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MODERATING THE EFFECT OF SHORT SELLING STRATEGY ON THE RELATIONSHIP BETWEEN THE RISK AND RETURN IN THE NIGERIAN STOCK MARKET

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The study looked at how short selling affected the link between risk and return in the Nigerian stock market. Secondary data was gathered from sources such as Standard & Poor's, NGX websites, and the CBN statistical bulletin. Fama-French Two-Step regression approach was used and it was found that short selling had a negative and statistically negligible influence on returns, according to the study. However, when used as a moderator, it lowered systematic risk slightly while improving the link between systematic risk and return in the Nigerian stock market. Short selling also lowered unsystematic risk and enhanced the link between unsystematic risk and return across multiple models. Unsystematic risk had a favorable and large impact on the Nigerian stock market's predicted returns. Unsystematic risk influenced predicted returns in the Nigerian stock market in a positive and significant way. According to the research, a short-selling investing technique can be implemented efficiently in the Nigerian stock market to maximize rewards while limiting risk. Unsystematic risk is not always diversified, but it demands a premium in the Nigerian stock market, since investors that take such risks are rewarded. The study advises investors to pay particular attention to how their investment returns correspond with several types of risk, such as unsystematic and non-market hazards, in addition to systematic risk. Implementing a well-managed short-selling investing plan can boost stock market performance.

Keywords: *Short selling strategy, Systematic Risk, Unsystematic Risk, Return, and Fama-French Two-Step regression approach*

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Introduction

Several developments, including market forums, index reviews, fee structures, and market education programs have been launched in emerging markets, particularly the Nigerian stock market. These actions have increased the market's appeal as a practical fundraising alternative and as a source of economic data to gauge government performance (NSE Outlook, 2021). It's important to remember, though, that these changes do not by themselves render the Nigerian stock market effective. In the context of stock markets, efficiency refers to more than only technical, operational, or market modifications. It instead centers on the idea of information efficiency, which denotes that information moves unimpeded and for no charge (Ejem et al., 2020). This suggests that no investor can outperform the market using insider knowledge that is not shared by other participants. Investigations have uncovered unmistakable proof of insider trading in the Nigerian context, which is defined as the use of secret information to gain an edge in arbitrage profits or disproportionate gains at the expense of less privileged participants (Bello, 2016; Ekundayo et al., 2020, and others). Insider trading may cause asymmetric knowledge to spread widely over time and prevent current prices from accurately reflecting the information that is currently accessible. This in turn calls into question the assumption of the risk-return connection and undermines the effectiveness of a Nigerian market that is operating effectively.

External elements are associated with firm success and market information, whereas internal impacts generally come from human behaviour such as overconfidence, conservatism, availability bias, herding effects, etcetera which affect investors' decisions. According to numerous studies, conservatism has a negative effect while overconfidence, availability bias, herding effects, and investors' sentiment have positive and significant effects on the risk-return relationship in the Nigerian stock market (Evbayiro-Osagie & Chijuka, 2021; Emanuel & Ahmed, 2020; Alajewu et al., 2017, among others). Investors can use a variety of investment methods in addition to behavioral characteristics to outperform the market and generate abnormal gains. According to Sarpong (2017), active investment methods take into account how investors might profit from the fact that asset prices aren't always precisely valued in order to generate abnormal returns.

The significance of active investment strategies in influencing the behavior of the financial markets. Due to the low volatility anomaly that resulted from the use of these tactics, academics and researchers are interested in learning more about how investment methods have contributed to it. Some contend that short sellers are responsible for regulating market volatility by shorting stocks when their prices rise above their intrinsic worth. Rahim (2018) argues that restricted short

selling makes it necessary for prices to reflect bad news and correct overpriced stock prices. Stock prices and market efficiency are significantly influenced by unrestricted short-selling opportunities. Researchers from all over the world have looked into how short-selling affects financial markets in both developed and developing nations. Studies by Shkilko et al. (2012), Cho and Kwak (2017), Chague et al. (2019) and others have shown that short-selling practices had destabilizing consequences that resulted in large price pressures and increased volatility. It is still unclear how much short-selling operations influence the market's price volatility and improved the return.

Thus, the present study extend the frontiers of knowledge beyond direct effect of short selling on risk and return to moderating effect of short selling on risk and return in the Nigerian stock market, this study seeks to provide new knowledge to this continuing discussion.

