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FACTORS AFFECTING THE CAPITAL STRUCTURE OF LISTED CEMENT ENTERPRISES IN VIETNAM

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The purpose of this research is to find out the factors affecting the capital structure of listed cement enterprises in Vietnam. The investigation was conducted on a sample of 77 observations with data collected from the financial statements of cement production enterprises in Vietnam with stocks listed on the Stock Exchanges in Ho Chi Minh city and Hanoi in the period from 2010 to 2019. Through the application of datasheet estimation methods, combined with the development, selection and testing of models, the study has selected a fixed effects model to assess the direction and level of the impact of factors on the debt ratio of enterprises in the sample. Factors identified to affect the capital structure of listed cement companies include: Firm size, asset structure, growth potential, liquidity, and profitability. In particular, the factor of firm size affects in the same direction and has the greatest impact on the capital structure. The results are in line with the relevant empirical studies, with the operational characteristic of Vietnam's cement enterprises as well as consistent with the Pecking order theory and the Trade-off theory of capital structure. The study can be useful to financial advisors, investors and corporate financial administrators.

Keywords: *Capital structure, panel data, impact factor, cement.*

1. introduction

Capital structure is the proportion of debt capital and equity capital in the total value of capital that the enterprise mobilizes and uses in business activities. Capital structure decision is one of the important decisions of financial managers. A wrong decision about capital structure can cause businesses to fall into financial crisis, even bankruptcy. Therefore, in order to make decisions on a reasonable capital structure from time to time, it is required that financial administrators have to identify and evaluate the impact of important factors on the capital structure

of enterprises. From there, contribute to minimizing the cost of capital and maximizing the value of the enterprise.

Currently, cement production enterprises in Vietnam play a particularly important role in the construction of social infrastructure as well as civil works in the national economy. Over the past time, listed cement production companies have made important contributions to the country's economic development: Creating more jobs, increasing income for workers, providing cement products for the needs of construction of national key projects,

infrastructure projects, construction of factories, offices, schools, houses... contributing to the achievement of socio-economic development goals of country.

Modigliani and Miller (M&M-1958) are the first authors to discuss the theory of capital structure. Since then, many researchers have developed the theory of M&M to build modern theories about capital structure. Factors affecting capital structure have been discussed for many years and are known as one of the unresolved issues in corporate finance theory. Many theoretical and empirical studies have been done on this issue, but so far there has not been a consensus and consistently accepted theory. Instead, the discussion of factors affecting capital structure in theoretical and empirical studies leads to different, even contradictory results. However, most of these studies were conducted in developed countries, while the capital structure in developing countries has received less attention. At the same time, the number of studies on the factors affecting the capital structure of cement enterprises is also very limited.

The research paper provides financial managers, investors and financial analysts with information about the identification of factors affecting capital structure in cement manufacturing enterprises in Vietnam. The selection of explanatory variables is based on empirical studies on capital structure and characteristics of the research sample. Accordingly, the explanatory variables selected in the model include 05 variables: Enterprise size, asset structure, growth potential, liquidity, and profitability. The remainder of the research paper is designed as follows: Part 2 is the theoretical basis and research overview; Part 3 is the research methodology and data; Part 4 is the results and discusses the research results; Finally, part 5 is the conclusion drawn from the research results.

2. Theoretical basis and research overview

2.1. Theoretical basis

Capital structure has a direct impact on risk and profitability rate or enterprise value, so the decision

to plan capital structure is one of the important decisions in corporate finance. Up to now, there have been a lot of research on capital structure theory published, in which the basic theories about capital structure below must be mentioned.

2.1.1. Theory of optimal capital structure

The theory of optimal capital structure states that when businesses start to borrow, the benefits from borrowing outweigh the disadvantages. The low cost of capital combined with the benefit of the tax shield reduces the weighted average cost of capital (WACC) as the debt increases. However, when the debt ratio increases, causing the level of risk to increase accordingly, then business owners will require a higher rate of return, the loan interest rate will also increase, thereby increasing the WACC. Therefore, according to this theory, when increasing debt to a certain level will increase WACC, an optimal capital structure exists that minimizes the cost of capital and maximizes the value of the enterprise.

