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FIRM CHARACTERISTICS AND PROFITABILITY OF LISTED INDUSTRIAL GOODS COMPANIES IN NIGERIA: THE MODERATING EFFECT OF FIRM SIZE

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ABSTRACT

Corporate success is measured by profitability, an important metric, influenced by various factors, including the firm's size, with multiple effects. The firm's size, however, as a moderating factor, adds complexity, potentially altering the relationship between firm characteristics and profitability, especially within Nigeria's industrial goods sector. This study examined the impact of firm characteristics and profitability of listed industrial goods companies in Nigeria. As a moderating factor, firm characteristics were represented by liquidity, leverage, and firm age, while the return on assets measured profitability. The study data was collected from ten listed industrial goods firms that had consistently published their audited annual financial reports from 2013 to 2022. The panel-corrected standard error for the random effect model was used to analyze the data. The results show that liquidity has a negative and significant effect on profitability. Conversely, leverage and firm age have a positive and insignificant impact on profitability. In evaluating the moderating effect of firm size, the panel regression results conclude that firm age can reduce profitability. However, the analysis also revealed that liquidity has a positive and insignificant effect on profitability when moderated by firm size while leverage has a negative and insignificant result on profitability. On the other hand, firm size significantly moderates the relationship between firm characteristics and profitability. The findings of this study recommend that younger listed industrial goods firms should not be discouraged by the negative effect of their age on profitability rather they may be profitable as they grow old.

INTRODUCTION

Firm characteristics are key players in determining a firm's profitability. Therefore, understanding firm characteristics could mean investigating the moderating effect of firm size on the components of firm characteristics and profitability, but within the complex role exhibited by the firm size and its likely impacts on business outcomes.

The producers of raw materials convertible into finished products and services by other companies are regarded as Industrial goods companies. Arize (2023) referred to the industrial goods producers as accelerators of a nation's economic development and, therefore, play a crucial role in the general development of any nation with contributions to massive employment, wealth creation, economic policy stabilization, enhanced product export, and stabilization of the local currency against its foreign counterparts. To achieve these goals, industrial goods companies are expected to make a profit, which determines their survival. Therefore, the performance of industrial goods companies must be examined as their profitability is essential to various stakeholders. Muema and Abdul (2021) stated that profitability is of great concern to many organizations due to its relation to their survival.

Firm characteristics have a great impact on the activities of companies that can be controlled endogenously, helping to achieve the organization's set objectives. These factors affect a company's ability to utilize its resources in a competitive environment. According to Kartiningsih and Daryanto (2020) and Etukudo et al. (2022), firm characteristics influence financial performance and indirectly affect an organization's profitability. It plays a major role in the profitability of industrial goods companies in Nigeria, which could be influenced by the company size. Hence, the importance of firm

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size emerges as a variable intertwined with other firm attributes when measuring the profitability of publicly traded industrial goods entities in Nigeria, thereby, serving as a moderating factor or element. Within the industrial goods environment or sector, with a notable emphasis on capital intensity, operational scope, and market rivalries, the magnitude of a firm takes on heightened relevance. Inquisition into this intricate interplay offers advanced reasoning and findings on how companies can tactically harness their traits to enhance profitability. Irrespective of the huge economic impacts on industrial goods companies in the Nigerian economy, many are struggling to achieve profitability due to numerous endogenous and exogenous factors. Existing literature has not examined the implications of firm size as a moderator of firm characteristics and profitability in Nigeria. This study, therefore, centers on this premise, to fill the existing gap in the literature. The study objective is to examine the firm characteristics and profitability of industrial goods companies listed on the Nigerian Stock Exchange, with firm size as a moderating effect.

The study is structured with section 2 presenting the literature review wherein other works of literature by different authors were examined to understand the implications of firm size on profitability and hypothesis formulation. Section 3 is the materials and methods applied in this study, while section 4 presents the study's result from the analysis of the collated data. Section 5 encapsulates and discusses the results from the previous sections and the conclusion is detailed in section 6.

