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THE IMPACT OF DEBT STRUCTURE ON FINANCIAL PERFORMANCE: EVIDENCE FROM LISTED TRANSPORTATION FIRMS

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Abstract. The transportation sector is a key pillar of economic activity, both supporting broader development and remaining highly responsive to shifts in the macroeconomic environment and the pressures associated with deeper international integration. Examining the relationship between debt structure and financial performance in transportation firms is essential in understanding the challenges and guiding financial management in the context of an emerging economy. This study focuses on analyzing the impact of key indicators related to debt structure, including the ratio of short-term debt to total debt (SDR), the ratio of long-term debt to total debt (LDR), and the total debt to total assets ratio (TDR), on financial performance metrics such as earnings per share (EPS), return on equity, and return on assets. The research data was collected from 99 listed transportation firms between 2019 and 2023 and analyzed using fuzzy-set Qualitative Comparative Analysis. The findings indicate that higher levels of SDR are associated with configurations linked to stronger financial performance, suggesting that the use of short-term debt may be conducive to improved performance in the short run. However, the simultaneous presence of LDR and TDR shows varying impacts, indicating that when the ratio of long-term debt or total debt exceeds a reasonable threshold, it can lead to increased financial costs and risks, ultimately degrading financial performance. Therefore, this study offers practical implications for developing appropriate debt management strategies to ensure sustainable growth and financial stability for Vietnamese listed transportation firms.

Keywords: debt structure, capital structure, financial performance, transportation firms.

1. INTRODUCTION

In emerging economies, decisions about debt structure are crucial for firm performance due to limited access to external capital and information asymmetry [1]. Debt is not only a financing option, but also plays a role in risk control, financial discipline, and increasing firm value, making it a central issue in corporate finance theory and practice. However, empirical evidence on the relationship between debt and financial performance is inconsistent, reflecting variations in firm characteristics, institutional environments, and market conditions [2, 3]. To synthesize and clarify these results, some studies have used meta-analysis, such as Binh Thi Thanh Dao & Tram Dieu Ngoc Ta's (2020) examination of 50 studies with 340 datasets from 2004-2019 [4]. Additionally, studies on specific contexts offer different perspectives: Riaz et al. (2022) found a positive impact of financial leverage on profitability in G-7 countries [5], while Ahmed et al. (2024) emphasized the need for careful consideration of debt decisions to control risk and ensure sustainable long-term financial performance [6].

In the post COVID-19 period, the transportation sector remains a core component of the national infrastructure system, exerting broad spillover effects on Vietnam's socio-economic recovery and long-term growth. However, due to its specific requirements for large initial investment capital, high operating costs, and significant sensitivity to government regulatory policies and external environmental shocks, most domestic transportation firms heavily rely on borrowed capital to maintain and expand their operations. In the context of an increasingly competitive and risky financial market, the pressure from capital costs and debt obligations necessitates that firms adjust their financial strategies to improve financial efficiency. This raises a core research question: how does the debt structure affect the financial performance of transportation firms in Vietnam?

Empirical studies conducted in Vietnam have yielded varying results regarding the relationship between capital structure and financial performance. These differences can be attributed to variations in industry context, research period, and methodological approach. For instance, a study by Dao Van Thi & Pham Thi Hong Mai (2022) on a sample of 53 transportation firms from 2016 to 2020 found a correlation between financial structure and firm performance, as measured by indicators such as ROE and P/B [7]. Similarly, Nguyen Minh Sang & Nguyen Thi Thien Nga (2023) confirmed that capital structure significantly impacts the operational performance (ROA, ROE) of 26 Vietnamese joint-stock commercial banks from 2011 to 2020 [8]. On the other hand, Pham Thi Phuong Loan & Phung Thi Cam Tu (2022) found that both short-term and long-term debt have a negative impact on return on equity (ROE) in the steel industry [9]. While there have been numerous domestic studies examining the relationship between capital structure and financial performance in various industries, including the transport industry, most of them are based on data from before 2021 and use traditional regression models that assume a linear and uniform relationship. In contrast, this study stands out by utilizing updated data up to 2023 and employing fuzzy set analysis (fsQCA), which allows for the consideration of the role of debt structure in various configurations. This approach is expected to provide new empirical evidence for transportation firms in an emerging economy, as well as valuable insights for policy planning and corporate governance.

