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Effect of economic recession on the relationship between Macro-economic variables and investment performance Of Nigerian banking sector

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Abstract
The relationship between macroeconomic variables and stock market performance may have been established but the relationship between macroeconomic variables and investment performance is extremely rare and this relationship becomes more fluid when the economy is experiencing an economic recession. Given the high volatility of the market, it is important that investment performance of the sector should be evaluated by putting into consideration the macroeconomic indicators that influence the financial market and how the relationship between these factors, as well as investment performance, is impacted by recession in order to maximize investors' return and reduce their risk. This among others provides a cause for investigating the Effect of Economic Recession on the Relationship between Macro-economic Variables and Investment Performance of Listed Commercial Banks in Nigeria for a period of 13years from 1st of January 2010 to 31st of December 2022. This study employed a census sampling approach and utilized secondary sources of data collected from Nigerian Stock Exchange (NGX) website for banking index (NSE Banking index) and All-share index as well as CBN website for the macroeconomic variables. Risk-adjusted measures like Sharpe ratio, Sortino measure, Jensen's Alpha, Modigliani measure and Treynor's ratio were adopted, however, after a series of analysis, the study finds Jensen's alpha ratio with a better lag for measuring investment performance while exchange rate, inflation rate, interest rate and money supply were used as proxies for macroeconomic variable and Economic recession was measured as a dummy variable. In order to achieve the objectives of this study, Auto-Regressive Distributive Lag (ARDL) model analysis was performed. The study finds out that the first lag of exchange rate was positively significant while the first lag of Money supply was negatively significant on the investment performance of listed commercial banks in Nigeria. However, Inflation Rate, Interest Rate and Economic Recession were statistically insignificant on the investment performance of listed commercial banks in Nigeria. It is therefore, recommended that, the Federal Government of Nigeria and the Central bank of Nigeria should employ a policy that will improve on the value of the naira currency against the dollar in order to encourage local institutions to invest more on the sector than the foreign investors. The study also recommends that monetary policies should be put in place by the Central Bank to mop-up excess liquidity in the economy in order to maximize the return on the investment in the sector.

Keywords: ARDL Model, Nigerian banking sector, Investment performance, Macroeconomic variables, Risk-adjusted measures.

1. Introduction

Performance as the adage goes is a "journey not a destination". Performance is the achievement of quantified objective; the terms effectiveness and efficiency are a part of any definition of performance. Effectiveness measures the extent to which goals and objectives are accomplished, and efficiency measures the number of resources used to reach that degree of performance (Samsonowa, 2011). Over the years performance is mostly measured from the Firm's perspective. Despite the great relevance of determining firm's performance, less importance has been placed on investment performance. Investment performance measures how a specific investment portfolio has scored in contrast to some benchmark. (Samarakoon & Hasan, 2005). An investment portfolio may consist of one or more assets and it is valued based on a specific time frame and currency (Bruce, 2003). Unlike using ratios such as solvency ratio, efficiency ratio, leverage ratio in measuring firm's financial performance (Fatihudin, et al. 2018), Conventional and risk-adjusted methods are used to evaluate investment performance. This simply has to do with comparing an investment portfolio with a broader market index or with a portfolio with similar investment style (Samarakoon & Hasan 2005). It is well documented that risk and return are two faces of a coin but regardless, a rational investor will go all-out to minimize risk and maximize total return. Phingsten, et al. (2004), Eling and Schuhmacher (2006) and Eling (2008) are of the view that different performance measures provide similar results, but in contrast, Zakamouline (2011) and Ornelas, et al. (2012) argued that evaluation of investment funds is influenced by the performance measure employed. Hence, risk-adjusted return measures of investment performance were conceptualized (Bhati & Parashar, 2019).

According to Zulfiqar et al., 2011; Dalvi & Kadkhodayi, 2013 the stock market is crucial to the development of any nation's economy because it encourages investment and macroeconomic factors which affect how investments will perform in the future and also provide an indication of an economics' wealth. Therefore, the stock market is highly driven by the unlikeliness of macroeconomic variables, which causes stock prices to fluctuate and also tends to affect investors' investment decisions (Gan et al., 2006; Keswani and Wadhwa, 2017). A number of banks also experienced financial hardship as a result of the 2007 global financial crisis. Nigeria's banking sector is still dealing with macroeconomic pressures like slowing real gross domestic product (GDP) growth rates, rising inflation, and unstable naira-to-dollar exchange rates brought on by unstable oil prices. Together, these factors are combining to cut back on government expenditure, to slow down both investment and consumption, and to affect investment, particularly in the banking sector.

The relationship between macroeconomic variables and investment performance may have been established but the relationship becomes more fluid when the economy is experiencing an economic recession. According to conventional economic theory, the business cycle has an impact on every economy (or economic cycle). Business cycle in a free-market system refers to medium- to long-term variations in output, trade, and overall economic activity across the entire economy and economic recession is characterized by a real Gross Domestic Product growth rate that is negative for more than two consecutive quarters (Noko, 2017). It is important to recognize that the macroeconomic, financial, and recessionary factors that affect many industries are essentially the same. Therefore, favorable macroeconomic circumstances will encourage the return on investment in the banking sector, but unfavorable financial and macroeconomic circumstances may spell doom for the performance of the banking industry. Therefore, how macroeconomic factors impact the investment performance of the banking industry in Nigeria during an economic downturn is a crucial problem to examine at this point.

According to the NGX (2022), the return of investors on banking index was at 2.47% on the average in the 13 years of the study and for the same corresponding period, the entire market returns (All-Share Index) delivered 8.32% return, A comparison of the foregoing shows that the banking sector underperformed the market by 5.85%. This is disturbing as many investors and analysts consider the sector as the most vibrant and promising in terms of investment performance. A close look at the statistics further revealed that investors' returns were frequently diminished by excessive fluctuations in returns for the sector. This suggests that the sector is volatile in terms of returns and performance. The fluctuation is arguably attributable to the unstable nature of the Nigerian financial system over the years. While the financial system instability is mostly attributable to fluctuations in key macroeconomic factors that includes the likes of interest rates, money supply, exchange rates, inflation, etc. Additionally, Economic recession has further amplified the unpredictable nature of the operating environment for Banks in Nigeria. On this note, the study is set to investigate how economic recession has affected the relationship between macroeconomic factors and the investment performance of Nigerian banking sector.

