confirm the findings of Ayaz, (2014) that in long-run each factor significantly contributed to the stock price while in shot run some factors were significant while some were not but the error correction term showed significant convergence toward equilibrium.

The estimated regression results proved that money supply have negative and significant relationship with stock market return from the manufacturing sector such that a unit increase on money supply will lead to 7.9 percent decrease on stock market return from the manufacturing sector. The negative relationship found in this study confirms our a-priori expectation as the study expected a negative relationship between real gross domestic and stock market return. The negative findings of this study contradict the Arowohegbe&Imafidon (2010) that Inflation rate, interest rate, money supply, Gross Domestic Product and Exchange rate were not significant for explaining earnings per share of the Companies under review and confirm the findings of Ayaz, (2014) that in long-run each factor significantly contributed to the stock price while in shot run some factors were significant while some were not but the error correction term showed significant convergence toward equilibrium. The estimated regression results proved that interest rate have negative and significant relationship with stock market return from the financial sector such that a unit increase on interest rate will lead to 1.9 percent decrease on stock market return from the manufacturing sector. The negative relationship found in this study confirms our a-priori expectation as the study expected a negative relationship between interest rate and stock market return. The negative findings of this study confirm the Budonyefa (2020) found that investment performance for the Nigerian Capital market does not toe the line of the objectives of the Arbitrage Pricing Theory as the selected macroeconomic risk factors not strongly explain investment performance. Isenmila and Erah (2012) that though the arbitrage pricing theory macroeconomic variables can explain stock returns, not all the variables are significant both in the long run and in the short run. Iwegbu and Adeoye (2020) that stocks do not hedge over inflation as expectations built up by agents in the economy affects stock returns.

Conclusion

The study was formulated to examine the relationship between arbitrage pricing model and manufacturing sector stock return from 1987-2019.From the, the vector error correction model (VECM) result shows that R^2 = 72.2 percent which indicates a good fit with an F- statistic value of 10.75931 and a probability value of

0.000005 and the error correction term. This was further analyzed by a Parsimonious. ECM was appropriately signed and statistically significant with a probability value of 0.0006 in the model.From the model the study conclude that Treasury bill rate, inflation rate and exchange rate have positive relationship on the manufacturing sector stock return. The study concludes that the variables were stationary at first difference and integrated in the order of 1(1). Findings of the study further conclude that the variables are linearly co-integrated while there were causal relationships among the variables in the estimated model.

Recommendations

i. Interest rate management and reactions to the stock market return should be factored into the management and transmission of monetary policy in Nigeria. In this case, the regulatory authorities, the monetary policy committee and operators of the capital market should strengthening the design and implementation of the objective of the interest rate variation with the operational objective of the capital market investment.

ii. Efforts should be made by government to ensure appropriate policy mix to ensure harmony and enhancing coordination in economic and financial policies in view of the observed nexus between arbitrage pricing model and sectorial stock market return in Nigeria.

iii. Nigeria stock market institutions and the involvements are marginally functioning compared with other countries; this will discourage both domestic and foreign portfolio investment into the stock market for increase performance. Therefore, there is need to consolidate the capital market institution through recapitalization, management reforms in asset structure and institutionalization of corporate governance.

REFERENCES

Akani, H. W &Imegi, J. C. (2017). Monetary policy transmission mechanism and liquidity of capital market: A time series study from Nigeria: 1981-2016. *IOSR Journal of Economics and Finance (IOSR-JEF , 8(5), 01-24.*

Anyamaobi, C. (2018).Monetary policy and the performance of Nigeria capital market: a time variant analysi**s.***European Journal of Accounting, Auditing and Finance Research, 6(6), 22-43.*

Arewa, A. &Nwakanma, P. C. (2013).An empirical test of factor likelihood arbitrage pricing theory in Nigeria.*European Journal of Accounting, Auditing and Finance Research,* 1(4):95-114.

Fama, E. (1965). Random walk in stock market prices.*Financial Analysis Journal*, 5: 135-150.

Fama, E. F. (1970). Efficient capital markets: A review of theory and empirical work. *The Journal of Finance*, 25(2): 383-417.