The structure of the paper is as follows: the next section will provide the theoretical framework for the research and establish the research hypotheses. The third section will outline the research design, data collection methods, and analytical techniques used. The

fourth section will present and analyze the main experimental findings. Lastly, the fifth section will summarize the conclusions drawn from the study and offer suggestions for managerial implications and future research directions.

2. LITERATURE REVIEW AND HYPOTHEIS DEVELOPMENT

In all business fields, determining the capital structure is a strategic decision that is closely linked to the goal of balancing growth, risk, and operational efficiency. Depending on factors such as size, industry characteristics, and market conditions, firms will choose different levels of debt utilization to meet their capital needs for production and operations. According to agency theory, proposed by Jensen & Meckling (1976), a firm is essentially a collection of contractual relationships that may have potential conflicts of interest, particularly between shareholders and managers [10]. While shareholders aim to maximize the firm value, managers may have personal goals that could lead to inefficient investment decisions. In this context, the use of debt can serve as a financial discipline mechanism, as the obligation to pay interest periodically forces managers to closely monitor cash flow, improve capital utilization efficiency, and limit overly risky investment decisions. When used effectively, debt can help reduce agency costs and improve the operational efficiency of firms [11].

In addition to agency theory, trade-off theory, developed by Kraus & Litzenberger (1973), suggests that firms tend to adjust their debt levels in order to achieve an optimal capital structure [12]. This approach takes into account the tax benefits of interest expenses and the monitoring role of creditors, which can help firms effectively allocate financial resources. However, if the debt level exceeds a certain threshold, it can lead to increased financial risk and the cost of financial distress, which may outweigh the benefits of the tax shield [13]. In light of these potential drawbacks, the pecking order theory (Myers & Majluf, 1984) proposes that firms prioritize using internal capital, followed by debt, and only resort to issuing equity as a last resort [14]. This theory suggests that an increase in debt ratios may indicate a decline in operational efficiency and profitability, as firms are forced to seek external funding to make up for internal capital shortages.

Despite operating in a high-risk environment, many firms still tend to increase their use of debt when facing financial difficulties, viewing it as a solution to maintain operations and liquidity [15]. However, empirical evidence on the relationship between debt structure and financial performance has yielded inconsistent results. In Vietnam, Le Thi Phuong Vy & Phan Thi Bich Nguyet (2017) argued that in the context of information asymmetry and an underdeveloped financial system, the benefits from tax shields are insufficient to offset borrowing costs, resulting in a negative impact of short-term debt, long-term debt, and total debt on operational efficiency, as measured by ROA, ROE, and Tobin's Q [16]. Conversely, Hung The Dinh & Cuong Duc Pham (2020) noted the positive role of debt as a financial lever, helping to improve the firm results of listed pharmaceutical firms [17]. In other contexts, Dabi et al. (2023) showed that the debt-to-total-assets ratio is related to profitability (ROA) but does not affect the financial stability of microfinance institutions [18], while Tesema (2024) in Ethiopia demonstrated an inverse relationship between long-term debt, total debt, and financial performance of manufacturing enterprises [19]. More recently, Ahmed et al. (2024) also emphasized that different debt indicators have a certain interaction with operational performance, as measured by EPS, ROA, and ROE [6].