2. Literature Review

In this section, the literature is presented and discussed. Specifically, this section examines the conceptual, empirical literature and theoretical framework underpinning the study.

2.1 Conceptual Framework

The important concepts of this study such as investment performance, macroeconomic variables and economic recession are discussed with a view to clarifying their meanings and usage within the context of this work.

2.1.1 Concept of Performance

Ghalem et al., (2016) refers to performance as the level or extent to which an organization or department achieves its goals. It is determined through judging and evaluating processes rather than the action itself (Ilgen & Schneider, 1991; Motowidlo, et al, 1997). Performance encompasses the financial concept of creating wealth or value for the organization. Therefore, the value of the benefits realized and cost (the organization's operational costs) are linked by performance (Lorino, 2001). However, this study adopts the definition of performance as an achievement of quantified objective in terms of effectiveness (the extent to which an investment meets its target return) and efficiency (the degree of risk that was taking to achieve the desired return). (Samsonowa (2011).

2.1.2 Concept of Investment Performance

Investment performance measures how a specific investment portfolio has scored in contrast to some benchmarks (Samarakoon & Hasan, 2005). However, According to Damani & Vaidya, (2021) investment performance refers to the measurement, analysis, interpretation, assessment and presentation of investment results, evaluation of investment performance provides information about the return and risk of investments over a specific period.

In recent years, conventional and risk-adjusted measures are used to evaluate investment performance. Many scholars have conceptualized the use of risk-adjusted measure as it accounts for the risk involved in an investment and help investors to consider any need for rebalancing of their investments, the most utilized risk-adjusted measures by investors according to numerous researchers includes Treynor's measure, Sharpe ratio, Jensen's Alpha, Sortino measure and Modigliani measure (Bhati &

Parashar, 2019; Dalvi & Kadkhodayi, 2013). All of which will be adopted for this study as performance measures.

2.1.3 Macroeconomic Determinants of Investment Performance

A number of important macroeconomic variables affect the performance of investments generally, as investors have no control over these factors. In the case of the Nigerian banking sector, the following macroeconomic variables as adopted by many researchers in the cause of their investigation will also be employed for this study.

2.1.3.1 Concept of Inflation

Inflation rate is the rate at which product prices generally rise as the buying power of currency declines. Simply expressed, it is an issue where too much money is chasing too few commodities while the value of the currency is declining (Sharma, et al. 2011). Inflation is a persistent rise in the general level of prices of goods and services in an economy over a period of time, it is a gradual reduction in the purchasing value (Khumalo et al., 2017). Similarly, Fashagba (2016) opined that inflation is a reduction in purchasing power of a currency and may not be harmful to an economy if properly managed. This paper adopts month on month change of CPI in measuring inflation, as it indicates how much of a return an investment needs to make to maintain a specific standard of living, it is a rate at which the real value of an investment is eroded as well as the loss in spending or purchasing power over time.

2.1.3.2 Concept of Exchange Rate

The exchange rate is a significant macroeconomic measure used to assess international competitiveness and reveals the nation's economic standing on the world stage. Due to the highly volatile nature of exchange rate, it has a far-reaching effect for consumers, businesses, inventors, and governments (Adusie & Gyampong, 2017). The price of a unit of a specific currency in relation to other currencies is known as exchange. The performance and profitability of sectors and businesses that import heavily or heavily rely on imports is significantly impacted by the exchange rate of the naira against major world currencies (Osamwonyi 2003). Therefore, in other to achieve the objective if this study, nominal exchange rate will be employed as a proxy for macroeconomic variable that affect the investment performance of the Nigerian banking sector.

2.1.3.3 Concept of Interest Rate

According to CBN, (2011) Interest rate serves as a vehicle for financial intermediation in the economy. It influences savings and investment decisions of economic agents, it also guides the flow of funds from savers to borrowers and these funds flows via intermediaries like DMBs, money and capital markets, insurance companies, mutual funds, and government securities. The level of increase of interest rates in the various economic sectors must be taken into account by investors as it assesses their effects on the productivity and profitability of businesses. For the purpose of this study the definition of CBN, (2011) will be adopted which posits that Interest rate is the amount charged on borrowed money, expressed as a percentage of the principal, by a lender to a borrower for the use of money.

2.1.3.4 Concept of Money Supply

Money supply is categorized by Kevin (2006) as a leading indicator. M1 is defined as money in circulation plus demand deposits, whereas M2 is defined as money in circulation plus near moneys, such as time deposits. A key monetary policy tool for fostering a country's economic growth is the availability of money. On the other hand, monetary policy is a crucial tool that Central Banks of nations utilize to uphold economic stability and encourage economic progress (Chaitip, et al, 2015). Numerous researchers employing information from industrialized nations came to the intriguing conclusion that money expansion had a negative impact on stock values (Davidson and Froyen 1982; Rozeff 1974). For the purpose of this paper, money in circulation plus near money, such as time deposits will be employed which is referred to as M2.

2.1.4 Concept of Economic Recession

In the field of economics, a recession is the business cycle's contraction brought on by a significant decline in economic activity. Typically, consumer spending decreases significantly to signal the start of a recession (an adverse demand shock). According to Oyesiku, (2009), economic recession is not something that just happens; it is brought on by a number of circumstances, including inflation, a decline in consumer confidence, an imbalance between supply and demand, an excess of one over the other, and a worldwide financial crisis. It is a period of negative GDP growth that lasts for longer than two months. Economic recession is typically followed by a decrease in the stock market, an increase in unemployment, and a decline in the housing market. Agri et. al., (2016) claims that economic recession slows wage growth, raises the percentage of persons earning low wages, and worsens unemployment and underemployment. However, recessions are typically less severe than depressions (Mbah, et al. 2018). Economic recession is therefore determined when there is negative GDP for two consecutive months and it is proxied as a dummy variable in this study where periods of recession is termed as 1 and 0 when there is no recession.

