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Determining Return on Investment in Listed Nigerian Oil and Gas Firms: the Role of Company Traits

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Abstract: The broad objective of the study was to examine the effect of company traits on the return on investment (ROI) of listed oil and gas firms in Nigeria. Specifically, the study assessed the effect of firm size, firm leverage and firm age on return on investment of listed oil and gas firms in Nigeria. Ex-post facto research design was deployed. Purposive sampling was applied in selecting the sample size of the study from a population frame of 10 listed Nigerian oil and gas firms. Secondary data for the study spanned from 2013 to 2022 accounting year-ends. Random effect estimation was run which found that: firm size has a positive and significant effect on return on investment; firm leverage has a negative and significant effect on return on investment; and firm age has a negative but insignificant effect on return on investment of listed oil and gas companies in Nigeria. We therefore recommend that managers of oil and gas firms should increase their size by diversifying operations, or scaling up their existing projects in order to access more resources, benefit from economies of scale, and enhance their bargaining power.

Key words: Company Traits, Return on Investment, Firm Size, Firm Leverage, Firm Age.

Introduction

The link between a company's inherent characteristics and its returns is a perennially intriguing and vital subject in the fields of finance, economics, and business studies. This enduring interest is driven by the profound importance of comprehending how specific firm attributes, such as firm size, firm age, and firm leverage, can impact a company's performance such as return on investment (ROI). This understanding holds paramount significance for a diverse range of stakeholders, including investors, financial analysts, and policymakers, as it equips them with the hints required to make well-informed decisions and effectively evaluate the financial performance of businesses (Chukwu, Damiebi & Okoye, 2019; Jawed, Vinod & Dhaigude, 2023; Jeroh, 2020; Jihadi, Vilantika, Hashemi, Arifin, Bachtiar & Sholichah, 2021).

Investors, for instance, depend on this knowledge to guide their investment strategies. By discerning the relationship between company traits and ROI, they can make more informed choices about where to allocate their resources. A deeper understanding of how factors like the size of a company, its age, and its level of leverage influence ROI can lead to more effective portfolio diversification and risk management. Financial analysts, too, rely on this information to evaluate the performance of companies. They can use these hints to conduct more comprehensive financial assessments and offer better-informed recommendations to clients (Ayuba, Balago & Dagwom, 2018; Kim, Li, Lu & Yu, 2021; Saona & Muro, 2018).

Moreover, the significance of this topic becomes even more pronounced in today's context of a swiftly changing global business environment (Bharadiya, 2023). The business environment is constantly evolving due to technological advancements, globalization, and changing consumer preferences (Mundra, 2018). Notably, the Nigerian oil and gas industry, one of the largest in Africa, plays a pivotal role in the country's economy. This sector is primarily characterized by the presence of major multinational corporations of assorted firm traits, while concurrently hosting a multitude of smaller firms that actively participate in the industry (Yahaya & Tijjani, 2021). Whether small of large firm, investors and analysts use return on investment (ROI) of the firms under this sector to gauge the companies' financial performance and profitability (Rangkuti, 2019). It measures the extent to which a firm generates profits in relation to its investments (Mayangsari, Suhadak & Moch, 2020). A company's traits, such as its size, age, and leverage, play a pivotal role in influencing its ROI. The size of a company, often measured by market capitalization or total assets, can considerably affect its ROI. Larger firms, due to their scale and resources, might have a competitive advantage in terms of economies of scale and bargaining power (Tipis, 2022). They can spread their fixed costs over a broader revenue base and access capital markets more easily, which may contribute to higher ROI. In contrast, smaller companies may face greater challenges in achieving comparable efficiency and profitability levels (Nworie & Mba, 2022). The effect of firm size on ROI varies by industry, with some sectors favouring larger companies, while others offer growth opportunities for smaller, nimbler firms.

The age of a firm is another critical factor impacting ROI. Newer companies often face higher levels of uncertainty and risk (D'Amato & Falivena, 2020) as they establish themselves in the market. They may need to invest more aggressively in research and development or marketing to gain a foothold, which can temporarily depress their ROI. However, younger firms also have the potential for rapid growth and innovation, and if they succeed (Semrau & Sigmund, 2012), their ROI can skyrocket. In contrast, older, well-established companies may have less growth potential but often exhibit more stable and consistent returns (Barba, Castellani & Pieri, 2014). The relationship between firm age and ROI is a complex one, as it depends on the industry, market conditions, and the company's strategic choices.

The level of leverage, or the extent to which a company relies on debt to finance its operations, is a crucial factor influencing firm returns (Aggreh, Nworie & Abiahu, 2022). Higher leverage can magnify ROI when the cost of debt is lower than the return on investment. In such cases, companies can use leverage to increase their profitability. However, high leverage also escalates financial risk and can lead to financial distress if not managed properly (Bolarinwa, Onyekwelu, Ojiakor, Orga, Nwakaego & Ekwutosi, 2022). Excessive debt burdens can constrain a company's ability to invest in growth opportunities, and the interest expense can erode profits, reducing ROI. Thus, the relationship between leverage and ROI is a delicate balance, with companies needing to carefully consider their capital structure.