LITERATURE REVIEW

Profitability

The reward for entrepreneurship is profit and it is an important motive for engaging in any business venture. According to Ogbadu (2009), it is what is available after all costs are deducted from the revenue (Ogbadu, 2009) or after all other factors of production have earned their returns. As a performance measure. Which is the efficient utilization of other factors of production by management and control of its available resources, profit signifies growth. For a company to show that it is financially successful, monetary results must outweigh expenses. Thuri (2021), stated that profitability is an indicator of the financial health of an entity**.** Profitability measurement is how an entity is being run which is a difficult task, and it helps investors analyze and compare the results of similar firms in one industry or across sectors (Robinson, 2024). It underlines all companies' decisions concerning all activities and is usually subject to manipulations by aggressive management. Profitability is a significant ingredient that leads to the imposition of tax on a company and reveals the finances of an organization, the finer the profitability, the higher the ROA of an organization (Wahyuni et al., 2017).

Empirical Review

There exists an enduring correlation between liquidity and profitability. Typically, companies strive to maneuver this connection to enhance their profitability. Striking a balance and navigating the trade-off between these two aspects has emerged as a significant challenge for numerous companies, influencing their ability to achieve their objectives. Alamanda and Santosa (2013) suggested that the interplay between liquidity and firm value within a company aligns with fundamental firm theory, thereby, indicating a negative correlation where risk and returns intersect from a business view. Liquidity, evaluating a company's capability to fulfill short-term obligations crucial for meeting working capital requirements, holds a vital position. Its scarcity or excess can significantly change any entity's operational efficiency, profitability, and expansion prospects (Chaudhary & Raja, 2023), resulting in the inability to meet the set objectives of the firm. Numerous empirical studies have explored firms' attributes and profitability including Egbunike and Okerekeoti (2018), Santosa (2020), Etukudo et al. (2022), and Kartiningsih & Daryanto (2020), proving a positive and substantial impact of liquidity on profitability. In contrast, empirical analyses by Umutesi and Tarus (2021) and Chaudhary and Raja (2023) have found an adverse impact of liquidity on profitability. While liquidity is pivotal in shaping a company's profitability, effective liquidity management is essential for optimally fulfilling this role as well as other future objectives of the firm. Therefore, inadequate liquidity management could have a detrimental impact on business outcomes. The current works of literature on liquidity and profitability portray a relationship that has yielded uncertain outcomes in the theory of the firm.
The argument above resulted in the development of the following hypothesis (H_1):

H_1: *Liquidity has no significant negative effect on the profitability of listed industrial goods companies in Nigeria.*

Leverage and profitability

As a financial mechanism, leverage involves utilizing fixed-charged sources of capital like borrowed funds, preference capital, and the owner's equity within the organizational capital configuration. These sources could be convertible or not but have an attached element of interest-charged. Skillful application of leverage in businesses could have a positive impact on profitability. However, companies typically employ leverage to enhance the return for shareholders on borrowed funds, aiming for earnings that surpass the costs incurred in acquiring them (Pandey, 2016), and meeting the stakeholders' needs. Notably, firms with elevated leverage levels tend to exhibit elevated risk profiles. It is generally prudent for companies to maintain a moderate level of financial leverage to operate within a reasonable risk limit and optimize returns on investment (RoI) for shareholders and other stakeholders. Investors measure the proportion of borrowed funds a company relies on using metrics like the leverage-to-equity ratio, which aids the assessment of firms' operational dependencies (Cheng & Tzeng, 2011). Leverage, therefore, facilitates the deductibility of interest payments, providing a tax shield that invariably makes debt more appealing than equity.

