

THE IMPACT OF INCOME TAX ON CAPITAL STRUCTURE OF JOINT STOCK COMPANIES IN OIL AND GAS INDUSTRY IN VIETNAM

PhD. Le Ha Trang* - Tran Thi Thuy Linh** - Phan Thu Hue** - Doan Thi Ha Anh**

Abstract: *Businesses are the cell of the economy. Depending on the type, characteristics and nature of the industry, each enterprise considers planning its capital structure effectively to realize the ultimate goal of maximizing enterprise value. There are many factors that affect capital structure. In which, the tax factor - including company income tax and personal income tax has been confirmed by financial theories and empirical studies in the world to have a significant impact on the choice of funding source of companies. This study analyzes the impact of Income tax on capital structure in the specific context of Vietnam's economy using secondary data of 12 Petroleum industry joint stock companies listed on the stock exchange Vietnamese securities. Conducting the study using the method of quantitative regression of panel data, the research results show that company income tax has a negative impact on the ratio of long-term debt and the ratio of total debt to total assets, but the level of impact is not much. Personal Income Tax has no impact on capital structure regardless of short-term debt or long-term debt.*

• Keywords: *capital structure, company income tax, personal income tax.*

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Tóm tắt: Doanh nghiệp là tế bào của nền kinh tế, tùy theo loại hình, đặc điểm và tính chất của ngành mà mỗi doanh nghiệp cân nhắc việc hoạch định cơ cấu vốn một cách hiệu quả nhằm thực hiện mục tiêu cuối cùng là tối đa hóa giá trị doanh nghiệp. Có nhiều yếu tố ảnh hưởng đến cấu trúc vốn. Trong đó, yếu tố thuế - bao gồm thuế thu nhập doanh nghiệp và thuế thu nhập cá nhân đã được các lý thuyết tài chính và các nghiên cứu thực nghiệm trên thế giới khẳng định là có tác động đáng kể đến việc lựa chọn nguồn tài trợ của doanh nghiệp. Nghiên cứu này phân tích tác động của thuế Thu nhập đối với cơ cấu vốn trong bối cảnh cụ thể của nền kinh tế Việt Nam bằng cách sử dụng dữ liệu thứ cấp của 12 công ty cổ phần ngành Dầu khí niêm yết trên sàn giao dịch chứng khoán Việt Nam. Thực hiện nghiên cứu theo phương pháp hồi quy định lượng dữ liệu bảng, kết quả nghiên cứu cho thấy thuế thu nhập doanh nghiệp có tác động tiêu cực đến tỷ lệ nợ dài hạn và tỷ lệ tổng nợ trên tổng tài sản, nhưng mức độ ảnh hưởng thì không, nhiều. Thuế thu nhập cá nhân không ảnh hưởng đến cấu trúc vốn bất kể nợ ngắn hạn hay nợ dài hạn.

• Từ khóa: *cơ cấu vốn, thuế thu nhập công ty, thuế thu nhập cá nhân.*

1. Introduction

Capital structure planning is one of the important financial decisions and also a big challenge for business managers. Planning a solid capital structure, building an effective financial leverage will create a safe pillar for businesses in the process of doing business. Among the factors affecting the capital structure of enterprises, income tax has been shown by financial theories and many empirical studies around the world to have a significant impact on the choice of funding sources of businesses in general. Therefore, analyzing the impact of taxes on the use of equity and debt in the process of business activities to generate profits is an important issue for business managers.

Over the past years, the constantly growing oil and gas industry poses many opportunities but also challenges in the context of epidemics and the ongoing energy crisis in the world. This requires joint stock companies. The oil and gas industry needs to improve its financial capacity and effectively manage its capital structure to maximize corporate value. However, to analyze the impact of income tax on the capital structure

* Lecturer in Faculty of Finance and Banking, Thuong Mai University; email: lehatrangvcu@gmail.com

** Student in Thuong Mai University

of joint stock companies in the oil and gas industry in Vietnam is still limited, the planning is still highly spontaneity, unprofessional, with little consideration for other issues. influencing factor.

Stemming from the above situation, the author establishes a quantitative model to determine the degree of influence and direction of the impact of taxes on the capital structure of joint stock companies in the oil and gas industry by means of data regression panel data with two models: fixed effects model (FEM) and random effects model (REM). Testing with the expectation of determining the specific impact of the income tax policy factor on the capital structure of the oil and gas joint stock companies in Vietnam, thereby proposing solutions in planning the capital structure below income tax impact.

