




CAPITAL STRUCTURE AND FINANCIAL EFFICIENCY: EVIDENCE FROM HO CHI MINH STOCK EXCHANGE OF VIETNAM



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ABSTRACT

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Capital structure and its utilization is one of the most crucial determinants to the growth and development of a business Thomas (2013). However, the level of financial leverage varies across firms and periods of time due to differences in business culture, administration, industry, or business strategy. In principle, there is no theoretically fixed perfect level for the proportion of financial leverage in a firm's capital structure (Modigliani and Miller, 1958). Various capital structure theories have been mentioned in the literature such as trade-off theory (Miller, 1977) and the pecking order theory (Myers and Majluf, 1984). However, they always come with specific assumptions and contexts which cause the issue of empirical capital structure to remain debatable, especially in terms of an emerging market. Vietnamese stock markets, with a history of less than two decades of development, rapid growth, and with the establishment of derivative market in 2017 (The State Bank of Vietnam, 2017) is regarded as a typical one. Thus, this research aims to investigate the impact of capital structure on firm financial efficiency in Vietnamese listed companies. The panel data were collected from 85 firms listed on the Ho Chi Minh Stock Exchange (HSX) during the period 2006 to 2017 (excluding the financial sector). The results reveal that short term leverage of listed firms is significantly positively correlated with its financial efficiency.

Contribution/ Originality: By using the quantitative methodology, this research concludes that short term leverage is significantly positively correlated with business financial efficiency of listed firms in the context of developing country like Vietnam.

1. INTRODUCTION

According to Thomas (2013) capital structure and its utilization is one of the most significant factors determining the growth and development of a business. The capital structure is defined as the ratio of long-term debt to equity, both of which are used by a business to pay for its assets (Swanson *et al.*, 2003; Dao and Lai, 2018). However, the level of financial leverage varies across firms and periods of time due to differences in business culture, administration, industry, or business strategy. Modigliani and Miller (1958) concluded it was impossible to propose any fixed perfect proportion of financial leverage in capital structure for any type of business in any industry. They proposed a capital structure irrelevant theory, which is considered as the first fundamental theoretical framework for further capital structure research. More recently, Shyam-Sunder and Myers (1999) posited the "pecking order theory" and suggested that to prioritize effectively it was first necessary to use retained

earnings as capital gain, and followed by debt and equity. Rajendran and Nimalthasan (2013) concluded that the impact of financial leverage on firm efficiency must be based on specific characteristics of individual firms, industries, or the whole macro economy of the country in question.

Although there are several studies on capital structure in Vietnam such as Nguyen and Ramachandran (2006); Vo (2017); Nguyen *et al.* (2016) and Vo and Ellis (2017), since the establishment of the derivative market in August 2017 (SBV, 2017) there has been no empirical research about the impacts of capital structure on financial efficiency. In consequence, this study is an original contribution to the literature on the effects of financial leverage on Vietnamese listed firms, before and after the establishment of the derivative market.

Capital structure is still a subject of debate. For instance, Biswas (2019) carried out research on the relationship between capital structure and profitability in India during the period 2008 to 2017. Ahmed (2019) studied the link between capital structure, ownership structure and corporate governance of small and medium enterprises in Ghana. The results showed that both ownership structure and all corporate governance variables are positively correlated to financial leverage. In terms of factors affecting capital structure choice, Ganiyu *et al.* (2018) used a general method of moment (GMM) for a dynamic panel data set in Nigeria during the period 1998 to 2016 which revealed that profitability, firm risk, and dividend are positively correlated to financial leverage, while asset tangibility, growth opportunities, firm size and age have negative correlations. In the most recent paper on Vietnam, Vo (2017) also employed GMM estimator with a dataset of non-financial listed companies from 2006 to 2015 and concluded there is a difference in terms of capital structure determinants for the long-term and short-term perspectives.

With these in mind, this study seeks to identify the impacts the level of capital structure has on the growth of Vietnamese listed firms, with recommendation for the formation of a firm's capital structure. It also contributes to the literature of empirical finance-related results on testing the capital structure theories, especially in the context of emerging markets with Vietnam as the case study.