Gilles, C. & Leroy, S. F. (1990). Co-integration for market forecast in the Spanish stock market. *Applied Economics*, 34: 843-857.

Gilles, C.&LeRoy,S. F. (1990). The arbitrage pricing theory: A geometric interpretation, Working paper, (Carleton University, Ottawa, Ontario).

Groenewold, N., & Fraser, P. (1997). Share prices and microeconomic factors. *Journal of Business Finance and Accounting*, 24(9), 1367-1381.

Isenmila, P. A. &Erah, D. O. (2012). Share Prices and Macroeconomic Factors: A Test of the Arbitrage Pricing Theory in the Nigerian Stock Market. *European Journal of Business and Management, 4(15), 66-76.*

Khudoykulov, K. (2017). The analysis of the arbitrage pricing model on the stock return: a case of Athens stock market. *American Journal of Finance and Accounting*, 5(1),.51-63.

Lintner, J. (1965). The valuation of risky assets and the selection of risky portfolio in stock portfolios and capital budgets. *Review of Economics and Statistics, 47(1), 13-37.*

Long, J. (1974). Stock prices, inflation and the term structure of interest rates. *Journal of Financial Economics, 1(2), 131-170.*

Mohammad, B. A. (2019). Impact of micro and macroeconomic variables on emerging stock market return: A case of Dhaka Stock Exchange (DSE). *Interdisciplinary Journal of Research in Business*, 1(5): 8-16

Morel, M. (2001). Stock selection using a multifactor model: Empirical evidence from the French stock market. *The European Journal of Finance*, 7(4), 312-320.

Mpohamba, B. (1955). Financial markets in development, and the development of financial markets. *Journal of Economic Dynamics and Control*, 21, 141-181.

Oyetayo, O. &Adeyeye P. (2017). The robust application of the Arbitrage Pricing Theory : Evidence from Nigeria. *Journal of Economics and Behavioural Studies*, 9(1), 141-151.

Radulescu, A.& Daniel, T. P. (2014). An econometric model for estimating the equity risk premium.*Procedia Economics and Finance,* 10: 185-189.

Ross, S. (1973). The Economic Theory of Agency: The Principal's Problem. *American Economic Review*, 63(2), 134-39.

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

Ross, S. A. (1976b). *Risk, return and arbitrage. In risk and return in finance*, Edited by I. Friend and J. L. Bicksler (Cambridge, Mass; Ballinger), 189-218.

Rubinstein, M. (1976).The valuation of certain income streams and the pricing of options.*Bell journal of Economics, 7(2), 407-425.*

Sharpe, W.F. (1964). Capital asset prices: A theory of market equilibrium under conditions of risk. *Journal of Finance*, 19, 425-442.

Torbira, L. &Agbam, A. (2017). Macroeconomic Risk Factors and stock Returns: The Arbitrage Pricing Approach. *Journal of Finance, Banking and Investment*, 4(l), 1596 – 9061.

Treynor, J. (1966). How to rate management investment funds.*Harvard Business Review*, 43(1), 63-75.

Umoru, D. &Iweriebo S. (2017), Econometrics test of Arbitrage Pricing and its Volatility in the Nigerian Equities Market. *CARD International Journal of Management Studies, Business & Entrepreneurship Research*, 2(2), 2545-5885,

Uwubanmwen, A. &Obayagbona, J. (2012).Tests of the Arbitrage Pricing Theory using macroeconomic variables in the Nigerian Stock Market.*Ethiopian Journal of Economics*, 24(1), 40-60.

Uwubanmwen, A. &Obayagbona, J. (2012).Tests of the Arbitrage Pricing Theory using macroeconomic variables in the Nigerian Stock Market.*Ethiopian Journal of Economics*, 24(1), 40-60.

Zhou, C. (1996). Stock Market Fluctuations and the Term Structure, Board of Governors of the Federal Reserve System.*Finance and Economics Discussion Series*, 96/03

Zubair, A. (2013). Causal relationship between stock market index and exchange rate: Evidence from Nigeria. *CBN Journal of Applied Statistics*, 4(2), 87-110.