2. Overview of studies on the impact of income tax on corporate capital structure

Capital structure planning is one of the important financial decisions and also a big challenge for companying managers. A number of financial theories and empirical studies in the country as well as in the world confirmed that there is a significant impact on the choice of funding sources of enterprises. Specifically:

Overesch, M. and D. Voeller (2008), "The Impact of Personal and Corporate Taxation on Capital Structure Choices" uses panel data regression research with a study area of 23 countries in Europe over the period. The period 2000 - 2005. The factors affecting the employee's shareholders are included in the research model: (1) Marginal CIT rate, (2) Tax rate on dividends, (3) Enterprise size, (4) Inflation, (5) Fixed assets, (6) Profit. The results show that the marginal corporate income tax rate and the dividend tax rate have a positive impact on the company's employees. In addition, factors such as enterprise size and fixed assets also have a positive impact on corporate shareholders.

Ramesh P.Rao & Mounther H. Barakat (2012), "The role of taxes in capital structure: evidence from taxed and non-taxed Arab economies" studied 1.576 companies in Saudi Arabia for the period 1996 - 2001. The research methods used are cross-sectional regression and time series data. The factors affecting CTV included in the research model are: (1) Collateral, (2) Non-debt tax shield, (3) Enterprise growth rate, (4) Size business, (5)

Business risk, (6) Profit, (7) CIT marginal tax rate, (8) Dividend payout ratio (representing the impact of PIT on dividends). The results show that the marginal CIT rate has a positive effect on employees while the dividend payout ratio (PIT on dividends) has a negative or no impact on the capital structure of the firm.

Nadeem Ahmed Sheikha & Muhammad Azeem Qureshi (2014), "Crowding-out or shying-away: Impact of corporate income tax on capital structure choice of firms in Pakistan" argues that corporate income tax has an effect on the equity capital of non-financial companies. Was listed on the Karachi Stock Exchange of Pakistan in the period 1972-2010. The author gives 5 factors affecting corporate shareholders as a premise to build the variables in the research model as follows: (1) Taxes, (2) Zero-debt tax shield, (3) Profit margin, (4) Collateral value, (5) Company size. After testing by the above research model, the experimental results show that tax has a positive relationship with total debt and short-term debt ratio, whereas tax is negatively related to long-term debt ratio. The negative relationship between tax and long-term debt ratio does not seem reasonable considering the tax advantage of debt in the presence of CIT, in addition, the author finds that other specific variables have significant effects. To the selection of collaborators of companies are profitability, value of collateral and company size.

Akram Temimi1, Rami Zeitun, Karim Mimouni (2016), "How does the tax status of a country impact capital structure? Evidence from the GCC region" studied 1.317 companies listed on the stock exchanges of Thailand, Malaysia and six GCC countries during the period 2003 - 2013. The paper uses a multivariate regression model and is authored. provides the factors affecting corporate employees as a premise to build the variables in the research model as follows: (1) Growth opportunity, (2) Tangibility, (3) Profitability, (4) Liquidity, (5) Taxes, (6) Firm size, (7) Inflation, (8) Stock market, (9) GDP growth. The results confirm that tax has a direct effect as well as an indirect and significant influence on the employees of enterprises. Meanwhile, liquidity and profitability have a significantly lower influence on leverage ratios in tax-paying countries. In addition, tangibility has a negative effect on leverage in non-tax countries and has a

positive effect on tax-paying countries. Only the relationship between GDP growth and leverage is affected by taxes while the effects of inflation and stock market development on leverage are not affected by taxes.

In addition to international studies, a number of domestic studies also show the impact of income tax on the capital structure of enterprises. Tran Tan Hung (2008) with the study “Impact of income tax on capital structure in listed joint stock companies in Vietnam” pointed out that when planning the optimal capital structure of enterprises, it is necessary to attach in relation to the income tax policy. Through analyzing the impact of corporate income tax and personal income tax policies on enterprise value, the author has also raised issues that need to be considered and researched and revised by the State when promulgating tax policies, determining tax regulations. guide enterprises in mobilizing and using limited capital in society.

Meanwhile, the empirical study of Assoc. Prof. Dr. Phan Thi Bich Nguyet (2011), “The impact of the income tax system on the capital structure of joint-stock companies in Vietnam” said that among the factors affecting the Capital structure, income tax - including CIT and PIT have been confirmed by financial theories and empirical studies in the world to have a significant impact on companies’ choice of funding sources. This article examines the impact of Income tax on capital structure in the specific context of Vietnam’s economy. The author gives 9 factors affecting the capital structure of enterprises as a premise to build the variables in the research model as follows: (1) Inflation, (2) Loan interest rates, (3) Growth rate GDP, (4) VN-Index, (5) CIT rate, (6) Profit, (7) Enterprise size, (8) Enterprise growth rate, (9) PIT policy dummy variable. Research results show that PIT actually has an effect on the debt ratio of Vietnamese companies, according to the negative correlation, CIT shows a positive correlation with both the long-term debt ratio and the debt ratio. total debt ratio.

