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Impact of capital structure on financial performance of listed steel firms in Vietnam

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Abstract

This study is conducted to evaluate the impact of capital structure on the financial performance of steel firms in Vietnam. Data for the research process were collected on the financial statements of steel firms listed on the Vietnam Stock Exchange, audited for the period 2014-2019. This study employs fixed effects model (FEM) and random effects model (REM) together with some other testing methods such as FGLS, GLS, Hausman model to test different defects as well as evaluate the suitability of the model, thereby analyzing the influence of the factors of

capital structure on the financial performance of listed sample firms. The results indicate that tangible assets have a positive impact on return on equity. In contrast, risk, liquidity, and firm size have the opposite effects. Long-term debt and short-term debt have a negative impact on return on sales. In addition, growth sales in the scope of this research, is not statistically significant. Based on the results, a number of recommendations are proposed to help firms optimize the capital structure and improve the financial performance.

Keywords: Capital structure, financial performance, listed steel firms, Vietnam

1. Introduction

Capital structure is a financial term used to describe the origin and method of forming the capital that a firm uses to acquire assets, construct facilities, and maintain the operation. An optimal capital structure is a basis for creating a balance between risk and return ratio, so firms can devise strategies to optimize stock prices while minimizing costs.

Based on capital structure theories, the impact of capital structure on the business performance of firms is described. According to the conventional understanding of the capital structure, organizations that rely on debt are more lucrative than firms that rely on equity, since the cost of equity is regarded to be higher than the cost of debt. However, when you employ a lot of debt, your financial risks and capital expenses go up. As a result, the optimal capital structure is offered from this perspective to minimize capital costs and maximize firm value.

Modigliani and Miller's work in 1958 established modern capital structure theory, which assumed that no transaction fees, income taxes, bankruptcy costs, or interest rates on loans are uniform among firms. According to the M&M hypothesis, capital structure has no influence on a firm's value. The assumptions of the M&M model, on the other hand, are only applicable to efficient market conditions. In terms of taxation, financial leverage raises a firm's value by the amount of tax avoided. The trade-off theory claims that when analyzing the cost of financial distress caused by debt, possibly financially challenged enterprises will use less debt in their capital structure to decrease risks (benefits from debt use only make sense when the business must meet tax obligations). As proposed by this theory, the beneficial influence of capital structure on firm performance is financial flexibility to realize business prospects as well as a certain assurance of having less risk in the business of the business owner. Hence, the capital structure decision is one of the most important decisions of any firm because it affects the performance, competitiveness, and satisfaction of investors and shareholders. With the continuous development of the world economy as well as the Vietnamese market, when funding for business operations comes from many different sources, firms have countless opportunities and choices in using operating funds. And no matter which capital structure is chosen, financial managers need to consider and evaluate it carefully because the existence and sustainable development of the firm depends a lot on its capital structure.

In recent years, Vietnam has actively promoted its economic structure towards industrialization and modernization. In which, the steel industry is considered as a spearhead industry, a core foundation for the sustainable development of our country.



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The steel market has increasingly been expanded and invested continuously, making a great contribution to the GDP of the country. At the same time, Vietnam's steel industry has been increasing its market share in the global steel industry, striving to become the center of steel production and export in the region.

In order for steel firms to develop quickly and sustainably in the global economic environment, financial managers need to evaluate the financial performance carefully, in which capital structure is the top concern. A reasonable capital structure has a significant impact on the ability to pay the costs and recover if there is an economic downturn, industry recession, etc. Optimizing the capital structure and using capital appropriately help firms avoid the shortage of working capital to serve firm purposes. If the financial manager is unable to establish the capital structure, capital control can simply be lost, such as the lack of capital when expanding production, leading to a large amount of borrowed capital or the excess of capital leading to wasteful usage of capital. Thus, building a capital structure is an indispensable activity in any firm.

The findings in the prior studies of the relationship between capital structure and financial performance are diverse, even though some disagreements exist. Some short-term positive relationships, but none or very little in the long term. A negative relationship between capital structure and financial performance in different contexts. Moreover, depending on the length of the time series and the context of developing or developed countries, the impact of capital structure on business performance varies. From the above facts, general research on the impact of capital structure on financial performance is necessary at this time.