Even, the Resource-Based View theory underscores how firm size, firm age, and firm leverage serve as internal resources and capabilities that can substantially influence a firm's strategic capabilities, thereby impacting its ability to maximize Return on Investment (ROI). Firms that recognize and leverage these resources effectively are better positioned to achieve a sustainable competitive advantage and, in turn,

higher ROI. In essence, the challenges of inadequate firm size, redundancy in firm age, and sub-optimal firm leverage are crucial factors that can expressively influence a company's ability to achieve a satisfactory ROI. They call for a more prudent financial management, strategic decision-making, and adaptability in an ever-dynamic business environment. By recognizing and addressing these challenges, companies can position themselves more favorably to enhance their financial performance and ensure the realization of their full ROI potential in an increasingly competitive and dynamic global market. Existing studies such as Parnata, Elfarosa, Kencanawati, and Suryadi (2023); Bolarinwa et al. (2022); Bahri, Saefullah, and Anwar (2022); Simanjuntak, Suripto, Wardianto, and Mulkhan (2022); Aribaba, Ahmodu, Afolabi, Egbewole, Salaam, and Adesunloro (2022); Ehiedu and Priscilla (2022); Susanti, Widiyanti, and Madyawati (2022); Abubakar (2021); Bui and Nguyen (2021); Abubakar (2020); Nyabaga and Wepukhulu (2020); Efuntade and Akinola (2020); Etim, Ihenyen, and Nsima (2020); Opeyemi (2019); Kwaltommai, Enemali, Duna, and Ahmed (2019); etc. have neglected to address this challenge in the context of listed oil and gas firms in Nigeria, hence the justification for the present study.

Objectives of the Study

The broad objective of the study is to examine the effect of company traits on the return on investment of listed oil and gas firms in Nigeria. The specific objectives of the study are to:

1) Determine the effect of firm size on return on investment of listed oil and gas firms in Nigeria.
2) Ascertain the effect of firm leverage on return on investment of listed oil and gas firms in Nigeria.
3) Examine the effect of firm age on return on investment of listed oil and gas firms in Nigeria.

Literature review

Conceptual Issues

Company traits, also referred to as firm structure, firm attributes, firm heterogeneity, firm specifics, and firm characteristics, are distinguishing attributes that set a firm apart from others within the same industry (Abubakar, Sulaiman & Haruna, 2018). These traits provide hints into the financial and non-financial status of the firm, establishing it as a unique entity in its industry (Chukwu, Damiebi & Okoye, 2019).

Firm Size and Return on Investment

When firms are relatively small in size, they may encounter difficulties in achieving the economies of scale required to enhance their competitive edge (Bentzen, Madsen & Smith, 2012) and maximize return on investment (ROI). Smaller enterprises often lack the resources and market presence necessary to spread fixed costs over a broader revenue base (Tipis, 2022). Consequently, they may struggle to compete efficiently and effectively within their industry (Niresh & Thirunavukkarasu, 2014), which, in turn, can hamper their ability to achieve a satisfactory ROI that meets investors' expectations. Therefore we hypothesize that:

Firm size positively affects return on investment.

Firm Age and Return on Investment

On the other hand, redundancy in firm age, where a market consists primarily of well-established companies, can introduce a different set of challenges. Aging firms may find themselves grappling with inertia, making it more difficult to adapt to the ever-evolving market dynamics and emerging trends (Ilaboya & Ohiokha, 2016). Their long-standing operational practices, while once successful, may become less agile and responsive to the changing needs and preferences of consumers and the demands of the modern business environment (Mundra, 2018). This lack of adaptability can constrain their capacity to seize new opportunities (Coad, 2018; Coad, Segarra & Teruel, 2016) and optimize their ROI,

leaving them at a disadvantage compared to more agile and innovative competitors. Therefore, we hypothesize that:

Firm age negatively affects return on investment.

Firm Leverage and Return on Investment

Moreover, the mismanagement of firm leverage can expose businesses to a myriad of financial risks (Abubakar, 2021), which, if not adequately controlled, can impede their ability to realize their full ROI potential. While leverage can be strategically utilized to amplify returns when the return on investment surpasses the cost of debt, a lack of prudent financial management can lead to excessive debt burdens. This, in turn, can result in higher interest expenses, which not only reduce profitability but also limit the firm's capacity to reinvest in growth opportunities (Nworie, Onyeka & Anaike, 2023). In the worst cases, excessive leverage can lead to financial distress, adversely impacting the company's overall financial health (Altman, Hotchkiss & Wang, 2019) and its ability to achieve a competitive ROI. Therefore, we hypothesize that:

Firm leverage negatively affects return on investment.

Theoretical Framework

The Resource-Based View (RBV) theory is a foundational framework in strategic management that highlights the pivotal role of a firm's internal resources and capabilities in achieving and sustaining a competitive advantage (Ciszewska - Mlinarič & Wasowska, 2015). According to this theory, a firm's unique set of resources, which includes tangible assets, intangible assets, human capital, and organizational routines, can be a source of sustained competitive advantage ((Dioha, Ahmed & Okpanachi, 2018). It suggests that firms that effectively leverage and exploit these resources and capabilities are better positioned to outperform their competitors in the long run (Nworie & Mba, 2022).

