IMPACT OF CAPITAL STRUCTURE ON FINANCIAL PERFORMANCE OF LISTED SEAPORT ENTERPRISES IN VIETNAM

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Abstract: ***The study aims to examine the impact of the enterprise's capital structure on financial performance of listed seaport enterprises in Vietnam. The research samples included 20 seaport enterprises, data collected over an 8-year period from 2017 to 2024. The study applied quantitative methods with the support of Stata software. The research results show that total debt ratio, debt to equity ratio have an inverse impact; growth rate and operating time are not statistically significant, while enterprise size, liquidity, efficiency and export turnover have a positive impact on financial performance. Based on the research results, the authors make some recommendations to improve the capital structure for listed seaport enterprises.***

• Keywords: *debt ratio, debt to equity ratio, capital structure, financial performance, seaport enterprises.*

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1. Rationale

During the operation process, enterprises always need to plan appropriate capital mobilization policies at each time in order to maintain operations, expand investment and improve competitiveness. Enterprises can use internal capital sources such as owners' equity and retained earnings. Enterprises also use external capital sources such as bank credit, bond issuance, stock issuance and other forms of commercial credit. Choosing and combining these capital sources reasonably helps enterprises minimize capital costs, reduce financial risks and improve operating efficiency in a sustainable manner. Building an optimal capital structure, exploiting the advantages of each source of funding is the foundation for enterprises to improve their financial capacity.

In the context of globalization, businesses operate in an increasingly competitive environment not only within an industry or a country but also on a regional and global scale. Business managers need to identify and evaluate the impact of capital structure on financial performance in order to propose appropriate capital mobilization policies. As a result, businesses can adjust their financial policies flexibly and easily adapt to fluctuations from the external environment. This can also be the foundation for improving financial performance, reflected through indicators such as return on assets (ROA), return on equity (ROE), or return on sales (ROS). Financial performance is not only the output of the capital use process, but also a measure reflecting the operational capacity, growth potential and value creation capacity of enterprises in the long term.

Seaport enterprises in Vietnam have great development prospects associated with the trend of economic integration. Acting as a gateway connecting international trade, seaport enterprises hold a key position in the global supply chain, thereby contributing to improving competitiveness and promoting the development of Vietnam's economy. Therefore, in order to have the ability to develop sustainably in a volatile business environment, seaport enterprises need to constantly improve financial efficiency associated with building a reasonable capital structure, optimizing capital costs and increasing enterprise value.

The study collected financial data of 20 listed seaport enterprises in Vietnam in the period of 2017-2024 to assess the impact of capital structure on the financial performance of enterprises. Based on the results of regression analysis, the study provides a number of recommendations that can be the basis for recommendations to help seaport enterprises build an optimal capital structure and achieve sustainable financial performance.

2. Literature review

Studies on the impact of capital structure on financial performance are quite diverse but the results are not consistent due to different contexts and theoretical assumptions.

Mohammad & Bujang (2020) analyzed data from the Bursa Malaysia exchange of 108 companies in all three sectors: finance, construction and plantation for analysis. The results showed that the impact of capital structure is different between industries. In the plantation industry, the short-term debt ratio has a positive impact, the long-term debt ratio has a

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negative impact on ROA and ROE. For the financial industry, the debt ratio has a positive impact on ROE but a negative impact on ROA. In enterprises in the construction industry, the short-term debt ratio has a negative impact on ROE while the long-term debt ratio has a positive impact on ROE.

Tesema's study(2024) used panel data from the financial statements of 85 manufacturing firms in Ethiopia for the period 2017-2021 with 425 observations. The results showed that debt ratio and long-term debt ratio had negative and statistically significant effects on ROA. In addition, control variables such as fixed asset utilization efficiency and firm size had positive and statistically significant effects on financial performance.

Kong et al. (2023) analyzed the relationship between capital structure and financial performance of 28 non-financial listed firms in Ghana for the period 2008–2019. In this study, debt ratio (DR) and debt to equity ratio (DE) both have positive and statistically significant effects on ROE of both groups of enterprises. In addition, enterprise size and asset growth also have positive effects, while tangible assets (TAN) do not have significant effects. The causal analysis shows a bidirectional relationship between capital structure and ROE, and emphasizes the role of capital structure policy in improving the financial performance of enterprises.