2.2 Empirical Framework

Most studies especially those in Nigeria concentrate on the traditional measures of performance using accounting-ratios or financial ratios. Empirical studies that used risk-adjusted measures of investment performance are reviewed.

Yang (2021) examined CAPM and Sharpe ratio usage for the three (3) years from 2017 to 2020 in China, using three market funds that represent three levels of risk (an equity fund, a traditional fund, and a monetary fund), where the equity fund has the highest level of risk and the monetary fund has the lowest) to explain the characteristics of Sharpe ratio. The study comes to the conclusion that given that the two models are easy to comprehend and generally trustworthy, they are well-liked by professional investors. The study, however, failed to analyze the market's external risk because it solely considered variation as a basis for risk expectations for the Sharpe ratio.

In order to assess the performance of a financial portfolio from Jordan's developing stock market for the years 2020–2021, using seven Amman Stock Exchange (ASE), Jaradat (2021), assess Jensen's Alpha of the portfolio under the Single Index Model and Ordinary Least-Square (OLS) Regression Method, the study analyzes its data using Regression analysis and finds that Treynor ratio and Jensen's Alpha produce different results for the same portfolio, according to the study, however Sharpe ratio doesn't produce the same conclusion for the same portfolio. The study comes to the conclusion that it is crucial for investors and decision-makers to undertake and apply all models to assess the success of their portfolios.

To determine whether M2 is the most comprehensive risk-adjusted return measure for evaluating portfolio performance over a 10-year period (2009 - 2018), Bhati and Parashar (2019) used the top 10 Indian diversified equity mutual fund schemes in terms of age at the first level, followed by Assets under Management (AUM) at the second level. Using rolling period returns, a rigorous measure for return computations that eliminates any bias or manipulation, and the Total Returns Index (TRI) as the benchmark, The study discovers that rankings based on M2 and Overall (Excluding M2) are essentially same.

Between December 2011 and January 2017, Chowdhury et al. (2018) assessed the performance of each closed-end mutual fund traded on the Dhakka Stock Exchange in Bangladesh. Using Treynor ratio, Jensens Alpha, and M squared measure, the study found that 21 funds produced positive M square on the basis of market price, while 23 funds produced positive alpha, while on the basis of NAV 22 fund produced positive M square. Likewise, Robiyanto (2018), used the Sharpe index, Treynor ratio, Jensens Alpha, Adjusted Sharpe index, Adjusted Jensen index, and Sortino Ratio to analyze the performance of stock price indexes on the Indonesian stock exchange, and finds that only three stock price indexes perform better than risk-free and stock market instruments when calculated using the Sharpe index, Treynor Ratio, Jensen Alpha, Adjusted Sharpe Index, and Adjusted Jensen Alpha index. While the Stock Price Index of Other Industries has the Best Performance when Calculated Using the Sortino Ratio.

2.2.1 Macroeconomic Variables and Investment Performance

Studies that have looked at the relationship between macroeconomic variables and investment performance in general are very rare especially in Nigeria; the majority of studies that are currently accessible have exclusively explored the effects or impacts of macroeconomic variables on the stock market. On this note, the researcher starts looking into the connection between macroeconomic variables and investment performance.

Udoka, et al. (2018) used macroeconomic variables like gross domestic product, exchange rate, inflation, interest rate, and absolute stock price to analyze the impact of macroeconomic determinants on stock price movements in Nigeria. According to the ADF unit root test, the study finds out that only interest rate was stationary at its current level, while the other variables became stationary after a single variation. The study used ARDL model which shows that there was no long-term link since the determinants (ASTP, GDP, EXCHR, INTR, and INFL) were not cooperatively co-integrated with it. The analysis came to the conclusion that there was no long-term correlation between macroeconomic factors and changes in Nigerian stock prices.

Similarly, John, (2019) used data from the CBN Statistical Bulletin for the years 1981 to 2016 to investigate the effects of four macroeconomic variables on the performance of the Nigerian stock market, four macroeconomic variables (money supply, exchange rate, interest rate, and inflation rate) were used as independent variables. The study conducted it analysis using Augmented Dickey-Fuller (ADF) and Ordinary Least Square (OLS) analysis and founds out that money supply has a positive significant impact on stock market performance, inflation rate and exchange rate has a positive but statistically insignificant impact on the Nigerian stock market performance and interest rate has a negative significant relationship with Nigerian stock market performance. On the other hand, Ditimi, et al. (2018) examined the dynamic interplay between macroeconomic fundamentals and stock prices in Nigeria using time series data spanning the years 1980 to 2016. The investigation made use of the co-integration test and the error repair procedure. Empirical estimates show a correlation between Nigerian stock prices and macroeconomic fundamentals. The study found no significant effect of macroeconomic variables on stock returns in Nigeria.

Using monthly data of the NSE 20-Share index, Ouma and Muriu (2014) investigate the relationship between Kenyan stock market performance and a group of macroeconomic factors from 2003 to 2013. Regression is used in the study to analyze the significance of the relationship between Kenyan stock performance and the money supply, exchange rate, inflation rate, and interest rate. The study uses the Ordinary Least Square (OLS) technique to test for validity. The research reveals that macroeconomic variables has a negative impact on stock returns in Kenya.

On Indian stock market Ray and Vani (2012); Naik (2013); and Panigrahi, et al. (2019), investigated the relationship between the stock market and macroeconomic factors using the Vector Auto Regression (VAR), VECM, the research reveals that the impact of macroeconomic variables on stock market is statistically significant. However, the related literatures mostly assume connection between macroeconomic variables and overall stock market, using market capitalization as proxy for stock market, hence the need to use risk-adjusted measures of investment performance of the banking index and All-share index as the benchmark for analysis in other to add to the rare literatures on investment performance and macroeconomic issues in Nigeria.

2.5 Theoretical Framework

The Arbitrage Pricing Theory is adopted for this study to demonstrate the significance and validity of the study. This is done in order to offer this study a well-defined and proven basis of argument.

