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The influence of size, financial leverage, and age on financial performance: A study of gasoline firms on the Vietnamese stock market

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Abstract: The purpose of this research is to investigate the impact of firm size, financial leverage, and firm age on the financial performance, measured by return on assets (ROA), of listed gasoline enterprises on the Vietnamese stock market. The research methods primarily used were quantitative. The research sample consists of 20 listed gasoline firms observed over the period 2021–2024, employing a combination of qualitative and quantitative research methods. A regression model was developed to examine the relationships between the explanatory variables and ROA, while ensuring the validity of key linear regression assumptions. The empirical results reveal that financial leverage (Lev) has a positive and statistically significant effect on ROA, with a coefficient of 0.1569723, indicating that an appropriate use of debt can enhance financial performance in gasoline firms. In contrast, firm age (Age) exhibits a negative relationship with ROA, with a coefficient of –0.0008917, suggesting that older firms may face challenges related to organizational rigidity and reduced adaptability in a dynamic market environment. Notably, firm size (Size) does not show a statistically significant impact on ROA, implying that scale advantages are not a decisive factor for financial performance in the gasoline industry during the study period. The findings provide valuable empirical evidence for corporate managers, investors, and policymakers in designing financial strategies and improving the business performance of listed gasoline enterprises in Vietnam.

Keywords: *Accounting, Age, Finance, Financial leverage, Financial performance, Gasoline firms, Size.*

1. Introduction

In the context of Vietnam's accelerating industrialization and energy transition, the petroleum industry plays a crucial role in ensuring energy security and macroeconomic stability. Listed petroleum companies must meet domestic consumption needs while facing competitive pressure, volatile global oil prices, and increasingly stringent requirements for financial and risk management. The annual report of Vietnam Petroleum Corporation (PLX) shows significant fluctuations in profitability over the years, clearly reflecting the challenges in optimizing asset and capital structure and maintaining reasonable profitability in a high-risk business environment.

The financial performance of a firm, often measured through ROA and ROE, is simultaneously influenced by numerous micro- and macro-factors; among them, business characteristics such as size, financial leverage, and age are considered important explanatory variables in capital structure theory and business life cycle theory. Recent international studies indicate that the relationship between financial leverage and business performance can differ significantly between large and small firms; firm size not only affects the cost of capital and borrowing capacity but also regulates the relationship between capital structure and financial performance.

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For emerging markets and capital-intensive industries like oil and gas, some empirical evidence suggests that the impact of scale on financial performance can be non-linear: in some cases, small and medium-sized enterprises (SMEs) achieve higher ROAs than very large enterprises due to more efficient asset utilization or greater flexibility in cost adjustments. Research on oil and gas companies in India shows that small enterprises have higher ROAs and profit margins than large businesses, suggesting that economies of scale do not always directly translate into profitability. This raises an interesting research question in the context of Vietnamese oil and gas firms, which are both pillars of the economy and subject to constraints related to pricing, reserve requirements, and significant infrastructure investment.

In Vietnam, many studies have examined the relationship between financial leverage and the financial performance of listed companies, incorporating company size and age into models as explanatory or control variables. However, most of these studies focus on non-financial companies in general or the securities, construction, and manufacturing sectors, rarely separating the petroleum sector, an industry with a unique asset structure, business risks, and regulatory mechanisms. Furthermore, company age is primarily measured by the number of years in operation, while the number of years listed on the stock market, representing transparency, experience in accessing capital, and shareholder pressure, has not been fully explored.

Given these gaps, research on the influence of size, financial leverage, and age on the financial performance of listed gasoline firms on the Vietnamese stock market is necessary both theoretically and practically. This research not only supplements empirical evidence for capital structure theories, business life cycle theories, and risk-benefit trade-off theories in the context of emerging markets but also provides a scientific basis for gasoline company managers, investors, and regulatory agencies in designing appropriate financial policies, capital structures, and development strategies to improve asset utilization efficiency and profitability measured by ROA.

This study aims to examine and assess the impact of firm size, financial leverage, and firm age on the financial performance of petroleum enterprises listed on the Vietnamese stock market during the period 2021–2024. By employing a mixed-method approach combining qualitative and quantitative analyses, the study seeks to clarify the role of firm-specific financial characteristics in enhancing corporate performance, as measured by return on assets (ROA). Based on empirical evidence, the research is expected to contribute practical insights for financial management and provide policy-relevant implications for the petroleum industry within the context of Vietnam's evolving capital market.