Although the topic of debt structure and financial performance has been widely discussed in Vietnam, most previous studies have relied on data from before 2021 and primarily used traditional regression models. These models assume linear and homogeneous relationships,

which means that the results may not fully reflect the socio-economic context of Vietnam during the period of profound impact from the Covid-19 pandemic and the subsequent recovery process. Additionally, there is a lack of in-depth studies focusing on the transportation sector, which is a pillar of economic growth characterized by high levels of financial leverage. Examining the impact of debt structure on performance in this sector not only helps fill research gaps, but also has significant practical implications.

For transportation firms in Vietnam, the link between debt structure and financial performance tends to be particularly salient, reflecting the sector's high capital intensity and exposure to volatile operating conditions. Cost structures are sensitive to movements in fuel prices, regulatory changes, and shifts in market demand. In this context, debt is not only a financing tool but also acts as a financial discipline mechanism, forcing managers to optimize cash flow and improve capital efficiency. However, when the debt ratio exceeds a reasonable level, increased financial risk can undermine firm performance and enterprise value. Based on established theoretical foundations and empirical evidence from both domestic and international studies, this research proposes the following hypotheses:

Hypothesis 1: The presence of the ratio of short-term debt to total debt constitutes a condition in configurations associated with financial performance within Vietnamese listed transportation firms.

Hypothesis 2: The presence of the ratio of long-term debt to total debt constitutes a condition in configurations associated with financial performance within Vietnamese listed transportation firms.

Hypothesis 3: The presence of the ratio total debt to total assets constitutes a condition in configurations associated with financial performance within Vietnamese listed transportation firms.

3. METHODOLOGY

3.1. Data

The data for this study was collected from audited financial reports of firms listed on the Vietnamese stock market, accessed through Vietstock.vn. The study focuses on the 2019-2023 period to capture the pre-pandemic stage, the Covid-19 shock, and the immediate recovery phase in Vietnam's economy. Initially, the sample included 126 transportation firms. However, after screening the data, firms that lacked necessary information or did not have complete time series were excluded. This resulted in a final sample of 99 firms, with a total of 495 observations in a tabular format. To meet the requirements of fuzzy set analysis, the research variables were normalized to a value range of 0 to 1 before being analyzed using the fsQCA software.

3.2. Research method

The study utilizes fuzzy-set qualitative comparative analysis (fsQCA), developed by Ragin (2008) based on set logic and Boolean algebra [20]. This approach is increasingly utilized in social science, particularly in studies focused on context heterogeneity and contextual effects. Unlike traditional regression models, which often assume linear relationships and isolate the effects of explanatory variables to determine an "average effect," fsQCA allows for the identification of various combinations of conditions that can lead to the same outcome. By adjusting the data on a fuzzy set scale ranging from 0 to 1, this method enables the assessment of the degree to which each case aligns with the research conditions,

while also clarifying how these conditions combine to create causal configurations related to financial performance. The use of fsQCA is therefore appropriate when the research objective is not only to determine the individual impact of each debt indicator, but also to identify the combined mechanisms of impact in different business contexts.

The process of fsQCA analysis involves several key steps, which are outlined below:

(1) *Identifying research variables*: This involves determining the outcome variable and the expected condition variables that will be used in the analysis.

(2) *Fuzzy set data adjustment*: In this step, observed variables are converted to fuzzy set scales. A value of 0 represents incompleteness, 0.5 is the cutoff point for ambiguity, and 1 indicates completeness.

(3) *Building a truth table*: The conditions identified in step 1 are combined to form configurations that represent potential causal patterns in the data.

(4) *Boolean reduction*: Redundant combinations are eliminated and configurations with explanatory significance are identified using the fsQCA software's reduction algorithm.

(5) *Selecting the appropriate configuration*: The final configuration is chosen based on two key criteria: consistency and coverage.

(6) *Interpreting the results*: The obtained configurations are presented and discussed, allowing for the identification of different causal mechanisms that can lead to the same financial performance state.

3.3. Research models

Based on the theoretical arguments presented in Section 2 and the research hypotheses already developed, this study proposes a research model, as illustrated in Figure 1.