The relationship between leverage and profitability could be both favorable and unfavorable outcomes. Various works of literature by researchers like Irwansyah et al. (2023), Etukudo et al. (2022), and Uzoka & Ifurueze (2020) have proven a positive correlation between leverage and profitability. However, investigations by other scholars such as Zaitoun

& Alquadah (2020), Bintara, R. (2020), Saliha et al. (2022), and Abid et al. (2024) highlighted a negative correlation between leverage and profitability, pointing to the capacity of fixed-charges in reducing the level of a company's profitability. Successfully managing the impact of leverage on profitability will necessitate finding the trade-off between debt and equity within the capital structure. Some entities leverage these financial tools to align with their strategic objectives, while others leverage them to gain a competitive edge within their respective industries, and again, others could leverage this to perpetrate financial statement frauds.

Profitability is a key metric in assessing a company's ability to generate earnings relative to its expenses and other costs. It provides crucial insights into how efficiently a business is managed and the effective utilization of the resources in creating value for stakeholders. It is, however, influenced by several factors, including operational efficiency, pricing strategies, cost management, market demand, competition, and overall economic conditions. Companies must continuously analyze and optimize these factors to enhance profitability and maintain a competitive edge in the market.
Based on the above argument, a hypothesis is developed thus:

H_2: *Leverage has no significant negative effect on the profitability of listed industrial goods companies in Nigeria*

Firm Age and Profitability
The period preceding an organization's establishment, known as firm age, is an important element impacting its performance. Coad et al. (2018) opined that a firm's age is a factor in determining its performance, and this influences established processes, accumulated reputation (goodwill), and organizational inflexibility. A firm's age is an influential factor in its value. Matemilola et al. (2019), adopting the life-cycle theory, opined that a firm's age is a determinant of networking and resource management noticed in older firms as against the higher capital costs recorded in start-ups. Arguably, older organizations tend to achieve profitability with ease than start-ups. But, researchers opined that several firms fight the survival battle and cannot overcome witness the impact of age on their existence as their declining performance results in financial troubles, and probably extinction. These firms may face decreases in operational efficiencies with time, having garnered experience over the years, but the reverse is usually the case with start-ups, often faced with higher risks of acquisition at the early stages of their business formations and which, in most cases are by the long existing firms. The foundational struggle for survival arising from financial inadequacies and competition from the older firms with well-established stakeholder relationships could impact their performance and ultimately their survival strategies. The age of a company may dampen its performance, creating an inverse relationship between the firm's age and profitability, as suggested by academics like Bananuka et al. (2021) and Elif (2016). However, in contrast to the above theories, Kaoje et al. (2022), Tapanainen et al. (2022), and Kartiningsih and Daryanto (2020) have proven positive and significant relationships between firm age and profitability.

Since profitability could be an advantage gained by older existing firms, due to experience and period of existence, chances are that of increased resource control and probability arising from the capability to develop a sustainability strategy or a retention plan for the rainy days. However, on the contrary, age without adequate capacity and survival plans could translate to losses and possibly, the collapse of a company.
Resulting from the above argument, this study formulates another hypothesis thus:

H_3: *Firm age has no significant negative effect on the profitability of listed industrial goods companies in Nigeria*.

Moderating effect of firm size on the relationship between firm characteristics and profitability
From a financial perspective, firm size could signify a business entity's scale or magnitude, which could either be in numbers or otherwise. It, therefore, rests on the management to consider and fundamentally, investigate the likely impact of firm size on the operations and profitability of the entity. Larger entities exhibit greater leverage than smaller ones, as the larger entities typically have superior investment prospects that enhance growth. Firm size is often perceived to be more appealing to investors with a consideration of the firm's ability to access substantial financing in the capital market, facilitating operational expansion and performance optimization. The impact of firm characteristics (such as liquidity, leverage, and firm age) on profitability could be contingent on a company's size. Obaje et al. (2021) submitted a positive relationship on the moderating effect of firm size which was in contrast with the findings of Nworie and Mba (2022).
From the above argument and the findings of Obaje et al. (2021) and, Nworie and Mba (2022), the hypotheses are stated thus:

H4: *Firm size has no significant negative effect on the profitability of listed industrial goods companies in Nigeria.*
H5: *Firm size moderates the relationship between firm characteristics and profitability of listed industrial goods companies in Nigeria*

Recent studies typically investigate firm size as a subset of the firm characteristics influencing profitability, yielding varied outcomes. Depending on this foundation, this study incorporates firm size as a moderating variable to evaluate its impact on the independent variables (firm characteristics) and dependent variables (Profitability), a point often overlooked by researchers. The objective of this study is to add to and improve the existing body of knowledge base by introducing firm size as a moderating factor in examining the interplay between firm characteristics and profitability of listed industrial goods companies in Nigeria.