Mazanec's study (2023) aimed to evaluate the impact of capital structure on the financial performance of nearly 4.000 small and medium-sized enterprises in the transport sector in Central Europe. The results of multiple linear regression showed that capital structure with the debt ratio variable had a negative impact on the performance of transport companies. In addition, the ratio of long-term assets had a negative impact on ROA, while the ratio of cash to total assets and liquidity ratio had a positive impact on ROA.

The study conducted by Ahmed et al. (2023) used panel data from 156 manufacturing companies listed on the Tehran Stock Exchange during 2011–2019. The authors performed regressions using a fixed-effects model (FEM). Debt ratio had a negative and significant impact on ROA and EPS. Debt to Market Capitalization had a negative and significant impact on all financial performance indicators (ROA, Tobin's Q, EPS). In addition, the variable controlling revenue growth rate positively affects all efficiency indicators, the variable of business operation time has an inverse effect on ROA and EPS but a positive effect on Tobin's Q.

Bui Thi Ngoc et al. (2023) conducted a study to analyze the relationship between capital structure and enterprise value, based on audited financial statement data of 769 enterprises listed on the Vietnamese stock market during the period of 2012-2022. In this study, ROA, ROE and Tobin's Q are positively affected by debt ratio. However, when separating the components of debt, the results indicate that both short-term debt ratio and long-term debt ratio have negative impacts on financial performance measured by ROA and ROE.

Based on a panel data sample of 116 listed service enterprises in Vietnam during the period 2010-2016, Nguyen Thi Dieu Chi (2018) found empirical evidence of the negative impact of debt structure on financial performance. Accordingly, the regression results showed that both short-term debt structure and long-term debt structure are factors that negatively affect ROA. Control variables of asset structure and market interest rate have a negative impact on ROA. Other control variables such as revenue growth rate, operating time, and management capacity do not affect the financial performance of service enterprises.

Bui Van Thuy & Nguyen Thi Ngoc Diep's study (2016) showed that increasing debt ratio, especially long-term debt, has a negative and statistically significant impact on the financial performance of non-financial companies in Vietnam. In addition, short-term debt has a positive and significant impact on Tobin's Q, but is not statistically significant on ROE. The control variables of company size and asset growth rate both have a positive impact on ROE. However, growth has a negative impact on Tobin's Q. The results also confirm that the impact of capital structure is significantly different across industries.

Duong Van Chi et al. (2023) conducted this study on 31 consumer goods manufacturing enterprises in Vietnam during the period 2010-2021. The authors also concluded that the debt ratio has a negative and statistically significant impact on both ROE and ROA. This shows that the use of high debt reduces financial performance in the consumer goods industry. For consumer goods manufacturing enterprises, enterprise size, asset growth and asset utilization efficiency all have positive and statistically significant impacts on financial performance.

Tran Thi Phuong Thao (2024) studied the data of 81 listed logistics enterprises in Vietnam in the period of 2018-2023 and showed that the debt ratio has a negative and statistically significant impact on the financial performance (ROA) of this group of enterprises. In addition, enterprise size, solvency and asset frequency have a positive impact on ROA.

Studies on the impact of capital structure on the financial performance of enterprises have relatively different results. It can be seen that there is no capital structure theory that can generally explain the decisions on capital mobilization structure of all enterprises. Because the company's financing policies

are determined depending on many factors such as the financial capacity of the enterprise itself, industry characteristics, the capacity and perspective of the enterprise's managers, and macroeconomic factors. In Vietnam, although many studies have examined the relationship between capital structure and financial performance, these studies only focus on a large sample representing listed companies, or on a group of enterprises in services, consumer goods, hotels, pharmaceuticals, steel or logistics...

Port companies belong to the logistics sector but have their own financial characteristics: operating capacity depends largely on the level of investment in long-term assets, exploitation output is affected by macroeconomic policies, import and export value of the economy... These characteristics can affect the influence of capital structure on financial performance. Empirical studies on the impact of capital structure on financial performance of the seaport industry are still limited, despite the strategic importance of this field in trade and logistics. Based on this gap, the author conducts research to build a research model with variables representing micro and macro factors to clarify the impact of capital structure on financial performance of listed seaport enterprises in the current context.