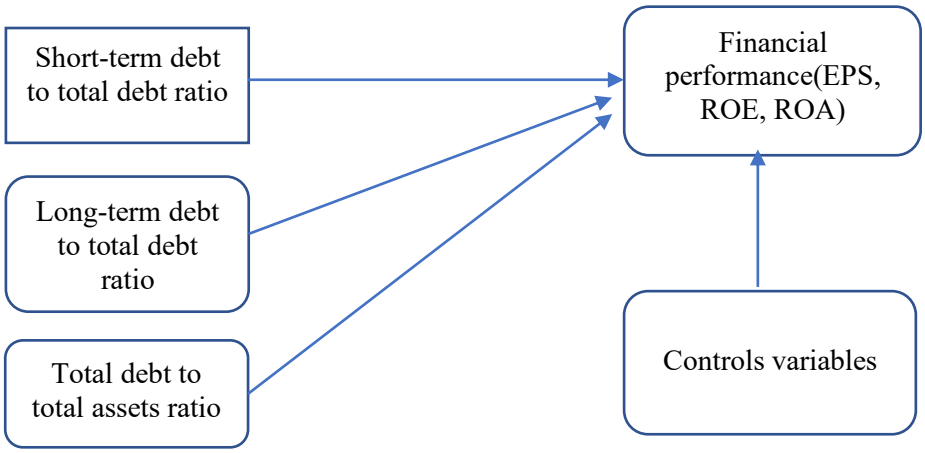

Figure 1. Proposed research model.

(Source: Author's proposed)

To investigate the impact of debt structure on corporate financial performance, this study proposes three estimation models corresponding to equations (1), (2), and (3). These models include key explanatory variables such as the short-term debt ratio (SDR), long-term debt ratio (LDR), and total debt ratio (TDR) to represent debt structure. Additionally, the model incorporates a set of control variables, including liquidity (LIQ), firm size (SIZE), firm age

(AGE), asset tangibility (TANG), and audit quality (AUDIT). The selection of these control variables is based on both theoretical and empirical evidence, which suggests that they can influence corporate financial performance through various channels. The inclusion of control variables in the model aims to reduce bias caused by omitted variables, thereby enhancing the reliability and explanatory power of the analysis results. Table 1 provides detailed information on the reference basis and methods used to measure the variables.

$$f(EPS) = f(SDR, LDR, TDR, LIQ, SIZE, AGE, TANG, AUDIT) \quad (1)$$

$$f(ROE) = f(SDR, LDR, TDR, LIQ, SIZE, AGE, TANG, AUDIT) \quad (2)$$

$$f(ROA) = f(SDR, LDR, TDR, LIQ, SIZE, AGE, TANG, AUDIT) \quad (3)$$

Table 1. Measurement of variables.

Variables	Symbol	Measurement	Sources
Financial performance	EPS	Net profit attributable to ordinary shareholders divided by the number of outstanding ordinary shares.	Ahmed et al. (2024) [6]
	ROA	The ratio of net profit to total assets	Dakhli (2021), Canbaloglu et al. (2022) [21, 22]
	ROE	The ratio of net profit to total shareholders' equity	Ramli et al. (2019), Dakhli (2021) [23, 21]
Debt structure	SDR	The ratio of short-term debt to total debt	Choi (2024) [24]
	LDR	The ratio of long-term debt to total debt	Canbaloglu et al. (2022) [22]
	TDR	The ratio of total debt to total assets	Tesema (2024) [19]
Liquidity	LIQ	The ratio of current assets to current liabilities	Ramli et al. (2019), Tesema (2024) [23, 19]
Firm size	SIZE	The natural logarithm of total assets	Canbaloglu et al. (2022), Pham Thi Lan Anh & Do Thi Hai Yen (2025) [22, 25]
Firm age	AGE	Natural logarithm of the difference between the observation year and the year of firm establishment	Karadag (2017) [26]
Asset tangibility	TANG	The ratio of tangible fixed assets to total assets	Margaritis & Psillaki (2010), Vătavu (2015) [27, 15]
Audit quality	AUDIT	A dummy variable that equals 1 if the firm's financial statements are audited by one of the Big Four audit firms, and 0 otherwise.	Dakhli (2021) [21]

