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Original Article

Transmission Mechanisms and Investment Funds Flow in Competing Financial Markets: Evidence from Developed and Emerging Markets

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Abstract: *This paper examines transmission mechanisms and the flow of investment funds in competing financial markets from 2000 to 2019 using multiple Least Square regression model, Sharpe's Capital Asset Price Model and Fama (1970) Return Decomposition model and the findings attest that interest rate on fixed-income securities (especially, on treasury bills) had a high degree of influencing equity prices in the USA, South Africa, and Nigeria financial markets. The nexus between interest on fixed-income securities and the rate of return on equity is inverse in the USA, South Africa, and Nigeria. Nigeria recorded the highest sovereign risk with the consequential higher interest rate on Government fixed-income securities. South Africa recorded the highest equity return of 9.40% and lowest interest on fixed-income securities by the USA (1.73%) as Nigeria paid the highest interest on fixed-income securities (11.05%). While Nigerian equity was less attractive to rational risk-averse investors from its negative market risk premium of -2.89%, the USA equity market was more attractive to risk-loving investors from a 2.34% risk premium. Overall, the USA equity market was more inducive to fund flow as against the Nigerian equity market. Conversely, Nigeria's fixed-income securities attracted more fund flow than the USA's. However, South Africa maintained balance returns on both equity and fixed-income securities and both attractive to fund flows.*

Keywords: *Fixed-Income Securities, Rate of Return on Equity, Interest on Deposits, Risk-Adjusted Return, Risk-Free Rate, and External Debts.*
JEF Classifications Codes: G11, G12, G14, G41

I. INTRODUCTION

A few developed and emerging nations have studied the factors that affect how investment capital move among rival financial markets, with mixed results. It's interesting to note that the movement of investment funds between the rival fixed-income and equities markets is heavily influenced by borrowing costs and equity returns. Investment is a capital asset that accords the holder the rights to series of prospective returns (Carver, 1913). The rate of interest on debt instruments and the rate of return on stocks must act disproportionally in order to encourage investment fund flow between rival markets. Transmission channels have the tendency of influencing asset prices. Mishkin (1995) divided transmission mechanisms into the so-called credit channel, other asset price effects, exchange rate effects, and interest rate effects. The channel by which interest rates impact asset prices is the most direct one (Horngren, 1995). Other asset price effects include equity returns which are made up of capital gain and dividend yield. Price stability is one of the goals of monetary policy in established and emerging markets. The transmission channels are dynamic as opposed to static. The monetary authorities control the flow of money into and out of the money market using a variety of instruments, including the cash reserve ratio, liquidity ratio, loan-to-deposit ratio, interest rate, and exchange rate.

Thus, the nexus between interest rates on debt securities and bank deposits as well as return on equities and their unique risk characteristics are the possible determinants of investment funds flow between equity and fixed-income security markets. Interest rates tend to induce the flow of investment funds between equity and fixed-income security markets Mishkin (1995). A higher interest rate induces the inflow of funds into the money market and vice versa (Zhou, 1996; Lee, 1997; Jefferis & Okeahalam, 2000). The discounted value of a stock's predicted cash flow streams determines the stock's price. The stock price is negatively correlated with the interest rate and directly correlated with predicted cash flow (Hu, 2015). Rising rates mean a higher risk-free rate and lower risk premium. Rising rates translate into investors preferring less volatile fixed-income securities over unpredicted equity returns. When employed as a stand-in for the risk-free rate in Sharpe's (1964) Capital Asset Pricing Model, a raised interest rate is thus investment disincentive and elastic, with a subsequent decrease on risk premium.

The influence of interest rates on investment funds flow can be interpreted as the effect of the costs of borrowing on the stock market performance by the various economic units especially in Nigeria relative to other economies: United States of America (USA), and South Africa (SA). In Nigeria, the borrowers include Federal and State Governments and Deposit Money Banks (DMBs), while equity investors cut across the various economic units. The debts instruments consist of Treasury Bills, Treasury Bonds, Federal Government of Nigeria (FGN) Bond, FGN Sukuk Bond, FGN Savings Bond, Development Stocks, Green Bond, Promissory Notes, and external debts issued by the FGN; State Government Bonds and external debts; and DMBs' Deposits. The debts and fixed deposits are characterized by different interest rates, tenors, ranging from one month to 30 years.

Federal Government borrows from the public to finance her budget deficits from two sources: domestic and foreign through the selling of bonds and treasury bills instruments. The external debts come from multilateral, bilateral, Commercial loans, Non-Paris Bilateral, Non-Paris Commercial, Eurobonds, Oil warrants, and others. Conversely, the Deposit Money Banks (DMBs) also accept deposits from the public into savings, fixed deposit accounts amongst others at a cost. These fixed instruments are risk-free.

Since Sharpe (1964) in his CAPM demystified stock returns into a risk-free rate and risk premium, the risk-free rate is crucial to comparing the performance of the equity market in finance. Relying on Tobin's (1958) Separation theory of investors' risk preferences; a risk-averse investor has zero betas and would not like to take additional risk. Conversely, a risk-seeking investor loves to take additional risk as long as the market will compensate him for the risk-taking via risk premium. The discrepancy between portfolio or market returns and the risk-free rate is the risk premium. This premium is a reflection of equities investors' general risk aversion, liquidity risk, and credit risk (Codogno, Favero, & Missale 2003).

The holders of government debt instruments, bank depositors, and equity investors are usually attracted by higher interest on their holding instruments (TBs, Bonds, equities, and bank deposit accounts). In Nigeria, the coupon on TBs peaked at 15% per annum in October 2011 (CBN Statistical Bulletin, 2012). The average cost of TBs in the past ten years stands at 9.77% per annum. The rates were virtually impossible to obtain in the Nigerian equity market post-global financial crises of 2008. The attractive interest in government securities coupled with their risk-free characteristics have won the confidence of risk-averse investors, promotes the fixed-income securities market that ushered in the Financial Markets Dealers Quotations (FMDQ) exchanges with capitalization (N13.125trillion) above the equity market as of August 21, 2020. FMDQ operates the largest Exchange in Nigeria, with an annual market turnover of $643 billion over the last six years (FMDQ, 2020). Since it's impossible to obtain such a risk-free rate in the equity market, investors have decided to patronize the fixed-income securities market. Investors operating in the equity market are being regarded as irrational investors (Omokehinde, 2020) because the market premium was negative due to the higher risk-free rate over the equity returns. Investing in equity is risky and it's expected that investors should be compensated for taking an additional risk over the risk-free rate. The beta of risk-free securities such as TBs, Federal government bonds is zero whereas it is not zero for equities. The beta of aggressive security could be above 1.0 and less than zero for a defensive stock. Thus, the interest rate is an important determinant of the flow of funds between the fixed income and the equity markets. Less money is available for the equities market and more money is available for the debt market where interest rates are higher.

Therefore, the establishment of the FMDQ market and the high cost of government borrowings that snowballed into a negative risk premium might have accounted for the risk averseness of investors in the Nigerian financial markets. This negative risk premium has influenced investment decisions on the fund managers, pension funds, and institutional investors in Nigeria. In the Mutual funds market, over 80% of the N1.2 trillion capitalization was invested in fixed income securities. Likewise, in the Pension market, more than 90% of the funds invested in fixed income securities. More specifically, 72.05% of the N10.2 trillion net asset value of pension funds was invested in Federal government securities as of 31st December 2019. The capitalization of the equity market stood at N12.0trillion in December 2019 relative to N18.0trillion of the FMDQ market (FMDQ, 2020). Other funds like Employee compensation funds also invested a large proportion in fixed income securities. The banks with higher credit risk relative to the government, obtained foreign loans at lower rates for onward lending to the government, thereby increasing credit to the government more in value than credit to the private sector. Investors from diasporas also took advantage of the higher interests paid on government securities.

This study helps explain the resource allocative power of interest rate by influencing investors' decisions and the need to minimize the cost of government borrowings, maximize returns on investment of the respective investors; establishes any positive/negative relationships between interest rates and equity returns. Particularly, the findings of the study are meant to provide a guide to fund managers, portfolio/asset managers, and pension funds administrators in constructing security portfolios with a view to maximizing returns. It is expected that lower interest rates will foster risk premium and induce fund flow to the equity market. Borrowing at lower rates stimulates the economy through increased investment and capital

formation. The study also helps explain the causes of the flow of funds between the equity and fixed income security markets. It also evaluates the rationality of investors operating in both markets.

