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Degree of Leverage and Systematic Risk of Quoted Industrial and Consumer Goods Firms in Nigeria

***Nurudeen Salako YISAU[1]; Sadiq Ademola RAJI (PhD)[2]; Muhammed Akinkunmi BELLO (Ph.D)[3] & Zainab Oreoluwa AGBAOGUN[4]**
[1, 2, 3,4]Department of Accounting and Finance, Fountain University, Osogbo, Nigeria
yisau.nurudeen@fuo.edu.ng; asdera@yahoo.com; muhammedbello27@yahoo.co.uk; agbaogunz@gmail.com)

*Correspondence: nurudeenyisau@gmail.com

Abstract

The relationship between degrees of leverage and systematic risk has been a subject of ongoing debate in finance. While it is generally accepted that leverage can amplify both return and risk, the exact nature and magnitude of this relationship remain unclear. In this light, the current study investigates the impact of degrees of leverage on the systematic risk of quoted industrial and consumer goods firms in Nigeria. The study covered a period of 11 years from 2012 to 2022. Data on operating leverage, financial leverage, and stock prices were obtained from the audited annual financial reports of 15 industrial and consumer goods firms and the official price list of the Nigeria Exchange Group. The data analysis methods consist of descriptive statistics, correlation analysis, and panel least squares regression analysis. The study's findings revealed that the degree of combined leverage (DCL) has a significant positive interactive effect on systematic risk. Further, both the degree of financial leverage (DFL) and operating leverage (DOL) individually have a negative relationship with systematic risk but only the financial leverage is statistically significant. The study therefore concludes that the degrees of leverage significantly influence the shareholders' systematic risk in quoted industrial and consumer goods firms in Nigeria. The study recommends that firms should carefully consider their leverage decision in the context of their overall risk management strategy. Firms should also be aware of the potential impact of market conditions and imperfection on the risk associated with leverage to minimise the systematic risk.

Keywords: Financial leverage, operating leverage, combined leverage, stock beta
JEL Code: G32

1. Introduction

Risk is a crucial part of investments and is challenging to predict. Allocating funds for investments is a demanding responsibility for financial managers. Systematic risk encompasses the characteristics of the entire market. Every decision made by a business increases the risk associated with the value of its common stock. Changes in capital structure and the use of debt impact the firm's cost of capital (Akbari & Mohammadi, 2013). Total risk can be divided into business risk and financial risk, with operating leverage indicating business risk due to the unpredictable nature of consumer demand. Financial leverage is an index of financial risk. Improper use of borrowed funds can increase the variability of the firm's returns, thus raising the firm's financial risk (Kyei-Mensah, 2019). This can lead to a decline in investments by risk-averse investors due to heightened uncertainty.

Sarkar (2018) highlights that businesses with higher fixed costs compared to variable costs have significant operating leverage. This implies greater earnings variability in response to sales changes. The degree of operating leverage measures the expected change in net operating income from a percentage shift in sales (Utama & Setiawati, 2020). Therefore, if systematic risk grows with operating leverage, a manager's decision on operating leverage is likely to impact the firm's cost of capital, making the initial cost

structure choice a critical decision. Financial leverage significantly increases the risk of bankruptcy and potential liquidation if interest payments cannot be made due to insolvency. This heightened risk arises from the increased sensitivity of investors to any event that could impact the stock's return performance. Combined leverage reflects the joint effect of operating and financial leverage, representing both business risk and borrowing risk (financial risk) (Aharon & Yagil, 2019).

The ongoing debate on the relationship between leverage and systematic risk continues, as leverage can magnify both returns and losses, leading to significantly higher risk (Purnomo, 2022). Further research is needed to develop a more advanced model that effectively isolates the impact of leverage and provides practical guidance for corporations in making informed capital structure decisions. This ambiguity creates challenges for investors and corporations alike, making it difficult to assess their optimal capital structure and its impact on risk exposure. In real-world scenarios, other factors besides leverage can influence a firm's systematic risk, such as its industry size, profitability, and growth prospects (Thohhirin, 2021). The ambiguity surrounding the leverage-risk relationship makes it difficult for corporations to determine the optimal level of debt to employ in their capital structures (Dakua, 2019).

Most of the previous studies made use of degree of operating leverage and degree of financial leverage on systematic risk but this research considered degree of operating leverage, degree of financial leverage and combined leverage on systematic risk. Further research is needed to reconcile the discrepancies in the existing empirical findings and develop a more robust understanding of the true nature of the leverage-risk relationship.