(Sources: Compiled by the author)

4. EMPIRICAL FINDINGS

Table 2 presents the descriptive statistics of the research variables, based on 495 observations from 99 Vietnamese listed transportation firms during the period of 2019-2023. The results indicate that the EPS value is 1.941, with the lowest value is -13.746. This suggests the presence of firms with poor firm performance during the study period. The two profitability indicators, ROE and ROA, had average values of 0.112 and 0.062 respectively, corresponding to returns of 11.2% and 6.2%. This indicates a generally stable operational efficiency in the transportation industry. In terms of debt structure, the sample of firms tends to have a higher proportion of short-term debt compared to long-term debt, as shown by the average SDR and LDR values of 0.768 and 0.232 respectively. However, there are significant differences in financial strategies, with some cases recording long-term debt accounting for up to 94.4% of total debt. Additionally, the ratio of tangible fixed assets to total assets averaged 0.903, indicating that the asset structure of transportation firms primarily consists of tangible assets, which is consistent with the capital characteristics of the industry. Only about 18% of the sample of firms were audited by Big-4 firms, reflecting the limited access to international auditing services in the transportation sector in Vietnam.

Table 2. Descriptive Statistics Results.

Variables	Mean	Std.Dev.	Min	Max
EPS	1,941.352	3,679.504	-13,746	27,461
ROE	0.112	0.294	-1.709	4.369
ROA	0.062	0.129	-0.506	1.080
SDR	0.768	0.264	0.056	1.000
LDR	0.232	0.264	0.000	0.944
TDR	0.499	0.572	0.013	4.793
LIQ	3.422	4.572	0.045	36.600
SIZE	2.650	0.648	1.301	4.939
AGE	1.200	0.173	0.602	1.672
TANG	0.903	0.197	0.015	1.000
AUDIT	0.180	0.384	0.000	1.000

(Source: Data analysis results)

The results of the fsQCA analysis on the relationship between debt structure and financial performance, specifically the measures EPS, ROE, and ROA, are presented in Tables 3, 4, and 5, respectively. The solution configurations were determined by considering a combination of conditions related to debt structure and control variables that impact the outcome variable. In Table 3, which presents the results for the EPS measure, all five extracted configurations consistently showed the presence of SDR as a condition leading to high EPS levels. This finding highlights the significant role of short-term debt in configurations related to financial performance, which is supported by previous empirical evidence, such as the study by Hung The Dinh and Cuong Duc Pham (2020) [17]. In addition to the SDR, other conditions such as LDR, TDR, LIQ, AGE, and TANG also appear in specific configurations, indicating the diversity of pathways (equifinality) that can lead to the same EPS outcome. On the other hand, the absence of the AUDIT variable is often observed in configurations associated with high EPS levels, suggesting that the combination of conditions leading to this outcome is more common among firms not audited by the Big-4. This result reflects differences in the characteristics and methods of profit recognition among the different firm groups in the study sample, rather than a single causal relationship.

Table 3. Configurations linking debt structure to financial performance (EPS).