Examining the impact of Transmission Mechanism and Investment Funds Flow in competitive financial markets is the study's main goal. Specifically, it evaluates the relationship between the sovereign risks of the nations and the rate of returns on their investment outlets, examines if the cost of government borrowing is a disincentive to equity investing in Nigeria; investigates the significant effect of interest rate transmission mechanism as a good determinant of investment funds flow between equity and fixed-income security markets; to evaluate the extent to which interest rate transmission mechanism determines the choice of government borrowing between domestic and foreign debts; to determine the extent to which interest rates on fixed-income securities have a significant effect on equity performance; and the extent to which return decomposition explains risk preference of equity and risk-averse investors.

II. THEORETICAL LITERATURE

A) Classical theory of interest rate

The traditional school of thought founded on Marshall's Principles of Economics from 1890 proposed that the interest rate is the cost associated with using capital in any market. According to Cassel's Nature and Necessity of Interest from 1903, investing creates a need for waiting while saving creates a supply of waiting. The classical economists led by Fisher (1930) believed that the interest rate was the main factor that determined whether saves and investments increased or decreased in response to changes in the money supply. The formula used to calculate the current values of all costs and returns necessary for equilibrium is Fisher's (1930) rate of return over cost. He clarified that a comparison between the rate of return over cost and the interest rate determines the amount of investment in any direction. Fisher (1930) asserts that the rate of return over cost must be higher than the rate of interest in order to encourage fresh investment. The classical theory is based on some fundamental assumptions such as the existence of perfect competition, full employment, laissez-faire, the operation of Say's Law, and the Quantity Theory where wages, prices, and interest rates are characterized by flexibility. The Great Depression of the 1930s contributed to the classical theory's demise.

B) Keynesian Theory of Interest rate

In his General Theory of Employment, Interest, and Money published in 1936, Keynes divided the demand for money into three categories: transactions, precautionary spending, and speculative spending. He also proposed that investment is a direct function of income and a negative function of interest rates. The supply and demand of money influence the interest rate. According to Keynes, a premium must be provided to persuade people to invest their money in bonds or other marketable assets as opposed to savings. The interest rate provided to cash holders will increase in direct proportion to the liquidity preference. According to Keynes, the precautionary and transactional incentives are largely income elastic but rather interest-inelastic. The Keynes theory was criticized as unemployment and inflation began to rise higher in a phenomenon called "stagflation"

C) Modern Portfolio Theory

According to Markowitz's Modern Portfolio Theory (1952, 1959), risk-averse investors can build portfolios to maximise expected returns depending on a specific amount of risk. To assess portfolio anticipated return, risk, and covariance, he used statistical techniques of central tendency (expected returns) and dispersions (variance). Also, the idea discovered a favourable correlation between risk and return. Markowitz (1959) first proposed the idea of diversification by raising the number of assets in a portfolio in order to lower portfolio risk and increase returns. Using the covariance, correlation coefficient, and coefficient of determination, the assets in the portfolio were statistically chosen. The Markowitz Theory is also known as Portfolio Selection Theory, applying correlation statistical methods to select assets with negative covariance or correlation to reduce portfolio risk. Markowitz's theory is a mean-variance asset pricing model using the graphical method of efficient frontiers to relate expected return and risk of assets in a portfolio; named as Capital Market Line and Security Market Line.

Tobin's (1958) Separation theorem demystifies investors' portfolio choice restriction by splitting the portfolio choice into two, furthering the Markowitz theory. First, based on the investors' attitude towards risk, choose the best combination of risky securities (efficient portfolio) and then decide whether to lend or borrow. Finding the ideal percentage to invest in an effective portfolio of risky and risk-free assets is the second step. An effective frontier for risky and risk-free assets was supported by Tobin's Separation Theorem. According to Tobin's theory, some portfolios can accomplish this combination of mean and standard deviation for any point on the frontier, and no other portfolio can do the same for either the same mean or a lower standard deviation. On this basis, investors were classified into three, relative to their risk preference: risk-averse, risk-neutral, and risk-lover.

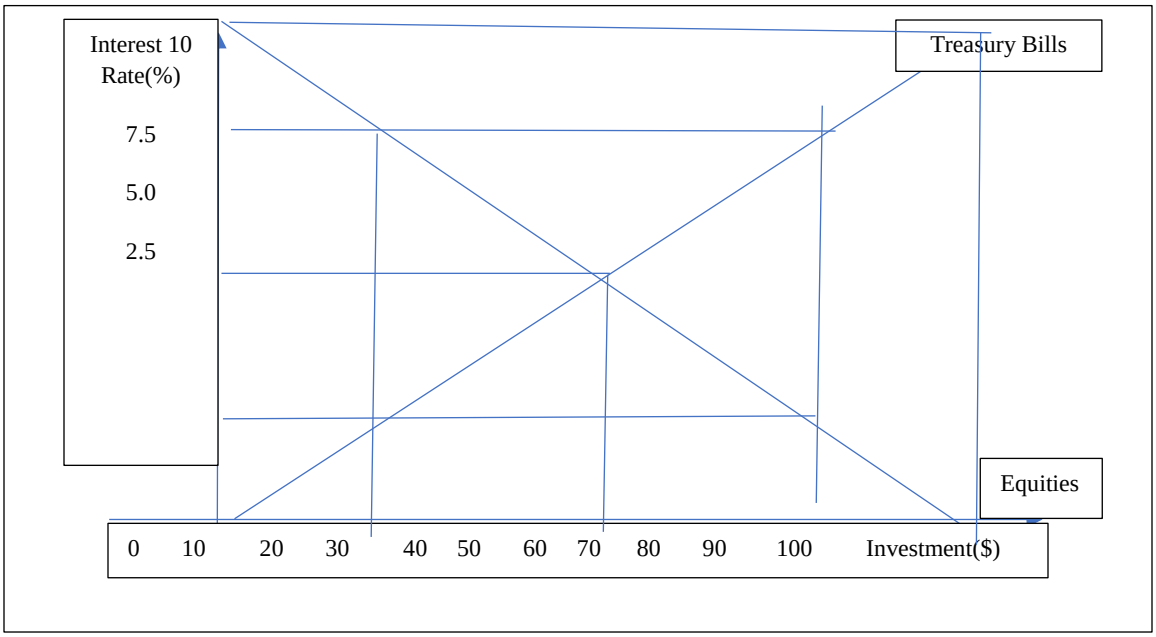
D) Capital Assets Pricing Model (CAPM)

Sharpe, however, extended Markowitz's theory of portfolio selection, particularly his understanding of the risk component of assets in a portfolio, in his 1964 work "Capital Asset Prices: A Theory of Market Equilibrium under Conditions of Risk." The mean-variance equilibrium single-index factor model is another name for Sharpe's (1964) CAPM. Systematic and unsystematic hazards, which he referred to as "non-diversifiable" and "diversifiable," respectively, make up the total risk. Sharpe promotes the use of an effective portfolio to reduce residual or company-specific risk through diversification. A variation in a stock's movement that is not connected to the movement of the market index is known as unsystematic risk. Labor unrest, a stock-out situation, or management shortcomings could all be at blame. The performance of investments may be impacted by systematic risk resulting from macroeconomic factors including inflation, interest rates, currency rates, and gross domestic product. The rate of return on equity calculated using Sharpe's CAPM therefore equals both risk-free and risk premium. As a stand-in for a risk-free rate, Treasury Bill interest is paid. The beta of a risk-averse investor is often zero. However, the beta for a risk-seeking investor is above 1.0, signifying that a rational investor must be compensated for taking additional risk.

E) Efficient Market Hypothesis

Fama (1970) propounded the theory of efficient market hypothesis by testing the response of prices to information under the underlying assumptions of a perfect market, symmetric information, normal distribution of information, investors' rationality, the homogeneous expectation of the probability distribution of returns, zero mean and variance of error term of one with tax-free transaction costs. Strong-form, semi-strong-form, and weak-form market efficiency were the three categories into which Fama's market efficiency was measured. One macroeconomic factor that might affect the pricing of securities is the interest rate. A higher interest rate induces investment in fixed income securities and increases divestment in equities.