MATERIAL AND METHODS

The study uses an ex post facto research design, assumed to be adequately effective in examining potential causes and effects of post-event data. The target population is all the industrial goods companies listed on the Nigerian Exchange Group (NGX) as of December 2022, totaling 15 companies in number. A sample of 10 companies was selected for the study, whose data on liquidity, leverage, firm age, and profitability (measured by ROA) were easily obtained from the annual reports and audited financial statements of the selected companies for the years 2013 to 2022 via their websites, which invariably made the sources suitable and complete. Data analysis was conducted using Stata 14.

Model Specification and variable measurement

A multiple regression analysis was adopted to test the formulated hypotheses with the model formula provided herein:
Model

$$\mathbf{ROAit = \beta O + \beta 1 LQDit + \beta 2 LEVit + \beta 3 FAit + \beta 4\ LQDit*FSIZEit + \beta 5\ LEVit*\ FSIZEit + \beta 6 FAit*\ FSIZEit + \varepsilon it}$$

Where:
ROA = Return on Assets
LQD = Liquidity
LEV = Leverage
FA = Firm's Age
FSIZE = Firm Size
βO = Constant to be estimated
$\beta 1$- $\beta 6$ = Coefficient of estimate
ε = Error term
t = Period
i = Firm

Table 1. Description of variables and measurements

Variables	Measurement	Type
Return on Assets (ROA)	Net profit after tax/Total assets	DV
Liquidity	Current assets to current liabilities	IV
Leverage	Total debt to total assets	IV
Age	Number of years the company has been in existence	IV
Firm Size	Natural logarithm of a firm's total assets.	Moderator

RESULTS

Correlation Analysis

Table 2. Matrix of Correlations Analysis

	ROA	Liqd	Lev	Firm age	Firm size	FS*liq	FS*lev	FS*fa
ROA	1							
Liquidity	-0.0362	1						
Lev	-0.4246	-0.18558	1					
Firm age	-0.2214	-0.3446	-0.0162	1				
Firm size	0.3342	-0.5204	-0.2498	0.1568	1			
FS*liq	0.0186	0.9853	-0.2377	-0.3668	-0.4095	1		
FS*lev	-0.3929	-0.2584	0.9817	-0.0544	-0.1093	-0.2879	1	
FS*fa	-0.0930	-0.4714	-0.1018	0.9314	0.4539	-0.4515	-0.0879	1

Source: Stata output from authors inputted data (2024)

Table 2 above, depicts the correlation coefficients for the moderating effect of firm size on the relationship between firm characteristics of liquidity, leverage, and firm's age, and profitability in Nigeria's industrial goods companies. The range of the correlation matrix is depicted with values from -1 to +1. From the results in Table 2 above, liquidity and profitability exhibit an inverse relationship, signifying that a decrease in liquidity could increase profitability.

In contrast, the moderating effect of firm size on the relationship between liquidity and profitability indicated a positive outcome, suggesting that when firm size increases, higher liquidity could be a contributing factor to increased profitability. This connotes that industrial goods companies without liquidity challenges are more likely to achieve profitability with an increase in size. However, the relationships between leverage, firm age, and their moderation with profitability showed a negative outcome, signifying that an increase in the firm characteristics as listed above, could result in a reduction or a decrease in the company's profitability. In other words, higher leverage and older industrial goods companies are less likely to adopt profitability-focused strategies.