In addition, the study of Nguyen Viet Hong Anh (2015), “Effect of income tax on capital structure of Vietnamese enterprises” also analyzed the current situation and found out the extent of tax influence. Regarding the capital structure of enterprises in Vietnam today, the scope of the

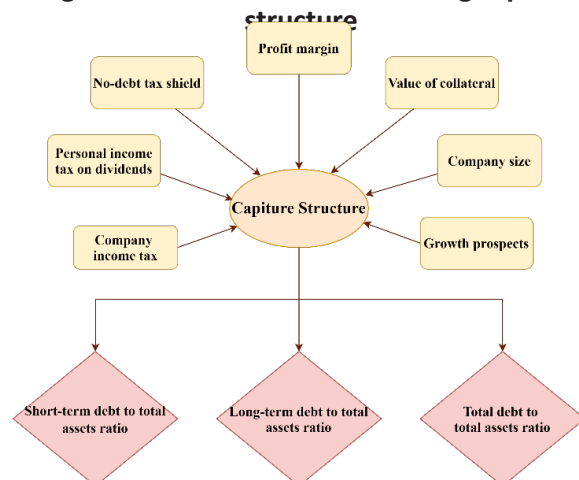
study revolves around 2 types of CIT and PIT on dividends paid, which have a relationship with corporate capital structure during the research period of 6 years. years from 2009 to 2014. The author gives 8 factors affecting corporate capital structure as a premise to build the variables in the research model as follows: (1) CIT, (2) PIT on dividends , (3) Non-debt tax shield, (4) Collateral, (5) Growth rate, (6) Firm size, (7) Business risk, (8) Profit. Research results show that taxes have an impact on employees of Vietnamese enterprises, but the level of influence is not high. Vietnamese enterprises tend to have more debt when the CIT payable increases and when the PIT on dividends increases, the enterprises will reduce their debt. The reality is that some enterprises still do not comply with the theory on the impact of taxes on capital structure. The conclusion about the level and direction of impact of the factors in the quantitative research model is the basis for proposing solutions that bring more benefits to the capital structure of Vietnamese enterprises under the influence of taxes.

In summary, after conducting an overview of the research situation related to the topic, it shows that the above academic scientific theoretical models are especially meaningful to the formation of the theoretical basis in building a theoretical framework. theory for research on the impact of income tax as well as other factors on the capital structure of enterprises.

3. Research methods

3.1. Models and hypotheses of research

Figure 1. Model of factors affecting capital



Source: Implementation team

Inheriting previous research models, the author applies a theoretical framework and research model to joint stock companies in the oil industry. The capital structure of companies in this industry includes: (1) Company income tax; (2) Personal income tax on dividends; (3) No-debt tax shield; (4) Profit margin; (5) Value of collateral; (6) Company size; (7) Growth prospects.

Dependent variables and independent variables included in the research model impact of income tax on capital structure of oil and gas industrial joint stock companies in Viet Nam are as follow:

Table 1. Dependent and independent variables in the research model

No.	Variable	Symbol	Define	Previous research
Dependent variable				
1	Short-term debt to total assets ratio	SDR _{it}	Short-term debt/ Total assets	Nadeem Ahmed Sheikha & Muhammad Azeem Qureshi (2014), Nguyen Viet Hong Anh (2015),
2	Long-term debt to total assets ratio	LDR _{it}	Long-term debt/ Total assets	Nadeem Ahmed Sheikha & Muhammad Azeem Qureshi (2014), Nguyen Viet Hong Anh (2015).
3	Total debt to total assets ratio	TDR _{it}	Total debt/Total assets	Nadeem Ahmed Sheikha & Muhammad Azeem Qureshi (2014), Nguyen Viet Hong Anh (2015), Do Kim Du (2019), Tran Viet Dung & Bui Dan Thanh (2019).
Independent variables				
4	Company income tax	MTR _{it}	Company income tax payable/ Earnings before interest and taxes	Phan Thi Bich Nguyet (2011), Nadeem Ahmed Sheikha & Muhammad Azeem Qureshi (2014), Nguyen Viet Hong Anh (2015), Tran Viet Dung & Bui Dan Thanh (2019).
5	Personal income tax on dividends	DIV _{it}	Dividends paid/ Net Profit After Taxes	Nguyen Viet Hong Anh (2015).
6	No-debt tax shield	NDTS _{it}	Depreciation/ Total assets	Nadeem Ahmed Sheikha & Muhammad Azeem Qureshi (2014), Nguyen Viet Hong Anh (2015).

No.	Variable	Symbol	Define	Previous research
7	Profit margin	PROFIT _{it}	Net Profit After Taxes/Total assets	Phan Thi Bich Nguyet (2011), Nguyen Viet Hong Anh (2015), Tran Viet Dung & Bui Dan Thanh (2019).
8	Value of collateral	CVA _{it}	Fixed assets at cost/Total assets	Nadeem Ahmed Sheikha & Muhammad Azeem Qureshi (2014).
9	Company size	SIZE _{it}	Ln(Total assets)	Nadeem Ahmed Sheikha & Muhammad Azeem Qureshi (2014), Do Kim Du (2019), Tran Viet Dung & Bui Dan Thanh (2019).
10	Growth prospects	GROW _{it}	(EPSt - EPS _{t-1})/ EPS _{t-1}	Phan Thi Bich Nguyet (2011).