When we apply the RBV theory to the context of firm size, firm age, and firm leverage, it becomes evident how these company traits can profoundly influence a firm's ability to maximize its Return on Investment (ROI). Firm size represents a significant internal resource. Larger firms often possess greater access to capital, a broader customer base, more extensive distribution networks, and enhanced bargaining power with suppliers. These resources can provide them with a competitive advantage, as they can invest in research and development, marketing, and operational efficiencies to achieve a more favorable ROI. Smaller firms, on the other hand, may lack the same scale of resources, which can hinder their ability to compete effectively. Inadequate firm size, in this sense, can limit a firm's strategic capabilities (Miller, 2019), thereby impacting its ROI. Smaller firms may find it challenging to pursue growth opportunities or achieve cost efficiencies that could lead to competitive ROI levels.

Redundancy in firm age can also be seen through the lens of the RBV theory. Older firms, while potentially possessing a wealth of historical knowledge and experience (Hadjimanolis, 2000), may sometimes suffer from organizational inertia, a concept closely related to this theory. Organizational inertia refers to a firm's resistance to change and its inability to adapt to evolving market dynamics and technological advancements. This resistance can impede a firm's strategic capabilities, preventing it from seizing new opportunities (Brouwer, De Kok & Fris, 2005) or optimizing its operations to achieve a competitive ROI. In contrast, younger firms may have more agile and adaptable organizational routines and a heightened capability for innovation. Thus, firm age, as an internal resource, significantly impacts a company's strategic capabilities (Cruz & Haugan, 2019), which, in turn, can influence its ROI.

RBV also applies to firm leverage, considering a company's capital structure as a vital resource. The extent to which a firm uses debt financing, known as leverage, can impact its financial resources and risk profile (Iqbal & Usman, 2018). The mismanagement of leverage, leading to suboptimal levels of debt or excessive borrowing, can affect a company's strategic capabilities. Companies that misuse or underutilize

debt may miss opportunities to invest in growth projects that could lead to a competitive ROI. Conversely, excessive leverage can increase financial risk and interest expenses (Tripathy & Shaik, 2020), constraining a firm's ability to realize its full ROI potential. By managing leverage effectively, a firm can optimize its resource allocation and enhance its strategic capabilities, which are essential for achieving competitive ROI.

Empirical Review

In a study conducted by Parnata, Elfarosa, Kencanawati, and Suryadi (2023), the researchers explored the influence of firm size on the value of transportation and logistics companies listed on the Indonesia Stock Exchange (IDX) during the period 2018-2020. Employing a purposive sampling method, they analyzed data from 21 selected companies and applied multiple linear regression analysis. Their findings indicated a significant and positive relationship between firm size and firm value in the transportation and logistics sector on the IDX during the specified time frame.

Bolarinwa et al. (2022) examined the threshold effect in the relationship between leverage and firm performance. Utilizing a dynamic panel threshold model to account for endogeneity, they examined data from 104 Nigerian firms spanning the years 2005 to 2018. Their empirical analysis revealed threshold levels for short-term, long-term, and total leverage, demonstrating a nuanced relationship between firm leverage and performance conditioned on firm size. The study also emphasized the often overlooked role of endogeneity in this nexus, ultimately highlighting a more favorable impact of leverage on larger firms compared to smaller ones within the Nigerian context.

Bahri, Saefullah, and Anwar (2022) explored the influence of business size and leverage on the financial performance and firm values of food and beverage companies listed on the Indonesia Stock Exchange (IDX) over the period from 2017 to 2020. Their analysis, based on data collected from a panel of individuals, employed path analysis as the data analysis technique. Their findings indicated that firm size had a significant positive effect on financial performance, whereas leverage had a significant negative effect on financial performance in the food and beverage sector on the IDX.

Simanjuntak, Suripto, Wardianto, and Mulkhan (2022) explored the impact of firm age and firm size on financial performance, with a focus on financial inclusion as an intervening variable. Their research employed a quantitative explanatory approach and employed purposive sampling. The study encompassed 144 samples from the Indonesian banking industry, all of which had undergone an Initial Public Offering (IPO). Data collection involved annual financial reports and company annual reports. Structural Equation Modeling (SEM) using Smart PLS 3's Professional version was the chosen analytical technique. The results unveiled a significant negative relationship between firm age and financial inclusion, while firm size exhibited a notable positive relationship with financial inclusion. Additionally, firm age and firm size positively influenced financial performance, with financial inclusion acting as a significant intervening variable, positively impacting financial performance.

In a separate study, Aribaba, Ahmodu, Afolabi, Egbewole, Salaam, and Adesunloro (2022) delved into the influence of firm characteristics on the financial performance of Nigerian-listed oil and gas companies. They collected information from the indices report of twelve oil and gas companies listed on the Nigerian Stock Exchange (NSE) from 2015 to 2019, covering the period before and after a significant economic downturn in Nigeria. Pool and cross-sectional data analysis techniques were applied. The descriptive statistics helped characterize the variables, while the pooled least square method revealed a negative relationship between Firm Size and financial performance. Conversely, Financial Leverage and Firm Age demonstrated a positive relationship with the financial performance of listed oil and gas companies in Nigeria.