Despite a wide range of empirical research on leverage and systematic internationally, there is a gross paucity of empirical studies on the topic in Nigeria. This research fills the gap in the literature by empirically investigating the link between degrees of leverage and systematic risk. The few available papers (Desmond et al., 2022; Ashara et al., 2020) did not even consider degrees of leverage directly as part of the factors influencing systematic risk. Also, the reviewed empirical studies have shown conflicting findings in terms of the variables used. Further, systematic risk being a market-wide risk is influenced by several factors including both microeconomic and macroeconomic variables. Previous studies have mainly concentrated only on micro-economic factors without controlling for macroeconomic variables that are equally important for robustness (Huong & Hoai, 2021). Macroeconomic variables such as exchange rates are factored into the analysis to see if the degrees of leverage will still perform well as expected in the presence of these macroeconomic factors.

By addressing these challenges, this research will contribute to a more comprehensive understanding of the financial market and provide valuable insights for both investors and corporations. Specifically, we seek to understand how operating leverage, financial leverage, and combined leverage impact the non-diversifiable portion of the overall risk profile in Nigeria's industrial and consumer goods firms. The choice of these firms is based on their increasing business and financial risk profile coupled with their significant contribution to manufacturing output in Nigeria.

The remaining part of the study is structured as follows: The next section provides a review of relevant research on degrees of leverage and systematic risk. Section three covers the study's methodology, while section four presents and discusses the results. The research concludes and the findings are summarised in the final section.

2. Literature Review

2.2 Theoretical Review

Theoretically, systematic risk is determined by business risk and financial risk (Eleftheriad, 2018). According to Mandelker and Rhee (1984), the corporate trade-off hypothesis (CTH) states that there are several methods to combine operating and financial leverage in order to achieve the desired degree of risk for the common stock. The trade-off theory posits that default risk functions as a counterbalance to debt financing to keep businesses out of bankruptcy and discourage them from taking on excessive amounts of debt. Financial distress costs can arise directly or indirectly as a result of default risk. According to Sekara, Gowrib, and Ramyac (2014), business risk is the primary risk associated with a company's operations, excluding debt. The optimal debt-to-income ratio decreases as company risk increases. Companies with a lower probability of financial difficulty should be allowed to borrow more than those with a higher probability of financial distress (Jordan, Ross, & Westerfield, 2007). The degree of operating leverage and the degree of financial leverage are the instruments to assess business risk and financial risk, respectively, while the degree of combined leverage is the tool to quantify all risks (Burrow et al. 2006). One of the numerous elements influencing business risk is financial leverage (Huy, 2015). Inversely, low financial leverage can offset high business risk.

According to the Fundamental Approach, the capital asset pricing model (CAPM) developed by Sharpe (1964) and Lintner (1965) suggests that the firm's fundamental decisions about what business to pursue, how to conduct that business, and how much debt the company utilizes impact beta. A company with a high DOL ratio will have greater operating income volatility, which will raise beta and increase systematic risk. When it comes to financial choices, a greater DFL ratio raises the variance in earnings per share and increases the risk associated with investing in the company's equity. Systematic risk will rise with increased financial leverage. The same occurs for the two risks' combination, or alternatively, their product (DOL * DFL) (Rubinstein, 1973). The foregoing theories provide a solid basis for this study to understand how the degrees of leverage interplay to determine the magnitude of systematic risk faced by corporate entities, and this culminates in developing the relevant hypotheses to achieve the research objectives.

2.3 Empirical Review

Over the years, several studies have attempted to provide empirical evidence on the relationship between leverage and systematic risk. On the international scene, Gupta, Kumar, and Verma (2016) conducted empirical investigations on Indian manufacturing and obtained that there is a statistically negligible correlation between operating leverage and systematic risk, but a strong positive correlation between financial leverage and systematic risk. However, for the organisations with high degrees of sensitivity and operating leverage, there was a substantial positive link between the degree of operating leverage and systematic risk. In Pakistan, Younas and Sarmad (2020) investigated the impact of degrees of financial and operating leverage on the systematic risk of cement firms in Pakistan and found that financial and operating leverage have a positive correlation with systematic risk. The study from Thailand by Vongphanchanh and Ibrahim (2020) showed that financial leverage had no significant relationship with systematic risk.