Source: Compiled from the authors

Research hypotheses are built:

- Hypothesis H1: Company income tax has a positive impact on capital structure.
- Hypothesis H2: Personal income tax on dividends has a negative impact on capital structure.
- Hypothesis H3: The no-debt tax shield has a positive or negative impact on capital structure.
- Hypothesis H4: Profit margin as a positive or negative impact on capital structure.
- Hypothesis H5: Collateral value has a negative impact on capital structure.
- Hypothesis H6: Company size has a positive or negative impact on capital structure.
- Hypothesis H7: Growth prospects has a positive or negative impact on capital structure.

By the method of testing multivariable regression used to measure the impact of income tax on capital structure of oil and gas industrial joint stock companies in Vietnam, 3 multivariable regression models are determined as follows:

$$STDR_{it} = \beta_{0i} + \beta_1 MTR_{it} + \beta_2 DIV_{it} + \beta_3 NDTS_{it} + \beta_4 PROFIT_{it} + \beta_5 CVA_{it} + \beta_6 SIZE_{it} + \beta_7 GROW_{it} + \epsilon_{it} \quad (1)$$

$$TDR_{it} = \beta_{0i} + \beta_1 MTR_{it} + \beta_2 DIV_{it} + \beta_3 NDTS_{it} + \beta_4 PROFIT_{it} + \beta_5 CVA_{it} + \beta_6 SIZE_{it} + \beta_7 GROW_{it} + \epsilon_{it} \quad (2)$$

$$LTDR_{it} = \beta_{0i} + \beta_1 MTR_{it} + \beta_2 DIV_{it} + \beta_3 NDTS_{it} + \beta_4 PROFIT_{it} + \beta_5 CVA_{it} + \beta_6 SIZE_{it} + \beta_7 GROW_{it} + \epsilon_{it} \quad (3)$$

3.2. Data collection and processing

The study uses secondary data from the financial statements, annual reports, and resolutions of the audited General Meeting of Shareholders in the period 2013 - 2020 of 12 Oil and Gas industrial joint stock companies in Vietnam, listed in Vietnam Ho Chi Minh City Stock Exchange and Hanoi Stock Exchange. The data sources used to collect information of the Stock Exchanges and securities companies are the websites: CafeF, Vietstock, the homepage of the Oil and Gas industrial Joint Stock company.

Collected data will be aggregated in an excel file including 13 columns corresponding to the following criteria: (1) Company name; (2) Years; (3) Short-term debt; (4) Long-term debt; (5) Total debt; (6) Total assets; (7) Company income tax expenses; (8) Earnings before interest and taxes; (9) Dividends paid; (10) Net Profit After Taxes; (11) Depreciation; (12) Fixed assets at cost; (13) EPS. The research team manually reviewed and compared the data many times, then corrected and changed to complete the secondary data table in the most accurate and transparent way. The data after processing and cleaning will be included in the calculation and the final data is stored in an excel file consisting of 12 columns corresponding to the following criteria: Company name; Years; Short-term debt to total assets ratio (3/6); Long-term debt to total assets ratio (4/6); Total debt to total assets ratio(5/6); Company income tax(7/8); Personal income tax on dividends (9/10); No-debt tax shield (11/6); Profit margin(8/6); Value of collateral(12/6); Company size(ln(6)); Growth prospects($13_t - 13_{t-1}/13_{t-1}$).

4. Research results

4.1. Descriptive statistics results

Figure 2 shows the results of the descriptive statistics with 96 observations, showing the minimum and maximum values along with the standard deviation and the mean of the dependent variables. Thereby, we can see that the ratio of long-term debt to total assets accounts for the smallest proportion in CTV with 9.65%. In which, the minimum value of LDRit is 0 and the maximum value is 0.345. While the ratio of short-term debt to total assets and the ratio of total debt

to total assets account for 44.08% and 53.35%, respectively. Short-term debt ratio reaches the minimum value of 0.07 and the maximum value of 0.81. The minimum and maximum values of the ratio of total debt to total assets are 0.08 and 0.81, respectively. Through descriptive statistics, it can be seen in the CTV of companies, the long-term ratio accounts for a very small proportion, which proves that the Oil and Gas Joint Stock Company is more inclined towards short-term debt ratio. This result is completely consistent with the current situation of debt use of oil and gas companies in Vietnam.