In view of this, the contributions of this study are as follow; to examine the moderating effect of short selling on systematic risk and return. In addition, to investigate the moderating effect of short selling on unsystematic risk and return. Fama-French two-step regression approach under CAPM, three-factor and five-factor model were used to show robustness in the estimation. More so, the study considered the interaction of short selling between systematic and unsystematic risks as a tool for investment performance through minimization of risk and maximization of return in the Nigerian stock market. To fulfil the objective of the study, the remaining part of the study are as follows; section two presents the relevant literature review, section three documents the methodology, section four outline the result and the discussion of findings and section five presents the conclusion and recommendation.

Literature and Hypotheses

In their 2016 study, Lee and Wang concentrated on day trading short sales in the Korean stock market. Using panel data regression, they discovered that day trading and short selling accounted for 42% of all shares that had been sold for short. In general, even after accounting for transaction costs, individual day traders were able to make money by short selling. The study also discovered that short selling was more common and generally more successful than long selling. According to the study's findings, day trading long selling was less profitable as trade volume rose than day trading short selling was.

Bohl et al. (2016) specifically focused on German financial institutions during the financial crisis as they investigated the effect of short selling regulations on the volatility of stock returns. They used asymmetric Markov-switching GARCH models and discovered that, particularly for stocks subject to short-selling restrictions, the financial crisis led to higher volatility

persistence. The study came to the conclusion that restrictions on short sales did not help keep stock values stable during bear markets. Cho and Kwak (2017) investigated the impact of short selling and stock lending and borrowing (SLB) on stock returns in Korea. They discovered through regression analysis that concentrated groups with high SLB and short sales displayed greater anomalous returns (AR) with adverse consequences as compared to comparative groups after short sales took place. The study concluded that short-selling bans did not contribute to stabilizing stock prices during market downturns.

Cho and Kwak (2017) investigated the impact of short selling and stock lending and borrowing (SLB) on stock returns in Korea. They discovered through regression analysis that concentrated groups with high SLB and short sales displayed greater anomalous returns (AR) with adverse consequences as compared to comparative groups after short sales took place. They came to the conclusion that short selling had a big impact on the stock market.

In the US stock market, Deshmukh et al. (2017) looked into the connection between short selling and seasoned equity offerings (SEOs). They used t-tests and discovered that companies who saw significant spikes in short interest before SEO announcements had lower announcement-period returns as well as worse long-term operating and stock price performance. According to the study's findings, this adverse association was more pronounced in the long-term operating and stock price performance. The study concluded that this negative relationship was more pronounced for shelf offers.

On the Taiwan stock market, Wang, Lee, and Zhao (2018) investigated the connection between short selling and stock trading. They employed regression analysis and discovered considerable annualized mean returns from pair trades using Taiwan 50 Index positions. They also noticed that the liberalization of short sales resulted in an increase in pair trading activity, which decreased the profitability of pair trading techniques. The relationship between short selling and momentum in US stocks was examined by Zhu et al. in 2019. Consistent momentum strategies outperformed inconsistent momentum strategies according to the Fama-French three-factor regression model, which they used to arrive at their findings. They came to the conclusion that equities subject to more stringent short-sale restrictions significantly affected momentum and that a risk-managed form of steady momentum appeared to be resistant to market crashes.

In the Brazilian stock loan market, Chague et al. (2019) looked at institutions' and individuals' short-selling abilities. Strong evidence of short-selling expertise was shown using panel data regression, with skilled short-sellers exhibiting performance persistence. The study came to the conclusion that knowledgeable

short-sellers tended to steer clear of liquid, volatile, and losing equities and did not exhibit the disposition effect. Hu and Chi (2019) investigated the function of short-selling activity in cross-predictability and information transfer on the Chinese stock market. Panel data regression revealed that future abnormal returns of non-shortable peer firms in the same industry were inversely correlated with industry-level short flow. They came to the conclusion that information about associated enterprises was helpful in short-selling activity.

The significance of market anomalies in shorting techniques in the US was evaluated by Wu and Zhang in 2019. The relative short interest-return relation across stocks and substantial relative short interest were both explained by market anomalies, according to a Fama-MacBeth regression analysis. They concluded that short sellers exploited market anomalies and possessed additional valuable information for predicting stock returns. Goyenko and Schultz (2020) looked at the connection between stock returns, idiosyncratic volatility, and short-selling expenses. They discovered that borrowing money was more difficult for stocks with significant idiosyncratic volatility and that the connection between idiosyncratic volatility and returns was largely dependent on the capacity to short. Ye et al. (2020) investigated how margin trading and short selling affected the individual stock trading liquidity in China. In general, liquidity improved once limitations on leveraged trading were lifted, according to regression research, but margin trading and short selling had the reverse effects, with short selling lowering stock liquidity.