2. Literature review

Phillips and Sipahioglu (2004) ^[28] used the Pooled OLS model with data collected from 43 UK-quoted organizations which possess an interest in owning and managing hotels to find out the relationship between capital structure and financial performance. However, the results show no relationship between capital structure and financial performance.

Abor (2005)^[2] employed correlation and regression analyses with data from 22 listed firms for the period 1998-2002 to investigate the effect of capital structure on firm performance. Capital structure is represented by three indicators: the ratio of short-term debt to total assets, the ratio of long-term debt to total assets, and total debt to total assets. Return on equity is used as a measure of the profitability of a business. This study reveals a significant positive association between short-term debt ratio and return on equity whereas long-term debt ratio has a negative relationship with ROE. Moreover, research results also found that the ratio of total debt has a significantly positive effect on ROE.

Zeitun *et al.*, (2007) ^[37] investigated the relationship between capital structure and financial performance of 167 firms in Jordan from 1989 to 2003. The dependent variables are ROA, ROE, and Tobin's Q. The results show that capital structure has a negative impact on firm performance as measured by ROA and ROE. Unforeseen changes in interest rates negatively and significantly affect the ROA of the business. Unforeseen changes in interest rates have a negative and considerable impact on a firm's ROA: higher interest rates raise the cost of debt. The required rate of return will then be lower than the cost of debt, reducing the firm's profitability. This research supports the pecking order theory, which claims that capital structure and firm profitability have a negative relationship. Similar results are also found in the studies of Masulis (1983)^[23], Balakrishnan and Fox (1993)^[8], Rajan and Zingales (1995)^[32], Gleason *et al.*, (2000)^[16], Singh and Faircloth (2005)^[30], King and Santor (2008)^[21], Ahmad *et al.*, (2012)^[4], Dawar (2014).

Chowdhury and Chowdhury $(2010)^{[11]}$ studied Bangladesh with a dataset of 77 firms, showing that the debt-to-total asset ratio has a positive effect on the firm's profitability, but the reliability is not high. Gill *et al.*, $(2011)^{[15]}$ used correlations and regression analyses with data collected from 272 American firms listed on the New York Stock Exchange for a period 2005- 2007 to estimate the functions relating to ROE with measures of capital structure. The results of this research show that short-term debt to total assets, long-term debt to total assets, total debt to total assets have positive relationships with profitability in the manufacturing industry.

Ater (2017)^[7] used secondary data from 36 firms quoted on the Nairobi Securities Exchange for the period from 2011 to 2015 to research the relationship between capital structure and financial performance. The results show that capital structure has a statistically significant relationship with the financial performance of non-financial firms listed on the NSE. Besides, long-term debt and equity capital have a positive impact on firm value. Based on the findings of the study, the author recommends businesses weigh the marginal benefit of long-term debt against the marginal expense of long-term debt before deciding to use it to fund their operations.

Using a panel data technique, Salim and Yadar (2012)^[34] studied the relationship between capital structure and financial performance for a sample of 237 Malaysian listed firms on the Bursa Malaysia Stock Exchange from 1995 to 2011. The results indicate that ROA, ROE and earnings per share (EPS) have a negative relationship with short-term debt, long-term debt and total debt. Furthermore, there is a positive association between growth and performance in all sectors. According to Tobin's Q, there is a significant positive relationship between short-term and long-term debt. It also indicates that total debt has a negative relationship with firm performance, which is similar to the previous analysis.

In the context of Vietnam, there are some studies on the impact of capital structure on financial performance in different industries with different periods. Tran and Ramachandran (2006) ^[26] investigated the capital structure of small and medium-sized firms in Vietnam in the period 1998-2001. In which, the study included 558 small firms, 176 state-owned firms and 382 private firms during the period 2007-2011. Research results show that SMEs in Vietnam mainly use short-term debt to finance their operations. Ownership structure also affects financing methods for SMEs in Vietnam. Capital structure has a positive relationship with growth rate, business risk, firm size, networking and relationships with banks, but it has a negative relationship with fixed assets. Profitability does not affect the capital structure of SMEs in Vietnam. The impact on determinants such as the firm's ownership structure, size, relationship with the bank, and networking reflects the imbalance in the process of transferring financial resources in a transition economy such as Vietnam.

