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DETERMINANTS OF CAPITAL STRUCTURE: AN EMPIRICAL ANALYSIS OF LISTED COMPANIES IN THAILAND STOCK EXCHANGE SET 100 INDEX

Abstract:

The main purpose of this study is to investigate some financial indicators that affect the debt ratio in Thailand's capital market. Two competing theories that explicate the capital structure are old-fashioned pecking order and static trade-off model. From existing literature reviews, we select seven traditional factors: profitability, asset structure, size, liquidity, non-debt tax shields, dividend policy and growth as explanatory variables. While long-term debt and total debt are used as proxies for dependent variables. This study uses secondary data collected from annual financial statements of companies in SET 100 index exclude financial business sector. All firms rank highest market capitalization and top trading liquidity in Thailand Stock Exchange for a period of 10 years during 2009-2018. After examine the data, only 760 samples are qualified under criteria. Two panel multiple regression models are implemented for statistic testing at the significant level 0.05.

The results for model 1 (Long term debt) show positive and statistical significant effect of asset structure, size, liquidity and growth. While other three factors comprising profitability, non-debt tax shield and dividend policy indicate negative statistical relationships. The results for model 2 (Total debt) show positive and statistical significant effect of asset structure and growth. Whereas, two factors including profitability and liquidity display negative statistical correlation. The results of the two models are consistent with the Pecking Order theory for profitability and growth. High growth firms have higher need for funds then expect to borrow more. While asset structure is consistent with trade-off theory which hold that there should be a positive relationship between fixed assets and debt since fixed assets can serve as collateral. The explanatory variables which have the highest impact on capital structure choices for long term debt and total debt are non-debt tax shield and profitability respectively. Other independent variables such as product uniqueness, risk and macroeconomic indicators are subject to future research.

Keywords:

Capital Structure; Thailand SET 100 Index; Pecking Order; Static trade-off; Leverage

1   INTRODUCTION

Capital structure is the mixture of interest-bearing debt (both short term and long term) and equity used by the firm. The general purpose of capital structure management is to mix the permanent sources of funds in a manner that will minimize the firm's composite cost of capital for raising a given amount of funds and maximize the firm's common stock price. However, there is no universal theory of the debt-equity alternative (Myer, 2001). Modigliani and Miller (1958) are the pioneers in examining the effect of capital structure on firm value. They came up with the concept of "capital structure" which means firm's decision on capital structure does not have any effect on its value or on the cost of capital. Each firm is unique; its access to source of funds is differ. A firm's selection of various financing depend on many factors such as economic environment, strategies, business sector, growth potential, monetary policy of countries and other factors (Daskalakis & Psillaki (2008); Rajan & Zingales (1995). The objective of this research is to study factors that determine the capital structure of SET 100 listed firms in Thailand.

2   LITERATURE REVIEWS

2.1   Capital Structure theory

The choice of the measure of corporate capital structure has been major studies by various academies. Even though this topic may be controversial, as lack of a univocal definition of capital structure which led to emergence of a variety of factors used to measure it. However, well-known theories that can explain about the debt-equity choice are static trade-off theory, pecking order theory and free cash flow theory.

2.1.1   Static trade-off theory

Static trade-off theory proposed by Modigliani & Miller (1958) mentions that firms seek optimal or target debt-to-value ratio that balance the benefits of debt and cost of debt and equity. Firm will borrow up to the point where marginal value of tax shields on additional debt is offset by the increase in the present value of possible costs of financial distress from possibility of bankruptcy or reorganization. In other words, the main benefit of debt is tax deductibility of interest, which is balanced against bankruptcy costs and agency costs. The tradeoff theory predicts moderate borrowing by tax-paying firms.

2.1.2   Pecking order theory

An old-fashioned pecking order framework, in which the firm prefers internal to external financing, and debt to equity if it issues securities, the firm has no well-defined target debt-to-value ratio (Myers, 1984). This theory insists that the firm will borrow, rather than issuing equity, when internal cash flow is not sufficient to fund capital expenditures. Since an announcement of new share issue is referred as negative signal which will lead to stock price drop. According to pecking order, retained earnings or internal financing, low risk debt and external equity financing will be funded respectively.