2. RESEARCH METHODOLOGY

2.1. Data Specification

2.1.1. Data Collection

The study uses a panel data set collected from the HSX market with 85 listed firms between 2006 and 2017. Firms listed after 2014 are excluded.

2.1.2. Stationarity Data Test

The panel data set is equivalent to around 1,000 individual observations. Time series data is also used. According to Baltagi (2008), a time series is stationary when the mean, variance, and covariance remain constant at any time within the period. A stationary time series tends to return to the mean values, and all variations around the mean will be the same. In other words, a non-stationary time series will have either a mean value or a variance value that changes over time.

There are variety of econometric tests for the stationarity of panel data including Levin *et al.* (2002); Harris and Tzavalis (1999); Im *et al.* (2003); Choi (2001, Fisher-type) and Hadri (2000, Lagrange multiplier (LM)). Different econometric tests have different assumptions and hypotheses depending on the number of cross sections and time series of each panel data set. The Im–Pesaran–Shin and Fisher-type tests allow for unbalanced panels which are not suitable for this research which has a balanced data set. In terms of the consideration between Levin-Lin-Chu and Harris-Tzavalis, the former is recommended if the number of panels to time periods tend to zero asymptotically. In other words, it is not suitable for data that has several cross sections significantly larger than the number of time periods. Hence, this paper employs Harris–Tzavalis.

2.2. Variables Measurement

2.2.1. Financial Efficiency Measurement

Firm performance can be measured by various financial indicators such as returns on assets (ROA), returns on investment (ROI), returns on equity (ROE), earnings per share (GPS), or Tobin's q (Pratheepkanth, 2011; Soumadi and Hayajneh, 2012). Because this paper focuses on capital structure, ROE is chosen as the dependent. In Onaolapo and Kajola (2010) and Krishnan and Moyer (1997) ROE shows the capability of a company to generate profit based on the capital invested by shareholders.

2.2.2. Capital Structure Measurement

This paper identifies independent variables such as the market debt ratio as measured by interest-bearing borrowings over the sum of interest-bearing debts, and the market value of outstanding common shares, in which short-term and long-term market debt will be used to better characterize the role of each type of debt. The variables are illustrated in the equation below:

$$\begin{aligned} STD_{i,t} &= LnSMDR_{i,t} \\ LTD_{i,t} &= LnLMDR_{i,t} \end{aligned}$$

The concept of market debt ratio (MDR) is proposed by Flannery and Rangan (2006) to measure the business capacity to acquire market capital. In detail, $SMDR_{i,t}$ represents the short term interest-bearing debt of company i at time t , and $LMDR_{i,t}$ represents the long term interest-bearing debt of company i at time t .

2.2.3. Control Variables

This research includes several control variables to take into consideration the industry-related and firm-related factors in research model. In detail, the determinants of capital structure will perform as control variables in order to explain more of the variance in performance indicators. These are firm size, sales growth, and liquidity, in which, sales growth (SG) measures the changes between business revenue of firm i at time t and that of firm i at time $t+1$. Zeitun and Tian (2007) found that a firm's sales is the first important condition in order to generate profit and increase financial efficiency. This variable has also been used in testing the effect of capital structure on financial efficiency by Margaritis and Psillaki (2010).

$$SG_{i,t} = \frac{Sales_{i,t} - Sales_{i,t-1}}{Sales_{i,t-1}}$$

Firm size is also suggested in the literature of finance research (Ramaswamy, 2001; Frank and Goyal, 2003; Jermias, 2008; Ebaid, 2009; Nguyen *et al.*, 2018) to be an independent variable that impacts on financial efficiency. Thus, this paper will take into account the differences in terms of firm capacity and capabilities by including size measurement in the model. The variable is measured by the log of a company's total assets (TA), as illustrated in the equation below.

$$SZ_{i,t} = LnTA_{i,t}$$

This study further includes liquidity (LQ), measured in terms of current assets ratio as another control variable to take industry-related and firm-specific aspects into consideration.

$$LQ_{i,t} = \frac{STA_{i,t}}{STD_{i,t}}$$

2.3. Empirical Research Model

2.3.1. Panel Regression Approach versus Fama-MacBeth approach

In the field of finance research, the panel regression approach has drawn the attention of several econometricians (Dielman, 1989; Raj and Baltagi, 1992; Matyas and Sevestre, 1996; Arellano, 2003; Hsiao, 2003; Baltagi, 2008). It is commonly suggested that panel data sets tend to give a diversified research environment in which to develop estimation techniques and interpret empirical results. Combining both cross section and time series

observational perspectives, panel data provide a better, more precise impact measurement that cannot be done with cross-sectional or time series data on their own (Baltagi, 2008).