Furthermore, Ehiedu and Priscilla (2022) investigated the firm-specific determinants of profitability (PROF) among listed Oil & Gas firms in Nigeria during the years 2011-2020. Their study relied on secondary data extracted from the annual reports and accounts of ten Oil and Gas Firms. The results of multiple regression analysis indicated that leverage had a significant and positive effect on Return on Assets (ROA), while firm size and firm age exhibited insignificant and positive effects on ROA.

Susanti, Widiyanti, and Madyawati (2022) ascertained the influence of company size (Firm Size), leverage, and sales growth on the performance of food and beverage companies listed on the Indonesia Stock Exchange from 2015 to 2019. Their research employed purposive sampling. The independent variables in the study encompassed Company Size (firm size), Leverage, and Sales Growth, with Return on Assets (ROA) serving as the dependent variable. The analysis involved multiple linear regression. The F test results demonstrated that the increase in ROA was collectively influenced by log size, leverage, and sales growth. Regarding the t-test results, log size was found to have no significant effect on ROA, leverage had a positive impact on ROA, while sales growth did not exhibit a significant influence on ROA.

In another study, Nworie and Mba (2022) sought to determine the impact of firm characteristics on the financial performance of listed food and beverage firms in Nigeria. They aimed to assess the extent to which firm size, firm age, and firm leverage affected the return on assets of listed food and beverage firms in Nigeria. The study adopted an ex-post facto research design and employed a purposive sample of five listed food and beverage firms. Secondary data were extracted from the annual reports of these companies spanning from 2012 to 2021. The Panel Least Square Regression using the Fixed Effect Model was employed to estimate the regression results at a 5% level of significance. The findings revealed that, while Firm Size had no significant positive effect on the return on assets of listed food and beverage firms in Nigeria, both Firm Age and Firm Leverage had a significant negative impact on the return on assets of these firms.

Abubakar (2021) undertook an assessment of the influence of financial leverage on the financial performance by utilizing data from the annual reports of seven quoted oil and gas firms in Nigeria. Additionally, data was sourced from the Nigerian Stock Exchange (NSE) daily official lists spanning from 2005 to 2018. Descriptive statistics were employed to present the data, while a random effects panel estimator was applied to determine the effect of financial leverage variables, including short-term debt ratio (STDR), long-term debt ratio (LTDR), and total-debt equity ratio (TDER), on financial performance, measured through the return on equity (ROE). The results derived from the random effects model (REM) indicated that STDR and LTDR did not have a significant impact on financial performance, whereas TDER exhibited a significant negative effect on financial performance, as denoted by ROE.

Bui and Nguyen (2021) investigated the correlation between firm leverage and firm profitability within Vietnam's oil and gas sector. Their study involved the collection of 203 samples drawn from 29 companies listed on the Vietnam Stock Market over a six-year period spanning from 2012 to 2018. The study's outcomes revealed that a high debt ratio within the capital structure had a detrimental impact on the profitability of these enterprises.

In a separate study, Abubakar (2020) sought to establish the influence of financial leverage on financial performance. This investigation utilized secondary data extracted from the annual reports of seven publicly traded Oil and Gas firms in Nigeria. Additionally, data was sourced from the Nigerian Stock Exchange (NSE) daily official lists, covering the period from 2005 to 2016. Descriptive statistics, including measures such as mean, median, minimum, maximum, standard deviation, coefficient of variation, skewness, and kurtosis, were employed for data presentation. The study also applied the random effects panel estimator to determine the effects of financial leverage variables, such as short-term

debt ratio (STDR), long-term debt ratio (LTDR), and total-debt equity ratio (TDER), on financial performance, measured through return on equity (ROE). The results from the random effects model (REM), selected as the most appropriate panel estimator based on F-test and the Hausman test, indicated that neither STDR nor LTDR significantly influenced financial performance. However, TDER had a notable negative impact on financial performance, as denoted by ROE.

Additionally, Nyabaga and Wepukhulu (2020) determined the effect of firm characteristics on financial performance, primarily within the context of listed banks in the Nairobi Securities Exchange over the period from 2010 to 2018. The data collected was analyzed using STATA 11, involving descriptive, correlation, and regression analyses. Their findings revealed a significant positive relationship between leverage and bank size with Return on Equity (ROE).

Efuntade and Akinola (2020) investigated the influence of firm characteristics on the financial performance of manufacturing firms listed in Nigeria. They employed a descriptive and cross-sectional research design to explore the relationship between various firm characteristics and the financial performance of these manufacturing firms over a 14-year period. Data were extracted from annual reports of five selected manufacturing firms, and panel least square regression analysis was used to test their hypotheses. The results revealed that firm age had a positive and significant effect on return on assets (ROA), firm size had a positive but insignificant effect on ROA, and leverage had a negative but insignificant effect on ROA.

Etim, Ihenyen, and Nsima (2020) examined the determinants of financial performance in the Oil and Gas sector in Nigeria, focusing on listed oil and gas companies. They adopted an ex-post facto research design, analyzing data extracted from the published annual accounts of the sampled oil and gas firms over the period from 2012 to 2018. The data analysis involved descriptive and inferential statistical techniques, including correlation analysis and multiple regression analysis at a significance level of 5%. Their findings indicated that firm leverage and firm age had a positive impact on financial performance, while firm size had a negative and significant effect on financial performance.

