Determinants of Capital Structure in the Presence of Supply Chain Activities of Listed Construction Firms in Vietnam

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Abstract- **The study aims to identify the capital structure determinants in the presence of the supply chain of the listed construction firms in Vietnam. The determinants of capital structure are factors affecting firm financial leverage, including firm profitability, size, growth rate, fixed assets, liquidity, interest coverage and state ownership along with the supply chain activities. The study is based on a data of 53 listed construction firms in the Hanoi and Ho Chi Minh Stock Exchange over the period 2014-2018. The results indicated that the supply chain activities along with other determinants except profits and liquidity have a positive association with the capital structure of the listed construction firm in Vietnam. These findings guided to the policymakers that they should enhance the intensions towards the determinant of the capital structure along with supply chain activities to improve the organizational performance.**

Keywords; *Capital structure, Supply chain activities, Liquidity, Profitability*

1. Background

The Vietnamese economy has experienced dramatic changes in recent years and one of the most important industries in the economy is the construction sector. The development of Vietnam's construction enterprises has created a great contribution to the growth and development of the country's economy [1]. Capital structure is not a new topic and studying on capital structure is very necessary for corporate governance, because the capital structure has a significant impact on the performance, existence and development of firms. At present, the financial market in Vietnam has developed a lot compared to the past. Although the development of Vietnamese financial market is still at a nascent stage, it has created a capital supply to meet the needs of production and business activities of enterprises including construction businesses [2]. However, looking at the balance sheets of Vietnamese construction firms, it can be seen that the proportion of debt is extremely high. There is mainly short-term debt whereas the proportion of long-term debt is zero or very small number. The capital structure with very high leverage level is questionable because it can create a high level of financial risk. Thus, this paper study the capital structure determinants of listed construction firms in Vietnam to examine what factors influencing their capital structure and how these factors affecting the firms' capital structure [3]. The study findings are expected to support the firm financial managers in adjusting the financing policies to determine appropriate capital structure choice, in order to improve the firms' performance.

The supply chain practices are essential for all types of organization because it has a positive influence on the performance of the organizations. Supply chain practices not only enhance the performance but also boost up the entire processes of the organization [4]. The practices of the supply chain have an effective tool especially for the manufacturing companies around the globe. The Jordon construction companies have also implemented the effective practices of the supply chain that would enhance the quality of the process along with the efficiency. In addition, supply chain activities also have a greater impact on the capital structure of the firms. The high performance of the supply chain would improve the profitability and in this regard enhance the capital structure of the organization [5]. Moreover, Vietnamese construction firms have maintained effective supply chain process that helps the organization to provide the material that is essential for the constructions. To improve the efficiency of the construction works in the country, there is an extensive need for efficient supply chain activities in the organization. Thus, the Vietnamese construction firms have improved and efficient supply chain process that leads them towards success [6].

In addition, the performance of the supply chain depends on the selection of the supplier and team efficiency. If the organization has maintained an efficient supplier along with effective team players than they achieve the goal of high performance that enhance the capital structure of the organization [7]. Vietnamese construction firms have implemented dramatic changes in

organizations that affect the economic activities of the organization. The supply chain activities are one of the changes that they have implemented in the organization. Thus, for the determination of capital structure, the present study has taken supply chain as one of the determinants among all other determinants such as profitability, liquidity, size and ownership. To do so, the paper employs panel regression methods to analyze the determinants of the capital structure of 53 construction firms for the period 2014-2018.

2. Hypotheses development

Research on the factors affecting the capital structure of enterprises has been carried out very early in developed economies. Some works of authors in the US are [8] with 469 enterprises in the period 1976-1982; research by [9] with the data of 50 years from 1950 to 2003. Results from the research of Titman and Wessels show that firm size, transaction costs and business characteristics have a significant impact to firm capital structure, while factors such as the interest tax shield and growth rate have no relation to the capital structure. In their research, Frank and Goyal looked at the impact of many factors including profitability, firm size, growth, taxes, asset structure, risk, and inflation, and found a statistically significant impact of growth rate, asset structure, profitability, inflation rate on the capital structure of enterprises.