Fig.1: Interest rate and Investment in Treasury Bills and Equity



Author, 2021: Theoretical Framework of the investment relationship between fixed income securities and equities

III. EMPIRICAL EVIDENCE

There is conflicting empirical evidence regarding how the transmission of interest rates affects the allocation of investment capital between fixed-income and stock markets. The central bank's primary tool for monetary transactions and price stability under the fundamental Keynesian model is the interest rate transmission mechanism. Interest rates have a direct impact on both the cost of lending and the cash flows of both creditors and debtors (Beblvy 2007). Numerous economists have noted that the wealth effect channel, which has an impact on consumption, and the balance sheet channel, which has an impact on investment spending, are the two ways in which monetary policy affects stock prices. These economists include Bernanke, Gertler, and Gilchrist (1996), Bernanke and Gertler (1999), and Goodhart and Hofmann (2000). The two key economic factors that have the biggest effects on common stock are interest rates and foreign currency rates (Vaz et al., 2008). In contrast, the interest rate has a more immediate impact on the financial market since it instantly transfers momentum from the capital market to the money market when interest rates fluctuate. Nonetheless, because of the inverse relationship between interest rate

changes and stock prices, stocks are sensitive to fluctuations in interest rates (Alam, Uddin 2009). In addition, Taylor (1995) claimed in his research that the interest rate channel of monetary transmission is a crucial part of how the impacts of monetary policy are passed on to the economy. He noted that there is a substantial interest rate channel of monetary transmission since there are strong interest rate effects on consumer and investment expenditure. A central bank should alter the interest rate in reaction to changes in inflation, output, or other economic variables, according to the Taylor rule, a well-known monetary policy rule.

Keynesian proposed that investment is an indirect function of interest rate in his dissertation on liquidity preference theory. The interest rate is a direct consequence of savings according to Fisher's Quantity Theory of Money. According to the inflationary theory, interest rates rise in direct proportion to the amount of money needed to cover the budget deficit. Using an event-study developed by Campbell and Ammer, Bernanke and Kuttner (2005) examine the impact of changes in monetary policy on equities prices. According to the study, broad market indexes typically improve by around 1% for every hypothetical, unanticipated 25-basis-point decrease in the Federal funds rate goal. Using Johansen's Multivariate Cointegration Model, Addo & Sunzuoye (2013) examine how the rate of Treasury Bills and the interest rate affect stock market returns in Ghana. The analysis demonstrated a long-run link and cointegration between the variables, showing a negative but not statistically significant association between the interest rate and stock returns. Based on monthly data from January 1988 to March 2003, Mahmudul & Gazi (2009) empirically examine the relationship between stock index and interest rate for fifteen developed and developing countries. They find that interest rates have a significant negative relationship with share prices, and that changes in interest rates have a significant negative relationship with changes in share prices for six of the countries. In order to assess the stability of the series and the long-run relationship, Cengiz Toraman and Çağatay Başarir (2014) first applied the unit root method and the Johansen Co-integration test to the Turkish stock market capitalization rate and interest rates for the period 1998–2012. The findings demonstrated a non-stationarity and long-term link between the interest rate and stock market capitalisation rate. With the help of the Unit Root Test, Cointegration Test, Vector Auto-Correction Model (VECM), Granger-Causality Test, and Impulse Response Functions (IRF), Asankha Pallegedara (2012) examines the dynamic relationships between stock market performance and interest rates in Sri Lanka from June 2004 to April 2011. The results showed that while there is no causal association in the short run, stock market performance is negatively associated with interest rates in the long run. Regression analysis is used by Ologunde, Elumilade, and Asaolu (2006) to analyse the correlation between interest rates and stock market capitalization rates using time series data from the Central Bank of Nigeria (CBN) and Nigeria Stock Exchange (NSE). The findings indicated that the stock market capitalization rate is positively impacted by the current interest rate. Government development stock rate and the current interest rate have a negative impact on stock market capitalization rate and government development stock rate, respectively. The study also showed that information is crucial to the growth of the capital market. Using a multiple linear regression model and a simple regression model, Khrawish, H. A., Siam, and Mohammad (2010) investigate the impact of interest rates on the stock market capitalization rate at the Amman Stock Exchange from 1999 to 2008. The results of the time-series analysis showed that there is a considerable and favourable correlation between the current government interest rate and the capitalization rate of the stock market. The study also demonstrates that the government's development stock rate has a detrimental effect on stock market capitalization rates, and it discovers a strong negative correlation between the government's development stock rate and current interest rates. Using Co-integration, Vector Error Correction, Impulse Response Function, variance decomposition, and Granger Causality techniques, Muktadir-Al-Mukit, D. (2013) examines the impact of interest rates on stock market performance in Bangladesh from 1991 to 2012. A steady and significant long-term association between the two variables is found by the study. While the result of variance decompositions suggests that stock market returns are largely independent of the other variables in the system and Granger causality analysis suggests the existence of unidirectional causality from interest rate to market index, the Impulse Response Function establishes a negative relationship between the variables. Using daily data from January 1994 through February 2000, Luis Eduardo Arango, Andrés González, and Carlos Esteban Posada (2002) investigate the connection between equities returns and interest rates in the Colombian stock market. The results show some indications of a nonlinear and inverse relationship between the variables and depict the stylised fact of significant return reliance over brief time periods. The research discovered evidence of a non-constant equity premium and refuted the efficiency of the Colombian stock market. Using the Duration and Convexity model with annual secondary data that covered the 1981–2006 sample period, Udebhunam, R. I., and Oaikhenan, H. E. (2012) investigate how stock prices in the Nigerian Stock Market respond to interest rate risk. The findings offer empirical confirmation of the presence of a non-linear relationship between the variables, according to the duration and convexity hypothesis. The results demonstrate that interest rates are sensitive to stock prices and that both measures of interest rate length and convexity have significant but opposing influences on Nigerian stock prices. The empirical data demonstrates that interest rate fluctuations have a net negative impact on stock values, which suggests that stock prices decline as stock risk increases. In order to determine how changes in interest rates (represented by the weighted average lending rate by Kenyan commercial banks) and stock prices (proxied by the NSE 20 share index) are related to one another for Kenya over the period of October 2002 to September 2012, Chirchir, D. (2014) investigated the relationship between Share

Prices and Interest Rates: Evidence from Kenya. The Toda Yamamoto approach [1] was utilised in the study to ascertain the connection between stock prices and interest rates. This approach can be used regardless of " whether the Vector Auto Regression (VAR) is stationary (centred around a deterministic trend), integrated, or cointegrated with an arbitrary order" [1] The findings showed that there is no meaningful causal connection between the interest rate and the share price. Positive and negative causation are both possible in terms of the sign of the relationship. The combined effects of interest rates and Treasury bill rates on stock market returns on the Egyptian Stock Exchange between November 2004 and November 2017 are examined by Abdelmonem Lotfy Mohamed Kamal (2018). The findings indicated a negative correlation between Treasury bill rates, interest rates, and returns on the Egyptian stock market. The econometric research additionally revealed co-integration between these three variables, indicating the existence of a long-term relationship.

IV. DATA AND METHODOLOGY

A variety of statistical tests are used in the study, starting with an ex-post facto research design based on time series data from the Nigerian Stock Exchange, the Central Bank of Nigeria statistical bulletins, the Debt Management Office, and FMDQ Daily Quotation List from 2000 to 2019. Across the border data from the Office of Debt Management, USA Department of Treasury, Yahoo Finance, African Stock Exchanges Securities Association email, and Johannesburg Stock Exchange web site. The datasets consist of treasury yields as a surrogate for the risk-free rate, and Nigerian Stock Exchange All-Share Index, Dow Jones Industrial Average (DJIA), and Johannesburg Stock Exchange All-Share Index (JSEALSH). The paper also uses descriptive statistics design to test the statistical behavior of the historical quarterly data sets such as mean, median, maximum, minimum, variance, standard deviation, skewness, and kurtosis considered for first, second, to fourth moments and unobserved metrics: beta, covariance, correlation coefficient, and R-Squared as the bedrocks for computing the CAPM, Jensen Alpha, systematic risk, unsystematic risk, risk premium, Treynor, Sharpe, and Jensen ratios. The study also used a correlation matrix to determine the presence of multicollinearity in the datasets. The CAPM specification proposed by Sharpe-Lintner (1964), which has been demonstrated to be one of the most widely used techniques to model the cost of government borrowing on equity returns from the perspectives of the market, industry, and individual company with more emphasis on their risk premium that reflects the credit risk, liquidity risk, and general risk aversion in the market at a given time, was also taken into consideration in the paper. The study also used the Treynor (1965), Sharpe (1964), and Jensen (1968) risk-adjusted portfolio performance indicators to determine whether or not equities have experienced their greatest days when treasury yields are rising or dropping.