In 2020, Hackney, Henry, and Koski investigated how informed or arbitrage short selling affected equity markets. Convertible arbitrage short selling was linked to both negative contemporaneous returns and positive future returns, according to linear regression analysis. Future returns were inversely correlated with short selling on days when earnings were announced. The effect of short selling on the method of price discovery in the Borsa Istanbul (BIST) market was examined by Sahin and Kuz in 2021. They discovered that short selling increased information efficiency by lowering information delays using Fama-MacBeth regressions. Short selling restrictions were linked to overvaluation and decreased liquidity. Gbadebo and Oyedeko (2022) looked at the effect of short selling on risk and return in the Nigerian stock market. The Fama-MacBeth two-step regression method was employed. It was found that the short selling strategy has a negative and insignificant effect on return and risk in the Nigerian stock market. The study concluded that short-selling strategies could be used as investment strategies that could promote efficiency if properly monitored and regulated in the Nigerian stock market. If not, they could lead to price pressure and volatility in the Nigerian stock market.

Short selling is a significant investment strategy that impacts a firm's performance in developed, emerging, and developing economies. Studies outside Nigeria have examined its impact on stock return, but none have been documented in Nigeria. Despite its recognition in the Nigerian stock market, short selling has not been extensively studied in the country. Previous studies have shown limited research on the moderating effect of short selling on the risk-return relationship. This study aims to fill this gap and contribute to the literature on the role of short selling on the risk-return relationship, formulated by formulating hypotheses.

H01: Short selling has significant effect on the relationship between risk (systematic and unsystematic) and return in the Nigerian stock market.

H02: Short selling has moderating significant effect on the relationship between risk (systematic and unsystematic) and return in the Nigerian stock market.

To test these hypotheses, the study is anchored on the modern portfolio theory.

Methodology

To determine the moderating impact of short selling on the risk-return relationship in the Nigerian stock market, this study used an *expo facto* design. The study used secondary data that was taken from the websites of Standard and Poor's, the Central Bank of Nigeria (CBN), and the Nigerian Group of Exchange (NGX). The approach for data collection and analysis used in this study was based on Fama and French's (2015) two-step regression methodology. In addition to the analytical method, the study arranged the portfolio according to 2x2, which is consistent with, among other things, Fama-French (2015) and Oyedeko et al. (2023). All of the listed companies on the Nigerian Group of Exchange (NGX), which had 116 companies as of the study's start date, made up the study's population. In order to avoid thin trading between 2006 and 2021, the study used a purposive sample technique to choose the stocks of roughly 90 companies that were traded regularly during that time. To calculate the return, the study used the difference between the price's logarithmic current value and its previous value. This is in line with the theories put forth by authors like Zubairu and Oyedeko (2017) and Gbadebo and Oyedeko (2021). According to Oyedeko et al.'s analysis from 2023, the model specification is accurate.

Where; $\hat{r}_i$ is the individual securities return, $\hat{\beta}_{mi}$ is market risk, $\hat{\beta}_{si}$ the size risk factor of individual securities, $\hat{\beta}_{hi}$ is the value risk factor of individual securities, $\hat{\beta}_{ui}$ is profitability risk factor of individual securities, $\hat{\beta}_{vi}$ is the investment risk factor of individual securities, $\hat{\beta}_{shi}$ is the loaded factor of short selling, $\hat{\beta}_{uri}$ is the loaded factor for the unsystematic risk, $\hat{\beta}_{uri} * \hat{\beta}_{shi}$ is the loaded factor for the interaction between unsystematic risk and short selling, a_2 represents the coefficient of size risk factor, a_3 represents coefficient of value risk factor, a_4 is the coefficient of profitability risk factor, a_5 is coefficient of investment risk factor, a_6 is the coefficient of short selling, a_7 is the coefficient of unsystematic risk, a_8 is the coefficient of interaction between the short selling and unsystematic risk in the equitation in 4, a_0 is the intercept and a_1 is coefficient of the market risk.

The study captures short selling with short interest ratio and this is in line with the study of Zhu et al. (2019). The short interest ratio (SIR_t) is the ratio of daily shortselling volume on day t over the total number of shares outstanding in daily t.

The average values of the relevant variables are presented in Table 1 along with a summary of the findings. The table clearly shows that, according to the CAPM, three-factor, and five-factor models, the average return, systematic risk, investment risk premium, profitability risk premium, short selling, and unsystematic risk all have positive values. This shows that during the sampling period, these variables have a tendency to rise. Other variables, on the other hand, show negative values, which suggest a decreasing tendency during the same time period. The risk premium value is the most volatile among the variables, while the average return is the least volatile, as seen by the standard deviation in the table.