Furthermore, Opeyemi (2019) explored the impact of firm size on the performance of selected firms in the building industry in Nigeria, using annual data from 2004 to 2017. The research employed panel analysis and evaluated performance based on return on assets (ROA), return on equity (ROE), output per labor, and output per capital. The results showed that two out of the four size-related variables, total sales and age of firm since incorporation, were statistically significant in determining ROA, with total sales having a positive effect and age of firm since incorporation having a negative effect. Only leverage was significant in determining ROE. When considering productivity measurements, total sales and age of firm since incorporation were again statistically significant in determining output per labor, with both having a positive effect, while leverage had a negative and significant impact. Age of firm since incorporation was the sole significant measure of size affecting output per capital, and liquidity ratio had a positive and significant effect on output per capital.

Kwaltommai, Enemali, Duna, and Ahmed (2019) examined the influence of firm characteristics on the financial performance of consumer goods firms in Nigeria. The specific focus was on assessing the effects of firm size, firm age, and leverage on financial performance, as measured by return on equity (ROE). The study amalgamated both financial and non-financial data extracted from the annual reports of five listed consumer goods firms in Nigeria during the period spanning 2007 to 2016. The data analysis entailed the use of descriptive statistics, Pearson correlation, and multiple regression, facilitated by STATA version 13. The results unveiled a positive relationship between firm size and financial performance, with firm age and leverage also demonstrating positive relationships with financial performance.

In another study, Abubakar, Sulaiman, and Haruna (2018) delved into the effect of firm characteristics on the financial performance of listed insurance companies in Nigeria. Data for the study were collated from the annual reports and accounts of insurance companies quoted on the Nigeria Stock Exchange (NSE) between 2007 and 2016. The analysis included robust regression analysis, in addition to various diagnostic tests conducted on the data. The findings of the study illuminated that firm size had a significant positive impact on the financial performance of insurance companies, whereas firm age exerted a significant negative influence on their financial performance.

Olawale, Ilo, and Lawal (2017) undertook an investigation into the effect of firm size on the performance of firms in Nigeria. Their research incorporated a panel dataset comprising 12 non-financial firms operating in Nigeria during the period from 2005 to 2013. Various regression models, including pooled regression, fixed effects model, and random effects model, were utilized to discern the relationship between firm size and the performance of companies listed on the Nigeria Stock Exchange (NSE). Return on equity served as a proxy for performance. The study examined two facets of firm size, total assets, and total sales, and included control variables such as leverage and working capital. The results divulged that firm size, concerning total assets, had a negative impact on performance, while in terms of total sales, firm size exhibited a positive effect on the performance of Nigerian non-financial companies.

Furthermore, Onyekwelu, Nwajei, and Ugwu (2017) endeavored to establish the impact of firms' leverage on the financial performance of companies in Nigeria, focusing on oil and gas firms. Their research employed the ex-post facto research design, and data were sourced from the financial statements of the firms under scrutiny. Multiple regression analysis was utilized for the analysis, with the outcomes indicating a negative effect of leverage on Return on Assets (ROA).

Lastly, Babalola (2013) evaluated the effect of firm size on the profitability of manufacturing companies listed on the Nigerian Stock Exchange, encompassing a panel dataset spanning from 2000 to 2009. Profitability was assessed through Return on Assets, while both total assets and total sales served as proxies for firm size. The study's findings unveiled a positive impact of firm size, whether measured in terms of total assets or total sales, on the profitability of manufacturing companies in Nigeria.

Method

The study employed an ex-post facto research design to analyse the research questions at hand. In this particular research design, the researchers do not manipulate any variables instead, data are collected from past events or records to observe and analyze relationships and outcomes. This design is particularly useful when conducting research on events that have taken place in the past (Nworie, Okafor & John-Akamelu, 2022). In the Nigerian Exchange Group, the listed Oil and Gas companies totaled ten (10) as at 31st December, 2022 and are as follows;

1. Ardova PLC
2. Capital Oil PLC
3. Conoil PLC
4. Eterna PLC
5. Japaul oil& ventures PLC
6. MRS oil Nig. PLC
7. Oando PLC
8. Rak Unity petroleum PLC
9. Seplat Nig. Petroleum PLC
10. Totalenergies Nig. PLC

For the purpose of this study, a purposive sampling method was utilized to select a sample of five firms from a total population of ten listed oil and gas companies in Nigeria. Purposive sampling involves deliberately choosing specific participants or elements based on certain criteria, in this case, selecting firms that met the criteria relevant to the research questions. This approach allowed the researchers to focus on a subset of the population that best suited the objectives of the study. The five selected quoted oil and gas companies in Nigeria are; Total energies PLC, Conoil PLC, Eterna PLC, Japaul oil& ventures PLC, and MRS oil Nig. PLC.

Data collection for this research was primarily reliant on secondary sources, which means that the information was gathered from pre-existing records and documents rather than through direct interaction with the firms or individuals. In this case, the annual reports and financial statements of the selected listed oil and gas companies in Nigeria served as the source of data.