Variables	Solutions				
	1	**2**	**3**	**4**	**5**
SDR	●	●	●	●	●
LDR	○	○	○	○	○
TDR	○	○	○	○	⊘
LIQ	●	⊘	⊘	●	●
SIZE	⊘	●	⊘	○	⊘
AGE	○	○	○	⊘	○
TANG	⊘	⊘	●	●	●
AUDIT	⊘	⊘	○	○	○
Raw coverage	0.4069	0.3300	0.3467	0.2817	0.2975
Unique coverage	0.0033	0.0019	0.0089	0.0016	0.00005
Consistency	0.8527	0.9236	0.7981	0.8243	0.8502
Solution coverage	**0.7997**				
Solution consistency	**0.7726**				

Detailed discussion of the results: (1) SDR*~LDR*~TDR*LIQ*~AGE; (2) SDR*~LDR*~TDR*~AGE; (3) SDR*~LDR*~TDR*~AGE*TANG*~AUDIT; (4) SDR*~LDR*~TDR*LIQ*~SIZE*TANG*~AUDIT; (5) SDR*~LDR*LIQ*~AGE*TANG*~AUDIT

Note: ● the present of a condition
○ "don't care" condition
⊘ absence condition

(Source: Data analysis results)

The results of the fsQCA analysis for the two financial performance measures, ROE and ROA, presented in Tables 4 and 5, show that the resulting configuration models have many similarities with the results for EPS. Specifically, the presence of a high SDR frequently appears in configurations leading to high ROE and ROA, while TDR is often absent in these combinations. For LDR, the results show that this condition appears inconsistently across different configurations, reflecting that the role of long-term debt capital depends significantly on the context combined with the remaining conditions. This finding is consistent with previous empirical evidence, as Le Thi Phuong Vy & Phan Thi Bich Nguyet (2017), Pham Thi Phuong Loan & Phung Thi Cam Tu (2022) and Tesema (2024) noted different results on the role of long-term debt in financial performance in different research contexts [16, 9, 19]. These results suggest that the use of long-term debt is only effective in certain configurations, rather than yielding uniform results for all firms.

For control variables, LIQ and TANG are commonly found in most models related to ROE and ROA. High liquidity indicates the ability to meet short-term financial obligations and effectively manage cash flow, which can lead to better financial performance. This finding is consistent with the results of Do Thi Hai Yen et al. (2025) [28]. On the other hand, the presence of tangible assets reflects the capital-intensive nature of the transportation industry. However, the impact of tangible assets is not linear and depends on how they are utilized and managed in each specific model. This suggests that tangible assets only contribute to financial performance when combined with other appropriate factors.

The results of the fsQCA analysis reveal that SIZE is a significant factor in various configurations related to EPS, ROE, and ROA. However, its role is inconsistent across different combinations. According to theory, larger firms typically have advantages in terms of access to capital, market prestige, and resource allocation. However, in some

configurations, the presence of SIZE, along with other financial conditions, does not necessarily lead to high performance. This indicates that economies of scale tend to materialize only when supported by appropriate governance and financial structures. On the other hand, AGE is either largely absent or does not play a central role in configurations related to financial performance. This implies that having a long history in the industry does not necessarily guarantee the ability to achieve high performance during the 2019-2023 study period.

In terms of the reliability of the configurations, the fsQCA analysis considers configurations with a consistency above the threshold of 0.9 to have strong explanatory power [20]. For the dependent variable ROE, the configuration "SDR*LDR~TDR*LIQ*~TANG" achieved the highest consistency of 0.9679 among the extracted configurations (Table 4). This configuration indicates that when transport firms use a combination of short-term and long-term debt, maintain a low total debt-to-asset ratio, and have high liquidity, they are likely to meet the necessary conditions for a high ROE. The overall consistency of the solution in Table 4 was 0.8170, which is considered sufficiently reliable in social and economic science studies by Schneider & Wagemann (2012) [29]. This suggests that the obtained configurations cover most of the condition combinations related to ROE in the sample of firms being studied.