Huong and Hoai (2021) looked at how macroeconomic variables affected the systemic risk of Vietnamese-listed companies The results revealed that systemic risk is negatively correlated with economic growth, whereas systemic risk is positively correlated with the interest rate. Moreover, a negative correlation between leverage and systematic risk was discovered. Mahendra and Suaryana (2023) obtained the results demonstrating that

systematic risk was positively impacted by financial leverage in Indonesia. In the Nigerian context, the study by Desmond, Ifurueze, et al. (2022) on industrial goods firms from 2012 to 2020 indicated that financial leverage has a negative relationship with the systematic risk. In different twist, Ashara, Emeka-Nwokeji and Ozua's (2020) study on quoted deposit money banks in Nigeria 2012 to 2018 revealed that leverage did not have a significant effect on systematic risk.

A careful look at the foregoing shows that empirical studies on the topic are not only grossly adequate, but also greeted with mixed findings especially in Nigeria. Hence, this justifies the objective of the current research effort to launch an investigation into the nexus between degrees of leverage and systematic risk of industrial and consumer goods firms in Nigeria.

3. Data and Method

This study adopts ex-post facto research design to assess the impact of degree of leverage on the systematic risk of quoted industrial and consumer goods firms in Nigeria. The research design was chosen because it is impossible to manipulate all or any of the independent variables. The population of the study consists of 13 industrial and 21 consumer goods firms listed on the Nigerian Exchange as at December 22nd, 2023. A sample size of 15 companies was purposively drawn from the total population of 34. 9 industrial goods and 10 consumer goods firms were dropped because they were not yet listed on the Nigeria Exchange Group and, therefore did not meet the 11 years of the study from 2012-2022. The use of these manufacturing companies can be justified based on their increasing business and financial risk profile coupled with their significant contribution to manufacturing output in Nigeria, and more importantly, fairly frequent changes in their weekly share prices (for beta calculation) and long-term existence. The study utilised unbalanced panel secondary data gathered from audited annual financial reports of the sampled firms.

The study employed descriptive statistics, correlation analysis, and regression analysis (panel least squares) to analyse the data collected from secondary sources. Panel least squares regression was used to estimate the model, and in choosing between the fixed and random effect models, the Hausman test was carried out to determine which model was better for the analysis. The model for this study is adapted from Gupta, Verma, and Kumar (2016) who examined the impact of the degree of operating and financial leverage on systematic risk. The model is specified below with slight modifications to suit the purpose of the study.

$\beta_{p} = f$ (DOL, DFL)

(1)

$$\beta_p = \beta_0 + \beta_1 lnDOL_p + \beta_2 lnDFL_p + \mu_p$$

(2)

β_P= slope coefficient representing the systematic risk (hereafter β) of a common stock
DOL = Degree of Operating Leverage
DFL = Degree of Financial Leverage
μ = Error term
The model is modified as follows to suit the purpose of the study.

$$BETA_{it} = \beta_0 + \beta_1 DFL_{it} + \beta_2 DCL_{it} + \beta_3 DOL_{it} + \beta_4 FIS_{it} + \beta_5 LNER_{it} + \mu_{it}$$

(3)

β_0 = intercept parametre
$\beta_1, \beta_2, \beta_3, \beta_4$ and β_5=Regression slope coefficients
μ_{it} = Composite error term

3.1 Measurement of Variables

Table 1:
Measurement of Variables

Variables	Measurement	A priori expectation	Sources
Systematic Risk (*BETA*)	$\beta_i = \frac{Cov\ (Ri,Rm)}{Var\ (Rm)}$	-	Desmond (2022
Degree of operating leverage (DOL)	$\frac{change\ in\ EBIT}{change\ in\ sales}$	$\beta_3 > 0$	Azizah *et al.* (2020).
Degree of Financial Leverage (DFL)	$\frac{change\ in\ EPS}{change\ in\ EBIT}$	. $\beta_1 > 0$	Mahandra & Suaryana (2023
Degree of Combined Leverage (DCL)	$\frac{change\ in\ EPS}{change\ in\ sales}$	$\beta_2 > 0$	Gutpa *et al.* (2016)
Exchange rate (LNER)	ln $US\$/₦$	$\beta_5 > 0$	Setyani and Gunarshih 2018)
Firm size (FIS)	Log of Total asset	. $\beta_4 > 0$	Al-quraan and Kaddumi (2021); Amtiran *et al.* (2015)

Source: Authors' Compilation (2024)

4. Data Analyses and Discussion of Findings

This section presents, interprets and discusses the results obtained from the analysis of data to achieve the objectives of the study. It covers the results of descriptive, correlation, and panel regression analysis.