Arbitrage Pricing Theory (APT), links an asset's expected return to the return from a risk-free asset and a number of additional common factors that systematically increase or decrease expected return. The APT was developed by economist Stephen Ross in 1976. The Arbitrage Pricing Theory, in contrast to the CAPM, assumes that markets are not always fully efficient and that assets are occasionally mispriced. The idea underlying the multi-factor asset pricing model known as arbitrage pricing theory (APT) is that returns on an asset may be predicted using the linear relationship between the asset's expected return and a number of macroeconomic variables that take systematic risk into account. It is a useful tool for looking at portfolios from the viewpoint of value investing in order to identify assets that may be briefly mispriced.

The risk premium to factor n and the asset's price sensitivity to factor n (βn) are the variables that add complexity to the arbitrage pricing model (RPn). A mathematical model can be used to express the arbitrage pricing theory:

$$ER(x) = Rf + \beta_1 RP_1 + \beta_2 RP_2 + \ldots. + \beta_n RP_n \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \text{(1)}$$

Where: Expected Return on Asset (ER(x)), The risk-free rate of return is Rf, while the asset's price sensitivity to a factor is n (Beta). The risk premium linked to the factor is denoted by RPn.

The model shows that returns are controlled by numerous factors, not only by "the market," and it also describes investor behavior in the marketplace. It can be tested on any set of data. By employing linear regression analysis in comparison to the macroeconomic factor, historical returns on securities are examined in order to get beta coefficients for the arbitrage pricing theory formula.

3. Methodology

This study adopts an ex-post facto design and correlational design to establish relationship between the dependent variables and independent variables. The population of this study consists of 156 observations comprising the monthly return computed from the price changes of NSE Banking Index and the benchmark All-share Index for the corresponding period on Nigerian stock exchange (NGX) from January 1st 2010 to December 31st, 2022. Since the data to be used by this study is in aggregate time series form, the data embeds and cumulates the return values for all the listed commercial banks in Nigeria for the period under study. Therefore, the study employs census sampling where all the members of the population are fully represented in the sample in other to give a more accurate information and overcome sampling error which makes the result more reliable. This study also used secondary data that was collected on a monthly basis during the study's duration via investing.com website and cross-checked against information obtained from the Nigerian Stock Exchange (NGX) database. Similar information will be obtained from the CBN statistical bulletin for the duration of the study on the interest rate, exchange rate, money supply, inflation rate and recession.

The data that has been acquired for a study was examined using a variety of techniques. Both descriptive and inferential statistics will be used to analyze the data in this study. Unit root tests, descriptive statistics, a correlation matrix, and the ARDL model were all employed in the statistical analysis. The software package Eviews 10 was used for all of the analysis in this study. Details of each of these is discussed below.

3.1 Variable Measurement and Description

This study employed a set of independent variable and a control variable to examine their effect on investment performance. The table below lists the details of the variables that will be utilized in this study:

Table 3.1 Variable Measurement

Variable name & acronym	**Variable type**	**Variable Description**	**Source**	**Apriori**
Investment performance (INVP)	Dependent variable	Measured by sharpe ratio, Jensen Alpha, Sortino Measure, Traynors measure and M^2 Measure	Sharpe(1964), Jensen(1968), Kidd(2012), Treynor(1965), Jaradat (2021).	N/A
Inflation (INF)	Independent variable	Measure for current price level	(Sharma & Singh, 2011)	Negative
Interest rate (INTR)	Independent variable	Use as measure to control monetary policy rate by CBN	Kevin (2006)	Negative
Exchange rate (EXCR)	Independent variable	Parallel market rate of USD to NGN	(Adusie & Gyampong, 2007)	Negative
Money supply (M2)	Independent variable	The stock of money in circulation + all deposit with commercial banks + Near Money.	(Davidson & Froyen 1982)	Negative
Recession (Rec)	Indicator (Dummy) Variable	To take the value of 1 if the period is during or after recession, and 0 if otherwise	Introduced by the researcher	Negative

Source: Author's compilation 2022.

3.2 Model Specification

Given the aforementioned theoretical and empirical arguments, it is very likely that the data used in this investigation will exhibit mixed stationarity. In spite of this, this study has chosen to use the ARDL model created by Shin and Pesaran (1999) and Pesaran et al. (2001). The ARDL model utilizes the bounds test to determine the degree of long-term cointegration among variables before estimating the appropriate model.

$$INVPF_t = \propto_0 + \propto_1 INF_t + \propto_2 EXR_t + \propto_3 MOS_t + \propto_4 INT_t + \propto_5 REC_t + \mu_t \quad \ldots\ldots\ldots \quad (1)$$

In this equation, INVPFt stands for investment performance at time t, INFt stands for inflation rate at time t, EXRt stands for exchange rate at time t, MOSt stands for money supply at time t, INTt stands for interest rate at time t, RECt stands for recession at time t, and Ut stands for the population random disturbance term. To ascertain whether there is long-run co-integration between the variables, the ARDL bound test will be used. This will be done in accordance with the requirement that the F-statistic must be less than the I(0) bound before the null hypothesis (no co-integration) is accepted. However, If the bound test result raveled I(1) and cointegration is established for the model, the ECM will be approximated. Equation 1 is changed to include an error correction term (ECM) in order to do this. Equation 1's ARDL specification will be changed to the following structure:

$$INVPF_t = \propto_0 + \sum_{i=1}^{p} \beta_1 INF_{t-i} + \sum_{i=1}^{p} \beta_2 EXR_{t-i} + \sum_{i=1}^{p} \beta_3 MOS_{t-i} + \sum_{i=1}^{p} \beta_4 INT_{t-i} + \sum_{i=1}^{p} \beta_5 REC_{t-i} + ECM_{t-1} + \mu_t \quad \ldots \quad (2)$$

