Macroeconomic Augmented Capital Asset Pricing Model in Nigeria Capital Market

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ABSTRACT

The study examines how augmentation of capital asset pricing model with macroeconomic variables: interest rate, inflation rate and exchange rate could explain stock return variation for Nigeria market spanning period January 2003 to December 2023 using ordinary least square regression method. The dependent variable is proxy with six sort size-value portfolios while the explanatory variables are market premium, interest rate premium, inflation rate premium and exchange rate premium. Regression results shows inflation rate premium and exchange rate premium are statistically significant for macroeconomic augmented CAPM while market factor is statistically significant for capital asset pricing model. Also, GRS test result reveals macroeconomic augmented capital asset pricing model is the superior model for explaining stock return variation in Nigeria market. Hence, it can be recommended that Government should roll out policies that will enhance management of inflation rate and exchange rate as they are very critical to growth of any economy and development of capital market.

1. INTRODUCTION

The yearn for optimal investment decision, return maximization and utility maximization have given rise to pricing of assets using different factors ranging from market factors, non-market factors, cognitive factors, social and ethical factors, with the aim of getting returns that satisfies the investors preferences and utility. Maringer (2004) opined a major issue in finance ever since] is what could be used to explain past returns and reliably forecast future returns while Markowitz (1991) surmised uncertainty cannot be eliminated in analysis of investment behavior and investor who can easily predict future returns will invest in one security that will give the highest future returns.

Asset pricing factors depicts function of factors that shows sensitivity of factors in relation to asset returns. The pricing factors can be classified as market factors, economic factors and fundamental factors. The market factors are the risk element affecting the whole market, economic factors are the macroeconomic indicators that directly impact on the capital market while the fundamental factors are the firm specific factors (financial or accounting indicators) that are directly related to firms. The asset pricing factors shows risk elements embedded in the capital market, economy and firms.

Market premium is the difference between the market return and the risk-free rate. Chib and Zeng (2020) opined that explanation and measurement of risk premium for cross section of assets has been the ultimate goal of theoretical and empirical finance. The macroeconomic factors are macroeconomic indicators that impact directly on firm performance, stock returns and equally depict strength of the economy. Oladosu and Akeerebari (2022) opined that macroeconomic factors are variable indices germane to the whole economy with direct impact on the various economic activities both at individual and firm level. Stock return is the expected gain in investing in a stock or change in value of a stock over a period of time. Okumu and Onyuma (2015) believed that investors envisaged return on investment which are majorly determined by different risk source in the market. Hence the basis of all investment decisions lies in risk-return relationship and this study is motivated to illustrate evidence on how market premium, interest rates, inflation rates, and exchange rate can be used to determine excess stock returns in Nigeria capital market.

Every investor anticipates to get optimal return from every investment decision irrespective of risk consideration employed in making such investment decisions. Investors employed various strategies in arriving at investment choice that gives optimal returns.

Likewise, the risk appetite of investor and knowing risk embedded in investment choice shows extent to which a potential investor can trade off risk to get likely optimal returns.

Historically, capital asset pricing model can be regarded as the benchmark model for formulating and augmenting other models to get other asset pricing models in existence. Capital asset pricing model was formulated to solve setback of Markowitz mean-variance efficiency which specifies mean and variance as determining factors that explains variations in stock returns. Sharpe (1964) and Litner (1965) formulated CAPM with argument that the most purposeful risk factor in explaining variation of stock return is beta (market risk). Beta measures volatility and sensitivity of market return in determining stock return variation. The beta shows relationship between risk and market returns only and sees market factor as only factor that determines returns variation without considering other possible factors that could influence variation of stock returns.

However, with the global acceptance of CAPM, it has failed to account for volatility in the economy and within the firm operation activities to determine variation in stock returns. The non-consideration of macroeconomic variables in CAPM has birthed motivation for this study to form a four-factor model; macroeconomic factor augmented capital asset pricing model.