Besides, the article answers the following research questions.

RQ1. Does firm size have a significant impact on the financial performance, measured by return on assets (ROA), of listed gasoline enterprises in Vietnam during the period 2021–2024?

RQ2. How does financial leverage affect the financial performance of listed gasoline companies in the Vietnamese stock market?

RQ3. What is the effect of firm age, measured by the number of years since listing, on the financial performance of listed gasoline enterprises in Vietnam?

RQ4. Among firm size, financial leverage, and firm age, which factor exerts the most influential impact on the financial performance of listed petroleum companies?

The structure of this paper is as follows. Section 1 introduces the pressing need for the research. Section 2 reviews the relevant literature. Section 3 analyzes the methodology used to conduct empirical research on the effects of size, financial leverage, and age on financial performance. Section 4 presents results. Section 5 discusses implications, and Section 6 concludes.

2. Literature Review and Theoretical Background

2.1. Literature Review

Ali and Fatima [1] studied whether firm size influences financial performance for oil and gas firms in India during the period 2015–2022. The results showed that smaller oil and gas firms had higher

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ROA and other profitability indicators than larger firms, reflecting better asset utilization and management cost efficiency in smaller enterprises; at the same time, size had a significant interaction with debt structure in shaping financial performance. This study emphasizes that in the oil and gas industry, economies of scale do not always equate to efficiency, and the relationship between size and ROA may be non-linear.

Alabdulkarim et al. [2] analyzed the moderating effect of size in the relationship between financial leverage and business performance in the Saudi Arabian market. The results showed that in large firms, the negative impact of leverage on financial performance tends to be mitigated by advantages such as collateral, lower cost of capital, and high transparency; conversely, in small enterprises, high leverage significantly impairs financial performance due to the greater risk of financial distress. This reinforces the argument that size is a key variable when assessing the leverage-performance relationship in emerging markets.

Ghafoorifard et al. [3] examined the simultaneous impact of size and age on financial performance at firms listed on the Tehran Stock Exchange. The authors pointed out that firm age can have a two-way impact: long-established firms have advantages in reputation and experience but also face bureaucratic risks and reduced flexibility, leading to a non-linear relationship between firm age and financial performance. These results suggest that, in heavily regulated industries like oil and gas, including the age variable in the model alongside size and leverage is necessary to more fully capture the characteristics of the firm's lifecycle.

Le and Pham [4] analyzed the relationship between financial leverage and the financial performance of listed non-financial enterprises in Vietnam, considering the regulatory role of enterprise size. The results show that financial leverage has an inverse impact on financial performance, while enterprise size has both a direct impact and influences the leverage effect's intensity. Large enterprises can tolerate higher debt levels without significantly reducing ROA and ROE compared to small enterprises.

Do [5] measured the impact of financial leverage on the financial performance of listed securities firms in Vietnam during the period 2010–2021 is analyzed. The research model used ROE as the dependent variable, leverage (TDA, TDE) as the independent variable, and included size (lnsize) and age (age) as control variables. Results showed that size had a significant positive impact on financial performance, while age did not have clear statistical significance. A reasonable level of leverage improved profitability, but exceeding it increased risk and degraded performance.

Nguyen and Duong [6] used ROA and ROE as efficiency measures, with firm size (size) and debt-to-equity ratio (D/E) included as important explanatory factors in the model. The results showed that size has a positive relationship with financial efficiency, while D/E has a negative impact when exceeding the optimal level, reflecting the trade-off between tax shield benefits and financial risk. The study also emphasized the role of macroeconomic context and industry characteristics in determining the optimal leverage threshold for each group of firms.

Overall, international and domestic studies have affirmed the important roles of size, financial leverage, and age in financial performance, while also highlighting the diversity and even contradictions in empirical results depending on market context, industry, and analysis period. However, in Vietnam, there are still very few studies focusing in depth on listed petroleum companies, a sector that combines characteristics of an essential commodity, large capital, significant tangible assets, and strong price and reserve requirements.

Furthermore, while the age of a firm is typically measured by the number of years in operation, the number of years listed, representing transparency and experience in accessing capital markets, has not been explored as a variable reflecting the financial and managerial maturity of the firm. Therefore, analyzing the simultaneous impact of size (logarithm of total assets), financial leverage (long-term debt/total assets), and listing age on the ROA of petroleum firms on the Vietnamese stock market will contribute to filling this gap while providing industry-specific empirical evidence for policy planning and corporate financial management.