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Chau *et al.*, (2017)^[9] looked into the influence of industry competition, the impact of capital structure on the performance of firms with data taken from the financial statements of firms listed on the Ho Chi Minh City Stock Exchange in the period 2007–2015. Using the two-step GMM estimation technique with instrumental variables for unbalanced panel data, the research results reveal the positive impact of capital structure on the performance of Vietnamese firms. More importantly, this effect is stronger, corresponding to higher industry competition. Besides, the research results also carry many important implications for investment activities and corporate policymaking. Some other studies by Doan (2011)^[14], Le and Phung (2013)^[29] also found a positive relationship between capital structure and financial performance.

Nguyen and Nguyen (2020)^[25] investigated the impact of capital structure on firm performance by using data collected from 488 non-financial listed firms on the Vietnam stock market in the 6-year period (2013-2018). The dependent variable is financial performance and is represented by return on equity (ROE), return on assets (ROA), and earnings per share (EPS). The results indicated that there is a negative relationship between capital structure and firm performance for both types of state and non-state firms. However, this study showed that this impact is larger in state-owned firms than in non-state firms in Vietnam.

Tran (2019) employed quantile regression and OLS regression with data from 269 listed firms from 2010 to 2016 to examine the determinants influencing the financial performance of listed firms on the Vietnam Stock Exchange. The results show that firm size has a positive relationship with financial performance. Meanwhile, capital structure, current ratio and fixed asset investment negatively affected financial performance. Moreover, this study also found that at the low level, growth rate and receivable management have no effect on financial performance, but have distinct effects at other quantiles.

3. Research methodology

3.1 Model design

This study's objective is to investigate the impact levels of determinants such as risk, firm size, liquidity, and growth on the financial performance of listed steel firms on the Vietnam Stock Exchange. To test their impacts on the financial performance of steel firms listed on the stock market, we design a regression model based on the quantification of determinants included in the model.

Based on the hypothetical basis and the regression is constructed as below:

$$\begin{aligned} \text{ROEi,t} &= \alpha 0 + \alpha 1 \text{*STDi,t} + \alpha 2 \text{*LTDi,t} + \alpha 3 \text{*RISKi,t} + \\ \alpha 4 \text{*TANGi,t} + \alpha 5 \text{*SIZEi,t} + \alpha 6 \text{*LIQi,t} + \alpha 7 \text{*GROWTHi,t} + \\ \text{Ei,t} & (1) \end{aligned}$$
$$\begin{aligned} \text{ROSi,t} &= \beta 0 + \beta 1 \text{*STDi,t} + \beta 2 \text{*LTDi,t} + \beta 3 \text{*RISKi,t} + \\ \beta 4 \text{*TANGi,t} + \beta 5 \text{*SIZEi,t} + \beta 6 \text{*LIQi,t} + \beta 7 \text{*GROWTHi,t} + \\ \text{Ui,t} & (2) \end{aligned}$$

In which:

ROE: Return on equity; ROS: Return on sales.

STD: Short-term debt; LTD: Long-term debt; TANG: tangible assets; SIZE: Firm size; LIQ: Liquidity;

GROWTH: Sale growth; RISK: Interest expense to earnings before Interest and Taxes—EBIT

Ei, Ui: Random errors

3.2 Hypotheses

We focus on the determinants influencing the financial performance of listed steel firms on the Vietnam Stock Exchange

Short-term debt (STD)

STD can be measured by the ratio of short-term debt per total assets. Through the study of Salim & Yadav (2012)^[34], STD has a negative impact on financial efficiency. But not a clear impact on financial efficiency in general and especially joint stocks. So, we design a hypothesis 1 as:

H1: STD has a relationship with the financial effectiveness

Long-term debt (LTD)

Salim and Yadav studied the performance relationships of 237 Malaysian firms from 1995 to 2011 from a financial and market perspective. The study gives 4 results: in which business performance is measured by ROE, Tobin's Q shows that the ratio of long-term debt to total assets (LTD) has a negative impact on operational efficiency. Other studies also gave similar results: Arbabiyan and Safari (2009)^[6], Saeedi and Mahmoodi (2011)^[33], Khan (2012)^[20]. Exchange, we design hypothesis 2 as:

H2: LTD has a relationship with the financial effectiveness

Risk

Risk can be determined by the ratio of interest expense per earnings before interest and taxes. According to Zeitun & Tian (2007) ^[37], Risk and financial effectiveness have a positive relationship but in the research of Vu & Nguyen (2013), risk has a negative relationship with financial efficiency. So, we have a hypothesis 3 as:

H3: Risk has a relationship with financial effectiveness.