The data collection spanned over a substantial period of ten years, encompassing the years 2013 to 2022. In terms of data analysis, the researchers employed a Random Effect Model to estimate the regression coefficients after conducting Hausman Specification test. This statistical model is particularly useful when dealing with panel data, where observations are collected from multiple entities over time. By using this model, the researchers aimed to test the formulated hypotheses and identify any significant relationships or patterns that emerged from the data. The linear regression model estimated is:

$ROI_{it} = \beta_0 + \beta_1 FSZ_{it} + \beta_2 LEV_{it} + \beta_3 FAG_{it} + \mu_t$…..(i)

Where:

ROI = Return on Investment measured as profit after tax divided by capital employed

FSZ = Firm size measured as the natural logarithm of total asset

LEV = Leverage measured as the ratio of firm's total liabilities to its total assets.

FAG = Firm age measured as number of years in operation.

Results and Discussion

Descriptive Statistics

Table 1 Descriptive Statistical Analysis

	ROI	FSZ	LEV	FAG
Mean	0.045695	7.716964	0.769625	39.30000
Maximum	2.653728	8.488291	2.222321	53.00000
Minimum	-3.227752	6.943113	0.525038	19.00000
Std. Dev.	0.640023	0.292464	0.309954	11.46468
Skewness	-1.432440	0.050219	3.224619	-0.423453
Kurtosis	20.14243	3.464558	13.92370	1.509365
Jarque-Bera	629.3134	0.470629	335.2497	6.123427
Probability	0.000000	0.790322	0.000000	0.046807

Source: Eviews Statistical Software (2023)

The average return on investment (ROI) for the oil and gas companies listed in Nigeria stands at approximately 0.0457. This signifies that, on average, these companies experienced a positive return on their investments throughout the study period. Notably, some firms achieved remarkable success with the highest observed ROI reaching 2.6537, indicating substantial returns. However, there were instances of negative returns, with the lowest ROI recorded at -3.2278, indicating that certain companies incurred losses during the study period. The standard deviation of 0.6400 suggests a degree of dispersion in the

ROI values around the mean, signifying variability in returns among different companies. The skewness value of -1.4324 reveals a negatively skewed distribution of ROI, with a longer tail on the left side. The high kurtosis value of 20.1424 suggests heavy-tailed leptokurtic distribution. Furthermore, the Jarque-Bera test's probability near zero (0.0000) underscores a significant departure from a normal distribution in the ROI dataset.

The average firm size (FSZ) for the selected oil and gas companies stands at approximately 7.7170, serving as a representation of their total assets. Among the selected companies, the highest FSZ value recorded is 8.4883, indicating the presence of relatively larger corporations within the sample. Conversely, the lowest FSZ value observed is 6.9431, implying the inclusion of smaller firms as well. The relatively modest standard deviation of 0.2925 signifies that the firm sizes exhibit a degree of proximity to the mean. A skewness value of 0.0502 reflects a near-zero skew, implying that the distribution of firm size approximates symmetry. With a kurtosis of 3.4646, the distribution is characterized as platykurtic, featuring lighter tails than a normal distribution. Moreover, a Jarque-Bera test probability of 0.7903 suggests that the distribution of firm size does not significantly deviate from a normal distribution.

The average firm leverage (LEV) among the selected oil and gas companies is approximately 0.7696, serving as a reflection of the typical debt utilization in their capital structure. Within this group, the highest recorded LEV value stands at 2.2223, signifying the presence of companies with relatively higher leverage ratios. Conversely, the lowest LEV value noted is 0.5250, indicating the existence of firms with lower levels of debt in their capital structure. The standard deviation of 0.3100 underscores a degree of variability in leverage levels across the sample of companies. A skewness value of 3.2246 reveals a positive skew, suggesting that the distribution of firm leverage is positively skewed, with a longer tail on the right side. The elevated kurtosis value of 13.9237 indicates a distribution with heavy tails and a leptokurtic profile. Furthermore, the nearly zero probability obtained from the Jarque-Bera test (0.0000) underscores a significant deviation of the firm leverage distribution from a normal distribution.

The average firm age (FAG) among the selected oil and gas companies is approximately 39.3000, representing the typical number of years these companies have been in existence. Within this set, the highest recorded FAG value is 53, indicating the presence of the oldest company in the sample. Conversely, the lowest FAG value recorded is 19, indicating the inclusion of younger companies. The standard deviation of 11.4647 highlights variability in the ages of these firms. A slightly negative skew of -0.4235 suggests a distribution with a minor leftward tail, indicating a modest asymmetry. The kurtosis value of 1.5094 characterizes the distribution as platykurtic, with tails that are lighter than a normal distribution. Additionally, the probability derived from the Jarque-Bera test, at 0.0468, underscores a significant deviation of the firm age distribution from a normal distribution.

Hausman Test

The Hausman test was used to determine whether a random-effects model or a fixed-effects model is more appropriate for a given dataset.

Table 2 Hausman Test

Test Summary	**Chi-Sq. Statistic**	**Chi-Sq. d.f.**	***Prob.***
Cross-section random	0.234327	3	0.9719

Source: Eviews Statistical Software (2023)

The results of the Hausman test indicate a relatively small Chi-Square Statistic of 0.2343. Furthermore, the associated probability (p-value) is notably high at 0.9719. Typically, in statistical tests, when the p-value exceeds the commonly used significance level of 0.05, it suggests that the null hypothesis should not be rejected. Not rejecting the null hypothesis implies that there is no significant distinction between the random-effects model and the fixed-effects model when applied to this dataset (Amini, Delgado, Henderson & Parmeter, 2012). In simpler terms, the random-effects model is just as suitable as the fixed-effects model for explaining the variance in the data. Consequently, based on the outcomes of the Hausman test, we can confidently employ the cross-section random-effects model for analyzing the data presented in Table 2.