However, this view is not convincing since there is no underlying theory to show how much the cost of equity will increase with the increase in debt ratio and how the cost of debt will increase when available risk of default. Therefore, the study of Modigliani and Miller (M&M) published in 1958 is considered the starting study for modern theories of capital structure.

2.1.2. Capital structure theory of Modigliani and Miller (M&M).

The theory of the relationship between capital structure and enterprise value was introduced by two researchers Franco Modigliani and Merton Miller in 1958. The M&M theory is stated into two important propositions: The first proposition is about enterprise value, the second clause talks about the cost of capital. These statements are considered in two cases with and without corporate income tax. In a tax-free environment, the value of debtors and non-borrowers is the same. In the tax environment, the value of the enterprise with debt is higher than the value of enterprises without using financial leverage due to the benefits from the tax shield. The

M&M theory is built on the basis of assumptions that do not happen in reality: Perfect capital structure, no transaction costs, no financial bankruptcy costs, individuals and businesses can borrow debt at the same interest rate. The M&M theory of capital structure is considered as a modern agency theory that explains the relationship between the enterprise value, the cost of capital and the level of debt use of the enterprise.

Thus, the M&M theory has clarified the impact of the capital structure on the cost of capital, enterprise value, but some assumptions of this theory are unrealistic. For example: In fact, the debt ratio between enterprises and individuals is different due to the difference in credit ratings. In addition, the impact of some other costs that make the benefits of the tax shield diminish gradually and go to annihilate when the enterprise increases the debt ratio, which is the impact of financial bankruptcy costs.

2.1.3. The Trade-off static of capital structure.

Based on the M&M theory, the trade-off theory is a theoretical development when considering the impact of taxes and the cost of financial exhaustion when explaining the capital structure of enterprises. The static capital structure trade - off theory was initiated by Kraus and Litzenberger (1973) and developed by Myers (1977). Accordingly, the optimal capital structure reflects a trade- off between the tax benefits of debt and the cost of financial bankruptcy. When enterprises increase debt ratio, the cost of financial bankruptcy increases due to an increase in the probability of bankruptcy. At a certain point, the increased value of the tax shield from the interest will be offset by the expected bankruptcy cost or at which point the cost of financial bankruptcy will outweigh the benefit of the tax shield from the interest borrow. At this point, the value of the enterprise starts to decrease, the WACC of the enterprise starts to increase as the enterprise borrows more debt. At this time, the benefits of the tax shield are not enough to offset the cost of financial exhaustion.

The trade - off theory also implied that benefits from the use of debt are only meaningful to enter-

prises in case they have tax obligations. Therefore, businesses with accumulated losses will benefit very little from the tax shield. In addition, businesses that benefit from a tax shield from other sources such as fixed asset depreciation may receive lower benefits from financial leverage. In addition, in the case of enterprises with different tax rates, the enterprise with the higher tax rate will have a greater incentive to borrow. This theory also implies that firms that are more likely to face financial difficulties will use less debt than firms with less risk of bankruptcy. Therefore, in terms of similar factors, companies with high fluctuations in earning before interest and tax often borrow at low rates.

Thus, the theory of trade - off capital structure approaches from the point of view of the trade- off between costs and benefits in using debt. In which, factors that increase the benefits to enterprise value will promote the use of debt, while factors that increase costs for businesses will prevent the use of debt. It can be said that the trade - off theory is an important supplement in perfecting the modern system of capital structure theory when considering the capital structure in both cost and benefit aspects instead of just calculating. The benefit calculation and cost hypothesis do not exist as in the M&M theory.

2.1.4. The Pecking order theory of capital structure

The theory of pecking order is studied by Myers and Majluf (1984), the study divides funding into internal capital (retained earnings) and external capital (loan and new stock issue) and explain the order of priority among these capital sources when businesses raise capital. According to Myers and Majluf, businesses prefer to use retained earnings over using loans and consider issuing new shares to raise capital as the last resort. That is, internal capital will be used first before considering external capital mobilization.