Tangible assets (TANG)

Tangible assets in firms are the main labor materials and have great value, participating in many production and business cycles. The experimental research results of Siminica *et al.*, (2011)^[35] show that the proportion of Tangible assets has a negative impact on the business performance of firms. Therefore, to clearly indicate the impact of Tangible assets on financial effectiveness, we have hypothesis 4 as:

H4: Tangible assets have a relationship with the financial effectiveness

Firm size (SIZE)

The effect of firm size on business performance is of great interest in the study of firms. Firm size is important to business performance because it represents the resources of the business. Kakani and Kaul assert that firm size is positively related to firm value, while Wu and Chua also argue that larger firms are more competitive because of their advantage in accessing resources. Other researchers such as International Journal of Advanced Multidisciplinary Research and Studies

Durand and Coeurderoy found that firm size has no significant effect on firm performance. Accordingly, to clearly indicate the impact of firm size on financial effectiveness, we have hypothesis 5 as:

H5: Firm size has a relationship with the financial effectiveness

Liquidity (LIQ)

The trade-off theory of capital structure suggests that highly liquid firms tend to maintain higher debt ratios, suggesting a positive correlation between liquidity and capital structure. Meanwhile, research by Raheman & Nasr (2007)^[31] shows that short-term solvency and profitability have a negative relationship. Research results by Nguyen & Nguyen (2020)^[25] show that, for the firm's solvency (LIQ), the influence of LIQ on ROE in State-owned firms in the same direction but in non-state firms in the opposite direction). So, we design hypothesis 6 as:

H6: Liquidity has a relationship with the financial effectiveness

Growth

Growth is one of the basic conditions for the firm to gain financial effectiveness. Based on earlier theories and studies on the relationship between growth and financial effectiveness, some studies demonstrate growth similarly as that financial effectiveness which is conducted by Zeitun and Tian (2007) ^[37], Onaolapo and Kajola (2010) ^[27], but also other studies pointed out that growth is contrarily related to the financial performance which are the studies of Dang and Quach (2014) ^[13], Chen (2004) ^[10]. So, we design hypothesis 7 as:

H7: Growth has a relationship with financial effectiveness.

3.3 Data collection

In this study, the data source collected is mainly secondary data, collected from audited financial statements (including balance sheet or statement of financial position; income or statement of comprehensive income; statement of cash flows; and notes to the financial statements) of firms listed on the Vietnam Stock Exchange during the 6 years of 2014 - 2019. The results obtained were 25 steel firms listed on the stock exchange with 1,242 observations. Some descriptive

statistics about steel firms are presented in the tables below:

Table 1: Descriptive statistics of listed steel firms

Variables	Obs	Mean	Std. Dev.	Min	Max
ROE	150	0.151808	0.62598	-0.6452	5.1853
ROS	150	-0.45043	2.44915	-17.768	0.198608
STD	150	0.673199	0.810951	0.185904	6.819252
LTD	150	0.105046	0.145468	0	0.524916
RISK	150	1.409355	12.13212	-4.94256	147.4329
TANG	150	12.38383	2.001498	6.668228	17.24886
SIZE	150	14.13894	1.675473	10.47365	18.43829
LIQ	150	1.209753	0.589734	0.035928	3.489615
GROWTH	150	74.21333	42.69143	1	148

Table 1 presents values based on the software of Stata, we get the following values: minimum value (Minimum); highest value (Maximum); Average values (Mean), and standard deviations (Std. Deviation) of 25 steel firms are listed on the Vietnam Stock Exchange in 6 years from 2014 to 2019. As stated in the theoretical framework, we calculate Return on Sale (ROS); Return on Equity (ROE) along with seven determinants influencing financial performance.