The average return, systematic risk, investment risk premium, unsystematic risk (as per CAPM, three-factor, and five-factor models), and the interaction value between systematic risk from the three-factor model and short selling all exhibit positive skewness when the skewness scores are taken into account. The remaining variables of importance, however, exhibit negative skewness. The kurtosis scores provide further context by showing that the variables deviate from a normal distribution and have a platykurtic character. The related probability values from the Jarque-Bera test, which are

$$\hat{r}_i = a_0 + a_1 \hat{\beta}_{mi} + a_2 \hat{\beta}_{si} + a_3 \hat{\beta}_{hi} + a_4 \hat{\beta}_{ui} + a_5 \hat{\beta}_{vi} + a_6 \hat{\beta}_{shi} + w_i \dots \dots \dots 1$$

$$\hat{r}_i = a_0 + a_1 \hat{\beta}_{mi} + a_2 \hat{\beta}_{si} + a_3 \hat{\beta}_{hi} + a_4 \hat{\beta}_{ui} + a_5 \hat{\beta}_{vi} + a_6 \hat{\beta}_{shi} + a_7 \hat{\beta}_{mi} * \hat{\beta}_{shi} + w_i \dots \dots \dots 2$$

$$\hat{r}_i = a_0 + a_1 \hat{\beta}_{mi} + a_2 \hat{\beta}_{si} + a_3 \hat{\beta}_{hi} + a_4 \hat{\beta}_{ui} + a_5 \hat{\beta}_{vi} + a_6 \hat{\beta}_{shi} + a_7 \hat{\beta}_{uri} + w_i \dots \dots \dots 3$$

$$\hat{r}_i = a_0 + a_1 \hat{\beta}_{mi} + a_2 \hat{\beta}_{si} + a_3 \hat{\beta}_{hi} + a_4 \hat{\beta}_{ui} + a_5 \hat{\beta}_{vi} + a_6 \hat{\beta}_{shi} + a_7 \hat{\beta}_{uri} + a_8 \hat{\beta}_{uri} * \hat{\beta}_{shi} + w_i \dots \dots \dots 4$$

Table 1
Descriptive Statistics

Statistics	AVR	B	S	H	C01	R	SHT	IDCAPM	ID3F	ID5F	BCAMP – SHT	B3F – SHT	B5F – SHT	IDCAPM – SHT	ID3F – SHT	ID5F – SHT
Mean	0.014080	0.717871	-0.097828	-0.358627	0.180325	0.130323	3.22E-07	0.181691	0.170610	0.165635	-0.029457	0.034185	-0.029457	-0.004613	-0.004390	-0.005107
Median	0.011067	0.749233	-0.122265	-0.360414	0.087921	0.158229	0.330584	0.142241	0.135097	0.132475	0.126749	-0.063194	0.126749	0.043323	0.037644	0.037051
Maximum	0.092572	2.013677	2.078426	9.281946	8.696328	8.121966	2.572793	1.058923	0.936818	0.777036	1.300864	11.44436	1.300864	0.612005	0.541434	0.449088
Minimum	-0.006740	-0.199242	-4.791040	-12.71657	-3.340890	-5.937704	-4.256860	0.052864	0.047409	0.047031	-3.851817	-7.349542	-3.851817	-1.816274	-1.765770	-1.686617
Std. Dev.	0.016928	0.407010	0.807487	1.830331	1.270236	1.248830	0.995585	0.153050	0.138347	0.124396	0.793311	1.605695	0.793311	0.261738	0.247068	0.237137
Skewness	2.741411	0.500754	-1.935526	-1.859732	4.119643	1.376769	-1.481299	3.682149	3.437322	3.102152	-2.086651	3.140707	-2.086651	-3.967919	-4.238972	-4.241099
Kurtosis	12.24628	3.590288	14.37401	32.63727	28.90493	26.53698	6.832022	18.10298	16.00034	13.06827	9.310266	34.67797	9.310266	27.97842	30.76142	30.16137
Jarque-Bera	433.3313	5.067970	541.3241	3345.758	2771.068	2105.892	87.98016	1058.748	811.0106	524.4879	214.6346	3911.063	214.6346	2575.872	3159.644	3036.330
Probability	0.000000	0.079342	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000

Note: AVR, B, S, H, R, C, IDCAPM, ID3F, ID5F, SHT, BCAMP*SHT, B3F*SHT B5F*SHT, IDCAPM*SHT, ID3F*SHT and ID5F*SHT represents average return, systematic risk, size risk premium, value risk premium, profitability risk premium, investment risk premium, unsystematic risk from CAPM, unsystematic risk from Three-factor model, unsystematic risk from Five-factor model, short selling, interaction of short selling with unsystematic risk from CAPM, interaction of short selling with systematic risk from three-factor model, interaction of short selling with systematic risk from five-factor model, interaction of short selling with unsystematic risk from CAPM and interaction of short selling with unsystematic risk from five-factor model respectively.