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2.2. Research Hypothesis

The impact of firm size on financial performance.

According to the SCP model, enterprise size can create economies of scale, thereby improving financial performance.

Large-size enterprises have advantages in resources, access to capital, and competitiveness, thus enabling them to achieve higher ROA [7].

H_1: Firm size has a positive impact on ROA.

The impact of financial leverage on financial performance.

The trade-off theory suggests that financial leverage has a two-way effect: increased borrowing helps businesses expand their operations, but it also increases the risk of financial costs [8].

High long-term debt ratios can reduce profitability due to interest expenses, especially in the gasoline industry, which is sensitive to price volatility and market risks [9].

H_2: Financial leverage (Lev) has a negative impact on ROA.

The impact of firm age on financial performance.

The firm life cycle theory suggests that a firm's age reflects its maturity level, its ability to accumulate experience, and its management performance.

Firms that have been listed for a long time tend to have higher reputations and better governance systems, thus operating more efficiently [10].

H_3: Firm age (age) has a positive impact on ROA.

3. Research Methodology

3.1. Methodology

This study uses both research methods, including qualitative research methods and quantitative research methods.

Qualitative research methods: We used techniques of synthesis, analysis, and comparison to evaluate the financial performance of gasoline firms and measure the effects of size, financial leverage, and age on financial performance. In addition to collecting previous studies, we interviewed experts. Qualitative research methods oriented and refined the research results of previous studies; from there, this study inherited and applied them.

Quantitative research methods are based on tabular data; data are aggregated over 4 years, from 2021 to 2024. We used Stata 13 software in the quantitative research method.

3.2. Data Collection

The list of 20 gasoline firms listed on the Vietnamese stock market is collected from the websites cophieu68.vn and https://24hmoney.vn/companies.

In order to learn, analyze, evaluate, and measure the financial performance of gasoline firms and assess the effects of size, financial leverage, and age on financial performance, we use data and information from audited, approved, and published financial statements on reputable websites such as https://finance.vietstock.vn/ and cafef.vn, as well as data service providers. Additionally, they refer to analysis and comments from experts in the media and specialized magazines.

Besides, we collected data from research documents and semi-structured interviews. First, previous papers were reviewed to examine similar studies and gain an overview of key discussions. Then, we interviewed chief accountants and management board members from three listed gasoline firms and two lecturers with extensive experience in finance at top economic universities in Vietnam. All recorded interviews generated a large dataset for analyzing and evaluating the attributes of the characteristics of size, financial leverage, and age of gasoline firms. All interviewees have experience in the research field. Respondents are assured of the confidentiality of the information they provide.

We designed a construct of size, financial leverage, age, and financial performance observed variables based on previous studies and interview results. Table 1 was officially sent for data collection in 2025. They collected and calculated the actual levels of the four observed variables, size, financial

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leverage, age, and financial performance, in listed gasoline firms from 2021 to 2024. Meanwhile, the shortcomings of data processing will be addressed, making the study more convincing over the long term.

Data collection results received 20 responses from 20 listed gasoline firms. Of these, there were no invalid responses, and all 20 responses from 20 companies were retained, meeting the required sample to reach 95% of the statistical results [11].

Table 1.
Independent variables and dependent variables.

Code	Observed variable	Measurement	Sources
Independent variables			
Size	Firm size	Logarithm of total assets at the end of the period.	Dang et al. [7] (To address the issue of data fragmentation and reflect exponential growth).
Lev	Financial leverage	Ending long-term debt/Ending total assets	Vo and Ellis [9] (This is consistent with the characteristics of firms in the energy and petroleum industries, which have a high proportion of borrowed capital for investment activities).
Age	Age	Number of years listed	Abor [10] (It reflects the level of maturity, market reputation, and operational experience of the firm).
Dependent variables			
ROA	Financial Performance	Profit after tax / Average total assets	Alarussi and Alhaderi [12], Do et al. [13], and Nguyen et al. [14]

3.3. Data Processing

The collected data will be checked for compliance information, then cleaned, synthesized, and analyzed according to the following steps:

Step 1: Encrypt data, declare and import data into Excel files

Step 2: Data processing using Stata 13 software, including descriptive statistics, correlation analysis, scale regression, and regression model testing.

