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The Impact of Capital Structure on Firm Value: A Case Study in Vietnam*

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Abstract

The article analyzes the impact of capital structure on the firm value of chemical companies listed on the stock market of Vietnam. Data was collected from the financial statements of 23 chemical firms listed on the Vietnam stock market from 2012 to 2019. Quantitative research method with regression model according to OLS, FEM, REM method is used; FGLS method is used to overcome the model's defects. In this research, firm value (Tobin's Q) is a dependent variable. Capital structure (DA), Return on assets (ROA), Asset turnover (AT), fixed assets (TANG), Solvency (CR), Firm size (SZ), Firm Age (AGE), and revenue growth rate (GR) are independent variables in the study. The analysis results show that the capital structure of firms in the chemical industry listed on the Vietnam stock market has an inverse correlation with firm value. Besides, firms with greater asset turnover, business size, and number of years of operation have lower firm value. This article helps corporate executives improve corporate value by adjusting their capital structure properly. Chemical firms adjusted their capital structure in the direction of gradually decreasing the debt ratio and gradually increasing equity. Firms use high debt, which has the effect of reducing the firm value of firms in the chemical industry.

Keywords: Capital Structure, Firms Value, Chemical Firms

JEL Classification Code: G30, M40, M41

1. Introduction

Capital Structure means arranging capital from various sources, in order, to meet the need for long-term funds for the business. Capital structure refers to the proportion of equity vs. debt financing that a firm utilizes to carry out its operations and grow.

Vietnam's international economic integration has turned into a deep and comprehensive implementation period. To ensure the goal of maximizing business efficiency, Vietnamese

businesses have constantly improved and researched advanced management methods. The capital market in Vietnam in recent years has had many remarkable achievements, contributing significantly to the development of the economy. However, the increase in the capital much more than the development capacity of the business can cause the optimal capital structure disruption, reduce capital efficiency as well as cause other financial risks.

The Vietnamese Chemical Industry plays a key role in economic development because it is an industry that provides inputs to many essential industries. Currently, Vietnam has fully developed sub-sectors of the chemical industry including fertilizers and nitrogen compounds, soaps and detergents, primary resins and synthetic rubber, mechanical chemicals, plates, paints and inks, pesticides, synthetic fibers, and other chemical products. However, Vietnam's Chemical Industry has not yet developed to meet the growing domestic demand. Compared with the Chemical Industry of other countries, the growth index of the Vietnamese chemical industry is relatively lower. The production index of chemicals and chemical products in 2019 stagnated at 6.5%. The proportion of inventories of

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the industry always increased, and in 2019, it increased by 21.3% over the same period last year due to the target index. However, consumption did not increase much. The output of the chemical industry is estimated to account for only about 10% of the total industrial output of the country. With modest growth and proportion, the Chemical Industry will face the challenge of rapidly increasing input demand average 9–10% per year in agriculture, pharmaceuticals, and others.

The above fact shows that for the sustainable development of the business, the manager needs to build an appropriate financial policy, including the content of the capital structure policy. The optimal capital structure of a firm is the best mix of debt and equity financing that maximizes a company's market value while minimizing its cost of capital. In theory, debt financing offers the lowest cost of capital due to its tax deductibility. However, too much debt increases the financial risk to shareholders and the return on equity that they require. Thus, companies have to find the optimal point at which the marginal benefit of debt equals the marginal cost. An effective capital structure policy not only helps businesses take full advantage of the positive effects of financial leverage but also minimizes possible financial risks, contributing to increasing firm value.

2. Literature Review

2.1. Capital Structure Positively Affects Firm Value

Antwi et al. (2012) provide evidence on the impact of capital structure on a firm's value. The analysis was implemented on all the 34 companies quoted on the Ghana Stock Exchange (GSE) for the year ended 31st December 2010. The result of the study revealed that in an emerging economy like Ghana, equity capital as a component of capital structure is relevant to the value of a firm, and Long-term-debt was also found to be the major determinant of a firm's value. From the findings of this study, it is suggested that corporate financial decision-makers must employ more of long-term-debt than equity capital in financing their operations since it impacts more on firm value.

Draniceanu et al. (2013) researched the relationship between capital structure and corporate value. This study was conducted with 48 companies listed on the Bucharest stock exchange (Romania) in the period 2003–2012. The research results showed that capital structure has a positive impact on corporate value. Besides, the study also added that variable firm size (size), revenue growth rate (growth), and capitalization of equity/book value of equity have a positive impact on firm value.