Given that the study intends to employ five different measures of investment performance against the same set of regressors, the parsimonious models to be estimated for the five different scenarios of the dependent variable will be based on the following models:

$$SHR_t = \propto_0 + \propto_1 INF_t + \propto_2 EXR_t + \propto_3 MOS_t + \propto_4 INT_t + \propto_5 REC_t + \mu_t \quad \ldots\ldots\ldots \quad (3)$$
$$TRM_t = \propto_0 + \propto_1 INF_t + \propto_2 EXR_t + \propto_3 MOS_t + \propto_4 INT_t + \propto_5 REC_t + \mu_t \quad \ldots\ldots\ldots\ldots \quad (4)$$
$$JEA_t = \propto_0 + \propto_1 INF_t + \propto_2 EXR_t + \propto_3 MOS_t + \propto_4 INT_t + \propto_5 REC_t + \mu_t \quad \ldots\ldots\ldots\ldots \quad (5)$$
$$SOM_t = \propto_0 + \propto_1 INF_t + \propto_2 EXR_t + \propto_3 MOS_t + \propto_4 INT_t + \propto_5 REC_t + \mu_t \quad \ldots\ldots\ldots\ldots \quad (6)$$
$$MSM_t = \propto_0 + \propto_1 INF_t + \propto_2 EXR_t + \propto_3 MOS_t + \propto_4 INT_t + \propto_5 REC_t + \mu_t \quad \ldots\ldots\ldots\ldots \quad (7)$$

Where SHRt is Sharpe Ratio at time t, TRMt is Treynor's Measure at time t, JEAt is Jensen's Alpha at time t, SOMt is Sortino's Measure at time t; and MSMt is M-Square Measure at time t. The ARDL long run representations with the ECT based on the five measures of investment performance can be specified as follows:

$$SHR_t = \propto_0 + \sum_{i=1}^{p} \beta_1 INF_{t-i} + \sum_{i=1}^{p} \beta_2 EXR_{t-i} + \sum_{i=1}^{p} \beta_3 MOS_{t-i} + \sum_{i=1}^{p} \beta_4 INT_{t-i} + \sum_{i=1}^{p} \beta_5 REC_{t-i} + ECM_{t-1} + \mu_t \quad \ldots \quad (8)$$

$$TRM_t = \propto_0 + \sum_{i=1}^{p} \beta_1 INF_{t-i} + \sum_{i=1}^{p} \beta_2 EXR_{t-i} + \sum_{i=1}^{p} \beta_3 MOS_{t-i} + \sum_{i=1}^{p} \beta_4 INT_{t-i} + \sum_{i=1}^{p} \beta_5 REC_{t-i} + ECM_{t-1} + \mu_t \quad \ldots \quad (9)$$

$$JEA_t = \propto_0 + \sum_{i=1}^{p} \beta_1 INF_{t-i} + \sum_{i=1}^{p} \beta_2 EXR_{t-i} + \sum_{i=1}^{p} \beta_3 MOS_{t-i} + \sum_{i=1}^{p} \beta_4 INT_{t-i} + \sum_{i=1}^{p} \beta_5 REC_{t-i} + ECM_{t-1} + \mu_t \quad \ldots \quad (10)$$

$$SOM_t = \propto_0 + \sum_{i=1}^{p} \beta_1 INF_{t-i} + \sum_{i=1}^{p} \beta_2 EXR_{t-i} + \sum_{i=1}^{p} \beta_3 MOS_{t-i} + \sum_{i=1}^{p} \beta_4 INT_{t-i} + \sum_{i=1}^{p} \beta_5 REC_{t-i} + ECM_{t-1} + \mu_t \quad (11)$$

$$MSM_t = \propto_0 + \sum_{i=1}^{p} \beta_1 INF_{t-i} + \sum_{i=1}^{p} \beta_2 EXR_{t-i} + \sum_{i=1}^{p} \beta_3 MOS_{t-i} + \sum_{i=1}^{p} \beta_4 INT_{t-i} + \sum_{i=1}^{p} \beta_5 REC_{t-i} + ECM_{t-1} + \mu_t \quad (12)$$

In summary therefore, The Sharpe ratio, Treynor's measure, Jensen's alpha, Sortino's measure, and M-square Measure will all be used in this study as indicators of investment performance (dependent variable). Additionally, the analysis will substitute macroeconomic variables including GDP, interest rates, money supply, exchange rates, and inflation (independent variables). Economic recession is also included as an indicator variable in the model. The measures of the five proxies of investment performance are highlighted below:

i) Sharpe Ratio

The Sharpe Ratio is a formula for calculating how well an asset has performed relative to the risk it has been exposed to. A higher Sharpe Ratio will signal a higher return in line with the assumed risk. A Sharpe ratio between 1 and 2 is typically regarded as desirable. Any result above 3 is great, and a ratio between 2 and 3 is considered to be very good. It is mathematically represented as follows:

$$S_a = \frac{E(R_a - R_b)}{\delta_a} \ldots \quad (13)$$

Where: S_a = Sharpe Ratio
E = Expected Value
R_a= Asset Return
R_b= Risk Free Return
δ_a= Standard deviation of asset excess return

T

ii) Treynor's Ratio

$$= \frac{r_p - r_f}{\beta_a} \ldots \quad (14)$$

Where: T = Treynor's Ratio
r_p= Portfolio Return
r_f= Risk Free
β_a= Portfolio Beta

A high positive Treynor Ratio shows that the investment has a high return compared to its (scaled-to-market) risk. A negative ratio indicates that the investment underperformed a risk-free product.

iii) Jensen's Alpha

$$\alpha_p = R_p - \left[R_f + \beta_p(R_m - R_f)\right] \ldots \quad (15)$$

Where: α_p= Jensen's Alpha
R_p= Expected Portfolio Return
R_f= Risk Free Rate
β_p= Beta of the Portfolio
R_m= Expected Market Return
R_f= Risk Free

One method to determine whether a portfolio is producing the proper return in relation to the level of risk is to use Jensen's measure. Values that are positive show that the portfolio is producing excess returns. In other words, a fund manager with a positive value for Jensen's alpha has "beat the market" with their stock-picking skills.

iv) Sortinor's Ratio

$$S = \frac{(R - T)}{DR} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (16)$$

Where: S= Sortinor's Ratio
R= Average Realized Return
T= Required Rate of Return
DR= Target Down-side Deviation

An unsatisfactory Sortino ratio is one that falls between 0 and 1.0. Sortino ratios greater than 1.0 are regarded as appropriate. A Sortino ratio greater than 2.0 is regarded as excellent. Sortino ratios of 3.0 or above are regarded as outstanding.

v) Modigliani and Modigliani Measure (M-squared).

$$M_A^2 = \bar{r}_f + \left(\frac{\bar{R}_A - \bar{r}_f}{\delta_A}\right)\delta m \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (17)$$

Where: M_A^2= M square Ratio
$\bar{R}_A$= Average Return for Portfolio A
$\bar{r}_f$= Average Risk Free of Rate of Return
δ_A= Standard Deviation of Portfolio A return
δm= Standard Deviation of Market Portfolio Return

The excess return, which is weighted across the benchmark and portfolio standard deviations as they increase along with the risk-free rate of return, is the M2 measure, which is evident from the Modigliani-Modigliani measure.