4.1 Descriptive Statistics

In this section, the study presents and interprets the results of descriptive statistics contained in Table 4.1 to summarise the striking characteristics of the variables of interest.

Table 2:
Descriptive Statistics

Statistics	BETA	DFL	DCL	DOL	LNER	FIS
Mean	0.721	1.328	0.310	0.763	5.556	17.976
Median	0.718	1.085	0.810	1.068	5.723	18.258
Maximum	2.006	9.626	9.513	8.889	6.054	21.701
Minimum	-1.592	-5.661	-9.935	-8.997	5.058	13.887
Std. Dev.	0.524	2.177	3.594	3.053	0.363	1.845
Skewness	-0.354	0.705	-0.527	-0.633	-0.241	-0.255
Kurtosis	4.475	5.928	4.015	4.664	1.567	2.185
Probability	0.000	0.000	0.000	0.000	0.000	0.043
Observations	164	164	164	164	164	164

Source: Authors' computations (2024)

The mean is the average of the data, which is the sum of all the observations divided by the number of observations. From Table 2, the mean values of BETA, DFL, DCL, DOL, LNER, and FIS are 0.721, 1.328, 0.310, 0.763, 5.556, and 17.976 respectively. The median shows the middle point for each of the variables. The maximum value shows the highest value while the minimum value indicates the lowest value for each variable. Standard deviation measures the variation that exists from the mean; a low standard deviation indicates the data are too close to the mean while a high standard deviation

indicates that the data spreads over a large range of values.

Skewness is used to measure the probability distribution of the random variable, it can be positive, negative or zero. Kurtosis measures the peakedness of the probability distribution, if the kurtosis coefficient is above three (3), this means there is a high peak while if it is less than three (3), it means there is a low peak. The results in Table 2 show that the data on the variables of interest are not normally distributed since they are characterised by skewness and peakedness.

4.2 Correlation Analysis

Correlation measures the linear relationship between variables, indicating their strength or weakness. Positive coefficients indicate direct relationships, while negative coefficients indicate inverse relationships. The values are interpreted between 0 (no relationship) and 1 (perfect relationship). The relationship between BETA, DFL, DCL, DOL, LNER, and FIS is shown in Table 3.

Table 3:
Correlation Analysis and VIF for Collinearity Tests

Statistics	DFL	DCL	DOL	FIS	LNER	VIF
DFL	1					1.08
DCL	0.205	1				1.59
DOL	-0.003	0.562	1			1.50
FIS	0.053	0.136	0.025	1		1.04
LNER	0.100	0.046	0.0337	0.178	1	1.04

Source: Authors' computations (2024)

Table 3 shows the relationship between DFL, DCL, DOL, FIS, and LNER. DFL is positively correlated to DCL, FIS and LNER, but negatively correlated to DOL. DCL is positively correlated to DOL, FIS and LNER. DOL is positively correlated to FIS and LNER. FIS is positively correlated to LNER.

The variance inflation factor (VIF) findings support the weak relationships identified by correlation analysis. With VIF values ranging from 1.04 to 1.59, well below the suggested threshold of 10, it can be concluded that the explanatory variables used in the regression analysis do not show significant collinearity.

4.3 Hausman Test

Table 4:
Hausman Test Results

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	7.322895	5	0.1977

Source: Authors' computation (2024)

Based on Hausman test results in Table 4, the random effect estimates are efficient as the null hypothesis is not rejected at the 10% significance level (Chi-Squared value of 7.322895, p-value of 0.1977), leading to the acceptance of the random effect specification for further discussions.

Table 5:
Regression Results

BETA	Panel OLS	FIXED EFFECTS	RANDOM EFFECTS
C	-0.392	-0.942	-0.392
	(-0.645)	(-0.956)	(-0.647)
DFL	-0.034**	-0.037**	-0.034**
	(-2.010)	(-2.058)	(-2.015)
DCL	0.024*	0.0210	0.024*
	(1.878)	(1.586)	(1.883)
DOL	-0.020	-0.012	-0.020
	(-1.422)	(-0.800)	(-1.425)
FIS	0.134***	0.177***	0.134***
	(6.748)	(2.752)	(6.766)
LNER	-0.224**	-0.264**	-0.224**
	(-2.232)	(-2.276)	(-2.238)
R-Square	0.36	0.43	0.66
F-Statistic	11.392***	3.794***	11.392***

Notes: ( ) t-statistic in parentheses; *, **, and *** denote significance @ 10%, 5%, and 1% respectively.