Source: Authors' Computation, (2025)

Table 2

Correlation Matrix

	B	S	H	C01	R	SHT	IDCAPM	ID3F	ID5F	BCAMP – SHT	B3F_SHT	B5F_SHT	IDCAPM – SHT	ID3F_SHT	ID5F_SHT
B	1														
S	-0.4964	1													
H	-0.2755	0.6365	1												
C01	0.4218	-0.2365	-0.1417	1											
R	0.0907	-0.4981	-0.6341	0.2311	1										
SHT	-0.0735	0.0079	0.0189	0.1208	-0.0270	1									
IDCAPM	0.2589	-0.2830	-0.2017	0.5235	0.10025	-0.0306	1								
ID3F	0.2550	-0.3226	-0.2264	0.4814	0.0945	-0.0322	0.6945	1							
ID5F	0.2348	-0.2826	-0.1714	0.4335	0.0338	-0.0417	0.6881	0.6960	1						
BCAMP_SHT	-0.0766	-0.0297	0.0040	0.2396	-0.0004	0.6888	0.0721	0.0610	0.0454	1					
B3F_SHT	-0.0127	0.2406	0.3553	-0.4432	-0.3480	-0.3275	0.0514	0.0667	0.11927	-0.4349	1				
B5F_SHT	-0.0766	-0.0297	0.0040	0.2396	-0.0004	0.6888	0.0721	0.0610	0.0454	0.6999	-0.4349	1			
IDCAPM_SHT	0.0628	0.0507	0.0360	0.4161	-0.0333	0.7890	-0.0234	-0.0497	-0.0792	0.7402	-0.6492	0.7402	1		
ID3F_SHT	0.0477	0.0625	0.0423	0.4015	-0.0374	0.7774	-0.0473	-0.0733	-0.1023	0.7371	-0.6674	0.7371	0.6981	1	
ID5F_SHT	0.0337	0.0821	0.0638	0.3783	-0.0556	0.79043	-0.0665	-0.0914	-0.1184	0.7450	-0.6518	0.7450	0.6973	0.6992	1

Source: Author's Computation, (2025)

nearly zero, support this observation. After describing these variable features, the study does a correlation analysis to see if the multicollinearity assumptions are true for the variables.

The correlation coefficients between each explanatory variable are shown in the results. The interaction between short selling and unsystematic risk from the five-factor model has a positive association with short selling, according to the table's highest correlation coefficient of 0.79043. This implies that the interaction between unsystematic risk and short selling in the five-factor model tends to move in the same direction. The lowest correlation coefficient, on the other hand, is -0.0004, which can be observed in rows 10 and 12 of the same column 5. The negative correlation between the profitability risk premium and the interaction with the systematic risk from the CAPM and short selling is shown in row 10, suggesting that the profitability risk premium goes in the opposite direction to the interaction with the systematic risk from the CAPM and short selling. Similar to the value in row twelve, the value in row thirteen shows that the profitability risk premium moves adversely with the interaction between systematic risk from the five-factor model and short selling. With the exception of 0.79043, the findings indicate that the correlation coefficients between the variables are typically relatively low.

As a result, there is absence of multicollinearity among the variables. This finding is consistent with the hypothesis put forth by Gujarati and Porter (2009), who believe that an excessively high correlation coefficient—above +0.8 or -0.8—between two independent variables may be a sign of multicollinearity. In this study, all correlation coefficients between independent variable pairs are, however, below +0.8 or -0.8, indicating that the independent variables can be successfully included in the regression model. The study then goes on to estimate and interpret the model in order to test the hypotheses. The result of the models are presented in the Table 3 and 4.