2.1.3   Agency cost and Free cash flow theory

Michael Jensen suggests that substantial free cash flow can lead to managerial misbehavior and poor decisions associated with expenditures of the cash (Keown et.al. (2017). Jensen's "control hypothesis" suggests that by increasing the level of firm debt, shareholders will have more control over management. Shareholders may encourage a higher level of debt as it requires the firm to pay out cash to service the debt, reducing the funds available for managers to misuse. Free cash flow theory claims that dangerously high debt levels will increase value despite the threat of financial distress. The free cash flow theory is designed for mature firms that are prone to overinvest but does not give a theoretical solution to the question of how much leverage is too much.

Since there is no universal theory of capital structure (Myers, 2001). Different frameworks display different predictions. Various survey results are consistent with pecking order theory and tradeoff theory (Strýčková, 2015). This study then will concentrate for two dominant capital structure theories; trade off vs. pecking order.

2.2   Determinants of Capital Structure

After reviewing the empirical evidence, we pinpoint seven explanatory variables. They are included profitability, asset structure, firm sizes, liquidity, non-debt tax shields, growth and dividend policy. The variables along with theoretical predictions to leverage ratio are summarized in table I.

2.2.1   Profitability

Profitability, due to the pecking order theory that maintains businesses with high profitability can generate a lot of cash flow within the business each year, therefore, the financing is raised within the business, first from retained earnings, second from debt, and third from issuing new equity. Since internal fund has the lowest cost of financing. And when capital from inside not enough, will seek external financing through debt consolidation. As a result, the ratio of total liabilities to total assets decreased. Profitability has negative direction relative to total debt to total assets (Titman and Wessels 1988; Serghiescu and Văidean, 2014; Thippayana, 2014; SithySafeena, 2015; Pratheepan and Yatiwella, 2016; Güner, 2016; Pepur and Poposki, 2016). On the contrary, trade off theory predicts to have positive relationship of profitability to debt ratio. Many empirical studies confirm this positive suggestion such as Prahalathan (2010) and Sangeetha and Sivathaasan (2013).

2.2.2   Assets Structure

Tangible assets such as land, factories, machinery can be used as collateral for debt to reduce the risk that the business will not repay the debt to the creditor. Therefore, firms with higher fixed assets can issue more secured debts. Accordingly, this situation allows creditor to approve loans more easily at lower interest rates than those with less tangible assets. So, businesses with highly tangible assets will be able to finance debt financing instead of issuing additional shares. Thus trade-off theory predicts positive relationship between fixed assets to leverage (Hall and Michaelas, 2000; Prahalathan, 2010; SithySafeena, 2015; Shah and Khan, 2017). While pecking

order theory estimates opposite direction. Many empirical studies confirm negative effect such as Serghiescu and Văidean (2014), Serghiescu and Văidean (2014), Balios et.al. (2016); Pepur and Poposki (2016).

2.2.3 Firm Sizes

According static trade-off theory, the debt-funded business will receive tax benefits. If too much debt is made, the cost of bankruptcy will increase. Owing to large scale firms are more reliable and lower bankruptcy costs than small firm, so firm is easier to get a loan approval. As a result, the total debt to total assets ratio of large firms increase more than leverage ratio of small one under trade-off framework. However, there are two conflicting viewpoints about the relationship of size to leverage of firms under pecking order theory. First, larger firms being more diversified have lesser chances of bankruptcy, so one may expect a positive relationship between size and leverage of a firm (Daskalakis and Psillaki ,2008; La Rocca, et.al., 2009; Sangeetha and Sivathaasan, 2013; Serghiescu and Văidean, 2014; Thippayana, 2014; Pratheepan and Yatiwella, 2016; Shah and Khan, 2017. Second, contrary to first view, Rajan and Zingales (1995) argue that large firms should be more capable of issuing informationally sensitive securities like equity, and should have lower debt. This means that a negative relationship between size and leverage of firms is expected (Handoo and Sharma, 2014; Güner, 2016; Pepur and Poposki, 2016).