The theory of pecking order is based on the asymmetry of information between managers and investors. Compared with outside investors, man-

agers know more about the real value and risks of the business and this affects decisions to finance capital from internal or external sources. Accordingly, enterprises only issue additional shares when their shares are valued at a higher price than their actual value. Therefore, when the company publishes the information of issuing additional shares, the market will receive this information as a bad signal about the prospects of the company, so the stock price will decrease. To avoid the loss of stock prices when businesses need to raise more capital, managers often seek to finance new projects by mobilizing capital sources that are not undervalued by the market such as internal capital or loan. The theory of pecking order explains why businesses tend to prioritize using internal capital and if they need to mobilize more external capital, they will prioritize using loans first. New equity issuance is often the last resort when businesses have used up their debt capacity, which means when there is the threat of financial bankruptcy costs of businesses to existing creditors as well as managers.

The advent of the theory of pecking order has explained why businesses with low profitability often borrow more, the attractiveness of the tax shield from debt securities is considered to have second-class impact. This theory explains why most of the external funding is borrowed capital and why the increase in debt in the capital structure stems from external financing needs. The debt ratio of enterprises will depend on the level of information asymmetry, the ability of enterprises to self-finance and the limitations that enterprises face when accessing many different capital sources.

2.2. Research overview

Many researchers have identified factors affecting capital structure from different perspectives and in different research environments. These empirical studies are aimed at testing capital structure theories in practice, thereby serving as a basis for building optimal capital structure to maximize enterprise value. Studying these documents is useful for the author's research:

Titman and Wessles (1988) introduced the factors identified from different theories that affect the selection of debt ratios of firms. These factors include: Asset structure, non-debt tax shield benefits, growth capacity, specific assets of a firm, industry subgroup, firm size, income fluctuations, and profitability. In which, the study finds an inverse relationship between the specific characteristics of the enterprise's assets to the debt ratio. At the same time, short-term debt is negatively affected by the size of the firm. However, the study did not provide strong enough evidence of the effect on debt coefficients due to the effects of the non-debt tax shield, income fluctuations, asset structure and potential future growth.

Rajan and Zingales (1995) have generally pointed out that the capital structure of enterprises is the same among G7 countries. Countries in the G7 group include: Asset structure, book value, scale, and profitability. Hall et al. (2000) studied over 3,500 small and medium-sized UK enterprises to test different hypotheses related to factors affecting capital structure of small and medium enterprises found results consistent with market scoring theory. Specifically, profitability has a negative impact on the short-term debt ratio and, therefore, older firms are able to raise capital better, so they need to mobilize less short-term debt and longer-term debt.

Huang and Song (2001) analyzed the market data and accounting data of more than 1,000 listed Chinese companies up to 2,000. The results showed that the size of enterprises and the asset structure have a positive impact on leverage finance; meanwhile, non-debt tax shield benefits, profitability, and growth potential have negative effects.

Bhaduri (2002) thinks that the non-debt tax shield is a good substitute for tax benefits from debt, so businesses with large non-debt tax shield benefits will borrow less. The study also shows that large scale enterprises will tend to diversify mobilized capital sources so they are less prone to financial crisis, in other words, there exists a positive relationship of enterprise size to capital structure. On

the other hand, product characteristics of enterprises have a negative impact on the debt ratio, because with specific capital structure, the risk of bankruptcy will be reduced.

Nguyen and Neelakantan (2006) have collected information of small and medium enterprises in Vietnam and showed a positive relationship of the ability to grow enterprises, enterprise size on capital structure, and negative effects the extreme of the asset structure to the debt ratio in these firms.

Mutalib (2011) conducted an empirical analysis of factors affecting capital structure of cement enterprises in Nigeria in the period 2000-2009. The study used the least squares estimation method for the panel data sample with 08 independent variables that significantly affect the capital structure. In which, profitability, firm size, liquidity, and lag factor 1 of the debt ratio have opposite effects on capital structure, on the contrary, growth capacity, age of enterprises, structure assets have a positive impact on the debt ratio.

In general, a review of relevant empirical studies has shown the following factors: Firm size, asset structure, profitability, growth, and liquidity affect the source structure capital of enterprises. In this study, the author uses static panel data analysis method to identify factors affecting the capital structure of enterprises, as a contribution to quantitative methods to determine the impact of factors capital structure of enterprises in Vietnam.

3. Research methodology and data

3.1. Research methodology

Inheriting the models of Titman and Wessles (1988), combined with the model of Hijazi and Tariq (2006) and the model of Mutalib (2011), the study finds empirical evidence on the impact of factors on capital structure of listed cement production companies in Vietnam. In which, the research model has added a liquidity variable (LIQUID) to suit the characteristics of the cement manufacturing enterprises in Vietnam.