Test of Hypotheses

In addition to examining the individual influence of independent variables on the dependent variable, a multiple regression analysis was conducted to understand both the individual effects and the collective impact of these independent variables on the dependent variable, which is the Return on Investment (ROI) of the listed oil and gas companies in Nigeria. To test the formulated hypotheses, the study employed the Random Effect Model, utilizing the Cross-section random effects approach.

Table 3 Hypotheses Testing Using Random Effect Regression Approach

Variable	**Coefficient**	**t-Statistic**	**Prob.**
FSZ	1.152630	2.765041	0.0082
LEV	-0.649106	-2.184169	0.0341
FAG	-0.017767	-1.601697	0.1161
C	-7.651313	-2.625238	0.0117
R-squared	0.221269		
F-statistic	4.356823		
Prob(F-statistic)	0.008783		

Source: Eviews 11 Statistical Software (2023)

The outcome of the Random Effect Estimation presented above unveils that the R-squared value, which stands at 0.2213, signifies that approximately 22.13% of the variability in the Return on Investment (ROI) can be elucidated by fluctuations in the firm size (FSZ), firm leverage (LEV), and firm age (FAG) of the chosen oil and gas companies in Nigeria. The probability value (Prob.) associated with the F-statistic is 0.0088, denoting that the overall model holds statistical significance at the 5% level. This suggests that the collective impact of firm size, firm leverage, and firm age on ROI is indeed substantial.

The constant term (C) within the regression equation is recorded at -7.6513. This value represents the estimated ROI when all independent variables (FSZ, LEV, and FAG) are at zero. With a t-statistic of -2.6252, it becomes apparent that the constant term holds statistical significance at the 5% level. The corresponding probability value (Prob.) of 0.0117 underscores the significant influence that the constant term exerts on ROI.

The coefficient for firm size (FSZ) is estimated at 1.1526. This signifies that a one-unit increase in firm size is correlated with an expected rise of 1.1526 units in the Return on Investment (ROI) for the listed oil and gas companies in Nigeria. With a t-statistic of 2.7650 surpassing the threshold of 2, it is evident that the coefficient attains statistical significance at the 5% level. Furthermore, the probability value (Prob.) of 0.0082, which is less than 0.05, implies that the impact of firm size on ROI is highly unlikely to be

attributed to random chance. Consequently, based on this evidence, we endorse the alternative hypothesis, signifying that firm size exerts a positive and substantial influence on the Return on Investment (ROI) of the listed oil and gas companies in Nigeria (β = 1.1526; p-value = 0.0082).

The coefficient for firm leverage (LEV) is recorded as -0.6491. This denotes that a one-unit increase in firm leverage is linked to an anticipated reduction of 0.6491 units in the Return on Investment (ROI) for the listed oil and gas companies in Nigeria. With an absolute value of the t-statistic at -2.1842, surpassing the threshold of 2, it becomes evident that the coefficient holds statistical significance at the 5% level. Moreover, the probability value (Prob.) of 0.0341, which falls below the 0.05 threshold, indicates that the impact of firm leverage on ROI is highly improbable to be attributed to random chance. Consequently, based on this evidence, we support the alternative hypothesis, signifying that firm leverage exerts a negative and substantial influence on the Return on Investment (ROI) of the listed oil and gas companies in Nigeria (β = -0.6491; p-value = 0.0341).

The coefficient for firm age (FAG) is registered at -0.0178. This signifies that a one-unit increase in firm age is linked to a reduction of 0.0178 units in the Return on Investment (ROI) for the listed oil and gas companies in Nigeria. However, the absolute value of the t-statistic, which stands at -1.6017, falls below the threshold of 2, indicating that the coefficient does not attain statistical significance at the 5% level. Additionally, the probability value (Prob.) of 0.1161 exceeds the 0.05 threshold, implying that the influence of firm age on ROI lacks statistical significance and could potentially be attributed to chance. Therefore, based on this observation, we embrace the null hypothesis, signifying that firm age yields a negative but statistically insignificant effect on the Return on Investment (ROI) of the listed oil and gas companies in Nigeria (β = -0.0178; p-value = 0.1161).

Discussion of Findings

The effect of Firm Size on the Return on Investment (ROI) of listed oil and gas companies in Nigeria is both positive and statistically significant. Larger firms benefit from increased access to resources, economies of scale, and enhanced bargaining power, all of which contribute to heightened profitability and more attractive investment prospects. In the oil and gas sector, sizable companies possess the capacity to embark on substantial exploration and production endeavors, negotiate more favorable agreements with stakeholders, and diversify their operations across various segments of the value chain. Consequently, their ROI tends to outperform that of smaller enterprises constrained by limited resources and market reach. Previous scholars such as Parnata, Elfarosa, Kencanawati, and Suryadi (2023) focused on the Indonesian transportation and logistics sector, finding a significant and positive relationship between firm size and firm value. Bolarinwa et al. (2022) examined the nuanced relationship between firm leverage and performance, emphasizing the impact on larger firms in the Nigerian context. They found that larger firms tend to benefit more from leverage. Similarly, Bahri, Saefullah, and Anwar (2022) explored the food and beverage sector on the Indonesia Stock Exchange, revealing a significant positive effect of firm size on financial performance. Simanjuntak, Suripto, Wardianto, and Mulkhan (2022) delved into the Indonesian banking industry, finding that firm size had a notable positive relationship with financial inclusion and subsequently impacted financial performance. However, Abubakar (2021) discovered a negative relationship between firm size and financial performance in Nigerian-listed oil and gas companies.