2.2.4 Liquidity

Based on the pecking order theory, firm will initially finance its operations with the lowest cost of financing. Therefore high liquidity companies can easily transfer cash to financing. Consequently, high liquid firms with more money supply will reduce leverage ratio. As a result, pecking order theory suggests that liquidity of firms have a negative effect on leverage. Some research studies also found that liquidity of firm has a negative bearing on leverage such as Serghiescu and Văidean, 2014; SithySafeena, 2015; Güner, 2016; Shah and Khan, 2017. Whereas trade off theory postulates that liquidity of firm has positive influence on leverage (Pepur and Poposki, 2016). It suggests that liquid firms are capable of paying their liabilities as they mature.

2.2.5 Non-Debt Tax Shields

Due to tax benefits under tradeoff theory, tax deductions for depreciation and investment tax credits are substitutes for the tax benefits of debt financing. As a result, firms with large non-debt tax shields expected to have more cash flow, so debt in their capital structures will reduce. This study applied depreciation and amortization expense to total assets. Firms with other non-liability tax benefits will benefit from this transaction to reduce taxes instead of using interest on loans. The money supply from tax benefit will reduce debt. Therefore, we expect negative relationship between non-debt tax shield and leverage ratio as confirmed by the studies of De Miguel and Pindado (2001) along with Pepur and Poposki, (2016).

2.2.6   Growth

The tradeoff approach predicts that firms with expected future growth should be negatively related to long-term debt levels. Myers (1984) noted that firms with growth opportunities tend to borrow less. It should also be reminded that growth opportunities are capital assets that add value to a firm but cannot be collateralized and do not generate current taxable income. For this reason, the arguments suggest a negative relation between debt and growth opportunities (Sangeetha and Sivathaasan, 2013; Güner, 2016; Pepur and Poposki, 2016). Alternatively, pecking order framework describes that high growth firms have more need for funds then they are planned to borrow more. So, positive relationship is expected. Most empirical studies report a significant positive correlation between growth and leverage level (Hall and Michaelas, 2000; Handoo and Sharma, 2014; Balios et.al.,2016; Pratheepan and Yatiwella, 2016).

2.2.7   Dividend Policy

According to Mazur (2007), dividend policy is less commonly included in empirical studies on the determinants of capital structure choice. However, upon pecking order theory, dividend policy has positive relationship between dividend payout ratio and debt. Dividend payment decrease the amount of internal funds and increase the need for external financing. In order to distribute high dividend, firms need financial debt capital. That is why a positive relationship between payout ratio and debt can be expected. The payout ratio is defined as dividends over net profit. Evidence can be found in the studies of Mazur (2007) and Sangeetha and Sivathaasan (2013).

3   RESEARCH METHODOLOGY

3.1   Population and Sample

The population of this study is 100 companies listed on the Stock Exchange of Thailand (SET) as called SET100 Index. They represent 100 stocks that meet the most conditions under the SET's conditions. The data was collected from these companies over 10 years starting from 2009 to 2018 excluding finance and fund industries since financial statements of this segment differ from the others'. By gathering listed firms with complete financial information, we found 760 companies are qualified.

3.2   Data collection method

Secondary data were derived from Thomson Reuters Datastream during the period from 2009 to 2018. Besides using the financial statements of secondary data, we also compiled financial information from the Stock Exchange of Thailand's website, the annual financial statements submitted by the Company to the Office of the Securities and Exchange Commission (SEC) and the Stock Exchange of Thailand.

3.3   Data analysis methods

Descriptive analysis is used to describe the general characteristics of the sample by using mean, median, maximum, minimum and standard deviation. Multiple regression analysis has been implemented in order to fulfill all seven assumptions such as the normality assumption Test, the linearity assumption test of each of the independent variables with the dependent variable, the Durbin Watson d statistic test for detecting serial correlation and the multicollinearity test in trying to understand the significant and the insignificant variables. The multicollinearity can be spotted through the correlation between the explanatory variables and the Variance Inflation Factor (VIF).

After considering two famous theories and concepts related to the capital structure choice, as well as the conclusions drawn from reviewing various researches, the conceptual framework of our study is summarized in Figure 1 while Table 1 summarizes dependent, explanatory variables along with their measurement and predicted relationship with leverage ratio under trade off theory and pecking theory.