3.4 Testing

Following data collection, data screening and worksheet entry are carried out. Then, data is transferred to Stata for processing and running the regression model. During this time, we used regression analysis, as well as testing methods for resolving model defects, thereby coming up with hypotheses based on case studies of listed steel companies on the Vietnam Stock Exchange.

The research samples include 25 steel firms listed on the stock market for the period from 2014 to 2019. The least-squares method (OLS) is used to determine the regression results of the model, as well as the evaluation of the statistical values obtained after the estimates and the use of testing methods to verify model defects, such as determining whether the model is statistically significant using the Prob (F-statistic), using xtserial verification to verify autocorrelation. Vif was used to test multicollinearity, and xttest0 to verify variance change.

4. Results and discussion

4.1 Correlation coefficients

The correlation coefficient matrix shows the relationship between each pair of variables.

	ROE	STD	LTD	RISK	TANG	SIZE	LIQ	GROWTH
ROE	1							
STD	0.0246	1						
LTD	0.1612	-0.1563	1					
RISK	-0.0938	-0.0413	0.1873	1				
TANG	0.059	-0.1432	0.3282	0.0695	1			
SIZE	-0.0381	-0.1299	0.1964	-0.0008	0.8783	1		
LIQ	-0.1413	-0.4139	-0.3662	-0.1425	-0.3909	-0.3827	1	
GROWTH	-0.0006	-0.0999	0.1473	0.1409	0.1378	0.089	-0.0097	1

Table 2: Correlation coefficient matrix for ROE model

	ROS	STD	LTD	RISK	TANG	SIZE	LIQ	GROWTH
ROS	1							
STD	-0.7246	1						
LTD	-0.0256	-0.1563	1					
RISK	0.0239	-0.0413	0.1873	1				
TANG	0.1091	-0.1432	0.3282	0.0695	1			
SIZE	0.1258	-0.1299	0.1964	-0.0008	0.8783	1		
LIQ	0.32	-0.4139	-0.3662	-0.1425	-0.3909	-0.3827	1	
GROWTH	0.1092	-0.0999	0.1473	0.1409	0.1378	0.089	-0.0097	1

Table 3: Correlation coefficient matrix for ROS model

Return on equity model Model 1

Table 4: Testing of autocorrelation for ROE model

Wooldridge test for autocorrelation in panel data						
H0: no first-order a	autocorrelation					
F(1, 24) =	29.127					
Prob > F =	0.0000					
		_				

We have prob > F = 0.000 < 0.05. So, the model has autocorrelation

Choosing the right model

Table 5: Hausman test 1

Coet	ficients	-		
1	(b)	(B)	(b-B)	<pre>sqrt(diag(V_b-V_B))</pre>
I	fel	rel	Difference	S.E.
+				
STD	1228104	0424525	080358	.1011684
LTD	9696788	.3633615	-1.33304	.9370206
RISK	0040039	0079941	.0039902	.0016964
TANG	.0272102	.1059415	0787313	.066756
SIZE	3292504	160769	1684814	.1996417
LIQ	0873299	1931156	.1057858	.1341546
GROWTH	0001253	0001196	-5.68e-06	.0004946
B =	inconsistent	<pre>> = consistent : under Ha, eff p coefficients</pre>	under Ho and Ha	; obtained from xtreg ; obtained from xtreg
1630. 110.	chi2(7) =	(b-B) / [(V b-V	B)^(-1)1(b-B)	
	=	11.37	-, (-,1(5 2)	
	Prob>chi2 =	0.1231		

If p-value (Hausman) > 0.05, the hypothesis Ho is accepted. The selected model is a random effects model REM. If P-value (Hausman) < 0.05, the hypothesis Ho is rejected. The results of the regression analysis to assess the impact of determinants on ROE show that the REM model is selected after the Hausman test between FEM and REM (p-value of the Hausman Test is greater than 0.05).

The results show that the model has autocorrelation defects. Therefore, the GLS correction model is used to return to a more reliable model to overcome.