The baseline models, the Capital Asset Pricing Model (CAPM), the Fama-French three-factor model (FF3F), and the Fama-French five-factor model (FF5F) with short selling, are shown in Models 1, 3, and 5. Models 2, 4, and 6 illustrate how systematic risk and short selling interact to affect returns under the CAPM, FF3F, and FF5F, respectively. The findings show that the coefficients for short selling in models 1, 3, and 5 are, respectively, -0.001508, -0.001656, and -0.002750, with corresponding probability values of 39%, 34%, and 10%. These results imply that short positions don't produce excess returns in the Nigerian stock market and that short selling has a negative and negligible impact on stock returns. When alpha value and systematic risk are taken into account, their respective coefficients in model 1 are 0.007580 and 0.009054, with corresponding probability values of almost 3%. This

suggests that systematic risk and alpha under the CAPM have a favorable and considerable impact on predicted returns. The coefficients for alpha, systematic risk, size risk, and value risk in the FF3F model estimation (model 3) are 0.011273, 0.003250, -0.006398, and 0.000423, respectively, with corresponding probability values of practically 0%, 53%, 16%, and 81%.

These results imply that whereas systematic risk and value risk have positive but negligible effects on return, size risk has a negative and negligible impact on return, and alpha value has a positive and large impact on return. According to the FF5F model, the coefficient values for alpha, systematic risk, size risk, value risk, profitability risk, and investment risk are 0.014384, 0.003208, -0.000604, 0.004466, 0.005120, and 0.005574, respectively. These values translate to probability values that are nearly 0, 54, 91, 25, 16, and 0 percent in the model 5. This suggests that whereas size, value, and profitability risks are negative and insignificant, and systematic risk has a positive but insignificant impact on return, alpha value and investment risk have significant and positive benefits. The investigation also reveals that models 2, 4, and 6 have coefficients of 0.006642, 0.003357, and 0.000975 with corresponding probability values of 17, 0 and 84 percent, respectively. This shows that the FF3F model is the only one where the interplay between short selling and systematic risk is meaningful. While short selling has a negative and minor impact on return in model 2, alpha value and systematic risk have positive and significant effects. While systemic risk and short selling have positive but minor effects on return in model 4, the alpha value has a positive and large impact. Size and value risk, on the other hand, have a detrimental but minor impact on return. The result of model 6 demonstrates that while systematic risk, size, value, and profitability hazards have negative and minor effects on return, alpha value and investment risk have significant and favorable effects on return.

According to the findings, short selling and systematic risk interaction improves model explanatory power, with the FF5F model having the maximum explanatory power. Except for the CAPM, the F-statistic models exhibit significant probability values at 0.05. With associated probability values greater than 0.05, suggesting independent residuals, the investigation validates the hypotheses of no autocorrelation and heterocedasticity. The normality assumption, however, is challenged, with related probability values of the Jarque-Bera statistic less than 0.05 suggesting that residuals are not normally distributed. At 0.05, the F-Statistic and Jarque-Bera statistics are significant. The study proceeds to documents the moderating effect of short selling on the relationship between the unsystematic risk and return in the Table 4.

The results of the baseline models, which comprise the Capital Asset Pricing Model (CAPM), Fama-French

three-factor model (FF3F), and Fama-French five-factor model (FF5F) with unsystematic risk and short selling, are presented in Models 1, 3, and 5. Models 2, 4, and 6, on the other hand, show the impact of short selling with unsystematic risk on returns under the CAPM, FF3F, and FF5F, respectively. The estimation results for Models 1, 3, and 5 show that unsystematic risks are considerably priced, although short selling is not significantly priced. Unsystematic risk, in particular, is found to have a positive and significant effect on returns, but short selling has a negative and small effect.

When alpha value and systematic risk are controlled for, neither has a substantial impact under the model 1. At the 5% level, alpha value, systematic risk, size risk, and value risk all have a negative and insignificant effect on returns in Model 3. In Model 5, alpha has a negative but significant effect on returns, whereas size risk and investment risk have negative but minor effects. Under Models 2, 4, and 6, the interaction of short selling with unsystematic risk is observed to have a negative but substantial influence on returns. Unsystematic risk and short selling both have positive and substantial effects on returns in Model 2, but systematic risk has a positive

but minor effect and alpha value has a negative but significant effect on returns. Systematic risk and size risk have positive but insignificant effects in Model 4.

Model 6 shows that alpha value, value risk, and profitability risk have negative and insignificant effects on returns, but systematic risk, size, and investment risk have positive but insignificant effects. Furthermore, the interaction of short selling with unsystematic risk improves the models' explanatory power, as evidenced by the adjusted coefficient of determination (adjusted R²). When compared to CAPM and FF3F, FF5F has the highest explanatory power and the largest adjusted coefficient of determination. The F-statistics' probability values in the models are significant at the 0.05 level. Furthermore, the analysis verifies the models' assumptions of no autocorrelation and homoscedasticity, demonstrating that the residuals are independent of other observations. Furthermore, the normality assumption is refuted under the models because the associated probability values of the Jarque-Bera statistic are larger than 0.05 except under model 1, which suggests that the residuals of the models are normally distributed.