In order to choose which of the models based on the five different measures of investment performance is best, the test for model selection based on the fitness of the data will be employed. This study will therefore utilize the model selection criteria of AIC and SC. The AIC is computed based on the following model:

$$AIC = 2l/T + 2k/T \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (18)$$

Where
l= Log likelihood
T= Number of observations
k= Number of right hand side regressors

The Schwarz Bayesian criteria on the other hand is based on the following model:

$$SIC = 2l/T + (k \log T)/T \quad \ldots \quad (19)$$

Where
SIC= Schwarz Information Criteria
log= logarithm
l, T and k are as previously defined

The model with the lowest AIC and SIC values will be preferred. As a decision rule, the lower the values of AIC and SIC, the better a model is compared to another with relatively higher values (Agung, 2009; Gujarati, 2003).

4. Result and Discussion

This presents the analysis and interpretation of the data collected from secondary sources. Stationarity test was conducted in this chapter in order to check the presences of unit root. The descriptive statistics as well as regression analysis were also conducted to established and evaluate the relationship between variables of this study.

4.1 Stationarity Test

There are various statistical tests to check stationarity of a time series, including the Augmented Dickey-Fuller (ADF), which was used in this study to check for the presence of a unit root in the data.

Table 4.1 Augmented Dickey Fuller unit root (ADF) Test for Stationarity of Variables

Variable	ADF Statistic	Stationarity	Order of Integration
Sharpe Ratio (SR)	-9.96***	Yes	I(0)
Treynor's Measure (TM)	-12.02***	Yes	I(0)
Modigliani-Modigliani (MM)	-12.55***	Yes	I(0)
Jensen's Alpha (JA)	-7.79***	Yes	I(0)
Sortino Measure (SM)	-12.21***	Yes	I(0)
Exchange rate	-12.63***	Yes	I(1)
Inflation rate	-12.44***	Yes	I(0)
Interest rate	-19.30***	Yes	I(1)
Money supply	-13.03***	Yes	I(0)
Recession	-12.33***	Yes	I(1)

Source: EViews10 stationarity test, 2023

The results above shows that the ADF stationarity test for the 10 variables depicts a stationarity of all the series at 1% level of significance. In addition, seven (7) variables were strongly stationary at levels and integrated at the order I(0), while the remaining three (3) variables were stationary at first difference and integrated at the order I(1). Thus, the result rejects the null hypothesis and accepted that certain attributes of the data do not change over time and the time series does not have a unit root and hence stationary in nature. The result has also qualified the market return series to be employed for further analysis without the fear of falsity or weakness in results.

4.2 ARDL Bounds Test for Co-integration Results

This study conducted ARDL bounds test for co-integration and tested the presence of long run relationship between the variables. The results for the test are presented in Table 4.8.

Table 4.2 ARDL Bounds Test for Co-integration Results

Variable	F-Bound test	I(0)	I(1)	t-Bound test	I(0)	I(1)	Model
SR	16.90	3.41	4.68	-9.85	-3.43	-4.79	ECM
TM	25.52	3.41	4.68	-12.31	-3.43	-4.79	ECM
MM	5.71	3.41	4.68	-5.20	-3.43	-4.79	ECM
JA	5.87	3.41	4.68	-5.69	-3.43	-4.79	ECM
SM	25.09	3.41	4.68	-12.19	-3.43	-4.79	ECM

Source: ARDL Bounds Test for Co-integration Results, 2023

From table 4.2, it can be seen that the ARDL Bounds-test was carried out based on unrestricted constant with no trend. The table further shows that the results were presented based on F-bounds test and t-bounds test. Results based on the F-bounds test revealed that for all the five measures of investment performance, the test statistics value is consistently higher than both the lower and upper I(0) and I(1) bounds. The F-bond test result shows cointegration between the variables. Similarly, the t-bound test also shows the absolute values of the test statistics consistently being greater than the lower and upper bounds limits. This results also support the rejection of the null hypothesis of no cointegration between the variables. The existence of cointegration means that an error correction model needs to be estimated to account for long run convergence and equilibrium between the variables.

4.3 Lag Selection Results

An important issue with estimating the ARDL model is determining the optimum number of lags to be used for the variables. Table 4.3 presents results for lag selection based on the five models.

Table 4.3 Lag Selection Results

Variable	LR Statistic	FPE Statistic	AIC	SC	HQC	Lags
SR	4.15	135.08	7.74	7.88	7.80	1
TM	-	1748.49	10.30	10.42	10.35	0
MM	-	855.71	9.59	9.71	9.64	0
JA	24.96	55.11	6.85	6.99	6.91	1
SM	-	36.42	6.43	6.55	6.48	0

Source: Lag Selection Results Eviews10

Table 4.3 shows that for all the five measures of the dependent variable, the Sharpe ratio and Jensen’s alpha fitted for one lag while the remaining three models fitted with zero lag. Hence, only the two fitted models will be retained for the remaining part of the analysis.

4.4 Collinearity Diagnostics

The possibility of collinearity between the regressors was investigated using the variance inflation factors. the VIF values for long run model and error Correction models using Sharpe ratio and Jensen’s Alpha did not exhibit any significant evidence of collinearity among the regessors.

4.5 Regression Analysis Result

In this section we used regression analysis output presented in table 4.5 below to test the hypotheses of this study. Regression analysis was also used to detect relationship between dependent and independent variables.