Hoque et al. (2014) studied capital structure policy and its impacts on the value of the firm. The study was based

on the opinion of 80 respondents of 20 manufacturing firms listed on the Dhaka Stock Exchange. The empirical analysis of the study was limited to a period of five years ranging from 2008–2012. The major findings of the study are: (i) the most important determinant of capital structure policy as rated by the respondents have been a financial risk, profitability, availability of fund, productivity, liquidity, operating risk, growth rate, proper timing, corporate tax, the stability of sales/investment, etc.

Farooq et al. (2016) studied the impact of financial leverage on the firm value of firms in the cement industry in Pakistan. The study used data including 19 companies listed on the Karachi Stock Exchange (KSE) for the period 2008–2012 with data on annual financial statements. The research results showed that capital structure has a positive impact on firm value and has high statistical significance (1%).

Ater (2017) provided evidence on the relationship between capital structure and firm's value. The study had drawn secondary data from 36 companies quoted on the Nairobi Securities Exchange (NSE) for the year ended 31st December 2011 to 2015. The results indicated there was a statistically significant relationship between the capital structure and value of non-financial firms listed on the Nairobi Securities Exchange. The study recommended that firms are strongly advised always to compare the marginal benefit of using long-term debt to the marginal costs of long-term debt before concluding on using it in financing their operations. Long-term debt impacts positively on a firm's value just like equity capital.

2.2. Capital Structure has a Negative Impact on Firm Value

Le Thi et al. (2013) researched the relationship between foreign ownership ratio, capital structure, and corporate value of 203 non-financial firms listed on the Vietnamese stock market in the period 2008–2011. Foreign ownership ratio and capital structure have a negative relationship to firm value. In contrast, control variables such as profitability, short-term solvency, and firm size have a positive impact on firm value. Mai (2020) researched data of 35 plastics and packaging firms listed on the stock exchange in the period 2012–2018, and the results indicated that the capital structure (DA, SDA) has the opposite effect to firm value (Tobin's Q). Among control variables, business performance (ROA) and size of assets (QMTS) have a positive impact on firm value.

2.3. Capital Structure has No Effect on Firm Value

Rajhans et al. (2013) investigated empirically the determinants of firm value creation. For this, 16 companies of four sectors namely Metal, Fast Moving Consumer Goods

(FMCG), Information Technology (IT), and Automobile industry listed on the Bombay Stock Exchange (BSE) from 2002 to 2011 were identified based on market capitalization in their industry. Taking evidence from numerous literature, various factors had been identified namely Net sales, Profit, Fixed Assets, dividend pay-out ratio, and capital structure as the financial variables affecting a firm’s value. Their findings are in line with the proposition of Modigliani and Miller i.e. capital structure does not influence the value of a firm. But at the same time, this research outcome suggests that WACC has a significant impact on the value of the firm. Other significant factors identified through the proposed model are fixed assets, net sales, and profit. The research will help managers and policymakers to make rational decisions while evaluating different financial parameters in-order to increase the value of the firm.

Asiri et al. (2014) attempted to measure how financial ratios explained the firms’ value through price-earnings ratio or market to book ratio in the Bahrain Bourse. All listed companies in Bahrain Bourse, except for the closed ones, were used from 1995 to 2013. Using all the main categories in financial ratios such as profitability, liquidity, efficiency, and debt, the paper found that return on assets (ROA) is the most determinant factor in explaining the market value followed by financial leverage and beta. Furthermore, the findings revealed that the size of the firm also has a significant effect on its market value. The size of the firm was measured through total assets and Tobin’s Q ratio. In this respect, investors perceive different signals from small firms compared to large ones, and from growth firms compared to no-growth firms. On the sector analysis, it was found that ROA is the main determinant factor for explaining the value of the firm.

3. Research Method

3.1. Research Model

Based on empirical studies, the author gives a general research model of the impact of capital structure on firm value.