Notably, in this study, variables reflecting the impact of factors outside the enterprise will not be

considered. This does not mean denying the impact of external factors on the capital structure of enterprises, but the study only focuses on evaluating the influence of factors specific to specific characteristics of enterprises capital structure.

The research uses three popular methods in estimating static panel data, including: Pooled OLS, fixed effects model (FEM) and random effects model (REM). Inside: Factors affecting the capital structure built in this study by the Pooled OLS method are determined as follows:

$$LEV_{it} = \beta_1 + \beta_2 SIZE_{it} + \beta_3 TANG_{it} + \beta_4 LIQUID_{it} + \beta_5 ROA_{it} + \beta_6 GROWTH_{it} + U_{it} \quad (t=1:11, i=1:7)$$

Inside:

- LEV_{it} : is the dependent variable measuring the debt ratio of the firm i in year t .
- $SIZE_{it}$: Enterprise size i in year t .
- $TANG_{it}$: Enterprise asset structure in year t .
- $LIQUID_{it}$: Enterprise liquidity i in year t .
- ROA_{it} : Enterprise profitability i in year t .
- $GROWTH_{it}$: Enterprise growth rate i in year t .

However, the Pooled OLS regression model considers the enterprises to be homogeneous, which is often not a true reflection of the reality because each enterprise is a separate entity, with completely different unique characteristics that can affect capital structure of businesses (such as management qualifications, reputation...). Therefore, the Pooled OLS model can lead to biased estimates when these individual effects are not controlled.

Fixed effects model (FEM) or random effects model (REM) can control these discrete effects, as follows:

$$LEV_{it} = \beta_1 + \beta_2 SIZE_{it} + \beta_3 TANG_{it} + \beta_4 LIQUID_{it} + \beta_5 ROA_{it} + \beta_6 GROWTH_{it} + \mu_{ii} \quad (t=1:11, i=1:7)$$

Inside, $\mu_{ii} = U_{it} + v_i$ where v_i represents the distinct, constant effects of time and space observed for each entity i . Thus, the difference between Pooled OLS and the two models FEM and REM is the existence of the index v_i . At the same time, the difference of FEM and REM is also in the v_i index. Both

the FEM and REM models acknowledge the plausible existence of v_i , but if these distinct effects are correlated with the independent variable then the most suitable method is FEM, otherwise if v_i is not correlated with the independent then the REM model is more suitable.

To choose between FEM and REM models, the Hausman test is used with the following hypotheses:

H0: Estimated results between FEM and REM are not different.

H1: Estimated results between FEM and REM are different.

The inspection standard used is χ^2 statistic. If the H0 hypothesis is rejected, conclude that the REM model is not appropriate and the FEM model should be used.

To choose the best model between two regression models according to Pooled OLS method and REM model, the study uses Breusch- Pagan test with the following hypotheses:

H0: Variance of the random error between entities is zero ($\text{Var}(U_i)=0$)

H1: Variance of the random error between non-zero entities.

If you reject hypothesis H0, use REM model, otherwise use Pooled OLS model.

3.2. Research data

The study uses data samples about the financial situation of cement production companies whose stocks are listed on the Ho Chi Minh Stock Exchange (HOSE) and Hanoi Stock Exchange (HNX) for 11 years from 2010- 2019. Data are collected from the financial statements of enterprises in the period 2010-2019 on Vietstock, Cafef, cophieu68 and secondary data calculated by the author. In which, the calculated data of the variables in the model is calculated according to the book value based on the financial statements of the enterprise. The reason for selecting enterprises in the research sample:

(1) The study sample only includes enterprises that conduct the full cement production process from raw material extraction to finished product

processing to ensure similarity in evaluation. Enterprises that process cement for other units or do not fully implement the entire cement production process are not considered in the sample.

(2) Enterprises that fully implement the cement production process have continuously listed stocks on HOSE and HNX in the period 2010-2019.