3. Research model and hypothesis

In the model, the financial performance of the enterprises is measured by the return on assets (ROA). Capital structure is measured by two basic indicators: debt ratio and debt to equity ratio. In addition, control variables in the model include: Growth rate, solvency, asset turnover, enterprise size, enterprise operation time, and Vietnam's export - import turnover. In the model, the authors added the export - import turnover variable for research, this is a new point compared to previous studies.

Information about the variables can be described in Table 1.

Table 1. Variables in the model

Criteria	Variable code	Measurements	Hypothesis of relationship with dependent variable
Return on assets	ROA	Profit after tax/Average total assets	
Debt Ratio	TD	Liabilities / Total Assets	-
Debt on Equity Ratio	DE	Liabilities / Owner's Equity	-
Growth Rate	SGR	Revenue Growth Rate	+
Solvency	LIQ	Current Assets/Current Liabilities	+
Asset Turnover	EFF	Net Revenue/Average Assets	+
Business Size	SIZE	Log (Total Assets)	+
Time in Operation	AGE	Number of Years in Operation	+
Export - Import Turnover	EI	Total Value of Exported and Imported Goods and Services	+

Source: Author compiled and constructed

The regression models are described as follows:

$$ROA_{it} = \beta_0 + \beta_1.TD_{it} + \beta_2.DE_{it} + \beta_3.SGR_{it} + \beta_4.LIQ_{it} + \beta_5.EFF_{it} + \beta_6.SIZE_{it} + \beta_7.AGE_{it} + \beta_8.EI_{it} + u_{it}$$

4. Research methods

The data used in this study is secondary data, collected from audited financial statements of seaport companies listed on the Vietnamese stock market over an 8-year period, from 2017 to 2024. The research sample is 20 companies, corresponding to 160 observations. The author uses Stata 17 software to support data processing and perform tests. The author analyzes the data using the following steps: descriptive statistics, correlation testing and linear regression between variables in the model. This process includes checking assumptions such as autocorrelation, heteroscedasticity and multicollinearity to select the appropriate regression model. The three models applied include: Pooled OLS, fixed effects model (FEM) and random effects model (REM). After determining the appropriate model, the author plans to test the reliability of the model. If defects are detected, the study continues to use the GLS model to calibrate and ensure the accuracy of the estimated results.

5. Research results

5.1. Description of research data

Table 2. Descriptive statistics of variables

Variable	Obs	Mean	Std. Dev.	Min	Max
ROA	160	9.73	6.38	-.44	36.75
ROS	160	19.23	14.23	-1.72	70.18
TD	160	.27	.22	.03	.96
DE	160	1.51	4.92	.03	30.66
SGR	160	.94	10.07	-.72	127.45
LIQ	160	4.08	4.30	.65	23.99
EFF	160	.71	.56	.17	3.48
SIZE	160	6.09	.49	5.17	7.25
AGE	160	12.10	6.86	2.00	34.00
EI	160	2.72	.18	2.30	2.895

Source: Data analysis results using STATA

The return on assets (ROA) of the enterprises in the research sample fluctuated around 9.73%, with the smallest value being -0.44% and the largest value reaching 36.73%. The return on sales (ROS) had an average value of 19.263%, with the lowest value being -1.72% and the highest value reaching 70.18%. The above data shows that there is a significant difference in financial performance among listed seaport enterprises. The majority of enterprises have profit margins of ROA >0, the only case with negative profit margins is An Giang Port Joint Stock Company (stock code CAG) in 2024.

Regarding capital structure: The average debt ratio is 27.8%, reflecting that equity capital still plays a leading role in financing policy. However, the debt-to-equity ratio has a fairly high average value of 1.516 because the Vegetable Port Joint Stock Company (stock code VGP) has a very high debt ratio (95% - 97%) throughout the research period.

The control variables SGR, LIQ, EFF, AGE, EI also differ among listed seaport enterprises, with a large gap between the largest and smallest values.