Figure 2: Descriptive statistics with variables in the model

Variable	Obs	Mean	Std. Dev.	Min	Max
SDRit	96	.4408202	.177479	.0672044	.8136638
LDRit	96	.096518	.1005983	0	.3454103
TDRit	96	.5334852	.1399412	.0779444	.8137415
MTRit	96	.2440396	.4450348	-.8302245	3.897376
DIVit	51	.5595918	1.533367	-2.537538	10.57996
NDRit	96	.0349142	.0341078	0	.1492216
PROFITit	96	.0467567	.0514396	-.1216213	.1856511
CVAIT	96	.5385274	.3660998	.0503499	1.365055
SIZEit	96	29.01785	2.002036	25.11634	32.14182
GROWit	73	.40707	4.275867	-8.735294	24.16667

Source: Stata15 software processing

The tax benefits of debt matter only to profitable companies. Companies with accumulated losses will receive little or no value from the interest tax shield. In order to better grasp the interplay of the interest rate tax shield and corporate debt decisions, oil and gas companies are being studied for profit as well as tax payment. Descriptive statistics results with independent variables show that corporate income tax and personal income tax on dividends with the average rate of 24.40% and 55.96%, respectively, are quite high rates. The Law on Income Tax in Vietnam is gradually stabilizing and plays a huge regulatory role in the production and business activities of enterprises in general and JSCs in the Oil and Gas industry in particular.

As for other relevant independent variables, we can see that the company size accounts for 29.02%, which is quite good value, this number indicates a significant increase in the expansion of production scale. current oil and gas industry. The average debt-free tax shield was 3.49%; profit margin was 4.67%; The average collateral value was 53.85%, while the average growth rate was 40.71%.

4.2. Correlation analysis

Correlation analysis with variable SDR_{it}

Figure 3. Correlation coefficient matrix with variable SDR_{it}

	SDRit	MTRit	DIVit	NDTSit	PROFITit	CVAit	SIZEit
SDRit	1.0000						
MTRit	0.0722	1.0000					
DIVit	0.1730	0.7049*	1.0000				
NDTSit	0.3684*	-0.1608	0.0241	1.0000			
PROFITit	-0.3326*	-0.0740	-0.0762	0.4393*	1.0000		
CVAit	0.7879*	-0.1787	0.0098	0.6243*	0.1690	1.0000	
SIZEit	0.1190	-0.1217	0.2207	-0.0260	-0.1883	0.1561	1.0000
GROWit	-0.0704	-0.0018	-0.0428	-0.0225	0.0218	-0.0230	-0.0538
GROWit							
GROWit	1.0000						

Source: Stata15 software processing

Correlation analysis with variable LDR_{it}

Figure 4. Correlation coefficient matrix with variable LDR_{it}

	LDRit	MTRit	DIVit	NDTSit	PROFITit	CVAit	SIZEit
LDRit	1.0000						
MTRit	-0.1102	1.0000					
DIVit	0.0210	0.7049*	1.0000				
NDTSit	0.6373*	-0.1608	0.0241	1.0000			
PROFITit	-0.3782*	-0.0740	-0.0762	0.4393*	1.0000		
CVAit	0.6295*	-0.1787	0.0098	0.6243*	0.1690	1.0000	
SIZEit	0.3257*	-0.1217	0.2207	-0.0260	-0.1883	0.1561	1.0000
GROWit	0.0039	-0.0018	-0.0428	-0.0225	0.0218	-0.0230	-0.0538
GROWit							
GROWit	1.0000						

Source: Stata15 software processing

Correlation analysis with variable TDR_{it}

Figure 5. Correlation coefficient matrix with variable TDR_{it}

	TDRit	MTRit	DIVit	NDTSit	PROFITit	CVAit	SIZEit
TDRit	1.0000						
MTRit	-0.3020*	1.0000					
DIVit	0.2086	0.7049*	1.0000				
NDTSit	0.0359*	-0.1608	0.0241	1.0000			
PROFITit	-0.0259	-0.0740	-0.0762	0.4393*	1.0000		
CVAit	0.5400*	-0.1787	0.0098	0.6243*	0.1690	1.0000	
SIZEit	0.3031*	-0.1217	0.2207	-0.0260	-0.1883	0.1561	1.0000
GROWit	-0.1632	-0.0018	-0.0428	-0.0225	0.0218	-0.0230	-0.0538
GROWit							
GROWit	1.0000						

Source: Stata15 software processing

In the above correlation analysis, we all have the correlation coefficient varying from -1 to +1, which is satisfactory. Through the individual correlation coefficient between the above variables, it can be seen that the model does not have multicollinearity because the coefficients r are all less than 0.8.