The general model of capital structure affects firm value as follows:

$$\text{Tobin's } Q_{it} = \beta_0 + \beta_1 DA_{it} + \beta_2 ROA_{it} + \beta_3 AT_{it} + \beta_4 TANG_{it} + \beta_5 CR_{it} + \beta_6 SZ_{it} + \beta_7 AGE_{it} + \beta_8 GR_{it} + u_{it}$$

The method of measuring the dependent variables and the independent variables (including explanatory and control variables) is summarized in Table 1 as follows:

Based on the research overview, the author gives the following research hypotheses:

- H1:** Capital structure has a negative impact on firm value.
- H2:** Return on assets impact firm value.
- H3:** Asset turnover has a positive impact on firm value.
- H4:** The proportion of fixed assets has a positive on firm value.
- H5:** Solvency has a positive impact on firm value.
- H6:** Firm size has a positive impact on firm value.
- H7:** Age of firms has a positive impact on firm value.
- H8:** The return on assets has a positive impact on firm value.
- H9:** Revolution assets has a positive impact on firm value.
- H10:** Revenue growth rate has a positive impact on firm value.

Table 1: Measurement of Variables

Variables	Description	Expectations
Tobin’s Q	(Price Market value of shares + Book value of liabilities) / Book value of assets	
DA	Debt ratio = Liabilities / total assets	–
ROA	Return on assets = Profit after tax / average assets	+
AT	Asset turnover = Net revenue /total assets average	+
TANG	Tangible fixed assets = Fixed assets / total assets	+
CR	CR = Current assets / short term liabilities	+
SZ	Logarithm of assets	+
AGE	Age of firms = Year t – year 0 (establishment)	+
GR	Growth rate of revenue = (Net revenue year t – net revenue year t–1) / net revenue year t–1	+

3.2. Research Methods

The study used table data collected from 23 chemical firms listed on the Vietnam Stock Exchange over 8 years, from 2012 to 2019, provided by FiinGroup JSC. Research data is extracted from the audited financial statements of these firms. Quantitative research method with regression model according to OLS, FEM, REM method is used, if the regression model has variable error variance and autocorrelation, FGLS method is used to overcome the model's defects.

4. Results

Table 2 presents descriptive statistics including mean, median, and standard deviation as well as minimum and maximum values of the variables in the model.

The results of the descriptive statistical analysis presented in Table 2 show that there are differences in firm value, capital structure, and other factors affecting the firm value of chemical firms listed on Vietnam's stock market. On average,

the firms in the sample have a firm value as measured by Tobin's Q close to 0.62; the maximum value is 3.88 and the smallest value is 0.12, which shows that the difference in firm value in the chemical industry is relatively large. The variable reflecting the capital structure is the debt ratio of the project with the largest value of 0.76 and the minimum value of 0.05, showing a huge difference. The remaining variables including ROA, AT, TANG, CR, SZ, AGE, and GR all have differences among firms in the chemical industry.

Table 3 shows the correlation coefficient between the dependent variable and the independent variables and between the independent variables. The correlation coefficient between the independent variables is not greater than 0.8, so there is no multicollinearity phenomenon. The variable debt ratio (DA), total asset turnover (AT), current solvency (CR), age (AGE), size (SIZE), and revenue growth rate (GR) are Inversely correlated with the variable "firm value", meanwhile, the profitability variables (ROA), the rate of investment in fixed assets (TANG) are positively correlated with the variable firm value.

Table 2: Descriptive Statistics Variables

Variables	Obs	Mean	Std.	Min	Max
Tobin's Q	184	0.6235024	0.5340432	0.1199839	3.881914
DA	184	0.3913813	0.1808348	0.0543145	0.7613153
ROA	184	0.0746155	0.0622752	-0.0752633	0.4194091
AT	184	1.513591	1.861635	0.1147191	14.02843
TANG	184	0.1804159	0.1464243	0.0211429	0.7033133
CR	184	2.463479	1.797975	0.382325	10.93396
SZ	184	27.43325	1.250191	24.83415	30.06816
AGE	184	19.97826	11.36477	4	45
GR	184	0.0903941	0.7010332	-0.7614212	8.735022

Table 3: Matrix of Correlation Coefficients Among the Variables in the Model

	Tobin's Q	DA	ROA	AT	TANG	CR	SZ	AGE	GR
Tobin's Q	1								
DA	-0.09	1							
ROA	0.32	-0.16	1						
AT	-0.14	0.19	0.14	1					
TANG	0.27	0.14	-0.04	-0.18	1				
CR	-0.10	-0.72	0.16	-0.15	-0.21	1			
SZ	-0.07	0.13	0.10	-0.24	-0.04	-0.05	1		
AGE	-0.20	-0.25	-0.20	-0.18	-0.12	0.17	-0.35	1	
GR	-0.02	0.08	0.28	0.06	0.20	-0.10	0.11	-0.05	1

After conducting descriptive statistics and correlation analysis, regression model results are presented in the following table:

The test results in Table 4 show:

Based on the F -test results, there is: $\text{Prob} > F = 0.0000 < \alpha$ ($\alpha = 5\%$): Hypothesis H_0 is rejected: FEM will be more suitable than Pooled OLS.