On the other hand, Fama and MacBeth (1973) issued another original method of estimation for asset pricing with the assumption of normal distribution and risk-averse investment. This is also regarded as an alternative estimation for analyzing cross section regression. In terms of Fama-MacBeth procedure with panel data that has i cross-sectional observation and t periods, for each time period t , run a cross-sectional regression:

$$y_{i,t} = x_{i,t} \times b_t + \varepsilon_{i,t}$$

From this, we can obtain a time-series of estimate \hat{b}_t . Under the assumption that error terms are uncorrelated over time, we can then compute the overall estimate and standard errors using the most basic Stats 1 method. For any component of the vector b one would compute the estimate and standard error as:

$$\hat{b} = \frac{1}{T} \sum_t b_t$$

$$SE = \sqrt{\frac{\frac{1}{T} \sum_t (b_t - \hat{b})^2}{T}}$$

Regarding the issues of estimating standard errors in finance panel data sets, Petersen (2009) indicated that the Fama-MacBeth standard errors are quite close to the standard errors generated by other methods (clustered by year, White). However, Petersen (2009) strongly concluded that with the existence of time effect, the Fama-MacBeth approach is able to provide unbiased standard errors and correctly form the confidence intervals, while with the existence of the firm effect, Fama-MacBeth will produce biased standard errors.

Given the characteristics of the project with the panel data of 85 cross-sectional firms and time series of 12 years, time and firm effect is indispensable. Thus, the panel regression approach is better suited to this project.

2.3.2. Criticism on Pooled OLS

When dealing with panel data, Greene (2010) proposed three econometric methods of analysis including Pooled Ordinary least square (Pooled OLS), Fixed effects, and Random effects. However, based on the research of Stimson (1985); Hicks (1994) and Beck and Katz (1995) pooled OLS for time series and cross-section is strongly criticized as it may violate the common OLS assumptions on error term process. Firstly, homoscedasticity is an essential requirement for all the errors to have an optimal OLS estimation, which means they are all independent of each other. Nevertheless Hicks (1994) concluded that in time series OLS, error terms have the tendency to be dependent on each other between a period and its next one. This means that error terms of company i at time t may correlate with error terms of company i at time $t+1$. Secondly, not only from a time series but also a cross section perspective, Hicks (1994) reported a contemporaneous correlation between different sections in a panel data set. For instance, error terms of firm i at time t can be correlated with error terms of firm j at time t . Thirdly, Beck and Katz (1995) also stated that if all observations are gathered into a panel data set, the OLS model will ignore the uniqueness of each firm, and even if the researcher tries to include the individual characteristics of the firms by using random error, this still results in an issue of correlation between random error and independent variables. In other words, this also infringes upon OLS assumptions.

Despite this, the Breusch and Pagan Lagrangian multiplier will be applied in order to test the relative appropriateness of the Random-effect model and Pooled OLS model.

2.3.3. Empirical Regression Equation

The regression analysis focuses on the coefficient for short-term and long-term debt ratio, (β_1 and β_2). The control variables for profitability are motivated by prior literature, including the firm age, liquidity, and firm size

(e.g., (Frank and Goyal, 2003; Jermias, 2008; Ebaid, 2009; Coad *et al.*, 2016)). Therefore, based on the relevance and reliability of such theories and approaches, the empirical model for this research will be developed and tested through panel regression model. The research's empirical model is illustrated below:

$$ROE_{it} = \beta_1 LnSTD_{it} + \beta_2 LnLTD_{it} + \beta_3 LnSZ_{it} + \beta_4 SG_{it} + \beta_5 LQ_{it} + \mu_{it}$$

The research will attempt to test the hypotheses below:

H_0 : Financial leverage has no impact on firm financial efficiency.