Table 3

Moderating effect of short selling on the relationship between systematic risk and return

Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
A	0.007580	0.007670	0.011273	0.010863	0.014384	0.014256
	[0.0368]	[0.0338]	[0.0068]	[0.0068]	[0.0006]	[0.0008]
B	0.009054	0.009202	0.003250	0.003063	0.003208	-0.002967
	[0.0399]	[0.0360]	[0.5297]	[0.5381]	[0.5434]	[0.5859]
S			-0.006398	-0.005163	-0.000604	-0.000464
			[0.1627]	[0.5381]	[0.9188]	[0.9384]
H			0.000423	-0.001110	-0.004466	-0.004513
			[0.8159]	[0.5444]	[0.2564]	[0.1652]
R					-0.005120	-0.005131
					[0.1635]	[0.1652]
C					0.005574	0.005472
					[0.0011]	[0.0023]
Sht	-0.001508	-0.006208	-0.001656	0.000158	-0.002750	-0.003417
	[0.3978]	[0.1098]	[0.3460]	[0.9304]	[0.1072]	[0.3644]
b*sht		0.006642		0.003357		0.000975
		[0.1720]		[0.0063]		[0.8421]
R ²	0.058088	0.078417	0.110606	0.186687	0.218662	0.219043
Adj-R ²	0.036435	0.046269	0.068752	0.138275	0.162180	0.152376
P(F-Stat)	0.074037	0.069906	0.039124	0.003404	0.001866	0.003962
Diagnostic						
LM Test	2.5220 [0.0863]	2.073905 [0.1321]	1.7506 [0.1800]	1.705209 [0.1881]	2.1263 [0.0911]	2.054004 [0.1349]
BPG Test	2.8503 [0.0632]	2.023932 [0.1165]	3.5723 [0.0096]	1.019730 [0.4114]	2.0051 [0.0741]	1.725051 [0.1145]
Normality Test	263.5701 [0.0000]	254.4931 [0.00000]	127.8242 [0.0000]	108.2905 [0.0000]	479.9499 [0.0000]	488.0411 [0.0000]

Source: Author's Computation, (2025)

Table 4

Moderating effect of short selling on the relationship between unsystematic risk and return

Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
A	-0.003166	-0.004518	-0.003695	-0.005557	-0.006620	-0.004608
	[0.1061]	[0.0111]	[0.1118]	[0.0117]	[0.0128]	[0.0683]
B	-0.000254	0.001822	-0.000552	0.002387	0.001060	0.001227
	[0.9115]	[0.3807]	[0.8357]	[0.3487]	[0.7092]	[0.6444]
IDCAPM	0.095921	0.094534				
	[0.0000]	[0.0000]				
S			-4.41E-05	0.001895	-0.003209	0.004408
			[0.9852]	[0.3956]	[0.3144]	[0.2298]
H			-0.000348	-0.000834	0.002484	-0.003004
			[0.7087]	[0.3349]	[0.2509]	[0.2373]
ID3F			0.105750	0.103803		
			[0.0000]	[0.0000]		
R					0.003668	-0.001684
					[0.0765]	[0.4890]
C					-0.001352	0.002604
					[0.1827]	[0.0759]
ID5F					0.122445	0.101072
					[0.0000]	[0.0000]
Sht	-0.001336	0.003874	-0.001310	0.003155	-0.000843	0.004674
	[0.1420]	[0.0045]	[0.1477]	[0.0225]	[0.3595]	[0.0006]
IDCAPM*sht		-0.024845				
		[0.0000]				
ID3F*sht				-0.022707		
				[0.0001]		
ID5F*sht						-0.033314
						[0.0006]
R2	0.759678	0.813063	0.768635	0.808121	0.778437	0.808882
Adj-R2	0.751294	0.804266	0.754863	0.794251	0.759523	0.790006
P(F-Stat)	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
Diagnostic						
LM Test	1.132060 [0.3272]	0.916086 [0.4041]	1.236445 [0.2958]	0.835339 [0.4374]	1.131722 [0.3275]	1.064897 [0.3496]
BPG Test	1.123471 [0.3442]	1.387019 [0.2453]	1.622682 [0.1629]	0.842761 [0.5406]	1.526048 [0.1798]	0.385050 [0.9086]
Normality Test	9.377018 [0.0092]	2.672246 [0.2628]	2.906548 [0.2338]	2.212913 [0.3307]	2.502384 [0.286163]	2.453815 [0.2931]

Source: Author's Computation, (2025)

Discussion of Findings

It concludes that shorting does not significantly affect returns when examined independently. But when short selling is added as a moderator, both systematic and unsystematic risks are decreased, and their connections with returns are improved in a number of models, including as the CAPM, FF3F, and FF5F. This conforms to the findings of Baidoo (2019)

and contradict the findings of Zhu et al. (2019). The Nigerian stock market's projected returns are found to be positively and statistically significantly impacted by systematic risk, particularly when viewed within the CAPM framework. The link between systematic risk and returns under the FF3F and FF5F models is positive but not statistically significant, demonstrating that the market rewards investors for taking on systematic risk.