Table 6: The GLS model for ROE model

		2							
Coefficients:	generalized	least squar	es						
Panels:	homoskedast	ic -							
Correlation:	no autocorr	o autocorrelation							
Estimated cov	riances	= 1		Number	of obs =	150			
Estimated auto	correlations	- 0	-	Number	of groups =	25			
Estimated coef	ficients	= 8		Time pe	riods =				
Dooland coa	11010101	-	,	Wald ch	i2(7) =	15 09			
Log likelihood	1	= -134.8845	i	Prob >	chi2 =	0.0349			
109 11	•	10	,		CIIII	012222			
ROE	Coef.	Std. Err.	z	P≻ z	[95% Conf.	Interval]			
STD	0411975	.0758014	-0.54	0.587	1897656	.1073705			
LTD	.3814231	.4062709	0.94	0.348	4148533	1.1777			
RISK	0083852	.0041744	-2.01	0.045	0165668	0002035			
TANG	.1075779	.054372	1.98	0.048	.0010108	.214145			
SIZE	1626406	.0640944	-2.54	0.011	2882633	0370179			
LIQ	197711	.1177843	-1.68	0.093	428564	.033142			
GROWTH	0000972	.0011726	-0.08	0.934	0023955	.0022011			
cons	1.365025	.605183	2.26	0.024	.1788879	2.551162			

After adjusting the GLS model, the model overcomes the autocorrelation phenomenon, in addition, the model is also statistically significant.

Table 6 shows that Prob (p-value) of four determinants is smaller than the significant level of 5% and 10%, that are: RISK with Prob =0.045, tangible assets (TANG) with Prob =0.048; Firm size (SIZE) with Prob =0.011 and Liquidity (LIQ) with Prob = 0.093. This means that the above variables have a significant impact on the Return on equity (ROE) at the significance level of 5% and 10% or that RISK, SIZE, TANG, and LIQ affect ROE. Thereby, we can build a sample equation of determinants influencing ROE as below:

ROE= 1.365025 - 0.0083852 * RISK + 0.1075779 * TANG - 0.1626460 * SIZE - 0.197711 * LIQ + e

Through testing the FEM and REM models, it is found that the impact of the REM model is the best. However, the model suffered from autocorrelation, so it was converted to the FGLS model and used well for statistical analysis.

Return on sales model Model 2

 $\begin{aligned} &\text{ROSi,t} = \beta_0 + \beta_1 \text{*STDi,t} + \beta_2 \text{*LTDi,t} + \beta_3 \text{*RISKi,t} + \\ &\beta_4 \text{*TANGi,t} + \beta_5 \text{*SIZEi,t} + \beta_6 \text{*LIQi,t} + \beta_7 \text{*GROWTHi,t} \\ &+ \text{Ui,t} \end{aligned}$

Wooldridge test for autoco	orrelation in panel data
H0: no first-order autocom	rrelation
F(1, 24) =	12.718
Prob > F =	0.0016

Prob > F = 0.000 < 0.05. So, the model has autocorrelation

Choosing the right model

Table 8: Hausman Test 2

Coe	fficients			
	(b)	(B)	(b-B)	<pre>sqrt(diag(V b-V B))</pre>
	fe1	re1	Difference	S.E
	+			
STD	-1.30768	-2.288558	.9808781	.2790757
LTD	-8.332387	-2.959014	-5.373373	2.571187
RISK	.0055037	.0026164	.0028873	.0043077
TANG	.0582984	012942	.0712404	.1844955
SIZE	1.430268	.0743419	1.355926	.5458177
LIQ	. 4667434	167659	.6344024	.3709059
GROWTH	.0000251	.0031049	0030798	.0012687
B Test: Ho	h = inconsistent : difference i) = consistent ; under Ha, eff .n coefficients	under Ho and Ha Ficient under Ho not systematic	; obtained from xtreg ; obtained from xtreg
	chi2(7) = = Prob>chi2 =	(b-B) ' [(V_b-V_ 23.92 0.0012	_B)^(-1)](b-B) _	

The results of the regression analysis to assess the impact of determinants on ROE showed that the FEM model was selected after the Hausman test between FEM and REM (the p-value of the Hausman test is less than 0.05).

From the results of model selection, research on Testing Heteroskedasticity of the model

Table 9: Testing heteroscedasticity for ROS model

Modified Wald test for groupwise heteroskedasticity
in fixed effect regression model
H0: sigma(i)^2 = sigma^2 for all i
chi2 (25) =1.9e+05
Prob>chi2 = 0.0000

Looking at the coefficient Prob > chibar = 0.000 < 0.05 => Reject Ho, so the model has Heteroskedasticity.