Descriptive Statistics

Table 3. Descriptive Statistics between Firm Characteristics, Firm Size and Performance

Variable	Obs	Mean	Std. Dev.	Min	Max
ROA	100	7.04	14.86	-58.01	53.95
Liquidity	100	268.18	483.89	16.31	3641.06
.Lev	100	254.04	448.35	-391.64	3000.45
Firm age	100	47.5	13.73	21	75
Firm size	100	7.13	1.02	5.24	9.42
FS*liq	100	1774.51	3005.38	111.26	22740.99
FS*lev	100	1723.39	2902.48	-2759.29	18560.12
FS*fa	100	337.18	106.84	186.95	553.06

Source: Stata output from authors inputted data (2024)

The descriptive statistics of the variables for the study are presented in Table 3, with the average profitability of Nigerian industrial goods companies showing 7.04%, a standard deviation of 14.86%, a minimum value of -58.01%, and a maximum value of 53.95%, invariably indicating that these companies are generally profitable. The average liquidity is 268.18 billion, with a standard deviation of 483.89 billion and a mean leverage of 254.04 billion.

Also, the average firm size is 45.7 billion, while the standard deviation of 13.73 billion, suggesting a variation in firm size among industrial goods companies is relatively small. The mean value of the moderation between firm size and liquidity amounted to 1,775.51 billion, with a standard deviation of 3,005.38 billion, while the mean of the moderating effect between firm size and leverage is 1,723.39 billion, and a standard deviation of 2,902 billion. These wide margins of the standard deviations and the means signify disparities within the companies.

Lastly, an average moderating effect of firm size and age is 337.18 billion, and a standard deviation of 106 billion, it is a reflection of a relatively small variation from the mean for industrial goods companies.

Empirical Results

Table 4. Heteroscedasticity Tests for Model 4

Breusch–Pagan/Cook–Weisberg test for heteroscedasticity	
Assumption: Normal error terms	
Variable: Fitted values of ROA	
H_0: Constant variance	
chi2(1)	Prob > chi2
2.48	0.1154

Source: Stata output from authors inputted data (2024)

Table 5. Hausman Specification Test

Test of H_0: Difference in coefficients not systematic	
chi2(3) = (b-B)'[(V_b-V_B)^(-1)](b-B) = 2.23	Prob > chi2 = 0.8162

Source: Stata output (2024)

Table 6. Breusch and Pagan Lagrangian Multiplier Test for Model 4

	Var	**SD = sqrt(Var)**
Test: Var(u) = 0	chibar2(01) = 67.52	Prob > chibar2 = 0.000

Source: Stata output (2024)

Table 7. Direct Relationship Regression Result

	Coefficient	**Z**	**P value**
Liquidity	-0.199	-4.27	0.000
Lev	0.048	1.08	0.282
Firmage	0.053	0.23	0.815
Fs*liq	0.031	4.12	0.231
Fs*lev	-0.01	-1.20	0.154
Fs*fa	-0.042	-1.43	0.000
R^2 = 23.00			

Source: Stata output from authors inputted data (2024)

DISCUSSIONS

Table 7 shows the regression results from examining the moderating effect of firm size on the various relationships between firm characteristics and profitability in industrial goods companies in Nigeria. The findings are hereby summarized as follows:

Homoscedasticity Test (Table 4): with an existing p-value is 0.1154 exceeding the 10% threshold, it is an indication that the data is homoscedastic.

Hausman Test (Table 5): it is a suggestion that the random effects model is more appropriate than the fixed effects model with a p-value of 0.8162. A further research study is encouraged for this.

Breusch and Pagan Lagrangian Multiplier Test (Table 6): has a p-value of 0.000, signifying a rejection of the null hypothesis and confirming that the random effects model is ideally more suitable for this analysis than the pooled ordinary least squares.

Observations

Impact of Liquidity and Profitability

The study observes that liquidity negatively and significantly affects profitability (β = -0.199; p = 0.000). The result is the rejection of the null hypothesis by the study which is in agreement with the findings of Umutesi and Tarus (2021), who identified a negative relationship between the variables of liquidity and performance. Nevertheless, the findings contradict the studies by Egbunike and Okerekeoti (2018) and Santosa (2020), which highlighted the critical function of liquidity management in profitability improvement.