Macroeconomic variables are very germane in an economy because they serve as a pivotal indicator to growth and strength of a country and have direct impact on all activities of various sectors of economy. Inflation rate, exchange rate and interest rate are believed to be vital variables upon which economic and financial activities within an economy lies and equally have direct relationship to savings and investment decisions in an economy. This study wants to examine how market factor, interest rate factor, inflation rate factor and exchange rate factor explains variation in stock returns for Nigeria capital market, and compare the performance of capital asset pricing model with macroeconomic factor augmented capital asset pricing model for Nigeria capital market.

The central objective of this study is to investigate sensitivity of macroeconomic factors in determining best factors that could explain variations in stock return for Nigeria capital market spanning period January 2013 to December 2022. The study attempts to focus on actively traded stocks in Nigeria group exchange within the sample period. Aside the limitation in the study period, the appropriateness of the variable proxies for macroeconomic variables may constitute limitation of study. The remainder of the paper proceeds as follows: Section two presents literature review, section three shows research methodology, while section four explains results and   discussion. Finally, section five explains the conclusions and recommendation.

2. LITERATURE REVIEW

Conceptual Review.

Asset pricing factors depict the risk element in asset pricing model while asset pricing model shows relationship between asset pricing factors and return on security. Asset pricing models: Capital asset pricing model and macroeconomic augmented CAPM will be used to show risk-return relationship in relation to determination of future stock returns. The Capital asset pricing model will be used to evaluate market premium while enhanced version of CAPM with macroeconomic variables will be used to evaluate macroeconomic factors and market premium together.

Market factor is the risk premium that has element of risk-free rate and market return which shows sensitivity of market premium in relation to expected return on a security while macroeconomic factors show sensitivity of macroeconomic variables of an economy in relation to return on a security.

The macroeconomic factors bring to fore the way an economy being managed can influence the return on a security. The macroeconomic indicators do have direct impact on asset pricing and stock returns in aspect of making investment choice and savings. The inflation rate shows the purchasing power in relation to stock investment, interest rate shows the tradeoff of savings to investing in stock returns, while exchange rate has relationship with asset pricing in relation to placing investment and repatriation of dividend by foreign investors in the capital market. These variables were chosen because of direct impact they have on performance of capital market, firms and stock returns.

Hence, combination of market factors with macroeconomic variables are expected to reveal capital market condition and performance of economy with respect to determination of future expected return.

Theoretical Review.

Capital Asset Pricing Model (1964).

Asset pricing model emanated from the empirical work of Sharpe (1964), Litner (1965) and Mossin (1966) that formulated capital asset pricing model (CAPM) as cornerstone which other asset pricing models were developed. Perold (2004) believed capital asset pricing model provided the most important empirical fact in finance for answering question relating to risk-return relationship. There are certain assumptions that must hold for capital asset pricing model to perform: all investors are risk averse, perfectly competitive market, no transaction costs, no taxation, free access to information, and risk-free borrowing and lending.

The model for capital asset pricing model can be represented below:

$$Er_{it} = Rf_{it} + \beta[Rm_{it} - R_f] + \varepsilon_{it} \tag{1}$$

Where:

Er_{it} is total return of a stock or portfolio i at time t,
Rf_{it} is risk-free rate of return at time t,
Rm_{it} is total market portfolio return at time t and
ε_{it} is the error term at time t.