The results show that the model has defects in autocorrelation and variable variance. Therefore, the FGLS correction model is used to return to a more reliable model to overcome.

Table 10: The FGLS model for ROS model

Cross-sectional time-series FGLS regression								
Coefficients: generalized least squares								
Panels: h	omoskedast	ic						
Correlation: n	o autocorr	elation						
Estimated covari	ances	- 1	L	Number of	of obs =	150		
Estimated autoco	rrelations	= 0)	Number o	of groups =	25		
Estimated coeffi	cients	= 8	3	Time per	riods =	6		
				Wald chi	2(7) =	184.94		
Log likelihood		= -286.4511	L	Prob > d	chi2 =	0.0000		
-								
BOS 1	Coef.	Std. Err.	z	P≻izi	[95% Conf.	Intervall		
+								
STD	-2.288558	.2082129	-10.99	0.000	-2.696648	-1.880469		
LTD	-2.959014	1.115953	-2.65	0.008	-5.146243	7717856		
RISK	.0026164	.0114663	0.23	0.820	0198572	.02509		
TANG	012942	.14935	-0.09	0.931	3056626	.2797787		
SIZE	.0743419	.1760558	0.42	0.673	2707212	.4194049		
LIQ	167659	.3235324	-0.52	0.604	8017708	.4664527		
GROWTH	.0031049	.003221	0.96	0.335	0032081	.009418		
cons	.4789216	1.662329	0.29	0.773	-2.779184	3.737027		
-								

After adjusting the GLS model, the model overcomes the phenomenon of autocorrelation and variable variance, in addition, the model is also statistically significant with prob = 0.000 < 0.05

Table 10 shows that Prob (p-value) of two determinants is smaller than the significant level of 1%, that is: Short-term debt (STD) with Prob =0.000, Long-term debt (LTD) with Prob = 0.008. This means that the above variables have a significant impact on the Return on sales (ROS) at the significance level of 1% or that STD and LTD affect ROS. Thereby, we can build a sample equation of determinants influencing ROE as below:

ROE = 0.4789216 - 2.288558 * STD - 2.959014 * LTD + e

4.2 Model Results

1. **RISK:** At the 5% level of significance, RISK has a negative influence (-) on ROE, as shown in Table 6. When a company's risk is higher, investors' trust in it is lower, and the company's capacity to raise funds from outside sources is limited. When it is anticipated that ROE would drop as risk increases, this conclusion has

the same outcomes as Ferreira and Zeitun & Tian $(2007)^{[37]}$.

- 2. Tangible assets (TANG): Tangible assets (TANG) have a positive influence (+) on ROE at the 5% level of significance, according to Table 6. But, it has no impact on ROS. It proves that the firm invests a lot in the facilities and equipment of the firm and many investment projects can bring high returns. This finding has the same results as Huang & Song (2006) ^[18], Wahab and Ramli (2014) ^[1], Alghusin (2015) ^[5].
- **3.** Firm size (SIZE): Firm size (SIZE) has a negative influence (-) on firm performance at the 5% level of significance, but is not statistically significant with ROS, according to Table 6. The large scale helps businesses increase profits by taking advantage of economies of scale but not every large scale brings high business efficiency.
- **4.** Liquidity (LIQ): From Table 6, it can be seen that Liquidity (LIQ) has a negative effect (-) on firm performance at the 10% level of significance but is not statistically significant with ROS. The ability to make

adequate and appropriate payments will boost the profitability of the business while minimizing the risk of bankruptcy. This finding has the same results as Agiomirgianakis *et al.*, $(2006)^{[3]}$ by analyzing the determinants affecting the profitability of 3,094 manufacturing firms in Greece in the period 1995 - 1999.

- 5. Short-term debt (STD): The variable short-term debt (STD) has a negative influence (-) with ROS with a significance level of 1%, but is not statistically significant with ROE, according to Table 10. That is, if the firm's short-term debt to total assets ratio rises, the rate of return on sales (ROS Return on sales) will fall, with 95% probability. The results of this study are also consistent with the expectations stated above.
- 6. Long-term debt (LTD): The research findings demonstrate that, like the short-term debt (STD) variable, the long-term debt (LTD) variable has a negative influence (-) on ROS with a significance level of 1%, but is not statistically significant with ROE. That is, if the firm's long-term debt to total assets ratio rises, the rate of return on sales (ROS Return on sales) will fall, with 95% probability.