The results of the fsQCA analysis, as shown in Tables 4, 5, and 6, indicate that the variables representing debt structure (i.e. SDR, LDR, and TDR) play a significant role in determining the financial performance of transportation firms. Specifically, the presence of SDR, the inconsistent impact of LDR, and the absence of TDR in many combinations of conditions related to financial performance demonstrate the complex ways in which debt structure interacts with other factors to influence outcomes. These findings are in line with our research hypotheses (H1, H2, and H3), which propose a relationship between debt structure and financial performance in listed transportation firms in Vietnam. However, the results also highlight the need to consider these hypotheses within a configurational and context-dependent framework, rather than as isolated linear relationships. This approach allows for a better understanding of the diverse pathways to financial performance in the transportation industry, particularly during times of economic volatility such as the post Covid-19 pandemic. Given that the sample period includes the Covid-19 disruption and the immediate recovery phase, the identified configurations should be interpreted within this macroeconomic context rather than as universally stable financial patterns.

Table 4. Configurations linking debt structure to financial performance (ROE).

Variables	Solutions		
	1	2	3
SDR	●	●	●
LDR	○	●	○
TDR	○	○	○
LIQ	⊘	●	○
SIZE	●	⊘	⊘
AGE	○	⊘	○
TANG	⊘	○	●
AUDIT	⊘	⊘	○
Raw coverage	0.3579	0.2589	0.3048
Unique coverage	0.0251	0.0138	0.0239
Consistency	0.9084	0.9679	0.9003
Solution coverage	**0.7846**		
Solution consistency	**0.8170**		

Detailed discussion of the results: (1) SDR*~LDR*~TDR*SIZE*~AGE; (2) SDR*LDR*~TDR*LIQ*~TANG; (3) SDR*~LDR*~TDR*~LIQ*~AGE*TANG*~AUDIT

Note: ● the present of a condition
○ "don't care" condition
⊘ absence condition

(Source: Data analysis results)

Table 5. Configurations linking debt structure to financial performance (ROA).

Variables	Solutions					
	1	**2**	**3**	**4**	**5**	**6**
SDR	●	●	●	●	●	●
LDR	○	○	●	○	○	○
TDR	○	○	○	○	○	⊘
LIQ	●	⊘	●	⊘	●	●
SIZE	⊘	●	⊘	⊘	○	⊘
AGE	○	○	⊘	○	⊘	○
TANG	⊘	⊘	○	●	●	●
AUDIT	⊘	⊘	⊘	○	○	○
Raw coverage	0.4767	0.3751	0.2599	0.4077	0.3300	0.3462
Unique coverage	0.0074	0.0020	0.0175	0.0152	0.0055	0.00004
Consistency	0.8912	0.9339	0.9532	0.8374	0.8616	0.8826
Solution coverage	**0.8764**					
Solution consistency	**0.7554**					

Detailed discussion of the results: (1) SDR*~LDR*~TDR*LIQ*~AGE; (2) SDR*~LDR*~TDR*SIZE*~AGE; (3) SDR*LDR*~TDR*LIQ*~TANG; (4) SDR*~LDR*~TDR*~AGE*TANG*~AUDIT; (5) SDR*~LDR*~TDR*LIQ*~SIZE*TANG*~AUDIT; (6) SDR*~LDR*LIQ*~AGE*TANG*~AUDIT.

Note: ● the present of a condition
○ "don't care" condition
⊘ absence condition

(Source: Data analysis results)

5. CONCLUSIONS AND IMPLICATIONS

This study presents empirical evidence on the correlation between debt structure and financial performance of listed transportation firms in Vietnam from 2019 to 2023, using fsQCA approach. The identified configurations reflect empirically observed financing-performance pathways within a heterogeneous sample of transportation-related firms, suggesting that these patterns are not confined to specific transportation sub-sectors. Instead of examining the individual impact of each debt indicator, the study demonstrates that a firm's financial performance is influenced by a combination of factors, including short-term debt, long-term debt, and total debt. The significance of each component is dependent on the specific context, financial factors, and firm characteristics. The overall results indicate that a high financial performance is often associated with SDR, while TDR is typically not present in these combinations. The role of LDR varies across different configurations, highlighting the importance of using long-term debt only in suitable financial conditions and strategies. These findings suggest that debt structure should be viewed from a contextual and configurational perspective, rather than a fixed linear relationship.