Arbitrage Pricing Theory (1976).
Ross (1976) formulated arbitrage pricing theory by arguing against capital asset pricing model that aside beta factor, there are certain economic factors that could be considered when pricing asset and making investment decision. Ross (1976) used a linear relationship of multifactor model to determine expected return on an asset by introducing macroeconomic variables to augment capital asset pricing model. Gokgoz and Sezgin-Alp (2014) opined arbitrage pricing theory serves as multi factor market model which explains expected stock return in relation to macroeconomic factors. Arbitrage pricing theory is a multifactor model that considers economic factors that causes volatility in the market in relation to expected return on an asset. Ross (1976) opined that arbitrage model was developed as an alternative to capital asset pricing model that has become the pivotal analytical tool for determining future expected returns in a typical market for risky assets. One of the significant contributions of arbitrage pricing theory is that it is less restrictive and has few assumptions compared to capital asset pricing model because it uses macroeconomic variables as risky factors in comparison to capital asset pricing model that considers market risk (beta) as solely risk factor to capture stock return variations. Groenewold and Fraser (1997) argued that what makes arbitrage pricing theory to be appealing is that it allows selection of macroeconomic factors to be used for study at the discretion of the researchers, while Dyrymes, Friend and Gultekin, (1987) contend that number of securities portfolios determines the number of factors that are priced.

The model for arbitrage pricing theory can be represented below:

$$E_r = R_f + \beta_1 [R_1] + \beta_2 [R_2] + \cdots + \beta_n [R_n] + \varepsilon_i \qquad (2)$$

Where: Er is expected stock return,
R_f is risk-free rate,
β_n is sensitivity of the macroeconomic variables,
Rn is macroeconomic variables and,
ε_i is the error term.

Empirical review and gap in the literature.
Empirical Review.
Adaramola (2011) investigates timpact of macroeconomic indicators on stock prices in Nigeria employing pooled panel model which has the ability to combine both time series and cross-sectional data on six macroeconomic variables: money supply (broad money), interest rate, exchange rate, inflation rate, oil price and gross domestic product (GDP) for the period 1985 and 2009. The empirical findings revealed macroeconomic variables have varying significant effects on stock prices of individual firms in Nigeria by concluding that oil price, exchange rate, gross domestic product and interest rate have significant effects on stock prices in Nigeria.

Benaković and Posedel (2010) examined if macroeconomic factors matter for stock returns. The paper analyzes returns on fourteen stocks of the Crotian capital market for period January 2004 to October 2009 using inflation, industrial production, interest rates, market index and oil prices as factors. The results revealed market index is statistically significant for all the stocks and a positive relation to returns. Interest rates, oil prices and industrial production also showed a positive relation to returns, while inflation had a negative influence. The most important factors affecting stock prices in Croatian stock market proved to be the market index, interest rates, oil prices and industrial production.

Dada, Mokuolu, Alabi and Miracle (2021) examined the presence of arbitrage pricing theory and volatility in Nigerian stock market between 1986 and 2018 using classical Ordinary Least Square. The study used stock returns as dependent variable and oil price, exchange rate, inflation rate, interest rate, industrial output and real gross domestic product as independent variables. The findings revealed industrial output is the only variable that explains changes in stock returns while other macroeconomic variable does not explain changes in stock returns. The study concluded that arbitrage pricing theory is valid in Nigerian stock market.

Elgiziry and Awad (2017) investigated test of arbitrage pricing theory in Egyptian stock exchange duri]ng the period 2007-2013. The study used principal component analysis and ordinary least square regression technique statistical method to examine macroeconomic variables that should be included in arbitrage pricing theory model for Egypt. The result findings showed that growth rates of Consumer price index (inflation rate), and price of brent crude petroleum are significant and valid for arbitrage pricing theory in Egypt while money supply, short-term interest rate, discount rate, exchange rate are insignificant for arbitrage pricing theory model in Egypt.

Gbadebo and Oyedeko (2021) examined the economic risk factors and expected return, emphasizing Nigeria's upside and downside market conditions. The study adopted an experimental research design. All quoted companies in Nigerian Group Exchange (NGX) served as population of study from December 2005 to December 2018. The study applied Ordinary Least Squares (OLS) technique in estimating parameters both at first and second pass regression models. The result revealed existence of observed and unobserved

risk factors in the upside and downside market in Nigeria. The study documents that economic risk significantly commands a market premium in both upside and downside market phase. The study concluded economic risk factors significantly explain average returns variations in Nigerian capital market.