Figures 1 Conceptual Framework
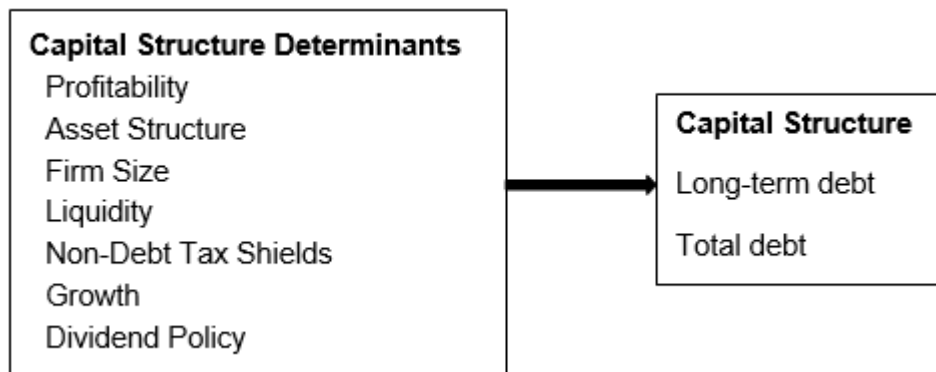
Table 1 Explanatory, Dependent variables, their measurement and expected relationship

Explanatory Variables		Definition	Predicted Relationship to Dependent Variables	
			Trade-off theory	Pecking order theory
Profitability	EBITDA_TA	Ratio of EBITDA to total assets	+	-
Asset Structure	FA_TA	Ratio of fixed asset to total asset	+	-
Firm Size	LN_SALES	Natural Log of sales	+	+/-

Liquidity	CR	Ratio of current assets to current liabilities	+	**-**
Non-Debt Tax Shields	DEP_TA	Ratio of depreciation to total asset (Amortization expense/total assets)	**-**	(0)
Growth	GRTH	$(Sale_t - Sales_{t-1})/ Sales_{t-1}$	**-**	+
Dividend Policy	DPR	Dividend/Net Profit	(0)	+
Dependent Variables				
Long-term debt	LTD	Ratio of short term debt to total assets		
Total debt	TD	Ratio of total debt to total assets		

* (0**)** represents insignificant

3.4   Hypothesis of this study

H1: Profitability has a significant effect on leverage.

H2: Asset Structure has a significant effect on leverage.

H3: Firm Size has a significant effect on leverage.

H4: Liquidity has a significant effect on leverage.

H5: Non-Debt Tax Shields has a significant effect on leverage.

H6: Growth has a significant effect on leverage.

H7: Dividend Policy has a significant effect on leverage.

3.5   Model Specification

The regression model can be specified as given below:

Model I

$$LTD = \beta_0 + \beta_1 EBITDA\_TA + \beta_2 FA\_TA + \beta_3 LN\_SALES + \beta_4 CR + \beta_5 DEP\_TA + \beta_6 GRTH + \beta_7 DPR + \xi_{ik}$$

Model II

$$TD = \beta_0 + \beta_1 EBITDA\_TA + \beta_2 FA\_TA + \beta_3 LN\_SALES + \beta_4 CR + \beta_5 DEP\_TA + \beta_6 GRTH + \beta_7 DPR + \xi_{ik}$$

Where β_0 = Constant, β_1, β_2, β_3, β_4, β_5, β_6 and β_7 are coefficients of the corresponding controlling variables and ξ_{ik} is the error term.

4   RESULTS AND DATA ANALYSIS

4.1   Summary statistics

Table 2 below presents the descriptive statistics for the determinants of capital structure in Thailand during 2009 to 2018. The table shows the mean, median, maximum, minimum and standard deviation values for each variables. From the table, the average and median of debt ratio (measured as total debt/ total assets) are 0.3480 and 0.3610 for ten year periods. These numbers show that firms owe approximately 34.8 percent of total assets. The maximum, minimum and mean of profitability are 0.7347, -0.2773 and 0.1477 respectively. This means, on the average, firms generate profit 14.77 percent while maximum profit is 73.47 percent and loss occurred for 27.73 percent. Average growth rate for the past ten years is 12.53 percent with maximum of almost 300 percent and minimum of 3 percent. Consequently, growth rate has the highest standard deviation among all variables.