According to the above criteria, there are 07 enterprises selected in this sample, including: Bim Son JSC (BCC), VICEM But Son Cement JSC (BTS), VICEM Hoang Mai Cement JSC (HOM), Cement JSC Quang Ninh Cement and Construction (QNC), Thai Binh Cement JSC (TBX), Ha Tien Cement Joint Stock 1 (HT1), Cement JSC VICEM Hai Van (HVX).

The selected variables in the research model and the expected relationship with the dependent variable based on the relevant empirical studies are described in Table 1 below:

4. Research results and discussion of research results

4.1. Research results

4.1.1. Initial analysis with data

Initial analysis with data is an important step to help the research identify and take measures to promptly process research data before making necessary estimates for the model.

Descriptive statistics:

The statistical results described in Table 2 show the mean and standard deviations of all variables included in the model. The explained variable (LEV) data shows that the average debt ratio of enterprises in the period 2010-2019 is 0.643, but this coefficient is relatively different between enterprises, ranging from 0.29 to 0.96. This shows that the level of debt use of enterprises in the research sample has a huge variation. Notably, enterprises with too large debt ratios (over 90%) will be susceptible to risks when lending rates rise sharply because then the financial autonomy of businesses is low. Meanwhile, there are businesses that hardly mobilize loans that will not take advantage of the benefits from the tax shield of using debt. The large ampli-

Table 1: Research data description

Variable	Symbol	Measure	Sign of the expected correlation coefficient
<i>Dependen variable</i>			
Debt ratio	LEV	Total liabilities/ Total resources	
<i>Independen variables</i>			
Firm size	SIZE	Ln(Total Assets)	+/-
Asset structure	TANG	Tangible fixed assets/ Total assets	+/-
Liquidity	LIQUID	Short- term assets/ Short- term liabilities	-
Profitability	ROA	Earning after tax/ Average total assets	+/-
Growth potential	GROWTH	(Total assets value in year t – Total assets value in year t-1)/ Total assets value in year t-1	+/-

Source: Author compiled

tude of variation is also the general trend seen in most of the data of the explanatory variables, most notably the data of GROWTH and ROA.

variables before regression analysis, and to identify the multicollinearity problem between the independent variables of the research model. Suppose

Table 2: Descriptive statistics of the research variables in the model

	LEV	SIZE	TANG	GROWTH	LIQUID	ROA
Mean	0.643194	7.118194	0.614583	9.154306	0.863194	1.681528
Median	0.625	7.515	0.67	6.5	0.81	4.83
Maximum	0.96	9.5	0.86	125.13	2.11	27.18
Minimum	0.29	3.61	0.22	-29.7	0.36	-265.3
Std. Dev.	0.162106	1.622141	0.181123	26.40671	0.386653	33.43231
Skewness	0.129459	-0.479482	-0.527021	2.312544	0.913067	-7.230287
Kurtosis	2.12347	2.324851	2.073796	9.914097	3.918617	58.16043
Jarque-Bera	2.506029	4.12632	5.906572	207.5885	12.53587	9755.345
Probability	0.285642	0.127052	0.052168	0	0.001896	0
Sum	46.31	512.51	44.25	659.11	62.15	121.07
Sum Sq. Dev.	1.865765	186.8253	2.329187	49509.31	10.61457	79358.08
Observations	77	77	77	77	77	77

Source: Results from EViews software

Correlation coefficient matrix:

To check the linear correlation relationship between the dependent variable and the independent

running the correlation matrix between the variables in the model. The results are shown in Table 3 below:

Table 3: Correlation matrix between the variables in the model

Covariance Analysis: Ordinary						
Sample: 2010 2019						
Included observations: 77						
Correlation						
Probability	LEV	SIZE	TANG	GROWTH	LIQUID	ROA
LEV	1					

SIZE	0.509013	1				
	0	-----				
TANG	0.370206	0.770877	1			
	0.0014	0	-----			
GROWTH	0.047708	0.067705	-0.028685	1		
	0.6907	0.572	0.811	-----		
LIQUID	-0.55205	-0.703385	-0.754638	0.126427	1	
	0	0	0	0.2899	-----	
ROA	-0.307226	-0.056311	-0.042387	0.11871	0.166315	1
	0.0087	0.6385	0.7237	0.3206	0.1626	-----

Source: Results from EVIEWS software

Data from Table 3 shows that among the 5 factors included in the model, LIQUID and ROA have an inverse relationship with the capital structure of enterprises. The results in Table 3 also show that the relationship between the debt ratio and the likelihood of growth is not statistically significant.