Imran, Wu, Zhang, Zhao, Jehan, and Moon (2021) examined the equity industry premium of seventeen non-financial sectors covering sample 306 firms using monthly data from January 2002 to December 2018. Two-stage least square (2SLS) method is applied to estimate the macro-based multifactor model. It is found that market premium and interest rate factors are significantly affecting industry equity premium of all the non financial sectors.

Kalam (2020) examined the effects of macroeconomic variables on stock market returns: Evidence from Malaysia's stock market return performance during the period year 2000-2019. The study employed multiple regression analysis technique on macroeconomic variables: gross domestic product, interest rate, inflation, exchange rate, and foreign direct investment with focus on effects of macroeconomic variables on stock market return. The findings showed that all the macroeconomic variables are significant and can be used to predict stock returns in Malaysia.

Mumo (2017) examined sources of risk factors that determine stock returns in emerging market of Kenya. The factors examined are excess market premium and selected macroeconomic factors: inflation rate, exchange rate, money supply and short-term interest rate. The study applied monthly time series data for period April 1996 to December 2016. The capital asset pricing model, a multifactor approach and Fama and MacBeth (1973) two-step procedure were used for data analysis. The study findings revealed capital asset pricing model cannot be rejected while market premium is the most important factor in explaining stock return variability in Kenya.

Musa and Okologume (2020) examined the test for validity of arbitrage pricing theory (APT) in Nigeria Banking Industry during the period year 2009 to 2019. The study used OLS regression method and macroeconomic variables used are exchange rate, inflation, money supply and real gross domestic product (GDP). The study findings showed revealed all the macroeconomic variables are significant with exception of exchange rate, can be used to explain changes in stock return of the banking sector in Nigeria capital market.

Torbira and Agbam (2017) examined macroeconomic risk factors and stock returns employing arbitrage pricing approach for period year 2002-2014. The study applied ordinary least squares technique for analysis of data using monthly data for period January 2002 to December 2014. The results of empirical validity of macroeconomic variable model showed that all the factors: capitalization, lending rate, deposit rate, interest rate differentials, inflation rate, exchange rate, premium motor spirit and treasury bill significantly influence the variations in average stock return.

Research Gap.

The unending controversy quest for most effective risk factor and factor model that clearly explains variations in stock returns remains unresolved amongst finance professionals and academics. This study seeks to address this gap by applying multifactor pricing model to investigate explanatory power of factors in macroeconomic augmented capital asset pricing model within context of Nigeria market. The choice of Nigeria capital market is motivated by classification of Nigeria market as a frontier market characterized by volatility, policies inconsistencies, monetary policy issues, growing economy and information asymmetry. Despite various previous literatures focusing on capital asset pricing model, the macroeconomic augmented CAPM have not been extensively examined in Nigeria especially with the usage of sort size-value portfolios as dependent variable. This study contributes new insights by augmenting CAPM with interest rate, inflation rate, exchange rate and examining model performance comparison of macroeconomic augmented CAPM with standard CAPM. Principally, based on available existing literatures and to best of researcher's knowledge, no prior study has undertaken a model performance comparison between CAPM and macroeconomic augmented CAPM using sort-size value portfolios for Nigeria market. Furthermore, evidences from prior study regarding the efficiency of augmented CAPM yields inconclusive results. Mumo (2017) and Imran, Wu, Zhang, Zhao, Jehan, and Moon (2021) study showed that market premium is significant to determination of stock returns, while Kalam (2020) and Musa and Okologume (2020) showed that interest rate and inflation rate is significant to stock return variation and Chakraborty and Gupta (2017) study showed that inflation and interest rate is insignificant to stock return variation. Therefore, this study seeks to address the gap by examining sensitivity of interest rate, inflation rate, exchange rate and market premium in explaining and predicting stock return variations and by examining model performance of macroeconomic augmented CAPM against standard CAPM for Nigeria market.

3. RESEARCH METHOD

Empirically, this study seeks to show how market premium, interest rate, inflation rate and exchange rate could assist in defining future expected average return of stocks for Nigeria market. The statistical approach for this study would be ordinary least square regression method while robustness check will be done with Gibbons, Ross and Shanken (GRS) test.