3.4. Research Model

Inheriting previous research and based on expert interviews, we build a research model as follows (see Figure 1):

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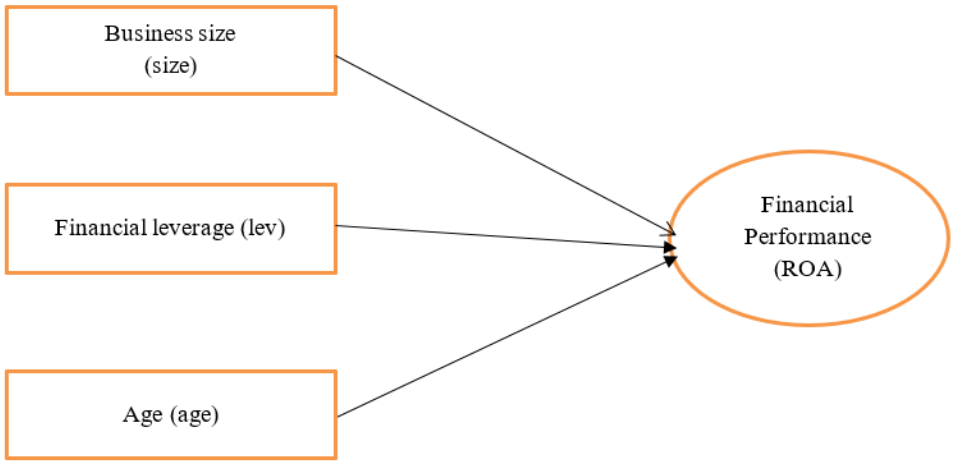

Figure 1.
Research model.

4. Research Result

4.1. Descriptive Statistics

Table 2 shows that the dependent variable includes one observed variable, and the independent variables include three observed variables. Each observed variable is described by 80 observations. Basic indicators such as mean, max, min, standard deviation (SD), variance, skewness, coefficient of variation, sum of variables, range, and coefficients of variation (P50 and CV) have been identified. These basic indices accurately reflect the current state of financial performance and the impact of size, financial leverage, and age on the financial performance of listed gasoline firms.

The current state of the control variables reveals a relatively diverse picture of the listed petroleum industry: size is increasing, but not uniformly, the age of the firms reflects their level of maturity, and financial leverage tends to be more cautious over time. These characteristics are expected to influence financial performance when based on the regression model and also help explain the differences in operational efficiency between firms in the same industry.

Table 2.
General descriptive statistics and detailed descriptive statistics.

General descriptive statistics						
Variable	**Obs.**		**Mean**	**Std. Dev.**	**Min.**	**Max.**
Dependent variable						
ROA	80		0.0359924	0.0441238	-0.1713448	0.1868993
Independent variable						
Size	80		14.42112	1.98811	11.94471	18.29723
Lev	80		0.0581205	0.0761922	0	0.2940125
Age	80		16.85	4.575941	9	31
Detailed descriptive statistics						
Stats	**ROA**	**Size**	**Lev**	**Age**		
N	80	80	80	80		
Sum	2.879393	1153.69	4.649642	1348		
Range	0.3582441	6.352526	0.2940125	22		
Variance	0.0019469	3.952581	0.0058053	20.93924		
Cv	1.22592	0.189718	1.310935	0.2715692		
Skewness	-0.3988765	0.7414257	1.448581	1.040228		
Kurtosis	9.632276	2.159991	4.129787	4.084566		
p50	0.0323356	14.11905	0.0183011	16		

4.2. Correlation Analysis Results

Table 3.
Correlation analysis results of the independent variable and the control variable.

	ROA	Size	Lev	AGE
ROA	1.0000			
Size	0.1224	1.0000		
Lev	0.1674	0.1999	1.0000	
AGE	-0.0221	0.0352	0.1186	1.0000

When analyzing the correlation between the independent variable and the dependent variable, the results in Table 3 show that, between the independent variables and the dependent variable, the absolute value of each correlation coefficient between two variables is less than 0.8; therefore, there is no multicollinearity phenomenon between the independent variable and the dependent variable and between the independent variables [15].

4.3. Regression Results

Table 4.
OLS regression results.