H_1 : Financial leverage has positive impact on firm financial efficiency.

In order to confirm the reliability of the quantitative model above, several econometric tests are carried out in the next part. Firstly, even though the pooled ordinary least square (Pooled OLS) model has been criticized in this study, the authors still use Breusch and Pagan Lagrangian multiplier test to make sure that the Pooled OLS is not appropriate for this research. Secondly, the Hausman test will also be used to figure out the appropriateness between fixed-effects and random-effects model. Finally, the autocorrelation and heteroskedasticity will be tested. Details are given below.

2.4. Method of Testing and Analysis

2.4.1. Breusch and Pagan Lagrangian Multiplier

Breusch and Pagan (1980) Lagrange multiplier is to test whether the variance of the unobserved individual effects is zero. For unbalanced panels, the modified Breusch-Pagan LM test for random effects (Baltagi and Li, 1990) is:

$$LM = \frac{(\sum_{i=1}^N T_i)^2}{2(\sum_{i=1}^N T_i(T_i - 1))} \left[\frac{\sum_{i=1}^N (\sum_{t=1}^{T_i} \hat{e}_{it})^2}{\sum_{i=1}^N \sum_{t=1}^{T_i} \hat{e}_{it}^2} - 1 \right]^2$$

The null hypothesis in the LM test is that variances across entities is zero, that is, no significant difference across units (i.e. no panel effect). In this case, rejection of the null, random-effects model is believed to be appropriate. The LM test helps to decide between a random effects regression and a simple OLS regression. Rejecting the hypothesis means that pooled OLS might not be the appropriate model. Although the Pooled OLS was criticized earlier, the Lagrange multiplier will still be applied to test whether the Pooled OLS or Random Effect model is appropriate to this research.

2.4.2. Hausman Test

The Hausman test will be used to select the appropriate estimation method between two fixed and random effects estimation methods (Baltagi, 2008).

The general form of Hausman test statistic is:

$$H = (\hat{\beta}_{RE} - \hat{\beta}_{FE})' [Var(\hat{\beta}_{RE}) - Var(\hat{\beta}_{FE})]^{-1} (\hat{\beta}_{RE} - \hat{\beta}_{FE})$$

It is $\chi^2(k)$ distributed where k represents the number of parameters. As mentioned above, the null hypothesis indicates that there is no correlation between error term and the explanatory variables. This means that random effects estimation will be appropriate in cases of failing to reject the null hypothesis. On the other hand, the fixed effects model is suitable whether accepting or rejecting the null hypothesis. However, in terms of rejecting the null hypothesis, the fixed effects model is more appropriate than the random effects one. On the contrary, if the null hypothesis is not rejected, the fixed effects model is no longer consistent, and the random effects model is more appropriate.

3. RESEARCH MODEL ANALYSIS

3.1. Unit Root Test (Harris-Tzavalis test)

The Harris-Tzavalis approach for the unit root test has been applied across all variables to ensure the stationarity of the panel data. The result is shown in Table 1:

Table-1. Harris-Tzavalis unit-root test hypotheses for variables.

Hypotheses	No. of panels and periods
Ho: Panels contain unit roots	Number of panels = 85
Ha: Panels are stationary	Number of periods = 12
AR parameter: Common	Asymptotics: N -> Infinity
Panel means: Included	T Fixed
Time trend: Not included	

After testing the unit root with Harris-Tzavalis approach, all the null hypotheses are rejected at the 5% significance level. Therefore, it is evident that the panel data contains no unit root and stationarity.

3.2. Breusch and Pagan Lagrangian Multiplier

The Breusch and Pagan Lagrangian multiplier (Breusch and Pagan 1980) is a typical test to determine between traditional pooled OLS and random-effect approach. The result at Table 2.

Table-2. Breusch and Pagan Lagrangian multiplier test for random effects.