The study would employ time series secondary monthly data of stocks traded on Nigerian Exchange Group (NGX) that covers period January 2013 to December 2022. The study selected 100 company stocks from listed firms on the Nigeria exchange limited to represent the sample size for the study out of 154 listed firms on Nigeria group exchange. The selected firms comprise both financial and non-financial firms on NGX.

The independent variables of the study are proxy with interest rate premium, inflation rate premium, exchange rate premium and market premium while the dependent variable is proxy with six portfolios based on sort size (market capitalization). The 6-portfolio is formed by the intersection of size (small and big capitalized firms) with value of the firms (value stock, mid stock and growth stock) in a 2 X 3 matrix portfolio to form six portfolios (SH, SM, SL, BH, BM BL). This portfolio model is chosen because it represents both the size and profitability of the listed firm stocks. The data used for the study is sourced from Central Bank of Nigeria (CBN) Statistical bulletin and Nigerian Exchange Group data bank.

Model Specification.

For the purpose of this study, this study would employ macro based multifactor regression model. One of the disadvantages of macroeconomic factor model is that there are no specific rules as regards selection and number of macroeconomic variables to be used. The model representations are below:

$$E_{rt} - R_{ft} = \alpha_i + \beta_0[R_{mt} - R_{ft}] + \beta_1 [INTR] + \beta_2 [INFR] + \beta_3[EXR] + \varepsilon_i \qquad (3)$$

$$E_{rt} - R_{ft} = \alpha_i + \beta_0[R_{mt} - R_{ft}] + \varepsilon_i \qquad (4)$$

Where:

$R_{mt} - R_{ft}$ is market premium at time t,

$E_{rt} - R_{ft}$ stock returns at time t,

INFR is change in inflation rate,

INTR is change in interest rate,

EXR is change in exchange rate,

ε_i is the error term at time t and,

$\beta_0, \beta_1, \beta_2, \beta_3$ represents the coefficients of the pricing factor

GRS Test

Following Merton (1973), an efficient asset pricing model produces an insignificant coefficient. Gibbons, Ross and Shanken (1989) tested this by computing F-statistic of the GRS test with mathematical expression:

$$GRS = \left|\frac{T}{N}\right| \left(\frac{T-N-L}{T-L-1}\right) \left(\frac{\acute{a} \sum^{-1} a}{1 + \acute{\upsilon} \, \Omega^{-1} \, \upsilon}\right) \sim F(N, T - N - L) \quad (5)$$

Where T denotes number of observations, N stands for number of portfolios, L signifies number of independent variables, 'a' represents the vector of the constants of the portfolio regressions, $\sum$ means the covariance matrix of the residuals of the portfolio regressions, υ denotes mean vector of the explanatory variables and Ω represents the covariance matrix of explanatory variables. GRS test has F- statistic distribution with degree of freedom T-N-L; with null hypothesis that all regression constants are not different from zero. Some other parameters employed to know which model is better are adjusted R^2, average standard error and mean absolute value of the constants.

4. RESULTS AND DISCUSSION

This section part interprets and explain outcome of regression estimates, focusing on explanatory power of capital asset pricing model and macroeconomic augmented capital asset pricing model.

Descriptive Statistics.

Table 1 shows descriptive statistics results. The table shows market premium has negative mean value translating to no presence of market factor for explaining future stock returns while interest rate premium, inflation rate premium and exchange rate premium possess positive mean values translating to macroeconomic factors could be used to explain average return of future stocks.

Table 1. Descriptive Statistics

	MKT	INTR	INFR	EXR
Mean	-0.000932	0.008554	0.001077	0.002765
Median	-0.003358	0.000945	-0.001844	0.002156
Maximum	0.608983	1.071687	0.509295	0.47163
Minimum	-0.517688	-0.755132	-0.609139	-0.666896
Std. Dev.	0.127358	0.175257	0.106349	0.107248

Source: Author's compilation from Eviews

Correlation Matrix.