On the other hand, across all models, unsystematic risk has a positive and significant relationship with projected returns. This shows that unsystematic risk is compensated for by investors, contrary to the CAPM's notion that diversification may completely reduce this kind of risk. The study adds to our understanding of these dynamics by offering insightful information on how short selling and other types of risk impact stock returns in the Nigerian stock market.

Conclusion

The investigation investigates short selling's moderating effect on the relationship between risk and return on the Nigerian stock market. The results showed that short selling did not have a large or advantageous effect on returns on its own. However, short selling as a moderator enhanced the link between systematic risk and return and marginally decreased systematic risk when it was incorporated, particularly in the Fama-French Three-Factor model. Unsystematic Risk: In several models, including CAPM, Fama-French Three-Factor (FF3F), and Fama-French

Five-Factor (FF5F), short selling's role as a moderator greatly reduced unsystematic risk and improved its relationship with returns. Additionally, the study revealed that unsystematic risk had a positive and significant impact on projected returns, correlating with the finding that investors in the Nigerian stock market are rewarded for taking such a risk. The study came to the conclusion that short selling, when used as an investing strategy, might help investors in Nigeria make the best decisions possible by maximizing profits and lowering risk. It brought attention to how active and dynamic the Nigerian stock market is, and how difficult it is for investors to foresee how risk and return would change over time, especially in terms of systematic risk. Investors should concentrate on evaluating how their investment returns connect with several dimensions of risk, including non-market and unsystematic hazards in addition to systematic risk, the study advised. It also highlighted the beneficial effects of well-regulated short-selling tactics on fostering stock market efficiency and boosting investment performance on the Nigerian stock market.

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ВПЛИВ СТРАТЕГІЇ КОРОТКОГО ПРОДАЖУ НА ВЗАЄМОЗВ'ЯЗОК МІЖ РИЗИКОМ І ДОХІДНІСТЮ НА ФОНДОВОМУ РИНКУ НІГЕРІЇ

У дослідженні проаналізовано вплив стратегії короткого продажу (short selling) на взаємозв'язок між ризиком і дохідністю на фондовому ринку Нігерії. Вторинні дані були отримані з таких джерел, як Standard & Poor's, вебсайт

Nigerian Exchange Group (NGX) та статистичний бюлетень Центрального банку Нігерії (CBN). Для аналізу даних застосовано двоетапний регресійний підхід Фами–Френча (Fama–French Two-Step Regression Approach). Результати дослідження показали, що короткий продаж має негативний, але статистично незначущий вплив на дохідність. Водночас використання короткого продажу як модератора сприяє незначному зниженню систематичного ризику та посилює взаємозв'язок між систематичним ризиком і дохідністю на фондовому ринку Нігерії. Крім того, стратегія короткого продажу зменшує несистематичний ризик і покращує взаємозв'язок між несистематичним ризиком і дохідністю в різних специфікаціях моделей. Встановлено, що несистематичний ризик має позитивний і суттєвий вплив на прогнозовану дохідність фондового ринку Нігерії. Дослідження також підтвердило, що несистематичний ризик статистично значуще та позитивно впливає на очікувану дохідність акцій. За результатами дослідження зроблено висновок, що стратегія інвестування, заснована на короткому продажі, може ефективно застосовуватися на фондовому ринку Нігерії для максимізації прибутковості за одночасного обмеження рівня ризику. Водночас несистематичний ризик не завжди може бути повністю диверсифікований, однак на фондовому ринку Нігерії він потребує відповідної премії за ризик, оскільки інвестори, які беруть на себе такий ризик, отримують додаткову винагороду. Автори рекомендують інвесторам приділяти особливу увагу відповідності очікуваної дохідності різним видам ризику, зокрема несистематичним і неринковим ризикам, поряд із систематичним ризиком. Запровадження ефективно керованої стратегії короткого продажу може сприяти підвищенню результативності функціонування фондового ринку.

Ключові слова: стратегія короткого продажу; систематичний ризик; несистематичний ризик; дохідність; двоетапний регресійний підхід Фами–Френча.

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