Stationary test:

Stopped or non-stop chain testing is very important for proposing and building suitable quantitative models. A series is non-stationary then we can not generalize or apply conclusions obtained from past data to future data, which means that predictive models for non- stop series are invalid. At the same time, to avoid spurious regression in the regression model, all the

variables considered in the model must be stationary variables. In the study, the author uses the unit root test developed by Levi - Lin - Chu (2002). The test results in Table 4 show that all variables stop at significance level less than 5%. Regression with stationary variables in the model will avoid spurious regression.

Table 4: The stationary test of the variables in the model

Variables	Statistic	p-value
LEV	-4.69378	0.0000
SIZE	-3.49184	0.0000
TANG	-17.3811	0.0000
GROWTH	-6.83121	0.0000
LIQUID	-5.22554	0.0000
ROA	-2.30817	0.0000

Source: Results of implementation and synthesis from EVIEWS software

4.1.2. Test options and rebuild the model

Research conducted selection testing and reconstructed the model to identify factors affecting capital structure for listed cement companies. As follows:

The study uses the Hausman test to evaluate and select the FEM model and REM model, in fact this is to test whether the error is correlated with the explanatory variables or not, the results are shown in Table 5 below:

Data in Table 7 gives the estimated model results as follow:

$$LEV_{it} = 1.620596 + 0.303992 * SIZE_{it} + 0.260492 * TANG_{it} + 0.001124 * GROWTH_{it} + 0.220612 * LIQUID_{it} - 0.000821 * ROA_{it} + e_{it}$$

Tests based on F statistics conclude that the regression model is appropriate (P-value is 0), the coefficient R² is 0.889569, which proves that 88.9569% change in capital structure of enterprises the listed cement is influenced by factors in the model.

Table 5: Hausman test

Correlated Random Effects - Hausman Test				
Equation: Untitled				
Test cross-section random effects				
Test Summary		Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random		62.198669	5	0
Cross-section random effects test comparisons:				
Variable	Fixed	Random	Var(Diff.)	Prob.
SIZE	0.303992	0.058429	0.001435	0
TANG	0.06956	0.046945	0.000719	0.3989
GROWTH	0.000215	0.000776	0	0
LIQUID	0.065545	-0.118647	0.000861	0
ROA	-0.000821	-0.000408	0	0

Source: Results from EVIEWS software

Hausman test results in Table 5 have P-value = 0, thus, using FEM model is appropriate.

Next, the study performs selection test of FEM and Pooled OLS models. The test results show that P-value = 0, so FEM model in this case is more suitable (Table 6).

Therefore, the study uses the FEM model to regression to find out the factors affecting the capital structure of cement companies listed in the period 2010-2019. The estimated results of the FEM model are shown in Table 7.

4.2. Discussion of research results

In addition, observing the data in Table 7, at the significance level of 5%, all five factors included in the model have an impact on the capital structure of cement listed companies in Vietnam. In which, the positive impact on capital structure is seen through the effects of SIZE, TANG, LIQUID, and GROWTH; meanwhile, the impact of ROA on debt ratio is in the opposite direction.

Table 6: Pooled OLS and FEM selection test

Redundant Fixed Effects Tests				
Equation: Untitled				
Test cross-section fixed effects				
Effects Test		Statistic	d.f.	Prob.
Cross-section F		30.534187	(11.65)	0
Cross-section Chi-square		118.86402	11	0

Source: Results from EVIEWS software

Table 7: FEM regression model

Dependent Variable: LEV				
Method: Panel Least Squares				
Sample: 2010 2019				
Periods included: 11				
Cross-sections included: 7				
Total panel (balanced) observations: 77				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
SIZE	0.303992	0.041447	7.33444	0
TANG	0.260492	0.095466	2.728634	0.0046
GROWTH	0.001124	0.000303	3.709385	0.0009
LIQUID	0.220612	0.051689	4.268056	0.002
ROA	-0.000821	0.000258	-3.178221	0.0024
C	-1.620596	0.32098	-5.048894	0
Effects Specification				
Cross-section fixed (dummy variables)				
R-squared	0.889569	Mean dependent var	0.643194	
Adjusted R-squared	0.864818	S.D. dependent var	0.162106	
S.E. of regression	0.059602	Akaike info criterion	-2.629596	
Sum squared resid	0.206038	Schwarz criterion	-2.18691	
Log likelihood	108.6654	Hannan-Quinn criter.	-2.453361	
F-statistic	35.9397	Durbin-Watson stat	0.808818	
Prob(F-statistic)	0			