OLS regression						
Source	**SS**	**df**	**MS**		Number of obs. = 80	
					F (3, 76) = 1.00	
Model	0.005864128	3	0.001954709		Prob > F = 0.3957	
Residual	0.147941902	76	0.001946604		R-squared = 0.0381	
					Adj R-squared = 0.0002	
Total	0.153806029	79	0.001946912		Root MSE = .04412	
ROA	**Coef.**	**Std. Err.**	**T**	**P>|t|**	[95% Conf. Interval]	
Size	0.0020677	0.0025484	0.81	0.420	-0.0030079	0.0071433
Lev	0.0891372	0.0669274	1.33	0.187	-0.0441604	0.2224347
AGE	-0.0004205	0.0010926	-0.38	0.701	-0.0025965	0.0017556
_cons	0.0080782	0.0405005	0.20	0.842	-0.0725856	0.088742

With 95% confidence degree, Table 4 shows:

The value of F is equal to 1.00 (< 1.96), and the value of Prob is greater than the value of F by 0.3957 (> 0.05). Thus, the model is not consistent and statistically significant [15]. R-squared is 0.0381, meaning that the independent variables in the research model explain 3.81% of the variance of the dependent variable. Therefore, the research results are not accepted temporarily, but the suitability of the model needs to be tested [15-18].

Table 5.
Result of the autocorrelation by VIF coefficient (estat vif) of ROA, ROE

Variable	**VIF**	**1/VIF**
Lev	1.06	0.947592
Size	1.04	0.959920
AGE	1.01	0.985795
Mean VIF	1.04	

Table 5 shows that all the observed variables of the independent variables have VIF coefficients < 2, so it can be confirmed that 100% of all independent variables do not have autocorrelation [15-18].

Next, Table 6 shows the results of the Breusch–Pagan/Cook–Weisberg test used to examine heteroskedasticity in the regression model, with the null hypothesis H_0: the variance of the errors is constant. The results show that Prob > chi^2 = 0.0807, which is greater than the commonly accepted 5%

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significance level (0.05). Therefore, there is insufficient basis to reject the null hypothesis H0 at the 5% significance level. The regression model with the dependent variable ROA does not have clear statistical evidence of heteroskedasticity. In other words, the homoskedasticity assumption of the linear regression model is satisfied [15-18]. However, in academic studies, the use of higher-order regression models is encouraged to increase reliability.

Table 6.
Results of heteroscedasticity (estat hottest).

ROA
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: fitted values of ROA
chi2(1) = 3.05
Prob > chi2 = 0.0807

Next, we proceeded to perform regression analysis of fixed effects (FEM) and random effects (REM). The results showed that H0: the difference in coefficients is not systematic, indicating no difference between FEM and REM; therefore, the REM model is chosen [15]. However, re-testing for heteroskedasticity using the estat hottest test revealed Prob > chibar2 < 0.05, indicating heteroskedasticity, and that the REM model does not fit the input data.[15-18]. Thus, the final regression, GLS regression, should be used (Table 7).

Table 7.
GLS regression results.

Cross-sectional time-series FGLS regression						
Estimated covariances = 20					Number of obs = 80	
Estimated autocorrelations = 0					Number of groups = 20	
					Time periods = 4	
Estimated coefficients = 4					Wald chi2(3) = 19.09	
					Prob > chi2 = 0.0003	
ROA	**Coef.**	**Std. Err.**	**T**	**P>|t|**	**[95% Conf. Interval]**	
Size	0.0013137	0.0009542	1.38	0.169	-0.0005564	0.0031838
Lev	0.1569723	0.0387873	4.05	0.000	0.0809505	0.232994
AGE	-0.0008917	0.0004167	-2.14	0.032	-0.0017084	-0.000075
_cons	0.0185966	0.0153322	1.21	0.225	-0.0114538	0.0486471

Table 7 shows that the research model is consistent with the input data [15]. No effect of size on ROA was found; financial leverage (Lev) had a positive effect with a coefficient of 0.1569723; age of the enterprise had a negative effect with a coefficient of -0.0008917. With a significance level of 95%. The regression equation of Lev and Age affects ROA as follows.

ROA = .1569723 * Lev - .0008917 * Age

5. Discussion and Implications

The regression model results show that firm size (size) does not significantly affect the return on assets (ROA) of listed gasoline firms in Vietnam. This finding is consistent with several international studies, such as Alarussi and Alhaderi [12] and Babalola and Abiola [19], which suggest that in industries with large capital requirements, stable operating costs, and low profit margins, size is no longer a decisive advantage in terms of efficiency. The Vietnamese petroleum industry is subject to price regulation and mandatory inventory, making it difficult for large firms to achieve superior profits compared to smaller firms. This result is also consistent with domestic research by Nguyen and Nguyen [20], where size is no longer a strong predictor of ROA in heavily regulated industries.