In accordance with the established theoretical framework and research hypotheses, the results of the fsQCA analysis demonstrate that the components of debt structure (SDR, LDR, and TDR) all play a role in determining the financial performance of transportation firms. This aligns with the hypotheses and suggests that the connection between debt structure and financial performance is not a straightforward one, but rather involves various pathways. This approach helps to shed light on the varying financial behaviors of transportation firms in an emerging economy, particularly during the study period which includes the significant impact of the Covid-19 pandemic and the subsequent recovery process.

In terms of academic contribution, the study adds evidence to existing debates surrounding the relationship between debt structure and financial performance by applying the fsQCA methodology to the context of the Vietnamese transportation industry. Emphasizing the role of conditional configurations allows the study to move beyond traditional regression approaches, thereby providing a more multifaceted perspective on the mechanisms shaping the financial performance in a volatile economic environment.

From a practical perspective, the research results suggest several noteworthy management implications for transportation firms. Firstly, the use of short-term debt, if managed appropriately according to the industry's cash flow and capital turnover characteristics, can play a crucial role in financial configurations linked to operational efficiency. This is particularly significant for large-scale firms with high creditworthiness and access to short-term capital at reasonable costs. Conversely, maintaining a high total debt ratio can impair financial flexibility and increase risk in various contexts. Regarding long-term debt, the results indicate that its use should be closely linked to long-term investment and cash flow management strategies to avoid creating unnecessary financial pressure during periods of market volatility.

From a policy perspective, the findings indicate that enhancing transportation firms' access to medium-term and long-term financing remains an important policy issue. Well-designed instruments, including preferential lending schemes and credit guarantee programs, can facilitate a gradual shift away from excessive reliance on short-term debt, thereby contributing to improvements in long-term operational efficiency and strengthening the overall competitiveness of the sector.

6. LIMITATIONS AND FUTURE RESEARCH

Although the study has provided significant empirical evidence regarding the relationship between debt structure and financial performance of listed transportation firms in Vietnam, there are still some limitations that need to be clarified. Firstly, the data was collected during the period of 2019-2023, which coincided with the Covid-19 pandemic. The Covid-19 pandemic affected different segments of the transportation sector differently, with passenger transport being more strongly constrained by mobility restrictions, while logistics and infrastructure activities were influenced by different demand and investment dynamics. This may have had a profound impact on the economy, and therefore, the observed financial indicators may not fully reflect the normal operating conditions of these firms. While this context allows for the examination of financial behavior during times of significant shocks, it may also limit the generalizability of the results to less volatile periods.

Second, the scope of this study is confined to transportation firms listed on the Vietnamese stock market, primarily due to the need for consistent and reliable financial data.

The findings may not fully capture the financial characteristics of unlisted transportation firms, nor can they be readily generalized to other economic sectors with different capital structures and risk profiles. In addition, the transportation sector in Vietnam includes firms with different operational characteristics, such as transport operators, logistics service providers, and infrastructure construction firms. While this sectoral focus allows for a more in-depth analysis, it also limits the broader economic applicability of the results.

Building on the limitations outlined above, several avenues for future research can be identified. First, subsequent studies could broaden the sample to include firms from other economic sectors in Vietnam or undertake cross-sectoral comparisons to clarify how the role of debt structure in shaping financial performance varies across industries with different structural and risk characteristics. Second, extending the study period or partitioning the sample into pre- and post-shock phases such as those associated with pandemics or financial crises, would allow for a more robust assessment of the stability and adaptability of financial configurations across different macroeconomic contexts. Thirdly, future research could integrate fsQCA with complementary quantitative techniques or expand the set of analytical conditions to deepen the methodological framework and strengthen the interpretation of complex financial mechanisms at the firm level. Finally, future research could further examine whether the configurations linking debt structure and financial performance differ across these transportation sub-sectors.

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