5.2. Correlation matrix

Table 3 shows the results of the correlation test as follows:

Table 3. The correlation coefficient matrix between the variables in the model

	ROA	TD	DE	SGR	LIQ	EFF	SIZE	AGE	EI
(1) ROA	1.00								
(2) TD	-0.32*	1.00							
(3) DE	-0.34*	0.75*	1.00						
(4) SGR	-0.10	0.25*	0.29*	1.00					
(5) LIQ	0.07	-0.51*	-0.19*	-0.06	1.00				
(6) EFF	-0.11	0.67*	0.76*	0.30*	-0.31*	1.00			
(7) SIZE	0.04	0.49*	0.29*	0.07	-0.35*	0.10	1.00		
(8) AGE	0.05	0.10	0.23*	0.043	0.05	0.07	0.36*	1.00	
(9) EI	0.10	-0.07	0.01	-0.04	0.05	-0.05	0.06	0.22*	1.00

*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Source: Data analysis results using STATA

According to the table above, the variables TD, DE, SGR, EFF have an inverse impact on ROA, the remaining variables have a positive impact on ROA. Analysis of the correlation coefficient between independent variables shows that no pair of variables has a coefficient exceeding 0.8, so initially excluding the possibility of multicollinearity. To confirm, the author calculates the variance inflation factor (VIF) in the regression results.

5.3. Regression results and discussion

Regression of three models with dependent variables ROA and independent variables TD, DE, SGR, LIQ, EFF, SIZE, AGE and EI. The regression results using OLS, FEM, REM methods are shown in Table 4. At the same time, after performing Hausman test, the REM model is more suitable.

According to Table 4, all VIF values are in the range of 1.07 to 4.2, less than the threshold of 10. Therefore, it can be affirmed that the model does not have multicollinearity problems. The study continues to perform the necessary tests to determine the appropriate regression model.

Homogeneity of variance test results in P-value of 0, less than 5%, indicating that the model has heteroscedasticity. The autocorrelation test results in P-value = 0.5123, greater than 5%, so it is concluded that there is no autocorrelation in the model. Use the GLS regression method to correct errors and improve the reliability of the model. Model is defined as follows:

$$ROA_{it} = -28.49 - 10.97TD_{it} - 0.72DEit + 0.166LIQ_{it} + 6.495EFF_{it} + 4.909SIZE_{it} + 2.712EI_{it} + u_{it}$$

Table 4. Regression results

	VIF	OLS	FEM	REM	FGLS
TD	4.20	−14.09***	−22.27***	−20.46***	−10.97***
DE	3.95	−0.748***	0.163	−0.185	−0.720***
SGR	1.12	-0.0199	0.00283	-0.00479	-0.0194
LIQ	1.64	0.0658	0.0928	0.0785	0.166*
EFF	3.09	7.429***	6.446***	5.938***	6.495***
SIZE	1.87	4.866***	6.049	5.782**	4.909***
AGE	1.35	0.0328	-0.258	-0.153	-0.0382
EI	1.07	2.735	3.995*	3.275*	2.712*
_cons		-28.29***	-33.95	-31.18**	-28.49***
N		160	160	160	160
R-sq		0.321	0.266	0.256	
Hausman Test				chi2(7) = 6.04	
				Prob > chi2 = 0.5354	
Breusch and Pagan Lagrangian Test				chibar2(01) = 164.72	
				Prob > chibar2 = 0.0000	
Wooldridge Test				F(1,19) = 0.446	
				Prob > F = 0.5123	

t statistics in brackets

* $p<0.1$, ** $p<0.05$, *** $p<0.01$

Source: Data analysis results using STATA

The debt ratio variable has a negative and statistically significant impact at the 1% level on ROA. This means that when the debt ratio increases by 1%, ROA decreases by about 10.97%, reflecting the negative relationship between debt use and asset profitability. Similarly, the DE variable has a negative and statistically significant impact at the 1% level on ROA. When the debt-to-equity ratio increases by 1%, ROA decreases by 0.72%. The relationship between the debt-to-equity ratio and ROA is negative.

In this model, the control variables LIQ, EFF, SIZE, EI have a positive and statistically significant impact on ROA. This result shows a positive relationship between solvency, asset turnover, enterprise size, and export-import turnover with the dependent variable ROA. Specifically, LIQ and EI have a positive impact on ROA at the 10% statistical significance level, EFF and SIZE have a positive impact on ROA at the 1% statistical significance level. The remaining control variables SGR and AGE are not statistically significant, meaning they do not affect the ROA of the enterprise.

The results of testing the hypotheses are as follows:

Hypothesis H1: According to the regression results, the debt ratio (TD) has a negative and statistically significant impact on financial performance, with a confidence level of 99%. The impact of TD on ROA is quite large (-10.97). Thus, hypothesis H1 is accepted in this model.

Hypothesis H2: The debt-to-equity ratio (DE) has a negative impact on the financial performance variable. Specifically, the impact of DE on ROA is (−0.720). Thus, hypothesis H2 is accepted.