Firm Leverage exerts a negative and statistically significant influence on the Return on Investment (ROI) of listed oil and gas companies in Nigeria. This adverse effect arises from the financial risks associated with elevated debt levels. Companies heavily reliant on debt financing encounter increased interest expenses and financial commitments, especially in the capital-intensive and volatile landscape of the oil and gas industry. High leverage exposes these firms to considerable financial vulnerabilities during economic downturns or periods of low oil prices. Subsequently, a substantial portion of their profits may

be allocated to servicing debt, rather than being reinvested or distributed to shareholders, resulting in a diminished ROI for highly leveraged companies. Aribaba, Ahmodu, Afolabi, Egbewole, Salaam, and Adesunloro (2022) reported a significant and positive effect of leverage on return on assets (ROA) among listed oil and gas firms in Nigeria. Nyabaga and Wepukhulu (2020) found a significant positive relationship between leverage and bank size with Return on Equity (ROE) in the Nairobi Securities Exchange. Efuntade and Akinola (2020) revealed that firm age had a positive but insignificant effect on ROA, while firm size had a positive but insignificant effect on ROA, and leverage had a negative but insignificant effect on ROA in the Nigerian manufacturing sector. Etim, Ihenyen, and Nsima (2020) indicated that leverage had a positive impact on financial performance, while firm size had a negative and significant effect on financial performance in the Nigerian oil and gas sector.

The influence of Firm Age on the Return on Investment (ROI) of listed oil and gas companies in Nigeria is characterized by a negative but statistically insignificant effect. Several factors contribute to this nuanced relationship. As companies mature and accumulate years of operation, they may grapple with challenges related to innovation, adaptability to market shifts, and intensified competition. Older companies might find themselves encumbered by legacy systems, outdated practices, or resistance to change, impeding their responsiveness to evolving market dynamics. Furthermore, they may have already capitalized on their most promising investment opportunities, potentially yielding diminishing returns on new projects. In contrast, younger firms often display greater agility, innovation, and access to contemporary technologies and market prospects, leading to superior investment returns. Simanjuntak, Suripto, Wardianto, and Mulkhan (2022) revealed a significant positive relationship between firm age and financial performance. In contrast, Nworie and Mba (2022) identified a significant negative effect of firm age on the return on assets of listed food and beverage firms in Nigeria.

Conclusion and Recommendation

This study set out to explore the influence of company traits on the return on investment (ROI) of listed oil and gas firms in Nigeria. The specific objectives delved into the effects of firm size, firm leverage, and firm age on ROI. The findings of this research reveal significant perceptions into the relationships between these variables and the financial performance of the oil and gas companies under investigation. Firstly, it is evident that firm size wields a positive and significant influence on the ROI of listed oil and gas companies in Nigeria. This implies that, in this context, larger firms tend to generate a higher return on investment, which can be attributed to their potential for economies of scale and more extensive resources.

Conversely, firm leverage exhibits a negative and significant effect on the ROI of listed oil and gas companies in Nigeria. This suggests that a high degree of leverage can hinder the return on investment, potentially due to increased financial risk and interest expenses, which may overshadow the gains made by the firm. Lastly, the study indicates that firm age bears a negative, albeit insignificant, impact on the ROI of listed oil and gas companies in Nigeria. While the effect may not be statistically significant, it does suggest that older firms do not necessarily outperform their younger counterparts in terms of ROI. In sum, addressing the challenges of inadequate firm size, redundancy in firm age, and sub-optimal firm leverage enables listed oil and gas companies position themselves more favorably to enhance their financial performance and ensure the realization of their full ROI potential in an increasingly competitive and dynamic global market.

Based on the findings of the study regarding the effect of company traits on the return on investment (ROI) of listed oil and gas firms in Nigeria, the following recommendations were made:

1. **Recommendation based on Firm Size and ROI:** Managers of oil and gas firms should increase their size by diversifying operations, or scaling up their existing projects in order to access more

resources, benefit from economies of scale, and enhance their bargaining power. These actions are likely to lead to higher profitability and more attractive investment opportunities.

2. **Recommendation based on Firm Leverage and ROI:** In light of the negative and significant effect of firm leverage on ROI, it is crucial for oil and gas firms in Nigeria to adopt prudent financial management practices by maintaining a balance between debt and equity to reduce financial risks and interest expenses.
3. **Recommendation based on Firm Age and ROI:** While the study found that firm age has a negative but statistically insignificant effect on ROI, it is essential for both older and younger oil and gas companies in Nigeria to focus on other aspects of performance and adaptability. Younger firms should leverage their agility and innovation to explore new technologies and market opportunities, which can lead to better investment returns. Older firms, on the other hand, should consider strategies for rejuvenation and innovation to remain competitive in a dynamic market.

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