4.3. Empirical Results

Estimation results of the regression model for the variable SDR_{it}

It can be seen that, in the FGLS model (4), CIT MIRit, PIT on dividends DIVit and growth

prospects GROWit have no impact on the ratio of short-term debt to total assets SDR_{it} , the remaining independent variables both have an impact on the dependent variable with a confidence level of 99%. The regression model between the dependent variable SDR_{it} and the independent variables is selected as:

$$SDR_{it} = 1,23428 + 1,114359 NDTS_{it} - 1,055901 PROFIT_{it} - 0,4215003 CVA_{it} - 0,0205912 SIZE_{it}$$

Figure 6. Synthesis of POOL (1), FEM (2), REM (3), FGLS (4) models

	(1) SDRit	(2) SDRit	(3) SDRit	(4) SDRit
MTRit	0.00326 (0.02)	-0.371** (-2.04)	0.00326 (0.02)	0.0654 (0.55)
DIVit	0.0312 (0.53)	-0.112** (-2.03)	0.0312 (0.53)	-0.00840 (-0.16)
NDTSit	0.921* (1.82)	0.283 (0.55)	0.921* (1.82)	1.114*** (2.58)
PROFITit	-0.995*** (-3.75)	-0.528* (-2.02)	-0.995*** (-3.75)	-1.056*** (-4.70)
CVAit	-0.423*** (-9.51)	-0.497*** (-6.06)	-0.423*** (-9.51)	-0.422*** (-10.74)
SIZEit	-0.0155** (-2.11)	0.0632** (2.31)	-0.0155** (-2.11)	-0.0206*** (-3.06)
GROWit	-0.00264 (-0.55)	0.00128 (0.31)	-0.00264 (-0.55)	-0.00194 (-0.58)
_cons	1.096*** (5.05)	-1.000 (-1.31)	1.096*** (5.05)	1.234*** (6.20)
N	55	55	55	55
R-sq	0.740	0.592		

t statistics in parentheses
* p<0.1, ** p<0.05, *** p<0.01

Source: Stata15 software processing

Estimation results of the regression model with the variable LDR_{it}

Figure 7. Synthesis of POOL (1), FEM (2), REM (3), FGLS (4) models

	(1) LDRit	(2) LDRit	(3) LDRit	(4) LDRit
MTRit	-0.232* (-1.86)	0.130 (0.96)	-0.232* (-1.86)	-0.156* (-1.88)
DIVit	-0.00913 (-0.18)	-0.0409 (-0.99)	-0.00913 (-0.18)	-0.00521 (-0.15)
NDTSit	1.190*** (2.79)	0.973** (2.51)	1.190*** (2.79)	1.409*** (3.89)
PROFITit	0.0337 (0.15)	-0.195 (-1.00)	0.0337 (0.15)	-0.0302 (-0.20)
CVAit	0.00516 (0.14)	-0.0952 (-1.56)	0.00516 (0.14)	-0.00466 (-0.16)
SIZEit	0.0429*** (6.90)	-0.0261 (-1.28)	0.0429*** (6.90)	0.0346*** (6.66)
GROWit	-0.00281 (-0.69)	-0.0000968 (-0.03)	-0.00281 (-0.69)	-0.00379* (-1.86)
_cons	-1.112*** (-6.07)	0.875 (1.53)	-1.112*** (-6.07)	-0.896*** (-5.92)
N	55	55	55	55
R-sq	0.633	0.267		

t statistics in parentheses
* p<0.1, ** p<0.05, *** p<0.01

Source: Stata15 software processing

In the FGLS model (4), corporate income tax MIRit and growth outlook GROWit have a negative impact on the ratio of long-term debt to total assets with 90% confidence, the debt-free tax shield NDTSit and the size of the company.

SIZE_{it} companies have 99% confidence, PIT on dividends DIV_{it}, PROFIT_{it} and CVA_{it} have no impact on the dependent variable. The regression model between the dependent variable LDR and the independent variables is selected as:

$$LDR_{it} = -0,8956187 - 0,1560037 MTR_{it} + 1,40942 NDTs_{it} + 0.0345619 SIZE_{it} - 0.0037859 GROW_{it}$$

Estimation results of the regression model for the variable TDR_{it}

Figure 8. Synthesis of POOL (1), FEM (2), REM (3), FGLS (4) models

	(1) TDRit	(2) TDRit	(3) TDRit	(4) TDRit
MTRit	-0.229 (-1.35)	-0.241 (-1.12)	-0.229 (-1.35)	-0.258* (-1.83)
DIVit	0.0220 (0.33)	-0.152** (-2.33)	0.0220 (0.33)	0.0263 (0.61)
NDTSit	2.111*** (3.65)	1.256** (2.03)	2.111*** (3.65)	2.281*** (4.17)
PROFITit	-0.961*** (-3.16)	-0.723** (-2.32)	-0.961*** (-3.16)	-1.064*** (-3.85)
CVAit	-0.418*** (-8.19)	-0.592*** (-6.07)	-0.418*** (-8.19)	-0.435*** (-9.24)
SIZEit	0.0274*** (3.25)	0.0371 (1.14)	0.0274*** (3.25)	0.0252*** (4.61)
GROWit	-0.00545 (-0.99)	0.00118 (0.24)	-0.00545 (-0.99)	-0.00584 (-1.19)
_cons	-0.0166 (-0.07)	-0.125 (-0.14)	-0.0166 (-0.07)	0.0574 (0.38)
N	55	55	55	55
R-sq	0.642	0.621		