Enterprises with high profitability often prioritize the use of internal capital instead of external mobilization. Increasing debt will increase financial risk due to dependence on debt repayment obligations, while issuing additional shares can lead to a decrease in the control of existing shareholders. Therefore, enterprises with good financial performance often choose the form of financing with retained earnings to carry out investment activities, thereby maintaining financial autonomy and limiting negative impacts on ownership structure. Some studies have similar results such as Tesema (2024), Mohammad & Bujang (2020), Mazanec (2023), Bui Thi Ngoc et al. (2023), Duong

Van Chi et al. (2023), Tran Thi Phuong Thao (2024), Tran Thi Bich Ngoc et al. (2017), Duong Van Chi et al. (2023).

Hypothesis H3: SGR does not show an impact on the financial performance of enterprises. Accordingly, hypothesis H3 is not accepted.

Hypothesis H4: Liquidity (LIQ) has a positive impact on the financial performance of enterprises. Hypothesis H4 is accepted. This result is similar to the studies of Mazanec (2023), Tran Thi Phuong Thao (2024). Enterprises with good liquidity often have stable cash flow, high financial autonomy, thereby maintaining financial performance.

Hypothesis H5: Asset efficency (EFF) has a positive and statistically significant impact on ROA, showing that hypothesis H5 is accepted. This result is similar to the findings of Tran Thi Phuong Thao (2024), Duong Van Chi et al. (2023).

Hypothesis H6: In the research model, enterprise size (SIZE) has a positive impact on the financial performance of enterprises. Accordingly, hypothesis H6 is accepted. This result is consistent with the findings of many studies such as Tesema (2024), Kong et al. (2023), Nguyen Thi Dieu Chi (2018), Tran Thi Phuong Thao (2024), Tran Thi Bich Ngoc et al. (2017), Duong Van Chi et al. (2023).

Hypothesis H7: The number of years of operation of the enterprise (AGE) does not show the influence on the financial structure in the model, so hypothesis H7 is not accepted.

Hypothesis H8: In the model, export-import turnover (EI) has a positive and statistically significant impact on the financial performance of the enterprise. Therefore, hypothesis H8 is accepted. Export-import turnover is an important macro factor representing the level of trade of goods between a country and the world. This factor directly affects the revenue of port exploitation enterprises, thereby positively affecting the financial performance of the enterprise.

6. Conclusion and recommendations

With the aim of studying the impact of capital structure on the financial performance of seaport enterprises, the study collected financial data of 20 listed seaport enterprises in Vietnam in the period of 2017-2024 as a basis for analysis and evaluation. The regression methods applied include OLS, FEM, REM and GLS. The dependent variable used to measure the financial performance of enterprises is ROA. The research results show that capital structure measured by two independent variables, TD and DE, has an inverse effect on the financial performance of enterprises. Revenue growth rate (SGR) and operating time (AGE) are statistically insignificant variables, while enterprise size (SIZE), liquidity (LIQ), asset efficiency (EFF), and export turnover (EI) have a positive impact on ROA.

Based on the results, some recommendations are made as follows:

First, enterprises need to restructure their capital structure and deliberately consider increasing the proportion of debt in their financial structure. The abuse of debt reduces the financial independence of enterprises, and high interest expenses put pressure on the need to achieve a certain level of profitability to ensure solvency. As a result, enterprises' profitability is reduced and financial risks are increased. Instead, enterprises should carefully evaluate alternative sources of funding to ensure maintaining operating efficiency at a more stable and sustainable level.

***Second*,** to optimize operational efficiency, seaport enterprises need to balance the two main sources of funding: loans and equity. In particular, retained earnings need to be exploited as an important internal source of capital, not only helping to increase financial initiative but also helping enterprises take advantage of investment opportunities in a timely manner. Accumulating retained earnings through a reasonable dividend policy and cost savings will contribute to strengthening internal financial strength, while limiting arising debt obligations. In addition, enterprises should also consider issuing additional common shares or preferred shares as a solution to expand equity capital at a reasonable cost of capital.

Third, enterprises need to maintain and improve profit margins at the same time as asset utilization efficiency. The main measure is to control business costs well, set appropriate selling prices to ensure asset efficiency, maintain stable profit margins, thereby improving the quality of financial growth in a sustainable manner.

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