A) Data

The dataset for the study is quarterly market indexes, and fixed income securities rates for both short and long-term, and interests on DMBs deposits. Some of the websites of the sources of data are ***www.nse.com.ng*** for The Nigerian Stock Exchange; ***www.cbn.gov.ng*** for Nigerian TBs and other fixed-income securities and DMBs interest rates; ***www.treasury.gov*** for USA TBs and Bonds; and ***www.jse.co.za*** for Johannesburg Stock Exchange Index. The indices are broad-based, constructed by the various Stock Exchanges to satisfy the diversities in the risk-return preference of the public investors. Finally, an expanded regression analysis was used to estimate the effect of cost of borrowings on equity returns in Nigeria, the USA, and South Africa using the quarterly cost of borrowings such as the weighted average interest rate on treasury bills of 91, 182, and 364 days; Weighted average interest rate on FGN Bonds; External Debt Rate; and Weighted interest rates on Deposit Money Banks from 2000 Q1 to 2019 Q4. In order to encourage investment capital flow in the competitive fixed-income and equities markets, the study also applied several statistical tests to assess the relationship between interest rate and equity return.

B) Model Specification

The natural log difference of data from NSE is taken to obtain the equity daily returns using Excel. The daily return is multiplied by 21 to obtain a monthly return and further multiply by 12 to obtain average annual returns for the market and the selected indices. Next, a descriptive application of the econometric programmes is used using EViews 10.0 to estimate the mean, variance, kurtosis, and skewness. The package was also used to estimate the normality, linearity, covariance, correlation, and heteroskedastic of the indices returns diagnostically. The market and sector index returns were related to the treasury bills rate to obtain the risk premium.

a. Estimating Quarterly Returns:

The natural log difference for the market index and NSE Indices, as provided by equations (1) and (2), is used to determine the quarterly ex-post returns.

$$R_t = ln\left(\frac{Index_t}{Index_{t-1}}\right) * 100 \ \ldots\ldots\ldots\ldots (1)$$

where R_t is the natural log historical quarterly returns on Equity Indices of USA, South Africa, and Nigeria; and interest income on the short and long-term fixed-income securities (TBs, Bond, External Debts, Domestic Debts) for USA, South

Africa, and Nigeria at time *t*, where *t* = 1, …, *N;* in which *N* is the sample size (80 quarters) from 2000 to 2019. The equivalent annual return is given by equation 2 as:

$$\underline{R}_t = \sum_{t=1}^{n} \frac{R_t}{N} * 4 \ldots\ldots (2)$$

b. Estimating Quarterly Variances:

The variance of the indices and the fixed income securities as given by equation (3):

$$\sigma_t^2 = \sum_{i=1}^{N} \left(R_t - \underline{\bar{R}}_t\right)^2 \ldots\ldots (3)$$

1. Beta:

However, the equity market risk and the risk of the fixed income securities is measured by beta (β_t) as indicated in equations (4) Beta as market variance is obtained by dividing the covariance of the funds and the market return ($COVR_iR_m$) per market variance (σ_m^2).

$$\beta_{it} = \frac{COVR_iR_j}{\sigma_j^2} \ldots (4)$$

2. **The Covariance** as given by equation 5.

$$COVR_iR_j = \rho_{ij}\sigma_i\sigma_j \ldots (5)$$

Equation (5) is equally written as:

$$COV_{ijt} = \frac{1}{N}\sum_{i=1}^{N}\left[R_{it} - \underline{\bar{R}}_{it}\right]\left[R_{jt} - \underline{\bar{R}}_{jt}\right] \ldots\ldots\ldots (6)$$

c. Performance Evaluation Measures:

Further performance evaluation indicators, in addition to the indices of equity risk and return and fixed income securities mentioned above, include as follows:

- Sharpe CAPM
- Jensen Alpha
- Fama's decomposition measure
- Treynor measure
- Sharpe Ratio

1. Sharpe CAPM:

However, the official specifications of Sharpe's (1964) CAPM model of ex-post return are as follows:

$$R_{it} = R_f + \beta_i\left((R_{mt}) - R_f\right) \ldots\ldots\ldots (7)$$

2. Jensen Alpha Measure:

Mathematically speaking, Alpha is the rate at which portfolio return exceeds CAPM as given by equations (13)

$$\alpha_{pt} = R_{pt} - [R_f) + \beta_i\left((R_{mt}) - R_f\right)] \ldots\ldots (8)$$

Where:

$\alpha_{pt} = alpha\ return\ on\ fund\ portfolios\ at\ time\ t$

$R_{pt} =$ Return on fund portfolios at time *t*

$\beta_{i,}R_{mt}, and\ R_f$ as previously defined

3. Fama's Return Decomposition Measure:

When describing the components accounting for the portfolios' total returns, Fama expanded Sharpe's CAPM by include residual risk and net selectivity risk elements. In other words, the Nigerian stock market's net selectivity and residual risk are too significant to be ignored, and as a result, the Fama return is broken down into four components:

$$\begin{bmatrix} i. Risk - free\ Return = (Rf) \\ ii. Compensation\ for\ systematic\ risk = \ \beta_i\left((R_{mt}) - R_f\right) \\ iii. Compensation\ for\ inadequate\ diversification = \left[R_m - R_f\right]\left[\frac{\sigma_p}{\sigma_m - \beta}\right] \\ iv. Net\ selectivity = \left(R_p - R_f\right) - \left(\sigma_p - \sigma_m\right)\left(R_m - R_f\right) \end{bmatrix} \ldots\ldots\ldots(9)$$

4. Treynor Ratio:

The reward-to-volatility ratio, often known as the Treynor Measure, is defined as follows:

$$T = \frac{\left[R_P - R_f\right]}{\beta_v} \ldots\ldots\ldots(10)$$

5. Sharpe Ratio:

The risk-adjusted performance per standard deviation of the portfolio is expressed as follows using the Sharpe measure, often known as the reward to variability ratio:

$$S = \frac{\left[R_P - R_f\right]}{\sigma_v} \ldots\ldots\ldots(11)$$

d. Multiple Regression of the effect of the cost of borrowings on equity returns as follows:

$$R_{mi,t} = \alpha_i + \beta_1 TBs_t + \beta_2 EXTDBT_t + \beta_3 FGNBND_t + \beta_4 DMBs_t + \beta_5 TDB_t + \beta_6 ATBR_t + \varepsilon_t$$

$$R_{pi,t} = \alpha_i + \beta_1 TBs_t + \beta_2 EXTDBT_t + \beta_3 FGNBND_t + \beta_4 DMBs_t + \beta_5 TDB_t + \beta_6 ATBR_t + \varepsilon_t$$

where:

R_{imt} = Market return on equity **i** at time **t**
R_{ipt} = Return on equity portfolio **i** at time **t**
α_i = Intercept of the regression of asset i
β_1 = The coefficients of the regression of the exploratory variables $\beta_1 \ldots \beta_6$
TBs_t = Treasury Bills Rate
$EXTDBT_t$ = External Debts Service Rate
$FGNBND_t$ = Federal Government Bonds Rate
$DMBs_t$ = Weighted average interest on deposits by Deposit Money Banks
TDB_t = Total Domestic Debt Service Rate
$ATBR_t$ = Weighted Average Treasury Bills Rate
ε_t = Error Term

Weighted average treasury bills rate is made up of the average interest rates on 91-day, 182-day, and 364-day treasury bills; Weighted average interest rate on DMBs consists of interest payments on Savings Account, 7-day call deposit, 1-month, 3-month, 6-month, 12-month, and over 1-year deposits accounts; External debt service rate includes principal, principal deferred, interest/Service fee, penalty charge, credit waiver, deferred interest, commitment charges, and others; and Total Domestic debt service rate include interest rates on Treasury bills, Treasury bond, and Interest on FGN and State & FCT bonds.

V. EMPIRICAL RESULTS

The datasets for the study (Appendix I) described details of the comparative analysis of the interest rates transmission mechanism on investment fund flows in Nigeria, USA, and South Africa financial markets from first to fourth moments on quarterly basis over a 20-year limited time window form Q12000 to Q42019.

In Nigeria, the domestic debts (TBs and FGN Bonds) topped with the highest average annual rate of return of 11.64%. The average long-term debts' (AVE.FGN) 11.08% rate was slightly outweighed average short-term debts' (AVE.TBs) 11.05%. Interest on external debts trailed behind others at 6.38% relative to the equity market average return of 8.14%. The average interest on deposits by DMBs stood at 8.43%. It can be inferred those investors in the fixed-income securities were better rewarded than equity investors during the period. Also, the cost of borrowings by Governments on domestic debts was almost double the cost of borrowing externally. Borrowing locally costs the government an average of 4.7% above the foreign debts. The interest on DMBs of 8.43% traded off between the equity market and fixed income rates.