The supply chain activities have also a significant impact on the capital structure because it boots up the business activities that enhance the organizational performance which ultimately effected the capital structure. In addition, the practices of the supply chain are considered as a significant tool to enhance firm performance and also determine capital structure [10]. Moreover, the management of supply chain practices is an essential part of the organizational activities to improve firm performance and determine capital structure [11].

[12] studied 1,000 listed enterprises in China from 1994 to 2000. The study was conducted by [13] considering factors affecting capital structure of 106 listed manufacturing enterprises in Malaysia from 2003 to 2012, found that the proportion of fixed assets and size has a positive impact on debt ratios while profitability and liquidity have a negative effect on debt ratios. [14] studied in Pakistani enterprises found that fixed assets and profitability have a negative nexus with capital structure; while size, growth and taxation have a negative nexus with the capital structure of the enterprise.

In Vietnam, capital structure determinants are also concerned by many authors. Most commonly factors such as profitability, size, fixed assets and growth, are applied in studies for the Vietnam market. The results from the studies vary among researches exposed that the level of debt usage of these businesses is positively related to growth. At the same time, the study pointed out the negative impact of investment in fixed assets with capital structure. Furthermore, [15] found that Vietnamese enterprises mainly use short-term loans. [16] studied at 178 non-financial enterprises and results found the factors affecting the capital structure, including macro factors, internal factors, business factors and governance behavior. The author also pointed out that the market value ratio on the book price, the ROA have the opposite effect on the debt ratio.

The practices of the supply chain would also determine the capital structure of the organization by enhancing the activities of the business along with firm performance. In addition, without supply chain firm could not survive and required to manage the best practices of the supply chain in the organization [17]. Moreover, the supply chain has proved that if the origination manages the supply chain it can produce high profit for the organization and vice versa [18].

To sum up, studies of the capital structure determinants in different economies considered similar factors, but the empirical results were very different. Some studies are concerned about explanatory variables of macro factors such as interest rates, taxes and inflation. The empirical studies in Vietnam have just been conducted in recent years and the number of research is small, so the implementation of quantitative research is necessary to contribute results for comparison and development of quantitative research in Vietnam. With the specific characteristics of a regulated market economy and the development of construction firms in Vietnam, the research of the capital structure determinant is appropriate and topical.

The source of internal capital (retained earnings) is considered the most preferred capital of enterprises. Businesses with high profitability often use more retained earnings to reinvest and use less debt. Several studies have found that profitability has a positive effect on firms' leverage [19, 20].

Hypothesis H1: Profitability has a negative effect on the capital structure of Vietnamese listed construction firms.

It can be seen that large enterprises are more likely to have access to loans than small businesses. Banks and credit institutions prefer to provide loans to large businesses because of their solvency, creditworthiness, and transparency in their financial information. Looking at the results from empirical studies, firm size also has a positive impact on the firm's level of debt use [12, 21].

Hypothesis H2: Firm size has a positive effect on the capital structure of Vietnamese listed construction firms.

Firms with high growth rates often maximize the use of retained earnings to reinvest, and to meet the demand for development, they tend to use additional loans. At the same time, numerous studies in developing economies

have shown a positive relationship of firm growth to the level of debt use [8, 22].

Hypothesis H3: The growth rate of an enterprise has a positive effect on the firm's capital structure.

The higher the level of enterprises' investment in fixed assets, the more likely it is to use debt. Generally, the more fixed assets an enterprise has, the better it can mortgage assets, the more collateral available for loans and the easier it is to access loans. According to a study of some authors, the level of investment in fixed assets has a positive impact on the firms' leverage. Other authors have found a negative relationship [23, 24].

Hypothesis H4: The degree of investment in fixed assets has a positive effect on the capital structure of the business.