Based on the results of the Hausman test, yes: $\text{Prob} > \text{chi}^2 = 0.0000 < \alpha$ ($\alpha = 5\%$): Hypothesis H_0 is rejected: The FEM model is more suitable than REM.

Based on the results of the Defect test: The model has the phenomenon of variance change and the phenomenon of autocorrelation, so the study will implement regression using the FGLS method to overcome these defects.

The results show that capital structure (DA), firm size (SZ), and company operating time have a negative impact on the firm value. It means 1%, asset turnover has the opposite effect with firm value at a 5% significance level. The remaining variables include profitability, rate of investment in fixed assets, current solvency, and revenue growth rate that do not affect firm value.

The results show that the debt ratio (DA) has a negative impact on firm value with a significance level of 1%.

If other factors remain constant and when the debt ratio increases by 1%, the firm value will decrease by 0.375% and vice versa. This shows that when the firms use a lot of debt, it will reduce the firm value. Pham (2020) showed that the leverage ratio (LR) has a positive effect on ROE in Pharmaceutical Firms. Nguyen et al. (2020) showed that LEV has a negative and significant impact on the ROA and Tobin's Q .

The results show that firm size (SZ) has a negative impact on firm value and has a 1% significance level. This means that if other factors remain constant, and when firm size increases by 1%, the firm value will decrease by 0.148% and vice versa. Nguyen and Nguyen (2020) showed that the size of the company is positively related to the business results of firms in Vietnam.

The results show that the age (AGE) of the firm has a negative impact on firm value and both have a significance level of 1%. This means that if other factors remain constant and the firm age increases by 1 year, then the firm value will decrease by 0.013% and vice versa.

The results show that the Asset Turnover (AT) has a negative impact on the firm value with a significance level of 5%. This means that if the other factors remain

Table 4: The Regression Results

Variables	Dependent Variable			
	POLS	FEM	REM	FGLS
DA	-0.787***	-0.480**	-0.356	-0.375***
ROA	3.346***	0.0101	0.200	0.350
AT	-0.0689***	-0.00362	-0.0703**	-0.0414**
TANG	0.733***	-0.963***	-0.460*	0.0692
CR	-0.0989***	-0.0413**	-0.0463*	-0.0122
SZ	-0.0887***	-0.749***	-0.448***	-0.148***
AGE	-0.0109***	0.0111	-0.0244***	-0.0128***
GR	-0.117**	-0.0526**	-0.0843***	-0.0445
Cons	3.560***	21.42***	13.85***	5.079***
Significance	$F(8, 175) = 11.07$	$F(8, 153) = 56.34$	Wald $\text{chi}^2(8) = 214.16$ Prob > $\text{Chi}^2 = 0.0000$	Wald $\text{chi}^2(8) = 100.35$ Prob > $\text{Chi}^2 = 0.0000$
White Test	Chi2 (44) = 65.05 Prob > Chi2 = 0.0212			
Wooldridge Test	$F(1, 22) = 25.777$ Prob > $F = 0.0000$			
Hausman Test		chi2 (8) = 34.32 Prob > chi2 = 0.0000		
Wald Test		chi2 (23) = 13794.09 Prob > chi2 = 0.0000		

Note: (*), (**), (***) Represents significance level of 1%, 5% and 10% respectively.

constant and when the asset turnover of the firm increases by 1%, the firm's value will decrease by 0.041% and vice versa.

5. Conclusion

The study shows empirical evidence about the impact of capital structure on the firm value of chemical firms listed on the Vietnam stock market. Accordingly, the capital structure is shown to have a close correlation with the firm value of listed chemical companies. Therefore, chemical firms adjust their capital structure in the direction of gradually decreasing the debt ratio and then gradually increasing equity. Firms use high debt, which has the effect of reducing the firm value of firms in the chemical industry. Besides, chemical firms also need to pay attention to asset turnover and firm size because these factors also affect the firm value. Research results help chemical business administrators to refer to in the decision-making process of funding policies aimed at improving corporate value.

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