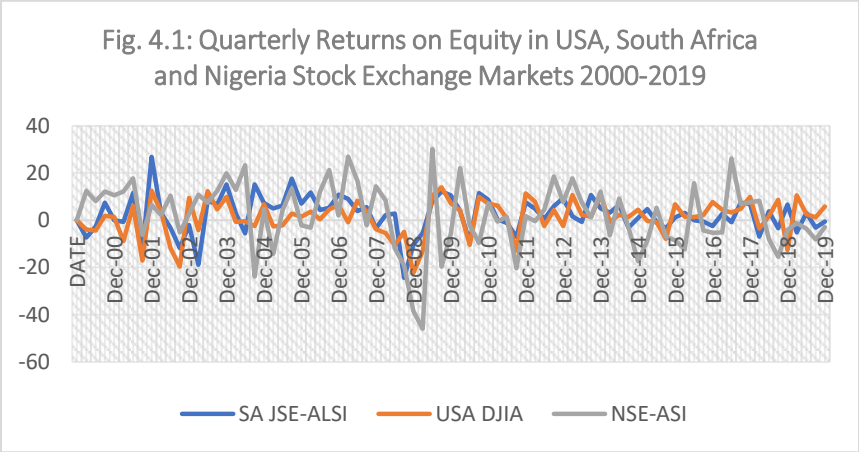
Despite the trailing of equity returns behind the fixed-income interest rates, its risk behavior contradicted Markowitz's investment proposition that higher risk is associated with a higher return. The equity returns exhibit higher volatility with a

maximum return of 30.24% and a minimum of -46.01% unlike the less than 1% volatility from fixed income securities. The risk measured by variance shows that equity returns recorded 189.89% compared to the 1.29% risk-free interest-bearing securities (Appendix I). Sans equity, the interest-bearing securities' risks are lower than their rates. The nexus between the equity and any of the interest-bearing securities is measured by the covariance and was very high for equity (187.52%). However, the sensitivity of interest rates to equity returns as measured by beta was one for equity market and zero for the fixed-income securities. The correlation coefficient between equity and the interest-bearing securities is positive for 91-day TBs (18%), short-term debts (14%), DMBs (4%), and domestic debts (1%); and negative for external debts (-14%), and long-term debts (-4%). The best portfolio that can be achieved from the correlations among the securities with equity is those with negative correlations: external and long-term debts. However, considerations can be extended to DMBs and domestic debts. The equity return was not normally distributed but asymmetrical and asymptotic as measured by their kurtosis and skewness that were above 3 and zero standard requirements.

In the USA, the interest rate transmission mechanism and investment fund flow behavior were the opposite of Nigerian financial markets because the DJIA Index recorded the highest average return (4.68%) which almost triple its interest rates on short-term debts (1.73%) and double long-term debts (2.71%). Importantly, average equity returns double the overall average interest rates on fixed-income securities (2.34%). The USA financial markets behaved normally and perfectly than Nigerian markets. The equity market was less volatile relative to the Nigerian and SA markets. The fixed-income securities exhibited risk-free while the equity risk stood at 57.42% with its returns ranging from -22.27% to 13.96%. The nexus between equity and any of the interest-bearing securities is negative and their correlation coefficients are negative and weakly correlated at 8.0% constant. The strength of the relationship between the equity and fixed income markets is positive but weak at 1.0%. Interestingly, USA equity markets exhibits relatively stable trend except some volatility in 2008 during the global financial meltdown and slightly in September 2001, June/September 2002, and September 2011 (Appendix I)

In South Africa, the equity performance (9.40%) slightly outweighed interests on fixed-income securities: 9.17% (Bonds), 7.69% (TBS), and 6.98% (DMBs). The JSE Index return peaked at 26.81% in Q42001 and minimum at -24.37% in Q32008 during the global financial crisis. The JSE Index average annualized of 9.40% outperformed returns on NSE-ASI (8.14%) and DJIA (4.68%). The risk level stood at 61.87% less volatile relative to NSE-ASI (189.87%) and slightly higher than DJIA by 4.45%. The interest-bearing securities were negatively related to the equity and the strength of the relationships is weak. Like NSE, JSE equity return was not normally distributed and asymptotic, having its kurtosis and skewness above 3 and not zero.

Comparatively, JSE-ALSI recorded the highest average return of 9.40%, next is NSE-ASI with 8.14% while the DJIA index trailed behind at 4.68%. Distribution by risk; NSE-ASI was the most volatile and risky, non-normally but asymmetric in returns.



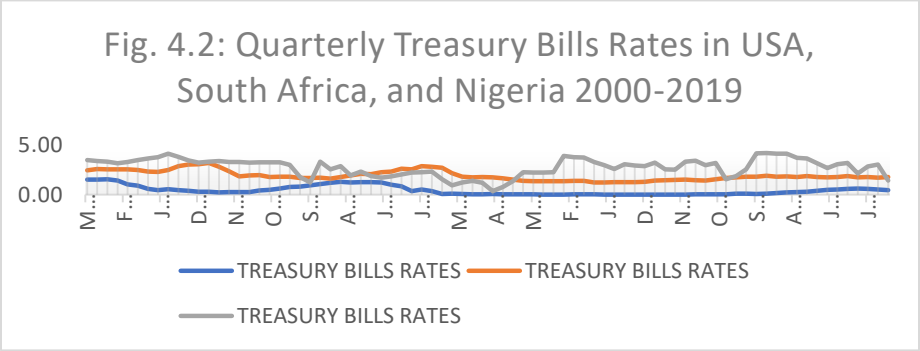
Source: Author's computation using DJIA, JSE, and NSE Data

Nigeria financial markets exhibited highest risk and highest interest rates on fixed-income securities. USA's DJIA index return was the least among the three stock exchanges' indexes studied with the lowest interest-bearing securities. However, JSE-ALSI returns was the highest with moderate risk.

A) Interest on Fixed-Income Securities and Sovereign Risk of USA, South Africa, and Nigeria Economies:

The distribution of interest rates by short term TBs, showed that Nigeria TBs consistently offered the highest rates which may be linked to her high sovereign risk while South Africa follows, and the USA offered the lowest rates (Fig. 4.2).

The level of interest on Treasury Bills from each country is a function of the public perception of their risk levels. The volatility of Nigerian TBs was higher relative to others, peaked at 4.18% and minimum of 0.36%; SA max at 3.18% and minimum 1.24% while USA TBs max at 1.55% and a minimum of 0.01% respectively



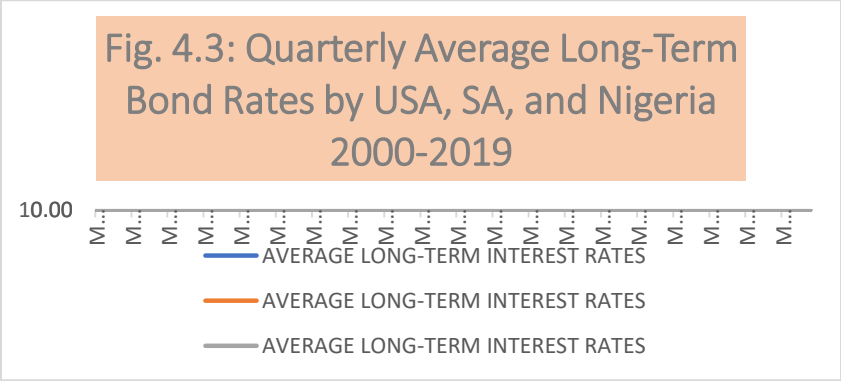
Source: Author's computation

Fig. 4.3 also showed the interest behavior of the quarterly average long-term bonds in USA, SA, and Nig. The trend was similar to TBs rates with Nigeria recorded the highest rate of 5.74% and a minimum of 0.1% relative to SA's 3.58% maximum and 1.84% minimum while the USA trailed behind at 1.58% maximum and 0.19% minimum. The Nigerian bond rates exhibited the highest volatility relative to SA and USA. The higher interest on fixed-income securities by Nigeria is associated with its higher sovereign risk.

However, Nigeria's credit rating trailed behind USA and South Africa. The credit position of the countries were rated by internationally accredited rating agents like S&P, Fitch and Moody. Nigeria was the most riskier among the countries with weaker ability to attract foreign loans. The credit rating for Nigeria stands at an average of "BB-" with stable or negative outlook. The higher risk of the sovereignty of Nigeria is also associated with the highest interest of 11.05% demanded by the creditors, hence Nigeria borrowed at the highest rate accounted by her higher sovereign risk. However, the USA with zero sovereign risk also associated with the lower interest of 2.21% while South Africa with lower risk also attracted moderate interest at 7.91% (Appendix V)

B) Do Interest Rates Transmission Mechanism a Good Determinant of Investment Fund Flow Between Equity and Fixed-Income Securities Markets?