t statistics in parentheses
* p<0.1, ** p<0.05, *** p<0.01

Source: Stata15 software processing

It can be seen that, in the FGLS model (4), corporate income tax MIR_{it} has a negative effect on the debt-to-total assets ratio with the significance level of 90%, the debt-free tax shield NDTs_{it}, the profit ratio PROFIT_{it}, the asset value. CVA_{it} and firm size SIZE_{it} affect with 99% significance, PIT on dividends DIV_{it} and growth prospect GROW_{it} have no impact on the dependent variable. The regression model between the dependent variable TDR_{it} and the independent variables is selected as:

$$TDR_{it} = 0,0574475 - 0,2579395 MTR_{it} + 2,281063 NDTs_{it} - 1,064448 PROFIT_{it} - 0,4347669 CVA_{it} + 0,0251739 SIZE_{it}$$

Through the results of running the regression model with 3 cases of 3 dependent variables SDR_{it}, LDR_{it}, TDR_{it} by the regression method of FEM and REM panel data. For each case, the study ran the final FGLS model to overcome the defects of the selected FEM model after Hausman determination. Finally, 3 suitable models were selected as follows:

$$(1) SDR_{it} = 1,23428 + 1,114359 NDTs_{it} - 1,055901 PROFIT_{it} - 0,4215003 CVA_{it} - 0,0205912 SIZE_{it}$$

$$(2) LDR_{it} = -0,8956187 - 0,1560037 MTR_{it} + 1,40942 NDTs_{it} + 0.0345619 SIZE_{it} - 0.0037859 GROW_{it}$$

$$(3) TDR_{it} = 0,0574475 - 0,2579395 MTR_{it} + 2,281063 NDTs_{it} - 1,064448 PROFIT_{it} - 0,4347669 CVA_{it} + 0,0251739 SIZE_{it}$$

In all three models above, the sig values are all less than 10%, so the independent variables are all statistically significant, the relevance of the 3 models is quite high at 90% and 99%. Therefore, the quantitative model results will be the basis to analyze the level and direction of the impact of each independent variable on the dependent variable and conclude the research hypotheses.

Table 2. Summary of direction of impact of independent variables on CTV

Independent variables	Research hypothesis	Research results			
		Direction of impact	SDR _{it}	LDR _{it}	TDR _{it}
MTR _{it}	(+)	(-)		(*)	(*)
DIV _{it}	(-)				
NDTS _{it}	(+)/(-)	(+)	(***)	(***)	(***)
PROFIT _{it}	(+)/(-)	(-)	(***)		(***)
CVA _{it}	(-)	(-)	(***)		(***)
SIZE _{it}	(+)/(-)	(+)/(-)	(-) (***)	(+) (***)	(+) (***)
GROW _{it}	(+)/(-)	(-)		(*)	

Source: Compiled from research results

Note:
(+/-): The independent variable acts in the same/opposite direction as the dependent variable.
(-): The independent variable has no effect on the dependent variable.
(*), (**), (***) : The independent variable affects the dependent variable with significance level 10%, 5%, 1%

5. Conclusions and recommendations

5.1. Conclusions and findings from the study

Through the summary of the above research results, it can be seen that company income tax has a negative impact on the ratio of long-term debt and total debt to total assets; does not affect the short-term debt ratio. Besides, the company income taxon dividends does not affect all three indicators of financial leverage of joint stock companies in the oil and gas industry in Vietnam. Other independent variables that have a positive/negative correlation for debt ratios are different in each model.

- **Correlation between corporate income tax (MTR_{it}) and capital structure:** Company income tax has a negative relationship with both dependent variables LDR_{it} and TDR_{it} in 2 regression models with 90% confidence. For the dependent variable SDR_{it}, the company income tax has no impact. In regression model (2), the regression coefficient of MTR_{it} shows that the impact of company income tax on the long-term debt ratio is -0.1560037. When the company income tax increases by 1%, the ratio of long-term debt to total capital decreases by 0.1560037%. In regression model (3), the regression coefficient of MTR_{it} is -0.2579395, showing that company income tax has a negative impact on the total debt of joint stock companies in the Oil and Gas industry in Vietnam, regardless of long term or short term. When the company income tax increases by 1%, the debt-to-equity ratio decreases by 0.2579395%.

- **Correlation between personal income tax on dividends (DIV_{it}) and capital structure:** The research shows that Personal income Tax has no impact on the employees of joint stock companies in the Oil and Gas industry in Vietnam. According to the characteristics of the Oil and Gas industry, the time to list on the stock exchange is later than other production and business sectors. Besides, from the payment of dividends in the company to the current personal income tax law, the research results show that there is no impact of personal income tax on employees during the research period. .