Table 2 present result of correlation matrix. The result showed that all factors are positive and strongly correlated with each other.

Table 2. Correlation Matrix

	MKT	**INTR**	**INFR**	**EXR**
MKT	1	0.51922	0.845153	0.773031
INTR	0.51922	1	]0.611342	0.560628
INFR	0.845153	0.611342	1	0.861541
EXR	0.773031	0.560628	0.861541	1

Source: Author's compilation from Eviews

Unit root test.

Test for stationarity was tested by employing Augmented Dicker fuller test and Philip Perron tests. The test results shows that all the variables are stationary at level form I(0) and do not contain unit roots.

Patterns of Average Returns of the Portfolios.

Table 3 result shows presence of size effect for small capitalized growth stocks which translate to small firms can give large variation for stock returns in Nigeria capital market.

Table 3. Average Excess Return Values for Portfolios

	SH	**SM**	**SL**	**BH**	**BM**	**BL**
Mean	-0.00058	-0.001869	0.000689	-0.000376	-0.000817	-0.000553
Std. Dev.	0.10776	0.106251	0.109943	0.110707	0.108222	0.110331

Source: Author's compilation from Eviews

Regression Results.

Regression Result for Macroeconomic Augmented CAPM.

Table 4 present the regression estimates for the macroeconomic augmented CAPM. The result showed that portfolio intercept all have negative values meaning that sensitivity of the model against portfolios shows an inverse relationship. Also, market premium for all the portfolios shows negative coefficients and the market premium is statistically insignificant. This could mean that market premium has negative sensitivity translating to the unit increase in market premium will also lead to decrease in portfolio return and market premium could not be used to explain stock return variation. However, all the macroeconomic variables have positive coefficients translating to positive sensitivity while inflation rate premium and exchange rate premium are the only factors statistically significant for all the portfolios. This can de deduced that inflation rate and exchange rate are very important pricing factors to be considered when considering making investment in Nigeria market. Also, the Adjusted R-squared shows that the model has strong explanatory power to explain stock return variation.

Table 4. Regression Estimates for Macroeconomic Augmented CAPM

Portfolios	Variable	Intercept	MKT	INTR	INFR	EXR	Adj. R-squared
SH	Coeff.	-0.0027	-0.1237	0.0199	0.5741	0.4620	
	Prob.	0.5470	0.0723	0.5485	0.0001	0.0001	
							0.7868
SM	Coeff.	-0.0042	-0.1834	0.0381	0.6179	0.4404	
	Prob.	0.3528	0.008	0.2508	0.0001	0.0001	
							0.7824
SL	Coeff.	-0.0016	-0.1009	0.0462	0.5949	0.4077	
	Prob.	0.7381	0.1511	0.1761	0.0001	0.0001	
							0.7854
BH	Coeff.	-0.0037	-0.6148	0.0306	0.8202	0.5632	
	Prob.	0.5441	0.0001	0.483	0.0001	0.0001	
							0.6521
BM	Coeff.	-0.0042	-0.5931	0.0519	0.7064	0.6048	
	Prob.	0.4771	0.0001	0.2309	0.0001	0.0001	
							0.6414
BL	Coeff.	-0.0038	-0.5264	0.0290	0.6828	0.6502	
	Prob.	0.5056	0	0.4862	0	0	
							0.6808

Source: Author's compilation from Eviews

Table 5. Average return regression estimates for Macroeconomic Augmented CAPM

Portfolio		Intercept	MKT	INTR	INFR	EXR	Adjusted R-Squared
Avrg. Return	Coeff.	-0.0042	0.8155	0.0198	0.0919	0.1065	
	Prob.	0.3177	0.0001	0.5156	0.3448	0.1772	
							0.8794

Source: Author's compilation from Eviews

Regression Estimates of Capital Asset Pricing Model (CAPM).