Investment fund flow between equity and interest-bearing securities can be explained from both risk and return perspectives. Investors are assumed to be rational and risk-averse. This is attributed to the high demand for the interest-bearing securities in Nigeria during the period. In Nigeria, the NSE-ASI average return of 2.54% trailed behind TBs' 11.32%, bonds' 10.15%, and DBMs' 6.62%. The nadir level of return on equity during the period has contributed to the high demand for TBs and Bonds by the various investors including DMBs, Mutual funds managers, Pension Funds managers, and institutional and individual investors. Investors are often risk cautious and seek to invest in assets that offer higher returns at lower risk.



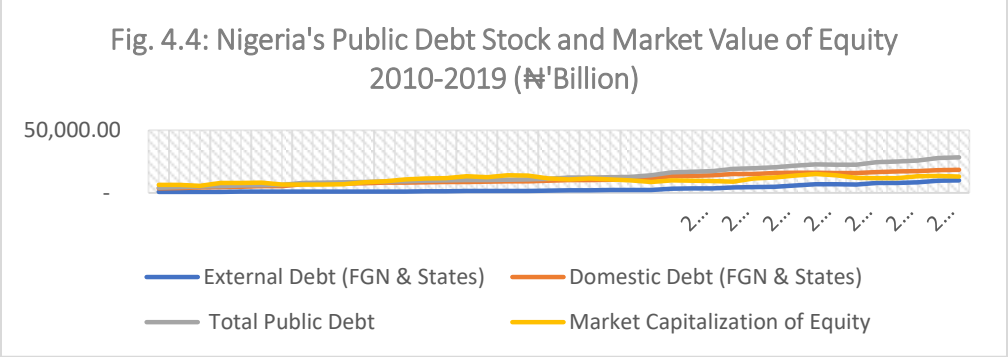
Source: Author's Computation

Table 4.1 shows that the Nigerian equity market is highly risky at 112.47% variance relative to the risk-free obtained from TBs (0.81%), Bonds (1.30%), and DMBs (0.16%) respectively. The result also indicated that investors operated in the equity market were risk lovers but behaved irrationally because the market risk of 112.47 they bore. Instead of settling for a

positive risk premium, they were penalized with negative risk premium of -8.78%. It indicates that equity investors were poorer than risk-averse investors on an average of 8.78% per annum. Using CAPM, the NSE-ASI return of 2.76% trailed behind the minimum 11.0% interest rate by the fixed-income securities. In a like manner, banks' depositors' sub-optimality was 4.70% poorer than investors who opted for TBs and Bonds but better than equity investors by 4.08%. However, the Sharpe, Treynor, and Jensen alpha all showed negative returns on equity investment.

C) To what extent do interest rate transmission mechanisms determine the choice of Government borrowing between domestic and foreign debts?

Governments have two sources of raising public debts: from domestic and foreign. The total domestic debts consist of TBs, Treasury Certificate, FGN Bond, FGN Savings Bond, FGN Sukuk Bond, Green Bond, Development Stocks and Promissory Note and State Government Bonds while External Debt by the FGN and States consists of: Multilateral, Africa Development Bank, Paris Club, London, Promissory Notes, Bilateral (China, Japan, France, India, Germany); Commercial (Eurobond, Diaspora bond), and others. Fig.4.4 revealed that the equity market dominated in terms of its capitalization from 2010 to Q42014. The equity value peaked at N14.028 trillion in Q2 2014 from where it started cascading to cuts total public debts at a value of N11.48trillion with a colossal loss of N2.55 trillion within 6 months. The equity market diminished value could be ascribed to its laggard interest rate (Table 1) with lowest quarterly average return of 0.63% relative to External debts (1.28% and Domestic debts of 2.82%. The equity return was highly volatile, hence, investors lost confidence in the market and behaved rationally by investing in fixed income government debt securities. Thus, both external and domestic debts continue to up trending and slightly above external debts in Q42019. Meanwhile, the average quarterly debt service rate on external debts was1.28% lower than the 2.82% on domestic debts all things being equal. The banks and diaspora holders arbitraged on this by borrowing low abroad and lent high to the government, whereas these investors are characterized with higher risk than the economy.



Source: Author's Computation

Table 1: Quarterly Equity Return and Interest on Public Debts and Bank Deposits 2010-2019 (%)

	NSE Index	External Debt	Ave. TBs	Ave. DMBs	FGN Bond	Public Debts
AVE.	0.63	1.28	2.83	1.65	2.65	2.82
Min	-20.39	0.35	0.37	0.80	0.66	0.97
Max.	26.07	4.62	4.18	2.13	4.95	5.16

Source: Author's Computation

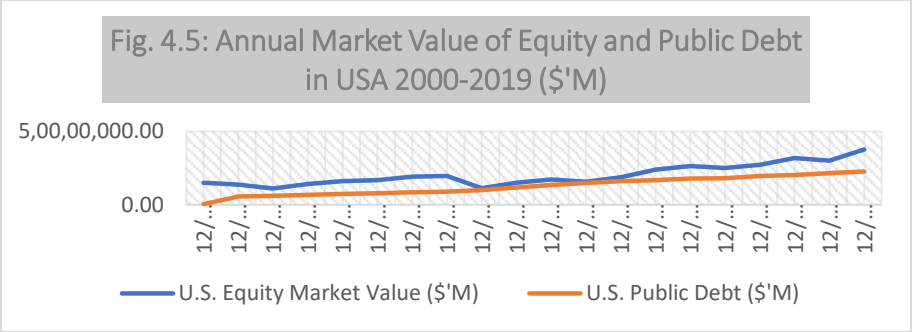
D) USA:

Return on DJIA of 4.68% trailed ahead of the fixed-income securities during the period and for this reason, equity attracted more funds from investing public than debts (Fig. 4.5). It almost thrice short-term average return (1.73%) and double the long-term average return (2.71%). American equity investors behaved rationally with a positive risk-adjusted return of 2.47% and a positive risk premium of 2.44% (Appendix I). The equity market capitalization persistently and relatively traded above the total public debt throughout the period amid the volatilities experienced in the 2011 and 2008 global financial meltdown (Fig. 4.5). Investors in the U.S. equity market are risk lovers, and the market rewards them for the risk they took.

E) Do Interest rates on fixed income securities have a significant effect on Equity Performance?

Appendix II shows that equity market performance in Nigeria is inversely related to Ave.TBs (-6.555); Ave.DMBs (-3.3575); External Debts (-1.0580); and Domestic Debts rate (-3.9281), but positively related to 91-day TBs (8.9228) and FGN Bond (2.1368). However, none of the relationships is significant. Thus, an increase in the interest rates on the fixed-income securities has the probability of influencing equity investors to sell off and consequently reduces stock prices and market

returns. Of course, the effect is not significant because all the dependent variables could only account for less than 7.0% of the changes in the equity market returns as measured by the coefficient of determination R-squared.



Source: Author's computation

F) The USA.

The average DJIA return was inversely but not significantly related to average interests on TBs (-0.32746) and long-term bonds (-1.34535). Only a 0.07% change in the average DJIA Index could be explained by changes in interests on average TBs and long-term bonds. The lower the interest rate on fixed income securities, the more attractive is equity to investment fund flow and vice versa (Appendix III).

G) South Africa

The average TBs and JSE index have a negative (-5.3628) relationship and significant effect (1.69%) while average DMBs and JSE return are negatively related (-0.8002) but have no significant effect. Also, the average long-term bond and the JSE return are positively related (1.3929) but not significant at 62.74% (Appendix IV)

H) Does Return Decomposition explain the Risk Preferences of Equity and Risk-Averse Investors?

The total return was decomposed into four based on Fama return's decomposition technique that depicts the risk preference of equity and interest-bearing investors (Table 4.3). They are risk-free return, systematic risk-return (Risk Premium), Residual risk-return, and return based on Managers' selection risk. The Nigerian equity market recorded 8.14% average annualized return, decomposed into risk-free (11.05%), and non-diversified risk (systematic risk) of -2.87%; DJIA also recorded an average annualized return of 4.65%, decomposed into risk-free of 2.21% and risk premium of 2.44%; and JSE's annual return of 9.4%, decomposed into risk-free of 7.95% and 1.45% risk premium. Since equity investors are risk lovers, their risk-loving behavior had cost Nigerian equity investors a loss of 2.87% relative to risk premia of 2.44% by American investors and 1.45% by South African investors respectively. To this extent, being a risk-loving investor is profitably rewarded in America and South Africa as both markets were able to generate returns enough to compensate for the risk-taking unlike the Nigerian equity investors with a loss of 2.87%. It is not possible for equity investors to diversify systematic risk. The reward for taking the risk (risk premium) was the loss of 2.87%, hence, Nigerian equity investors trailed behind risk-averse investors in returns. However, the risk-averse investors' returns only from the risk-free. However, due to the well-diversified nature of both the equity and interest-bearing security markets, the residual and net selectivity risks had no effect on their returns while risk-averse risk-free returns were not influenced by the systematic risk, residual, and net selectivity risks (Table 4.3).