Table 4.5 Regression Model Result

Variable	Sharpe ratio			Jensen's alpha	
	Coefficient/Std. Error	***t-ratio***	**Variable**	***Coefficient/Std. Error***	***t-ratio***
Constant	-0.09 (0.91)	-0.10	Constant	0.01 (0.58)	0.02
Sharpe ratio (-1)	0.28 (0.10)	2.75***	Jensen's alpha (-1)	0.17 (0.12)	1.36
Exchange rate (-1)	-0.11 (0.08)	-1.30	Exchange rate (-1)	0.14 (0.05)	2.62***
Inflation rate (-1)	-0.01 (0.14)	-0.09	Inflation rate (-1)	0.10 (0.09)	1.08
Interest rate (-1)	1.51 (1.48)	1.02	Interest rate (-1)	-0.07 (0.94)	-0.07
Money supply (-1)	276.87 (467.18)	0.59	Money supply (-1)	-493.55 (296.56)	-1.66*
Recession (-1)	-0.05 (5.69)	-0.01	Recession (-1)	-0.41 (3.61)	-0.11
Error Correction (-1)	-1.07 (0.13)	-8.23***	Error Correction (-1)	-0.85 (0.15)	-5.75***
R-squared		0.42	R-squared		0.34
Adjusted R^2		0.39	Adjusted R^2		0.31
Standard Error		11.29	Standard Error		7.15
Durbin Watson		1.97	Durbin Watson		2.01
F-Statistics		14.80***	F-Statistics		10.79***

Source. EViews Regression Output, 2023

Table 4.5 presented the regression analysis result in respect of the dependent variables (SR) as well as the independent variables (EXCR, INF, INTR, M2 and REC) which describes the summary of the model and their relationships accordingly. The table 4.5 also presented the summary of JA model, and its relationship with 5 independent variables (EXCR, INF, INTR, M2 and REC). The equations of the models are given below:

$$Sharpe\ Ratio = -0.09 - 0.11 * EXCR - 0.01 * INF + 1.51 * INTR + 276.87 * M2 - 0.05 * REC$$

$$Jensen's\ Alpha = 0.01 + 0.14 * EXCR + 0.10 * INF - 0.07 * INTR - 493.55 * M2 - 0.41 * REC$$

4.6 Correction Model Serial Correlation LM Test Results

Serial correlation, also known as autocorrelation, occurs when the regression residuals are correlated with each other. In other words, it occurs when the errors in the regression are not independent of each other. Table 4.6 presents summary of the results for auto-correlation test.

Table 4.6 Error Correction Model Serial Correlation LM Test Results

Sharpe ratio			Jensen's alpha		
	Test Statistic	Prob.		Test Statistic	Prob.
F-statistics	0.87	0.42	F-statistics	1.07	0.35
Obs*R-squared	1.84	0.40	Obs*R squared	2.26	0.32

Source: Error Correction Model Serial Correlation LM Test Results, 2023

From Table 4.6, it can be seen that the F-statistic test for autocorrelation test based on two lags in respect of Sharpe ratio and Jensen's Alpha. The results imply that there is no traces of autocorrelation in the residuals at all level of significance. Thus, the null hypothesis of no serial dependence in the residuals could not be rejected at all levels.

4.7 Correction Model Selection Criteria Statistics

The study had to select between the model based on Sharpe ratio and the one based on Jensen's alpha which one is better. The choice was based on the values of the AIC and SC as presented in Table 4.7

Table 4.7 Error Correction Model Selection Criteria Statistics

Sharpe ratio		Jensen's alpha	
	Test Statistic		Test Statistic
Akaike Information Criteria (AIC)	7.71	AIC	6.76
Schwarz Bayesian Criteria (SC)	7.87	SC	6.92

Source: Correction Model Selection Criteria Statistics

It can be seen from Table 4.7 that the values of AIC for the error correction model is higher for the Sharpe ratio when compared with Jensen's alpha. It can also be seen that the value of SC for the Sharpe ratio error correction model is equally higher than the value of SC for the Jensen's alpha. This shows that the Sharpe ratio model consistently had higher values compared to the Jensen's alpha values. This implies that the Jensen's model is preferred to the model based on Sharpe ratio as the dependent variable because of the lower values of the model selection criteria associated with Jensen's alpha. Therefore, the Jensen's alpha model is selected as against the Sharpe ratio model.

4.8 Discussion of Findings

The statistical tests conducted in this research work revealed that the regresion model used in this study in respect of Jensen's alpha model fits for multiple regression analysis. The result of analysis used in this study appears to be similar to the previous studies on some variables and disagree with the findings of some studies conducted in the past. The result for Jensen's Alpha model is presented in two parts accordingly, the first part shows that Exchange rate and Inflation rate has a positive significant contribution on investment performance of Nigerian banking sector and the study accept the rejection of the null hypothesis and conforms the study of Ouma and Muriu (2014), Ray and Vani (2012) who documented positive contributions and disagree with the study of Osamuonyi and Evbayiro-Osagie (2012).

Conversely, the study established a negative insignificant value for Interest rate Money supply and Recession Meaning that they contributed negatively to investment performance of listed commercial banks in Nigeria. Therefore, the null hypothesis was accepted. The result of the study agrees with the findings of Osamuonyi and Evbayiro-Osagie (2012), Nail (2013) and Forson and Janrattanagul (2014) who reported negative relationship. On the other hand, the result of the study does not confirm the findings of Islam and Watanapalachaikul (2003), Ray and Vani (2012), Ouma and Muriu (2014) and Ditimi, et al. (2018) who reported positive relationship.

The study shows that the coefficient of determination or R^2, is approximately 0.34. This means that the independent variables explain approximately 34% of variations of investment performance of listed commercial banks in Nigeria which is reasonably good for this study. Similarly, the adjusted R^2 for the model, which explains the explanatory power of additional variables, is approximately 0.31. This means that adding additional variable(s) to the model will yield approximately an increase in 31% explanatory power. The findings also reveals that the value of Durbin-Watson is approximately 2.01. This suggests that there is no serious cause for concern with respect to the problem of serial dependence among residuals. The Durbin-Watson value meets the Rule of Thumb requirement that it should be as close as possible to 2.0. Lastly, the table shows that the F-Statistics value of approximately 10.79 is strongly significant at the 1% level. This is an indication that the model is fit. The study shows also that the overall error of estimating the regression model is an abysmal 7.15, which shows that the model is well-specified.