Table 6 shows result of regression estimates for CAPM. The tables shows that market factor is statistically significant for all portfolios and the market factor coefficients value for all portfolios have positive values showing that market premium has positive sensitivity while the intercepts of the models show negative values for all the portfolios. This shows that market premium is highly important for prediction of stock returns in Nigeria market when using capital asset pricing model.

Table 6. Regression Estimates For CAPM

Portfolios	Variable	Intercept	Mkt	Adjusted R-Squared
SH	Coeff.	-0.0001	0.5965	
	Prob.	0.9972	**0.0001**	
				0.4926
SM	Coeff.	-0.0013	0.5666	
	Prob.	0.8522	**0.0001**	
				0.4567
SL	Coeff.	0.0013	0.6173	
	Prob.	0.8585	**0.0001**	
				0.5071
BH	Coeff.	-0.0001	0.3525	
	Prob.	0.996	**0.0001**	
				0.1573
BM	Coeff.	-0.0005	0.3363	
	Prob.	0.9562	**0.0001**	
				0.1494
BL	Coeff.	-0.0002	0.3995	
	Prob.	0.9841	**0.0001**	
				0.2059

Source: Author's compilation from Eviews

Table 7. Average return Regression estimates CAPM

Portfolio		Intercept	Mkt	Adjusted R-Squared
Avrg. Return	Coeff.	-0.0035	0.9639	
	Prob.	0.4153	0.0001	
				0.8732

Source: Author's compilation from Eviews

Robustness Check Result.

This robustness check shows and validate the regression result. Evidenced from Table 5 and Table 7, average return of all the stocks will be used as portfolio to check robustness of the model. The regression of average return revealed market factor is the only statistically significant factor for both macroeconomic augmented model and capital asset pricing model. This can be deduced that market premium is very important in determining future stock return for Nigeria market when averaging all the stocks as a single portfolio.

Table 8. GRS Test Robustness Check Result

	GRS	|α|	s(α)	Adj. R-squared	R-critical value
MACRO-CAPM	-6.9860	0.0203	0.0314	0.72	2.455
CAPM	7.4041	0.0033	0.0487	0.32	3.9258

Note: *GRS is GRS statistic, | α | is average absolute value of the intercept, and s (α) is average standard error of the intercept and* $\overline{R}$ *is average adjusted R squared.*

As evidenced in Table 8, the GRS result of macroeconomic augmented CAPM is less than the critical value at 0.05 F distribution which signify the model can capture variation of both asset and portfolio returns. Also, the average Adjusted R-squared for macroeconomic augmented capital asset pricing model is greater than that of capital asset pricing model. Thus, robustness test result showed that macroeconomic augmented CAPM is superior in explaining excess return of stock portfolios in Nigeria capital market.

5. CONCLUSIONS AND RECOMMENDATION

The study seeks to examine the effective asset pricing factors (market premium, interest rate premium, inflation rate premium and exchange rate premium) when CAPM is augmented with macroeconomic variables and the best asset pricing model amongst augmented CAPM and standard CAPM that could assist in determining stock returns in the Nigeria. The study finds that inflation rate factor and exchange rate factor are statistically significant for the macroeconomic augmented CAPM and R-squared for all the portfolios have strong explanatory power compared to standard CAPM that has market factor as the only statistically significant factor with a weak R-squared value. The result of the macroeconomic augmented CAPM is in line with Ross (1976) that says addition of macroeconomic variable could explain better variation of stock returns while the standard CAPM result is in line with Sharpe (1964) that says market factor is the only significant factor for explaining variation in stock returns. Also, the GRS test revealed that macroeconomic augmented CAPM is the superior model in explaining stock return variation compared to the capital asset pricing model. In addition, the sensitivity of all the macroeconomic factors has positive coefficients for macroeconomic augmented CAPM. Hence, it can be recommended that Government should focus more on management of inflation rate and exchange rate through robust monetary policies that could assist both the market and investors in making informed decision that gives better returns.

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