Liquidity represents the level of guarantee for short-term debts by current assets of the company. Enterprises with high liquidity ratio are rated by banks or credit institutions for their safety and easier to get loans. However, according to pecking order theory, enterprises with high liquidity often prefer internal capital over debt, in other words, liquidity has the opposite impact on the firms' leverage [25, 26].

Hypothesis H5: Liquidity has a negative effect on the capital structure of the business.

Interest coverage ratio provides information on the firms' ability to generate profit before tax and interest to cover interest expenses. Businesses with interest coverage ratio are more likely to access loans because they have a higher level of trust and appreciation of their ability to repay debts from banks and credit institutions.

Hypothesis H6: Firms with high-interest coverage ratio have a higher debt ratio than firms with low-interest coverage ratio.

In Vietnam, state-owned enterprises are more likely to have access to loans than businesses that do not have state capital or have a small portion of the state capital. The fact is that the financial market in Vietnam is not developed and the state still holds the dominant capital of enterprises in key industries. The positive effect of the state's ownership level on the capital structure is a fairly appropriate hypothesis. Some empirical studies also show this relationship [27, 28].

Hypothesis H7: State-owned firms are more leveraged than non-state-owned firms.

The higher the management of the supply chain practices the higher the firm performance that also enhances the capital structure of the organization. In addition, supply chain practices have a greater impact on the capital structure due to its efficient process of the business. Moreover, supply chain practices always positive influenced the firm performance and structure of capital if it properly managed. Thus, based on past studies it is concluded that the supply chain has a positive impact on the capital structure of the firm and this study also developed the hypotheses:

Hypothesis H8: The supply chain activities of an enterprise have a positive effect on the firm's capital structure.

3. Methodology

The Quantitative method has been used by the current study and the regression methods on the panel data are used include FEM (fixed-effect model) and Robust Standard Error Model. Factors affecting firms' capital structure include profitability, firm size, firms' growth, firms' level of investment in fixed assets, liquidity, interest coverage ratio, supply chain activities and level of state ownership.

Model 1:

$$TDTA_{it} = \alpha_0 + \beta_1 PROFIT_{it} + \beta_2 SIZE_{it} + \beta_3 GROWTH_{it} + \beta_4 FATA_{it} + \beta_5 CR_{it} + \beta_6 ICR_{it} + \beta_7 SCA_{it} + \beta_8 STATE_{it} + e_{it} \quad (1)$$

Where;
TADA = Total debt to total asset ratio
i = Firm
t = Time Period
PROFIT = Profitability
SIZE = Firm size
GROWTH = Growth in total assets
FATA = Level of investment in fixed assets
CR = Liquidity (Current ratio)
ICR = Interest coverage
SCA = Supply chain activities
STATE = State ownership

Table 1: Measurement of Variables

Dependent Variables	Measurement
Total leverage (Total debt to total asset ratio)	Total debt/Total assets
Independent Variables	
Profitability	Profit before tax/Total assets
Firm size	Ln(total assets)
Firm growth	(Total $assets_t$ – Total $asset_{t-1}$)/Total $asset_{t-1}$
Level of investment in fixed assets	Net fixed assets/Total assets
Liquidity (Current ratio)	Current assets/Current liabilities
Interest coverage	EBIT/I
Supply chain activities	(time is taken by suppliers to provide

	material / total time allowed to the supplier)
State ownership	1= State-owned (State capital is > 50%), 0 = Non-state-owned (State capital is < =50%)

The data has been used by the current study from the audited financial statements of Vietnamese construction firms that are listed on "Hanoi Stock Exchange and Ho Chi Minh Stock Exchange" in the period from 2014 to 2018. These listed construction enterprises have the main operation in civil, industrial and infrastructure sectors. There are 53 firms are chosen with enough available information for the period 2014-2018. Table 2 presents statistic information of data including 265 observations of 53 listed construction firms over 5 years from 2014 to 2018. The mean of debt to total assets ratio (TDTA) has 1.618 mean value along with .567 standard deviation, -.179 minimum and 3.437 maximum values. It illustrates that many construction firms in the research sample have a high level of financial leverage and the proportion of short-term debt is high compared to the proportion of long-term debt. In addition, supply chain activities have 11.564 mean values along with 23.847 standard deviations and 20.023 minimum while 65.89 maximum value. Finally, the minimum, maximum, standard deviation and mean values of other variables are mentioned in Table 2.