Table 2 Descriptive statistics of dependent and independent variables (2009-2018) (n=760)

Variables	Mean	Median	Maximum	Minimum	Std. Dev.
Profitability	0.1477	0.1346	0.7347	-.2773	0.0941
Asset Structure	0.6029	0.6734	0.9991	-.9228	0.2548
Firm Size	16.8395	16.7566	21.7680	11.9921	1.6797
Liquidity	1.7541	1.3623	12.3622	.0791	1.3884
Non-Debt Tax Shields	0.0398	0.5087	0.2324	0.0000	0.0320
Growth	0.1253	0.0343	2.9972	-.6493	8.6898
Dividend Policy	0.5081	0.0508	1.9093	0.0000	0.2458
Long-term debt	0.2243	0.2248	0.7525	0.0000	0.1596
Total debt	0.3480	0.3610	1.1427	0.0000	0.1755

The correlation between all the explanatory variables is given as the correlation matrix as shown in table three. A very high correlation of .90 or above between the independent variables shows the presence of possible problematic multicollinearity. However, the current samples display no evidence for the multicollinearity.

Table 3 Correlation Matrix

	Variables	1	2	3	4	5	6	7
1	Profitability	1						
2	Asset Structure	-.133[**]	1					
3	Firm Size	-.068	.045	1				
4	Liquidity	.081[*]	-.373[**]	-.090[*]	1			
5	Non-Debt Tax Shields	.439[**]	.313[**]	.101[**]	-.196[**]	1		
6	Growth	.015	-.055	-.134[**]	-.073[*]	-.087[*]	1	
7	Dividend Policy	.267[**]	-.159[**]	.029	.040	.143[**]	-.079[*]	1

** Correlation is significant at the 0.01 level.

* Correlation is significant at the 0.05 level.

Table 4 shows the Variance Inflation Factor (VIF) which is used to measure the degree of multicollinearity of the ith independent variable with other independent variables in a regression model. VIF values between 1 and infinity. Unfortunately, several rules of thumb – most commonly the rule of 10 – associated with VIF are regarded by many practitioners as a sign of severe multicollinearity (O'brien, 2007). It can be seen from table four that VIF for all the variables is less than ten. Therefore, problematic multicollinearity is inexistent in the regression model.

Table 4 Variance Inflation Factor Values

	Variables	Long-term debt	Total debt	VIF
1	Profitability	-.307[**]	-.410[**]	1.462
2	Asset Structure	.442[**]	.245[**]	1.391
3	Firm Size	.166[**]	.056	1.049
4	Liquidity	-.081[*]	-.303[**]	1.205
5	Non-Debt Tax Shields	-.049	-.133[**]	1.573
6	Growth	.022	.070	1.049
7	Dividend Policy	-.201[**]	-.169[**]	1.115

**. Correlation is significant at the 0.01 level.

*. Correlation is significant at the 0.05 level.

4.2   Regression Results

The regression is run in a panel manner. Various options of panel data regression, fixed effects, random effects and OLS panel were run. The most robust of all was the OLS panel, thus, the study report results of the OLS panel regression in Table 5 for model I (Long-term debt) and compare with Table 6 for model II (Total debt)

4.2.1   Model I

The results show positive and statistical significant effect of asset structure, firm size, liquidity and growth to long term debt. While the results show negative and statistical significant of profitability, no-debt-tax shield and dividend policy to long term debt. The results are consistent with prior survey and trade off theory except profitability which shows opposite direction.

Table 5: Regression results of Long-term debt

Independent variables	Dependent variable : LTD		
	Coefficient	**t-statistic**	**Significance**
Constant	-0.159	-2.855	0.004[**]
FA_TA	0.299	13.315	0.000[**]
EBITDA_TA	-0.309	-4.948	0.000[**]
LN_SALES	0.016	5.264	0.000[**]
CR	0.013	3.452	0.001[**]
DEP_TA	-0.488	-2.560	0.011[*]
GRTH	0.032	2.173	0.030[*]
DPR	-0.043	-2.066	0.039[*]

Notes: R^2 = 0.305; Adjusted R^2 = 0.298; F-value = 4.269 (p-value = 0.039)

**. Significant at the 0.01 level

*. Significant at the 0.05 level

A multiple regression model I can be built as follow with r square of 30.5%.