VI. SUMMARY

The statistical results showed that investment fund flows between the money and capital markets in the United States, South Africa, and Nigeria, respectively, are well predicted by the interest rate transmission mechanism. The lower interest rates in US and SA fixed-income markets upbeat their equity returns while a higher interest rate in the Nigerian interest-bearing market reduces equity return. The interest rate on foreign debts is lower than interest on domestic debts but the government sub-optimally availed the opportunity cost differential with more domestic debts portfolio than the foreign debts. Interest rates on fixed income securities have negative but not significant effects on equity performance in all the countries, except average bonds in South Africa and Nigeria with positive but non-significant effects on equity performance. Thus, an increase in the interest rates of the fixed-income securities has the probability of influencing rational equity investors to sell off and consequently reduces stock prices and market returns. Of course, the effect is not significant and characterized by a weakly coefficient of determinations in Nigeria 7.0%, USA 0.07%, and South Africa 13.21% respectively. The return decomposition is a true reflection of the risk preference of the investors as only equity investing that was characterized with non-diversifiable risk while interest-bearing securities averse to the risks. The cost of government borrowing in Nigeria was too high especially on domestic debts relative to what was obtained in the USA and South Africa. Interest on depositors' funds with banks was commonly found in between equity returns and interests on public debts in all the countries. Nigerian equity market exhibited a

negative risk premium relative to others in the study with an average loss of 2.87% attributed to systematic risk while the USA and SA made annualized risk premia of 2.44% and 1.45% on average. Nigeria's equity market was the riskiest of all with a variance of 189.89% and a negative risk-adjusted of 2.91%.

A) Conclusion

Empirical evidence revealed that the Nigerian equity market was riskier relative to other countries in the study. It is evident that the interest rate transmission mechanism influenced investment funds to flow between equity and fixed-income markets. The higher equity returns in the US and South Africa attracted more investment funds inequities resulted in higher market capitalization relative to lower value of debts. Conversely, the debt market in Nigeria was more attractive to investment funds in tandem with higher interest rates on debts relative to market capitalization in the equity market. The equity markets also make it clear that, contrary to Sharpe's (1964) CAPM and Markowitz's contemporary portfolio theory from 1952, the risk increases with increasing return. Because of the market's high risk, Nigeria's risk-averse investors sought higher interest rates. In each of the three markets, there is an inverse link between equities returns and interest rates. That the equity markets were well-diversified and their residual and net selectivity risks are zero. The interest rates on deposits paid by DMBs were sub-optimal relative to interests on debts in Nigeria and South Africa. Nigerian equity investors lost a 2.87% premium while equity investors in the US and South Africa gained 2.44% and 1.45% respectively. Nigerian interest rate transmission behavior was not indifferent from what was obtained in the USA and in South Africa. While the equity returns attracted more investment funds, Nigeria behaves vice versa. The Government sub-optimally availed the opportunity of borrowing lower internationally but preferred to borrow more locally. The hypothesis that lowers interest rate upbeats equity returns in all the markets are accepted.

B) Recommendations

The inverse relationship between investment in fixed-income and equity securities portends opportunities for investing public, Mutual funds managers, and other operators in the markets to rebalance their portfolios anytime monetary policy is announced that leads to increased/decreased interest rate. The fund managers should allocate more money market instruments to their money market portfolios and other fixed-income portfolios when there is an increase in the interest rate variables. , extreme riskiness and volatility of Nigerian equity return is a function of the inefficiency of the market relative to the behavior of other markets in the study. The Nigerian equity market must be more transparent in an efficient manner in terms of information, instruments, institutions, regulations, operations, and openness for internalization with a view to commanding investors' confidence. Nigerian Government should avail the opportunity to borrow lower internationally in order to reduce the domestic cost of borrowing. The findings are recommended for interest arbitraging where equity investors can avail the information opportunity to invest in JSE for higher returns and risk-averse investors in Nigerian public debts for higher interest returns.

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Appendix I: Descriptive, Diagnostic, Risk-Adjusted and Return Decompositions of Transmission Mechanism of Investment Funds Flows in USA, SA, and NIGERIA Financial Markets