Table 2. Data descriptive statistic

Variable	Obs	Mean	S.D	Min	Max
TDTA	265	1.618	.567	-.179	3.437
FATA	265	.643	.476	-1.085	2.007
CAR	265	1.191	.205	.021	1.771
GROWTH	265	8.554	.643	5.699	9.986
ICR	265	.249	.256	0	.846
STATE	265	.158	.214	0	.983
PROFIT	265	1.009	1.898	-9.18	5.116
SIZE	265	4.974	.841	2.862	6.399
SCA	265	11.564	23.847	-20.023	65.89

4. Results

The results show that the variance inflation factor (VIF) values are less than 5 of all the variables that mean no issue of multicollinearity problem in the data. These values are mentioned in Table 3.

Table 3. Variance inflation factor

	VIF	1/VIF
GROWTH	4.128	.242
SCA	3.154	.317
PROFIT	3.125	.32
SIZE	2.435	.411
STATE	2.373	.421
ICR	1.861	.537
CAR	1.292	.774
FATA	1.24	.806
Mean VIF	2.451	.

To check the appropriate model among the fixed and random models, Hausman test has been used and the results indicated that the value of probability is less than 0.05 that reject the null hypotheses that describe the random effect is appropriate. Thus, the fixed-effect model is appropriate in this study. These values are shown in Table 4.

Table 4. Hausman test

	Coef.
Chi-square test value	30.374
P-value	0.000

The results of fixed effect model exposed that the FATA, GROWTH, ICR, Size, and supply chain activities have positively linked with the TDTA because the beta has a positive sign and t-values are larger than 1.64 while p-values are less than 0.05. However, CAR, STATE and PROFIT have negatively associated with the TDTA because the beta has negative sign and t-values are larger than 1.64 while p-values are less than 0.05. These values are shown in Table 5.

Table 5. Fixed effect model

TDTA	Beta	S.D.	t-value	p-value
FATA	.445	.051	-8.80	0
CAR	-.908	.144	-6.32	0
GRO	.561	.083	-6.78	0
ICR	.338	.177	1.91	.056
STAT	-.546	.21	-2.60	.009
PRO	-.003	.021	-0.15	.88
SIZE	.264	.062	4.26	0
SCA	.011	.002	5.48	0
Con.	4.315	.631	6.83	0
*** p<.01, ** p<.05, * p<.1				

The results of robust standard error model also exposed that the FATA, GROWTH, STATE, Size, and supply chain activities have positively linked with the TDTA because the beta has a positive sign and t-values are larger than 1.64 while p-values are less than 0.05. However, CAR, ICR and PROFIT have negatively associated with the TDTA because the beta has a negative sign. These

values are shown in Table 6.

Table 6. A robust standard error model

TDTA	Beta	S.D.	t	P>t
FATA	**0.460**	**0.068**	**6.730**	0.000
CAR	**-0.668**	**0.095**	**-7.020**	0.000
GROWTH	**0.420**	**0.128**	**3.290**	0.004
ICR	**-0.371**	**0.130**	**- 2.850**	0.010
STATE	**0.548**	**0.178**	**3.070**	0.006
PROFIT	**-0.024**	**0.017**	**-1.370**	0.186
SIZE	**0.182**	**0.031**	**5.890**	0.000
SCA	**0.013**	**0.001**	**14.240**	0.000
_cons	**3.826**	**1.004**	**3.810**	0.001

5. Discussion and conclusion

All three models have Prob> chi is 0.0000, proving that the model is suitable and has good explanations. Model 1 provides information about the impact of factors (profitability, firm size, and growth rate, level of investment in fixed assets, liquidity, interest coverage, the level of ownership of the state in businesses and the supply chain activities of enterprises) to Vietnamese listed construction firms' total leverage.