LTD = -.159 - .309 EBITDA_TA +.299 FA_TA + .016 LN_SALES + .013 CR - .488 DEP_TA
   + .032 GRTH - .043 DPR

4.2.2   Model II

The results show positive and statistical significant effect of asset structure and growth to total debt. While the results show negative and statistical significant of profitability and growth affecting total debt ratio. The results are consistent with prior survey and in line with pecking order theory.

Table 6: Regression results of Total debt

Independent variables	Dependent variable : TD		
	Coefficient	t-statistic	Significance
Constant	0.450	20.525	0.000**
FA_TA	0.079	3.343	0.001**
EBITDA_TA	-0.704	-11.899	0.000**
CR	-0.028	-6.597	0.000**
GRTH	0.035	2.078	0.038*

Notes: R2 = 0.255; Adjusted R2 = 0.251; F-value = 64.649 (p-value = 0.000)

**. Significant at the 0.01 level

*. Significant at the 0.05 level

A multiple regression for model II can be constructed as follow with r square of 25.5%.

TD = .45 -.704 EBITDA_TA + .079 FA_TA - .028 CR + .035GRTH

4.2.3 Results comparison

Table 7 shows predicted and results relationship between explanatory variables and leverage ratio.

Table 7: Summarized predicted and results relationship

Explanatory Variables	Definition	Predicted Relationship to Leverage level		Results Relationship to	
		Trade-off theory	Pecking order theory	LTD	TD
Profitability	EBITDA_TA	+	-	-	-
Asset Structure	FA_TA	+	-	+	+
Firm Size	LN_SALES	+	+/-	+	(0)
Liquidity	CR	+	-	+	-
Non-Debt Tax Shields	DEP_TA	-	(0)	-	(0)
Growth	GRTH	-	+	+	+
Dividend Policy	DPR	(0)	+	-	(0)

* (0) represents insignificant

Nevertheless, model 1 (Long-term debt) is better explanation than model 2 (Total debt) because the result demonstrates higher adjusted r square. All seven determinants have impact on long term debt. Four out of seven including asset structure, size, liquidity and non-debt tax shields are

in line with trade off theory. On the other hand, only four factors that are statistical significant to total debt. They consist of profitability, asset structure, liquidity and growth. Three factors which are profitability, liquidity and growth, complied with pecking order theory. Only asset structure factor that shows the same direction to trade off theory. The rest three factors including size, non-debt tax shields and dividend policy are not relevant or have any effect to total debt.

5   CONCLUSIONS

Capital structure or leverage level of firm is the mix of firm's debts and equity that is used to finance its operations. This research paper investigates the relative importance of seven financial factors to the capital structure choices of 100 Thai companies listed at Stock Exchange of Thailand. All of them are ranked by market capitalization and top trading liquidity. The analysis is based on data of 760 samples collecting for a period of 10 years during 2009-2018. Seven independent variables and two dependent variables have been tested using regression analysis. Traditional independent variables are adopted in the study, including profitability, asset structure, size, liquidity, non-debt tax shields, dividend policy and growth. While two dependent variables are long-term debt ratio and total debt ratio.Two panel multiple regression models are implemented for statistic testing at the significant level 0.05.

Long term debt was found to be positively to asset structure, size, liquidity and growth and negatively to profitability, non-debt tax shield and dividend policy. Total debt was related positively to asset structure and growth and negatively to profitability and liquidity. The regression results of model I (long term debt) are mostly in line with trade off theory except profitability that shows opposite direction. While results of model II (total term debt) are consistent with the Pecking Order theory for profitability, liquidity and growth. Because high growth firms have higher need for funds then expect to borrow more. Profitability negatively affects to both long-term debt and total debt. Asset structure is consistent with trade-off theory which hold that there should be a positive relationship between fixed assets and debt since fixed assets can serve as collateral. Growth positively affects to long term debt and total debt which consistent with pecking order theory which hold that when company grows external funds are needed for expansion. The explanatory variables which have the highest impact on capital structure choices for long term debt and total debt are non-debt tax shield and profitability respectively.

Future research might consider other independent internal variables such as product uniqueness, business risk, or firm age as well as external economic factors such as interest rate, inflation, exchange rate ; economic and political development of the country, market environment.

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