ROE[firm1,t] = Xb + u[firm1] + e[firm1,t]		
Estimated results:		
	Var	Sd = sqrt(Var)
ROE	314.6469	17.73829
E	235.1386	15.33423
U	48.25641	6.946683
Test:	Var(u) = 0	
	Chibar2(01) = 65.10	
	Prob > chibar2 = 0.0000	

Since the result of Table 2 shows the significance level as lower than 5%, it is correct to reject the null hypothesis. In other words, Pooled OLS is indicated to be inappropriate as it ignores the difference between units and the time effect. Thus, using this method can lead to bias in the estimation of model results. Based on this result, random effects estimation is recommended to be applied. In the next part, the Hausman test will be employed to determine the appropriateness between random-effect and fixed-effect models.

3.3. Hausman Test

In order to decide whether fixed effects or random effects are appropriate for the study, the Hausman test is applied to investigate the correlation between error term and the explanatory variables. In detail, Hausman's null hypothesis states there is no correlation between error term and the explanatory variables. Thus, in case of failure to reject the null hypothesis, random effects estimation is chosen and vice versa.

The result of the Hausman test presented below shows the significance level of 17.8% which means that the null hypothesis H_0 cannot be rejected. Therefore, the random-effect model is used.

Table-3. Hausman test.

Variables	---- Coefficients ----		(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
	(b) fe	(B) re		
STD	-.00000109	-.00000153	.00000044	.000000974
LTD	-.00000088	-.00000104	.00000016	.000001140
SZ	.000000638	.000000954	-.000000316	.000001140
LQ	-.0785226	-.113974	.0354514	.000000767
SG	5.568908	5.508314	.0605944	.2242256

b = consistent under Ho and Ha; obtained from xtreg.
 B = inconsistent under Ha, efficient under Ho; obtained from xtreg.
 Test: Ho: difference in coefficients not systematic.
 $\chi^2(5) = (b-B)'[(V_b-V_B)^{-1}](b-B)$
 = 3.45
 Prob>chi2 = 0.1780

3.4. Random Effect Model Estimation

The result of random-effects regression model is illustrated in Table 4.

Table-4. Random-effects GLS regression.

R-sq: within = 0.3246						
Between = 0.0057						
Overall = 0.1471						
Wald chi2(5) = 49.25						
corr(u_i, X) = 0 (assumed) Prob > chi2 = 0.0000						
ROE	Coef.	Std. err.	z	P> z	[95% Conf. Interval]	
LnSTD	1.882123	1.680004	1.12	0.003	-1.410624	5.174869
LnLTD	.2747095	.4306036	0.64	0.523	-.569258	1.118677
LnSZ	-5.675382	2.116236	-2.68	0.007	-9.823129	-1.527635
LQ	-.0525371	.0901778	-0.58	0.560	-.2292823	.1242082
SG	5.450136	1.021961	5.33	0.000	3.44713	7.453143
_cons	65.11555	13.21136	4.93	0.000	39.22175	91.00934
sigma_u	7.3827718					
sigma_e	14.784374					
rho	.19959248 (fraction of variance due to u_i)					

In Table 4, the model is significant with the p-value less than 5%. With the R-square of 32.46%, it can be concluded that a 32.46% variation of the dependent variable (ROE) is generated by the explanatory variables. The coefficient summary shows that STD, SZ, and SG have correlation with ROE at a statistical significance level of 5%. Meanwhile, there is no statistical evidence for the relationship between ROE and LTD and LQ (with p-value of 52.3% and 56%, respectively).

In order to ensure the empirical model is valid and reliable, cross sectional dependence and autocorrelation issues are tested below.

Table-5. Cross-sectional dependence test.

Pesaran's test of cross sectional independence = 11.042, Pr = 0.3247
Average absolute value of the off-diagonal elements = 0.332

Data on Table 5 show that the p-value of Pesaran's test of cross-sectional independence is 32.47% which is far larger than the significance level of 5%. This means the null hypothesis cannot be rejected, or in other words, there is no cross-sectional dependence.

Table-6. Wooldridge test for autocorrelation in panel data.

H0: no first-order autocorrelation		
F (1, 84) = 1.026		
Prob > F = 0.3190		
No auto correlation		
<i>H0: Panel Homoscedasticity - Ha: Panel Groupwise Heteroscedasticity</i>		
Lagrange Multiplier LM Test	4.20e+04	P-Value > Chi2(31) 0.0000
Likelihood Ratio LR Test	233.5239	P-Value > Chi2(31) 0.0000
Wald Test	8.53e+05	P-Value > Chi2(32) 0.0000

Table 6 shows the Wald test statistic is significant with the p-value of 0.0000, which means the null hypothesis H_0 will be rejected. Thus, the empirical model encounters an issue of autocorrelation. This problem can be solved by applying FGLS regression in Table 7:

Table-7. FGLS regression.