- In addition to focusing on analyzing the impact of income tax on the capital structure of joint stock companies in the oil and gas industry, the study also shows the degree of correlation between other independent variables in the model such as:

+ **No-debt tax shield $NDTS_{it}$:** There is a positive correlation to all 3 indicators of employee engagement in companies, namely the short-term ratio, the long-term debt ratio and the ratio of total debt to total assets. This means that as companies in the Oil and Gas industry use more debt, the greater the tax shield benefit will be due to the deduction when paying company income tax, the higher the tax benefits. the larger the net cash flow from business profits to shareholders.

+ **Profit ratio $PROFIT_{it}$:** Research results show that profitability ratio has a negative impact on the ratio of short-term debt and total debt in capital structure, with no impact on the ratio of long-

term debt with the degree of profitability. 99% confidence.

+ **Value of collateral CVA_{it} :** Similar to the rate of return, the value of collateral also has no impact on the long-term debt ratio, but only negatively correlates with the ratio of short-term debt and total debt with 99% confidence, coefficients in model (1) and (3) are -0.4215003 and -0.4347669, respectively. In the current situation, joint stock companies in the Oil and Gas industry in Vietnam mostly use short-term debt more in capital structure planning.

+ **Company size $SIZE_{it}$:** Firm size has a negative relationship with the ratio of short-term debt and a positive relationship with the ratio of long-term debt and total debt at the 99% confidence level. The level of impact of company size on capital structure is shown in the regression coefficients in each case SDR_{it}, LDR_{it}, TDR_{it}, respectively: - 0.0205912; 0.0345619; 0.0251739. This is consistent with the trade-off theory and logic with the current situation because joint stock companies in the Oil and Gas industry are more likely to borrow long-term loans. Furthermore, commercial banks feel safe in extending loans to large firms because such firms have less information asymmetry and are able to diversify risks.

+ **Growth prospect of $GROW_{it}$:** Growth prospects are negatively related to long-term debt ratio with 99% confidence. The impact of growth rate on capital structure is shown in the regression coefficient in the case of LDR_{it} - 0.0037859. The research results are suitable when the Oil and Gas Joint Stock Company in Vietnam has a high growth rate, it will reduce long-term debt.

5.2. Recommendations

5.2.1. Recommendations for joint stock companies in the Oil and Gas industry

Firstly, companies in the Oil and Gas sector should aim to adjust the debt ratio to market value in the medium term on the basis of the optimal debt ratio to suit the characteristics of each company.

Second, in the capital structure planning, it is necessary to study the impact of factors in general and especially to be more careful in taking advantage of the tax shield, especially to implement synchronous solutions to raise the tax rate. improve the credit rating, raise awareness and efficiency of financial management of the company, focus on building and enhancing the role of financial

managers in the company to achieve the goal of maximizing value the company.

Thirdly, in order to prevent and limit bad debts arising from credits granted to the company, because companies want to exploit this capital, the company itself must assert its position in the financial sector. from an investor's perspective, flexibly applying the ratio and form of dividend payment on charter capital.

5.2.2. Recommendations for State management agencies

- For Company income tax:

Firstly, the promulgated company income tax policy must ensure the social balance and support the development of the capital market.

Secondly, the government needs to continue to have effective policies to create conditions for companies to take the initiative in issuing corporate bonds and preferred shares, specifically non-refundable preferred shares.

Thirdly, the Government needs to continue to have effective policies to create conditions for companies to take the initiative in issuing corporate bonds and preference shares, specifically non-refundable preferred shares.

- For Personal income tax:

Firstly, the government should adjust the personal income tax policy in the direction of increasing the deduction for family circumstances for themselves and their dependents according to the increase of inflation, the gap between tax levels by increasing the level of taxable income tax of each silver, remove the silver le chi, keep the rank...

Secondly, the government needs to study and develop a tax schedule and tax calculation method in a scientific way, so that the PIT policy can become a tool of macro regulation in economic development, orientation for policy companies' finances towards an optimal capital structure.

Thirdly, the CIT policy needs to be developed in connection with the PIT policy aimed at creating accumulations for both the company and its shareholders, creating favorable conditions for companies to prioritize the use of financial resources. retained earnings as per the pecking order theory. In order for the Income tax system to bring harmony between the interests of taxpayers and the State, there should be specific scientific research to give an appropriate PIT rate.

5.2.3. Recommendations for Commercial Banks

Firstly, Commercial Banks need to increase the proportion of medium and long-term credit capital in investment activities, pay attention to and create conditions for small-scale companies to access loans as easily as expanding the portfolio of usable assets. Using mortgage, more preferential interest rate policy, using assessment and appraisal method suitable for small-sized companies to extend long-term loans to the company.

Secondly, commercial Banks should monitor the performance of listed companies with fully and accurately audited information on the Vietnamese stock exchange, thereby calculating competitiveness based on the market from which to give reasonable lending policies to companies that are borrowing capital from their banks. To make decisions on lending credit to companies that need to borrow capital, commercial banks should support loan policies and incentives for companies when they realize that borrowing can bring benefits for commercial banks.

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