5. Conclusion and recommendation

The financial performance of the business is reflected through its capital structure, an optimal capital structure suitable to the characteristics of the business will help the business survive and develop sustainably, expand the market share and increase value for its owners. Optimizing capital structure is always the top task of business administrators, requiring managers to have in-depth knowledge of business finance, understanding of the firm's operating situation to understand the weaknesses in the process of choosing a capital structure, thereby having solutions to improve and enhance the efficiency of capital structure. This study aims to find and evaluate the impact of capital structure on the financial performance of steel firms listed on the Vietnam Stock Exchange from 2014 to 2019. The study first systematized the theoretical framework on capital structure, the impact of capital structure on the financial performance of the business, and the determinants affecting the decision on its capital structure. The research model is built from financial indicators and accounting indicators, mainly from secondary data, which are firms' financial statements. This study uses Fixed Effects Model (FEM) and Random Effects Model (REM) along with some other testing methods to analyze the influence of determinants.

This research meets the objectives and answers the previous research questions. The results show that short-term debt, long-term debt, risk, liquidity, tangible assets, firm size, and growth all affect the financial performance of the business. In which, tangible assets (TANG) have a positive impact on ROE, long-term debt (STD) and short-term debt (LTD) hurt ROS and risk (RISK), liquidity (LIQ), and firm size (SIZE) are the determinants that negatively affect ROE. Based on those results, the study makes contributions and recommendations to improve the steel industry's competitiveness, domestic steel firms need to implement several solutions to improve production and business efficiency, contributing to promoting the high and stable growth of Vietnam's steel industry.

Continue to improve production and firm performance

The current problem of firms in the steel industry is to expand and exploit defects in the value chain to create added value like the HRC steel segment. If steel pipe firms can proceed to produce HRC, the growth potential will be very open. It is necessary to exploit the gaps in the industry value chain, diversify the product structure, especially products with good export potential and high-profit margins such as steel pipes and galvanized steel.

More investment

New investment or production expansion is necessary, however, firms should only invest in the production of product lines that Vietnam cannot yet produce, such as steel billets or hot rolled steel products, processed steel products, etc to form a closed production line. As for the top-end products such as galvanized steel, construction steel, etc, the firms need to be very careful.

Continuously improve and innovate to improve productivity, product quality, and competition

It is necessary to actively improve internal resources and highly competitive products, thereby building an asynchronous and modern steel industry. In addition, it is necessary to build a professional team on trade remedies, have a standardization plan, and well prepare data for domestic and foreign investigation agencies. The firm should focus on training and fostering knowledge, skills, and professionalism for employees, creating conditions for employees to participate in short-term and long-term training courses to serve their jobs.

Solvency improvement

To quickly collect receivables and increase cash flow, firms must immediately take measures to collect debts to recover receivables to avoid the situation of receivables being too large to cause capital stagnation. In addition, to improve the efficiency of debt recovery, businesses should apply a heavier penalty interest rate depending on the overdue time of the debt, which will make customers more active in paying debts to the business. If firms do this, they will be able to better deal with your due debts.

Promote product consumption, release inventory

Volume is always proportional to inventory costs, the problem for businesses is how to reduce inventory costs. Firms need to calculate and plan to determine the optimal inventory volume to ensure uninterrupted business while reducing inventory costs. The more inventory of goods, the more capital the firm is stagnant and slow to circulate.

Reducing receivables

Currently, many businesses must suffer many disadvantages because their customers are slow or refuse to pay their debts. The jobs of employees, as well as the existence and development of firms, depend a lot on due debts and loans from businesses to customers. As a business, it is necessary to have reasonable methods of managing receivables.

Towards the future development of green steel

"Green " steel is understood to be environmentally friendly, thanks to being produced based on a technology called International Journal of Advanced Multidisciplinary Research and Studies

HYBRIT (Hydrogen Breakthrough Ironmaking Technology). The production of "green" steel will meet EU standards when this market imposes an emission tax on export products. If doing well in this direction, Vietnam will maintain and even increase its export market share.

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