Regression results of models 1 show that at 1% and 5% significance level, the profitability of businesses has a negative effect on the firms' total leverage. Profitability also but this effect is not statistically significant. These results concern about the information asymmetry affecting investment decisions and financing decisions of businesses. The firms' managers usually have an information advantage over outside investors. Therefore, new investors often require a higher rate of return when businesses want to raise capital by issuing securities, and this makes share issuing more expensive. Thus, when businesses have high profitability, businesses often prefer to use the internal capital source (retained earnings) for reinvestment rather than using debt securities and loans. Also, issuing common stock is the last choice.

The regression results show that firm size has a significant impact on the capital structure of construction firms. The greater information transparency and easier access to loans rather than small businesses. According to trade-off theory, large-scale businesses often have a lower risk of bankruptcy than small businesses do. Large companies also have the advantage of cooperating with financial institutions compared to small businesses because transaction costs will often decrease when businesses buy and sell a large number of goods and services and loan interest rates tend to decrease when the size of loans and the frequency of transactions is large. This result is similar to the result from research of [29], [30]. Thus, it is found that hypothesis H2 is true for Vietnamese listed construction firms.

The effect of the growth rate on the capital structure is statistically significant at 1%. Growth rates have a positive effect on the firms' TDTA. Companies with high growth rates are generally well appreciated by investors, banks and credit institutions, making it easy to access loans. These businesses also tend to use long-term loans to invest in development and maintain high growth opportunities in the future. The similar results are also found in other studies, for example: [31], [32]. Thus, the finding is in line with hypothesis H3.

Enterprises with a high value of fixed assets will have many collaterals and mortgages for loans, thus having a higher chance of accessing long-term loans. It can be seen that businesses that invest less in fixed assets will tend to use more debt, and mainly use short-term debt. Thus, the result shows that hypothesis H4 is true for long-term leverage but not true for total leverage and short-term leverage. Generally, enterprises with high liquidity are better evaluated by banks and credit institutions when considering loan projects. Thus, quantitative results support the hypothesis H5.

This is also very understandable, in the Vietnamese economy, the State is still holding key sectors, including the construction industry, and enterprises with a dominant capital contribution of the State often have advantages in mobilizing loan capital. Research by [33] also found a positive relationship between state ownership and capital structure. Thus, quantitative results are in line with the hypothesis H7.

The results of the present study also exposed that the supply chain practices that are effectively managed by the Vietnam construction firms that are the reason for positive association among the supply chain activities and capital structure. These findings are the same as the outcomes of the [4] who also found that supply chain has positively associated with the capital structure of the company.

From the analysis, it is presented that the listed construction firms in Vietnam have a high level of leverage and there is a high level of short-term debt usage. It is also found that the level of investment in fixed assets along with supply chain activities has the strongest impact on the firms' leverage, followed by the firms' liquidity. The factor that has the least impact is the ability of enterprises to pay interest on loans (interest coverage ratio). To sum up, studies of the capital structure determinants in different economies considered similar factors, but the empirical results were very different. Some studies are concerned about explanatory variables of macro factors such as interest rates, taxes and inflation. The empirical studies in Vietnam have just been conducted in recent years and the number of research is small, so the implementation of quantitative research is necessary to contribute results for comparison and development of quantitative research in Vietnam. With the

specific characteristics of a regulated market economy and the development of construction firms in Vietnam, the research of the capital structure determinant is appropriate and topical.

In addition, the regression results found the negative effect of profitability, the level of investment in fixed assets, liquidity and interest coverage on firms' capital structure. In contrast, firm size, growth rate, supply chain activities and state ownership have a positive effect on capital structure. Enterprises with large scale, high growth rate and dominant capital contribution of the State often have more advantages when mobilizing loans, reflecting a fact in Vietnam.

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