5. Conclusion and Recommendation

The findings of this study improve the understanding of investment performance of the banking sector in Nigeria by providing useful information to investors, regulators and the supervisory authorities. The findings of this study pave a way to a better understanding of macroeconomic variables that has significant effect on investment performance of listed commercial banks in Nigeria by relevant stakeholders in the banking industry and other regulatory authority. It also revealed that the variables used in this study found to be similar to those used in previous studies in Nigeria and other countries.

This study concluded that exchange rate has a vital role to play toward improving the investment performance of listed commercial banks in Nigeria. This is as a result of producing positive coefficient of 0.01 which is statistically significant at 10%. Thus, the study accepted the idea that exchange rate has statistically significant contribution to the investment performance of listed commercial banks of Nigeria during the period of the study. The study also concluded to reject the of null hypothesis **H_{01}** of this study and agree that exchange rate has significant effect on investment performance of listed commercial banks of Nigeria.

Furthermore, the study also concluded that inflation rate is statistically insignificant on investment performance of listed commercial banks of Nigeria. Though, it has contributed positively with approximately 0.10 coefficient value per unit of investment performance but the magnitude of contribution cannot be justified. Therefore, the study disagrees with the assumption that inflation have statistically significant effect to the investment performance of listed commercial banks of Nigeria during the period under study. Thus, the study concluded to accept the null hypothesis (**H_{02}**) that inflation has no significant effect on investment performance of listed commercial banks in Nigeria.

In addition, the study recorded negative and statistical insignificant coefficient value of (-0.07) produced by interest rate. Therefore, the study did not accept the notion that interest rate has statistically significant effect to the investment performance of listed commercial banks of Nigeria during the period under study. Thus, the study concluded to accept the null hypothesis (**H_{03}**) of this study and agree that interest rate has no significant effect on investment performance on listed commercial banks in Nigeria.

The findings of the study established that money supply has contributed negatively on investment performance of listed commercial banks in Nigeria. The magnitude of the negative effect of money supply was recorded at -493.55 per unit of investment performance. But the effect was found to be significant at 1% level. Therefore, the study accepted the idea that money supply has statistical significant effect on investment performance of listed commercial banks of Nigeria during the period of investigation despite the fact that it has negative coefficient value. Thus, the study rejected null hypothesis (**H_{04}**) of this study and concluded that money supply has significant effect on investment performance of listed commercial banks of Nigeria.

The study also found negative coefficient value of (-0.04) in respect to recession which was also statistically insignificant at levels. This study concluded that recession has no significant effect on investment performance of listed commercial banks in Nigeria. Therefore, the study did not confirm the idea that recession have statistically significant effect to the investment performance of listed commercial banks of Nigeria during the period under study. Thus, the study concluded that recession has no significant effect on investment performance of listed commercial banks in Nigeria and therefore, accepted the null hypothesis (**H_{05}**) of this study.

5.1 Recommendation

Findings of this study established the unique contribution of each independent variable towards the investment performance of listed commercial banks in Nigeria. Therefore, in order to ensure that the banking sector in Nigeria will continue to perform significantly and efficiently, the following recommendations are proffered based on the findings of the study.

This study established that exchange rate has made statistically significant positive effect on investment performance in the banking during the period of the study. It is therefore, recommended that the Federal Government of Nigeria and the Central bank of Nigeria should strictly regulate the issuance of US Dollars to BDCs who may divert such currencies to means that may strain the demand for Dollars further. This measure will improve on the value of the naira currency against the dollar in order to encourage local institutions to invest more on the sector than the foreign investors.

During the period of investigation, this study established an insignificant contribution of inflation rate. This may be due to overlap with other independent variables in the model and the study therefore recommends that further investigation on the subject matter should exclude inflation rate as it has no statistical impact on the performance of investment in the banking sector.

Findings of the study revealed that interest rate has negative statistically significant contribution on the investment performance of listed commercial banks in Nigeria. Therefore, the study recommends that investors in the banking sector should have a laid down strategy to mitigate against interest rate volatility in other to improve on their returns.

From the findings of the study money supply has the highest negative beta coefficient value among the independent variables which at the same time statistically significant at 10% significance level, this may result to losses and therefore the study recommends that monetary policies should be put in place by the Central Bank to mop-up excess liquidity in the economy in order to maximize the return of the investments in the sector and investors in the sector must undertake strategies such as hedging exposures in other to mitigate such eventualities that may be caused as a result of changes in the supply of money.

The study recommends that the Federal Government of Nigeria should try as much as possible to focus their national economic policies to address subsequent recession in Nigeria, as recession does not only affect the performance of investment in the sector but also impact all the macroeconomic determinant that influences investment performance in the banking sector.

The stakeholders and investors in the banking sector should focus their analysis on the macroeconomic variables which have an adverse impact on the performance of the sector and the policy makers and regulators of the sector should come up with policies that will regulate the macroeconomic determinants of investment performance, the investors are also recommended to diversify their investment in other to offset any risk associated with adverse price movement. The study finally recommends the use of Jensen's alpha as the risk-adjusted measure that fully analyses the performance of investment against other ratios employed by this study.

Suggestions for further research

1. This study was limited to the listed commercial banks in Nigeria (NSE Banking Index) in order to have a microscopic view of performance of investment in the banking sector, however, the Nigeria stock exchange consist of several other sectors and therefore this study suggests that further studies should be conducted for other sectors in order to fully understand the relationship the selected macroeconomic variables will have on the other sectors.
2. This study also suggest that further studies should be conducted using several other relevant macroeconomic variables that is found to be specifically related to another sector in the Nigerian stock market.
3. Since this study utilized only economic recession as the moderating variable, this study suggests further investigation on the subject matter using other economic turbulences as the moderating variables such as COVID-19 pandemic.
4. This study also suggest that further studies should be conducted on the impact of specific macroeconomic shocks on different bank segment.
5. Lastly, the study further suggests analyzing the effectiveness of various risk management strategies during recessions

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