Regarding financial leverage (LEV), the study shows that LEV has a positive impact on ROA (β = 0.1569723). This contradicts many international studies, such as Gill et al. [21] and Enekwe et al. [22],

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which argue that high debt reduces efficiency due to increased financial risk. However, the results are consistent with the specific characteristics of the gasoline industry in Vietnam, where firms often use long-term debt to finance mandatory reserves, petroleum imports, and investments in storage, port, and retail systems. The study by Tran and Do [23] also indicates that gasoline firms use debt as leverage to expand their network, thereby increasing revenue and profits, explaining the positive impact of leverage in the Vietnamese context.

Finally, the age of the enterprise (Age) has a very small inverse impact on ROA (-0.0008917), indicating that long-listed firms tend to experience a slight decrease in financial performance compared to newer firms. This negative relationship is consistent with international studies such as Yahaya and Onyabe [24] and Mwangi and Murigu [25], which suggest that older firms are more prone to bureaucratic problems, high operating costs, and slow adaptation to change. In Vietnam, this aligns with Le and Pham [26], who observe that long-established gasoline firms often face outdated management mechanisms, cumbersome structures, and high system maintenance costs, which can lead to decreased efficiency over time.

Overall, the research results show that the specific characteristics of Vietnam's gasoline industry make financial leverage a positive leverage tool, while the size and age of enterprises do not improve performance as expected. This confirms the role of industry context in corporate finance research.

The research results show that financial leverage (Lev) has a positive impact on return on assets (ROA), implying that gasoline firms can effectively utilize long-term debt to expand business operations, invest in fixed assets, and improve profitability. However, firms need to maintain a safe debt structure, assess their repayment capacity, and control interest expenses to avoid the risk of financial imbalance in the context of volatile oil prices.

Furthermore, the results show that the age of the firm has an inverse impact, suggesting that long-established firms may experience reduced efficiency due to outdated management models, obsolete technology, or inflexible operations. Therefore, firms need to restructure, innovate technology, rejuvenate their workforce, and adopt modern management models to improve competitiveness.

The absence of an impact of size on ROA indicates that financial efficiency in the gasoline industry depends more on capital utilization efficiency and operational management than simply expanding scale. Both large and small enterprises need to focus on optimizing the supply chain, managing inventory, increasing distribution efficiency, and controlling costs. Simultaneously, improved financial transparency is necessary to attract capital and enhance performance in an increasingly competitive environment.

6. Conclusion

This study examined the impact of size (SIZE), leverage (LEV), and age (AGE) on the return on assets (ROA) of listed gasoline firms in Vietnam. The results showed that SIZE had no significant impact, LEV had a positive impact, and AGE had a slightly negative impact on ROA. These findings reflect the specifics of the Vietnamese gasoline industry, where financial performance depends more on debt utilization strategies and the ability to optimize operating costs than on size or years of operation. The study contributes empirical evidence to the field of corporate finance and emphasizes the role of industry context in explaining traditional financial relationships. These results can support managers in strategic capital planning and open avenues for further research on optimal capital structure in heavily regulated industries.

Despite its achievements, the study has some limitations that need to be acknowledged. Firstly, the data focuses only on listed gasoline firms, thus not fully reflecting the entire industry, especially unlisted firms or large state-owned enterprises. Secondly, the research model only uses three independent variables (size, Lev, and age), thus not considering other important factors such as corporate governance, market risk, level of competition, asset quality, or oil price volatility. Thirdly, the research timeframe may be limited, failing to assess the long-term impact of macroeconomic fluctuations or major energy shocks (e.g., COVID-19, oil crisis). Finally, the study does not utilize advanced

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econometric methods (GMM, threshold regression); therefore, the possibility of endogeneity and bias due to omitted variables may still exist.

Future studies should expand the sample to include unlisted firms and state-owned enterprises to create a more comprehensive picture of Vietnam's gasoline industry. Additionally, adding variables such as corporate governance, asset structure, risk management capabilities, cash flow quality, and product diversification levels will make the model more complete and explanatory.

Further research could also apply advanced quantitative models such as System-GMM, panel threshold models, or quantile regression to examine nonlinear impacts and better address endogenous issues. Additionally, analyzing the impact of oil price fluctuations and international market shocks on the relationship between Lev, Age, Size, and ROA would provide deeper insights. Finally, qualitative research (expert interviews) could be conducted to supplement practical evidence on the mechanisms of financial leverage and operational efficiency in the energy sector.

Transparency:

The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

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