Source: Results from EVIEWS software

Notably, the impact of the factor of enterprise size on the debt ratio is seen to be the largest among the impacting factors. The impact of factors on capital structure in turn is discussed below:

- Regarding the factor of firm size (SIZE): The estimated regression coefficient of the firm size variable is +0.303992 and significant at 5%, this is the factor that has the strongest impact on the debt ratio. This means that companies in the large-scale cement industry will tend to use more debt. This result is consistent with the theory of trade-off for static capital structure and similar to the studies of Titman and Wessels (1988), Bhaduri (2002), Nguyen and Neelakantan (2006). This proves that large-scale enterprises do not consider the direct costs of bankruptcy as a factor affecting the level of debt use because these costs account for a very small proportion of the total value of the enterprise. Therefore, large-scale enterprises have the ability to

diversify, less affected by financial crisis, and low risk of bankruptcy. In addition, large-scale enterprises often have a better reputation in the debt market, so the ability to access loans easily, reducing transaction costs when issuing long-term loans increases the level of debt mobilization.

- About the asset structure factor (TANG): The estimated regression coefficient of this variable is +0.260492 and is statically significant at 5%. This shows that the asset structure has a positive impact on the capital structure, implying that enterprises with a large fixed asset structure will mobilize large debts. This conclusion is similar to that of Huang and Song (2001), Mutalib (2011).

- About the growth possibility factor (GROWTH): The regression coefficient of this variable is +0.001124, which has a significant impact on the capital structure. This suggests that businesses with growth opportunities in the cement industry in

Vietnam often use more debt than equity to finance new projects. This result is consistent with the theory of pecking order, whereby listed cement companies will prioritize to mobilize internal capital first, this capital may not meet the growth needs of businesses. The next option to meet the growing needs of businesses is debt, which shows that a company with good growth capacity will mobilize a lot of debt. However, this result contradicts research by Titman and Wessels (1988), and Rajan and Zingales (1995) when finding an inverse relationship between growth probability and debt ratio.

- About the liquidity factor (LIQUID): The convergence coefficient of this variable is positive and statistically significant with the significance level of 5%. This result is contrary to previous studies, but consistent with the current situation of listed cement companies in Vietnam in the past period. When the liquidity of these businesses improves, reducing financial risks, businesses have easier access to credit sources. Since then, these businesses have the opportunity to access credit capital through debt, making the debt ratio increase.

- Regarding the factor of profitability ratio (ROA): The impact is inversely and has statistical significance for the capital structure. This suggests that companies with high profits in the cement industry listed in Vietnam use a lot of equity and less debt. Therefore, a business with high profits will avoid borrowing a lot, this result is consistent with the theory of classification order. That again affirms, companies with high profitability tend to be financed by internal capital rather than external capital. Because, the use of borrowed will increase the financial burden, meanwhile, the issue of additional shares will make the ownership of the shareholders dilute. In fact, companies with high profits often use retained earnings to finance their capital needs. Similar results are shown in the studies of Myers (1984), Rajan and Zingales (1995), and Hall et al. (2000).

5. Conclusion drawn from research results

The study identifies the factors affecting the capital structure of listed companies in the cement

industry in Vietnam for the period 2010-2019. Through initial analysis with data and application of methods estimating static panel data model, researching and building models, testing selected fixed effects model (FEM) with 05 independent variables including: Firm size, asset structure, growth probability, liquidity, and profitability affect the debt ratio of the enterprise. The results obtained are essentially consistent with theoretical basis and related empirical studies.