		USA			SOUTH AFRICA				NIGERIA					
DJIA		**INDEX_RTN**	**STAVERG**	**LTAVERG**	**INDEX_RTN**	**TBS_RATES**	**BOND_**	**DMBS_R**	**INDEX**	**AVE_TBS**	**AVE__DMBS**	**EXTNAL_**	**AVE_FGN_**	**DOMEST**
Mean		1.17	0.43	0.68	2.35	1.92	2.29	1.75	2.04	2.76	2.11	1.60	2.77	2.91
ANNUAL RTN		**4.68**	**1.73**	**2.71**	**9.40**	**7.69**	**9.17**	**6.98**	**8.14**	**11.05**	**8.43**	**6.38**	**11.08**	**11.64**
Median		2.01	0.29	0.61	3.03	1.78	2.22	1.59	2.49	3.01	2.01	1.27	2.75	2.66
Maximum		13.96	1.55	1.58	26.81	3.18	3.58	10.33	30.24	4.18	4.49	5.72	5.74	5.16
Minimum		-22.27	0.01	0.19	-24.37	1.24	1.84	-0.90	-46.01	0.37	0.80	0.01	0.10	0.97
Std. Dev.		**7.58**	**0.45**	**0.36**	**7.87**	**0.49**	**0.38**	**1.61**	**13.78**	**0.88**	**0.68**	**1.07**	**0.98**	**0.87**
VAR		**57.42**	**0.20**	**0.13**	**61.87**	**0.24**	**0.14**	**2.60**	**189.89**	**0.78**	**0.46**	**1.15**	**0.96**	**0.75**
COVAR		**56.70**	**-0.26**	**-0.22**	**61.10**	**-1.24**	**-0.48**	**-2.64**	**187.52**	**1.74**	**0.41**	**-2.04**	**-0.60**	**0.10**
CORREL		1.00	-0.08	-0.08	1.00	-0.32	-0.16	-0.21	1.00	0.14	0.04	-0.14	-0.04	0.01
BETA		0.99	0.00	0.00	0.99	-0.02	-0.01	-0.04	0.99	0.01	0.00	-0.01	0.00	0.00
R-SQR		1.00	0.01	0.01	1.00	0.10	0.03	0.04	1.00	0.02	0.00	0.02	0.00	0.00
Skewness		-0.9	1.0	0.7	-0.38	0.74	1.67	2.45	-0.70	-0.58	0.76	1.41	0.15	0.37
Kurtosis		3.7	2.9	2.5	4.75	2.64	5.56	13.19	4.27	2.61	4.34	5.07	4.09	2.77
Jarque-Bera		12.1	13.8	7.2	12.03	7.67	58.87	426.07	12.01	4.98	13.65	40.58	4.26	1.96
Probability		0.0	0.0	0.0	0.00	0.02	0.00	0.00	0.00	0.08	0.00	0.00	0.12	0.38
Sum		93.6	34.5	54.2	188.01	153.75	183.33	139.63	162.86	221.06	168.68	127.61	221.63	232.81
Sum Sq. Dev.		4536.2	16.0	10.0	4888.00	19.32	11.25	205.41	15001.35	61.59	36.17	90.80	75.88	59.47
Observations		80.0	80.0	80.0	80.00	80.00	80.00	80.00	80.00	80.00	80.00	80.00	80.00	80.00
RISK-FREE		2.34	1.73	2.71	7.95	7.69	9.17	6.98	11.05	11.05	8.43	6.38	11.08	11.64
SYSTEMATIC	β^2*Mkt Var	55.99	0.00	0.00	60.34	0.02	0.00	0.11	185.17	0.02	0.00	0.02	0.00	0.00
TOTAL RISK	VAR	57.42	0.20	0.13	61.87	0.24	0.14	2.60	189.89	0.78	0.46	1.15	0.96	0.75
SYSTEMATIC	R^2(VAR)	57.42	0.00	0.00	61.87	0.03	0.00	0.12	189.89	0.02	0.00	0.02	0.00	0.00
RESIDUAL RISK	VAR-(R^2*VAR)	0.00	0.20	0.13	0.00	0.22	0.14	2.48	0.00	0.76	0.46	1.13	0.96	0.75
PROPORTION	SYSMTC RISK (%)	100.00	0.60	0.66	100.00	10.34	2.65	4.43	100.00	2.09	0.20	1.95	0.20	0.01
	UNSYSYMTC RISK	0.00	99.40	99.34	0.00	89.66	97.35	95.57	0.00	97.91	99.80	98.05	99.80	99.99
RISK PREMIUM	Bi(Rm-Rf)	2.31	0.00	0.00	1.43	0.00	0.00	0.00	-2.87	0.00	0.00	0.00	0.00	0.00
CAPM	Rf + Bi(Rm-Rf)	**4.65**	**1.73**	**2.71**	**9.38**	**7.69**	**9.17**	**6.98**	**8.18**	**11.05**	**8.43**	**6.38**	**11.08**	**11.64**
SHARPE RATIO	(Rp-Rf)/δp	0.31	0.00	0.00	0.18	0.00	0.00	0.00	-0.21	0.00	0.00	0.00	0.00	0.00
TREYNOR RAT	(Rp-Rf)/βp	**2.37**	0.00	0.00	**1.47**	0.00	0.00	0.00	**-2.94**	0.00	0.00	0.00	0.00	0.00
JENSEN RATIO	(Rp-Rf)-Bi(Rm-Rf)	0.03	0.00	0.00	0.02	0.00	0.00	0.00	-0.04	0.00	0.00	0.00	0.00	0.00
JENSEN ALPHA	Rp-{Rf+Bi(Rm-Rf)	0.03	0.00	0.00	0.02	0.00	0.00	0.00	-0.04	0.00	0.00	0.00	0.00	0.00
Benchmk Com	(Rm-Rf)/δm	0.04	0.00	0.00	0.02	0.00	0.00	0.00	-0.02	0.00	0.00	0.00	0.00	0.00
CFID	(Rm-Rf)(δp/δm-β	-2.30	0.00	0.00	-1.43	0.00	0.00	0.00	2.85	0.00	0.00	0.00	0.00	0.00
Net Selectivity	(Rp-Rf)-(δp/δm)(F	2.33	0.00	0.00	1.44	0.00	0.00	0.00	-2.89	0.00	0.00	0.00	0.00	0.00
Mkt risk adjust	(Rm - Rf)	2.34	0.00	0.00	1.45	0.00	0.00	0.00	-2.91	0.00	0.00	0.00	0.00	0.00
Portfolio risk a	(Rp - Rf)	**2.34**	0.00	0.00	**1.45**	0.00	0.00	0.00	**-2.91**	0.00	0.00	0.00	0.00	0.00
Superiority of r	Rm - Rp)	0.00	2.95	1.97	1.71	0.23	2.42	9.40	0.00	-2.91	-0.29	1.76	-2.94	-3.50
Superiority of p	(Rp - Rm)	0.00	-2.95	-1.97	0.00	-1.71	-0.23	-2.42	0.00	2.91	0.29	-1.76	2.94	3.50
Sharpe Differe	Rp-{Rf+(Rm-Rf)*δ	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Jensen Differe	Rp-{Rf+Bi(Rm-Rf)	0.029	0.000	0.000	0.02	0.00	0.00	0.00	-0.04	0.00	0.00	0.00	0.00	0.00
Portfolio risk a	(δp/δm)	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.01	0.00	0.01	0.01	0.00	0.00
	(δp/δm-βi)	-0.98	0.01	0.01	-0.98	0.02	0.05	0.04	-0.98	-0.01	0.00	0.02	0.01	0.00
Alpha rtn to to	(Rp-Rf)+(Rm-Rf/δ	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Alpha risk CML	Rf + [Rm-Rf)*(δp/	0.02	0.01	0.01	0.04	0.02	0.39	0.00	0.06	0.03	0.05	0.03	0.04	0.00
Fama's Dcompositn Rtn:														
Risk Free	Rf	**2.34**	**1.73**	**2.71**	**7.95**	**7.69**	**9.17**	**6.98**	**11.05**	**11.05**	**8.43**	**6.38**	**11.08**	**11.64**
Rtn for systen	Bi(Rm-Rf)	2.31	0.00	0.00	1.43	0.00	0.00	0.00	-2.87	0.00	0.00	0.00	0.00	0.00
Rtn for Residu	(δp/δm-βi)*(Rm-F	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Net Selectivity	Rp-(Rf+δp/δm)*(F	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Returns		**4.65**	**1.73**	**2.71**	**9.38**	**7.69**	**9.17**	**6.98**	**8.18**	**11.05**	**8.43**	**6.38**	**11.08**	**11.64**

Source: Author's computation

Appendix II: Regression Analysis of Interest Bearing Securities on the NSSE-ASI 2000-2019

Dependent Variable: NSE-ASI_INDEX				
Method: Least Squares				
Date: 09/19/20 Time: 03:53				
Sample: 2000Q1 2019Q4				
Included observations: 80				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	10.266221	10.71487108	0.9581283	0.341161
_91DTBS	8.9227992	5.164541631	1.727704	0.08827
AVE_TBS	-6.555324	5.328848814	-1.230158	0.222588
AVE__DMBS	-3.357465	3.554952726	-0.944447	0.348057
EXTNAL_DEBT_RATE	-1.058976	1.80984008	-0.585121	0.560271
AVE_FGN_BOND	2.1368299	2.986283951	0.7155481	0.476553
DOMESTIC_DEBT	-3.928114	3.779752544	-1.039252	0.302118
R-squared	0.0663737	Mean dependent var		2.035779
Adjusted R-squared	-0.010363	S.D. dependent var		13.78008
S.E. of regression	13.851294	Akaike info criterion		8.178067
Sum squared resid	14005.659	Schwarz criterion		8.386495
Log likelihood	-320.1227	Hannan-Quinn criter.		8.261632
F-statistic	0.8649572	Durbin-Watson stat		1.74515
Prob(F-statistic)	0.5248599			

Source: Author's computation

Appendix III: Regression Analysis of Interest Bearing Securities on the DJIA 2000-2019

Dependent Variable: DJIA_INDEX				
Method: Least Squares				
Date: 09/21/20 Time: 19:50				
Sample: 2000Q1 2019Q4				
Included observations: 80				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.222492	2.577637	0.862221	0.391243
AVE__TBS	-0.32746	4.979705	-0.06576	0.947741
AVE__BONDS	-1.34534	6.306488	-0.21333	0.831636
R-squared	0.006629	Mean dependent var		1.169966
Adjusted R-squared	-0.01917	S.D. dependent var		7.577598
S.E. of regression	7.649895	Akaike info criterion		6.94404
Sum squared resid	4506.109	Schwarz criterion		7.033366
Log likelihood	-274.762	Hannan-Quinn criter.		6.979853
F-statistic	0.256918	Durbin-Watson stat		2.021206
Prob(F-statistic)	0.774092			

Appendix IV: Regression Analysis of Interest Bearing Securities on the JSE 2000-2019

Dependent Variable: JSE_ INDEX_RTN___				
Method: Least Squares				
Date: 09/05/20 Time: 02:58				
Sample: 3/01/2000 12/01/2019				
Included observations: 80				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	10.8615	5.1841	2.0952	0.0395
TBS_RATES	-5.3628	2.1947	-2.4435	0.0169
BOND_RATES	1.3929	2.8579	0.4874	0.6274
DMBS_RATES	-0.8002	0.5282	-1.5149	0.1339
R-squared	0.13206	Mean dependent var		2.35018
Adjusted R-squared	0.09780	S.D. dependent var		7.86596
S.E. of regression	7.47141	Akaike info criterion		6.90875
Sum squared resid	4242.47100	Schwarz criterion		7.02785
Log likelihood	-272.35010	Hannan-Quinn criter.		6.9565
F-statistic	3.85466	Durbin-Watson stat		1.86328
Prob(F-statistic)	0.01266			

Source: Author's Computation

Appendix V: Sovereign Risks and Transmission Mechanism of Fund Inflows 2000 – 2019

Year		**Rating**		
		USA	S/AFRICA	NIGERIA
2019		AAA	BB	B+
2016		AAA	BBB-	B+
2015		AAA	BBB-	B+
2012		AAA	BBB	BB-
2011		AAA	BBB+	BB-
2010		AAA	BBB	BB-
2009		AAA	A3	B+
2006		AAA	BBB+	BB-
2003		AAA	BBB	BB-
2000		AAA	BBB	BB-
Ave. Risk	Fixed-Income	0.00	0.00	0.10
	Equity	57.42	61.87	189.98
Ave. Return	Fixed-income	2.21	7.91	11.05
	Equity	4.65	9.40	8.14.

Source: www.tradingeconomics.com