Source: Authors' computations (2024)

The R-square value of 0.66 indicates that 66% of the variations in stock beta (systematic risk) were explained by the degrees of leverage and other variables considered, with the remaining 34% due to variables not used in the model. Also, the results show a coefficient of -0.034 for DFL, indicating a negative correlation with BETA. With a t-statistic of -2.015, we reject the null hypothesis at a 5% significance level, suggesting a significant impact of financial leverage on systematic risk. This implies that as the degree of financial leverage increases, the systematic risk faced by shareholders of the studied companies decreases at an increasing rate, assuming other factors remain constant.

The coefficient for DCL is 0.024, indicating a positive relationship with BETA. With a t-statistic of 1.887 and a p-value of less than 10%, we confidently reject the null hypothesis at a 5% significance level. This suggests that a 1% increase in combined leverage would result in a 0.024% increase in shareholders' systematic risk, all else being equal. The negative relationship between BETA and DOL is not statistically significant, as indicated by the coefficient of -0.020 and the t-statistic of -1.425. The null hypothesis that DOL has no influence on systematic risk cannot be rejected at the 10% level of significance, suggesting that the relationship between Beta and DOL is not statistically important.

The coefficient of FIS is 0.134, indicating a positive correlation with firm size. The t-statistic of 6.766 establishes significance at the 1% level. The null hypothesis of no discernible effect on systematic risk is rejected due to the computed p-value being less than 1%. This implies that systematic risk increases with firm size at a rate of 0.134%.

The negative correlation coefficient of -0.224 suggests an inverse relationship between BETA and LNER. The t-statistic of -2.238 and the p-value less than 1% indicate a significant link between the exchange rate (LNER) and systematic risk. This implies that systematic risk decreases as the exchange rate increases at a rate of 0.224%. The F-statistic of 11.392 establishes a strong overall fit of the model for studying leverage and systematic risk. The null hypothesis that DFL, DCL, DOL, FIS, and LNER are all zero is strongly rejected at a 1% level of significance. This suggests that systematic risk is significantly influenced by financial leverage, combined leverage, operating leverage, firm size, and exchange rate in listed industrial and consumer goods firms.

4.5 Discussion of Findings

After carrying out the necessary investigation on the impact of degrees of leverage and systematic risk of quoted industrial and consumer goods companies in Nigeria, some important findings obtained by the study are worthy of discussion. According to this study, the degree of financial leverage is negatively correlated with systematic risk and is statistically significant. This is inconsistent with the result found by Mahandra and Suaryana, (2023)**.** The study also found that the degree of combined leverage and systematic risk are predicted to have a strong positive association. There is a statistical significance in the positive association. The result is similar to the one obtained by Gupta, et al., (2016) and is consistent with the a priori expectation. The degree of operating leverage and systematic risk were found to be negatively correlated in the study and statistically inconsequential. This matches the results of (Azizah at al. 2020) and the a priori anticipation.

Additionally, firm size was shown to be a positive indicator of systematic risk and to be statistically significant. This is in line with the results found by Amtiran et al. (2015) and the a priori anticipation. The findings also show a statistically significant negative association between exchange rate and systematic risk. This is against the result of Lang and Scholz (2015) and is inconsistent with the a priori expectation but it is congruent with the findings obtained by Huong and Hoai (2021) who inferred that systemic risk could be reduced when currencies are devalued.

The findings of this study imply the need for optimal corporate financing policy and effective foreign exchange management to achieve bearable market-wide risk for shareholders in the industrial and consumer good firms in Nigeria.

5. Conclusion and Recommendations

Based on the statement of findings, the study concludes that the degree of combined leverage and firm size have a considerable impact on systematic risk. Additionally, except for the insignificant influence of degree of operating leverage; degree of financial leverage, and exchange rate have a substantial effect on systematic risk. Therefore, this study concludes that the investigated industrial and consumer goods firms in Nigeria have a systematic risk that is significantly influenced by the degree of financial leverage, degree of combined leverage, firm size, and exchange rate.

The study suggests that factors beyond degrees of leverage, such as exchange rates, may influence systematic risk. It recommends careful consideration of leverage decisions within the overall risk management plan, considering market conditions and imperfections. It also is suggested that future researchers can use other sectors and add variables including macroeconomic factors that can affect systematic risk such as interest rate, inflation rate; operating efficiency, profitability, and dividend payout ratio.

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