Cross-sectional time-series FGLS regression						
Coefficients: generalized least squares						
Panels: homoskedastic						
Correlation: no autocorrelation						
Estimated covariances = 1			Number of obs = 1020			
Estimated autocorrelations = 0			Number of groups = 85			
Estimated coefficients = 5			Time periods = 12			
Wald chi2(5) = 36.33						
Log likelihood = -1631.294			Prob > chi2 = 0.0000			
ROE	Coef.	Std. err.	z	P> z	[95% Conf. Interval]	
LnSTD	.4008238	1.411165	-0.28	0.006	-3.166656	2.365008
LnLTD	.1657248	.3288532	0.50	0.614	-4.788157	.8102653
LnSZ	-1.234379	1.740915	-0.71	0.478	-4.646508	2.177751
LQ	-.2142249	.0902443	-2.37	0.018	-.3911004	-.0373494
SG	5.1241	1.09138	4.70	0.000	2.985034	7.263166
_cons	34.33621	9.560688	3.59	0.000	15.5976	53.07481

FGLS regression in Table 7 reveals that the data is homoscedastic and there is no autocorrelation. The model is also significant with the p-value of 0.0000. There are minor changes in the coefficient summary part, in which the SZ variable no longer has a significant correlation with ROE, meanwhile, LQ shows a significant relationship with p-value of 1.8%.

4. DISCUSSION AND CONCLUSION

As the result of the FGLS regression, it can be concluded a significant positive correlation between short term debt and financial efficiency of 85 listed firms in Vietnam with the coefficient of 0.4, which means if the short-term debt increases by 1%, ROE will increase accordingly by 0.4%. The results of this model show that the short-term financial leverage has a positive effect on financial efficiency. According to the capital structure theory, the debt ratio increases the profit of the enterprise by benefiting from the tax shield, and debt is the leverage for firms to increase revenue, thereby increasing profits. The results show that Vietnamese listed firms made efficient use of short-term debt and the benefits from debt financing can offset the costs incurred from being in debt.

The more firms increase the use of short-term debt, the higher the financial efficiency. This indicates that Vietnamese listed companies can actually take advantage of financial. This is consistent with the results of Muhammad *et al.* (2013); Dessí and Robertson (2003); McConnell and Servaes (1995) and Myers (1977). Nevertheless, this paper is still unable to conclude the same positive impact for long-term debt.

In terms of capital structure and financial efficiency, there are certain issues that have been resolved during the data collection process. Specifically, little importance is attached to retained earnings. In fact, State-owned enterprises are funded by Government which makes them free from pressure regarding capital raising and re-

structuring. From this standpoint, State-owned businesses in Vietnam experience no pressure to operate efficiently and their maximize shareholders' wealth. This situation also occurs with small to medium enterprises (SMEs) which are suffering from economic difficulties and unable to generate profit, this leading to capital deficit. Insolvency is also a huge problem in the Vietnamese economy due to the unstable capital market, which leads in turn to a significant rise in bad debts across the whole economy. However, along with the development of the stock exchange market since the beginning of 20th century, it becomes the most important additional source of finance for Vietnamese firms, which means being listed is a priority for all SMEs in Vietnam. Although the market is still in the developmental stage, attracting capital from share issues is significant and essential.

Nevertheless, rapid development of the stock exchange market has also resulted in certain issues. In detail, the number of enterprises going public is growing quickly every year using share issues as the main source of finance, which might lead to imbalance in businesses' capital structure and systematic risks. This situation can be justified for several reasons. Firstly, many minority investors in Vietnam are unprofessional with the objective of getting short-term profit through price changes rather than long-term investments. Therefore, the businesses that plan to keep retained earnings as capital gain for future projects will be less attractive to those investors. Secondly, agency cost is another issue with unprofessional investors often having conflict with management boards. Finally, bank credit is not easy to access, especially in the private sector.

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