Effects of Leverage on Profitability

There is a positive but insignificant effect of leverage on profitability (β = 0.048; p = 0.282) at the 5% significance level. This study, therefore, accepts the null hypothesis which states that leverage does not significantly impact profitability, suggesting that an increased leverage limit could enhance profitability thereby, promoting economic growth in the form of job creation and corporate social responsibilities to the communities, which aligns with the findings of Irwansyah et al. (2023), Etukudo et al. (2022), and Uzoka & Ifurueze (2020), but contradicts those by Zaitoun & Alquadah (2020), Bintara (2020), Saliha et al. (2022), and Abid et al. (2024), which emphasizes that financial risks and bankruptcy costs could result from excessive leverage.

The age of the Firm and Profitability

The age of the firm is said to have a positive but insignificant relationship with profitability (β = 0.053; p = 0.815), resulting in our rejection of the null hypothesis. This finding aligns with that from the studies of Bananuka et al. (2021) and Elif (2016), which report that older firms could encounter bureaucratic challenges as well as resistance to change. However, the finding contradicts those of Kaoje et al. (2022), Tapanainen et al. (2022), and Kartiningsih and Daryanto (2020), which suggested that older firms are prone to benefitting more from experience, brand recognition, and goodwill.

Moderating Effects of Firm Size

The Firm Size and Liquidity

The moderating effect of firm size and the relationship between liquidity and profitability showed a positive but insignificant (β = 0.031; p = 0.231) which resulted in the rejection of the null hypothesis, signifying that the moderation may be induced by industry-specific factors.

The Firm Size and Leverage

Leverage and profitability moderation by firm size is negative but insignificant (β = -0.01; p = 0.154) suggesting that an increase in leverage will decrease profitability, which could be due to inefficient debt management or lack of debt servicing.

The Firm Size and Firm Age

The interaction between the two variables of firm size and firm age has a negative but significantly related to profitability (β = -0.042; p = 0.000) indicating that with the age of the firm, profitability may decrease, potentially due to change resistance and diminishing innovation among older and larger firms.

CONCLUSIONS

This study highlights the complex dynamics of the firm characteristics of liquidity, leverage, firm age, and profitability, with firm size as the significant moderating variable. With liquidity negatively impacting profitability, leverage has a negligible but positive influence. Also, firm age and size interactions indicate challenges in adapting to innovation (including technological) and market changes. The data for the firm characteristics are derived from the annual audited statements of listed select industrial goods companies in Nigeria between 2023 and 2022. Bening a fast-growing sector with an exponential demand for their products, the industrial goods companies had demonstrated unequivocal flexibility in the Nigerian environment arising from the different characteristics that impact profitability.

The study could state that liquidity has a negative and significant effect on profitability while leverage and firm age have a positive and insignificant effect on profitability. When moderated by firm size, the outcomes showed a difference, leading to the conclusion that industrial goods companies are not using their cash assets effectively to enhance profitability. Moreso, the study highlighted the implications of high borrowing costs on the profitability of the studied population.

With the impact of age on profitability, the study opined that old existing firms are more focused on profitability rather than expansion and development. In addition, with the introduction of the moderating effect of firm size, the study concluded that the relationship between firm size and profitability was insignificant. With a decrease in profitability, leverage, and age considered, the researchers suggested that the management of industrial goods companies should be more focused on improving their liquidity to aid profitability. Also, the management should strike a balance between the benefits

of debt over its associated risks to increase their profitability significantly and also suggesting that the Central Bank of Nigeria (CBN) should implement positive and favorable monetary policies that could strengthen effective borrowing and resource utilization by these companies.

The research findings are limited to the firm characteristics of liquidity, leverage, and firm age, and profitability (ROA) as a moderating variable of listed industrial goods companies in Nigeria. The researchers encourages future studies to examine other firm characteristics such as growth, operating efficiency, asset tangibility, and board independence as relating to profitability such as net profit margin, Tobin's q, and return on equity.

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