Estimation results of FEM model show that the impact of the factor of firm size on the debt ratio is strongest. Notably, the study once again corroborates the dominance of the pecking order theory and the static trade-off theory on the data of cement manufacturers listed in Vietnam in the period 2010-2019. In which, the impact of firm size on capital structure is consistent with static trade-off theory and related experimental studies. Meanwhile, the theory of pecking order governs the impact of the factors of growth and profitability on the choice of debt mobilization of listed cement companies in Vietnam. The trend of impact of the liquidity factor of enterprises on the debt ratio obtained in this study is contrary to the previous experimental studies, but consistent with the operation characteristics of cement producers in Vietnam.

The results from this study may be suggestions for enterprises in the cement industry to consider in the process of planning capital structure when there are fluctuations of factors:

Firstly, for enterprises with large capital scale, guaranteed liquidity and growth opportunities, they should take advantage of the ability to access credit capital from banks, thereby making good use of financial leverage to improve business performance.

Secondly, enterprises with high business efficiency need to promote well endogenous capital resources to reduce the debt mobilization coefficient in order to restructure their capital sources. In fact, in the past period, due to the great pressure of investment, and this is a difficult period of operation for cement production enterprises, the ability to re-

invest in the past time has not really met the need to increase capital of businesses. Therefore, cement producers need to better exploit the capital from retained earnings, this is a financial resource to help businesses proactively meet capital needs, catch up with business opportunities that retains control of the enterprise. To do so, cement producers need to build a unified financial plan, which makes investment management decisions and rational use of capital, in order to further improve business efficiency, create a lot of profit. At the same time, it is necessary to have appropriate profit distribution decisions to promote profit accumulation for re-investment.

Thirdly, the model analysis show that the construction of target capital structure in each period for cement production enterprises should be focused. Since then, in the organization of capital sources, it is necessary to mobilize capital according to the target capital structure built, regularly supervise and promptly adjust the structure of the target capital when there are unusual changes in the macroeconomic model and development strategy of enterprises.

This study contains at least two limitations. First, the study is built on databases from cement manufacturing enterprises in Vietnam. Second, the estimation model uses debt coefficient data and the impact factors are calculated based on book value. In the next studies, it is possible to expand in the direction of adding debt coefficient variables and some influencing factors according to market value. At the same time, it is possible to consider adding a number of influencing factors such as: Specific characteristics of the enterprise's assets, the time of operation of the enterprise, cash flow, income fluctuations,... into the model of estimation and expansion. Research data for all enterprises in the manufacturing industry in Vietnam instead of data in the cement manufacturing industry as in this study. ♦

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Summary

Mục đích của nghiên cứu này nhằm tìm ra các nhân tố tác động đến cơ cấu nguồn vốn của các doanh nghiệp xi măng niêm yết ở Việt Nam. Nghiên cứu thực hiện trên mẫu gồm 77 quan sát với số liệu thu thập từ báo cáo tài chính của các doanh nghiệp sản xuất xi măng ở Việt Nam có cổ phiếu niêm yết trên Sở giao dịch chứng khoán Thành phố Hồ Chí Minh và Hà Nội trong giai đoạn từ năm 2010 đến năm 2019. Thông qua việc áp dụng các phương pháp ước lượng dữ liệu bảng tĩnh, kết hợp với việc xây dựng, lựa chọn, kiểm định các mô hình, nghiên cứu đã lựa chọn được mô hình tác động cố định nhằm đánh giá chiều hướng và mức độ tác động của các nhân tố đến hệ số nợ của các doanh nghiệp trong mẫu nghiên cứu. Những nhân tố được xác định có tác động đến cơ cấu nguồn vốn của các doanh nghiệp xi măng niêm yết gồm: Quy mô doanh nghiệp, cơ cấu tài sản, khả năng tăng trưởng, khả

năng thanh toán và khả năng sinh lời. Trong đó, nhân tố quy mô doanh nghiệp có tác động cùng chiều và mạnh nhất tới cơ cấu nguồn vốn. Kết quả nghiên cứu cơ bản phù hợp với các nghiên cứu thực nghiệm liên quan, với đặc thù hoạt động của các doanh nghiệp xi măng Việt Nam cũng như nhất quán với lý thuyết trật tự phân hạng và lý thuyết đánh đổi cấu trúc vốn dạng tĩnh. Nghiên cứu có thể hữu ích đối với các chuyên gia tư vấn tài chính, nhà đầu tư và các nhà quản trị tài chính doanh nghiệp.

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