All in the Family: The Role of Related Shareholders in Capital Structure Decisions for the Shipping Industry

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ABSTRACT

The purposes of this paper are to understand the factors that determine capital structure decisions and examine how the family business affects the decision-making process in the sea and coastal freight water transport companies in Thailand. We test the hypotheses by employing the sample panel of 71 non-listed companies. The findings show that tangibility, size, and growth are positively associated with capital structure whereas profitability is negatively related. The findings reinforce the uniqueness of shipping sector that the impact of being in the sector is greater than being SMEs, either operating by non-family or family firms. For family shipping firms, the result is in the same manner of overall data except for higher impact on size, indicating the existence of the family role. It is also consistent with pecking order theory in that family ownership adds use of debt, possibly due to risk control preferences.

Keywords: Capital Structure, Maritime Financial Management, Shipping Company, Family Business, Trade-Off Theory, Pecking Order Theory

บทความวิจัย

ธุรกิจครอบครัว : บทบาทของผู้ถือหุ้นที่เกี่ยวข้องในการตัดสินใจโครงสร้างเงินทุนในอุตสาหกรรมการขนส่งทางทะเล

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บทคัดย่อ

งานวิจัยนี้มีวัตถุประสงค์เพื่อทำความเข้าใจปัจจัยที่กำหนดการตัดสินใจโครงสร้างเงินทุนและตรวจสอบว่าธุรกิจครอบครัวส่งผลกระทบต่อการตัดสินใจเลือกโครงสร้างเงินทุนในกลุ่มผู้ประกอบการขนส่งสินค้าระหว่างประเทศทางทะเลและตามแนวชายฝั่งทางทะเลในประเทศไทยอย่างไร ผู้วิจัยได้ทดสอบสมมติฐานจากบริษัททั้งหมด 71 แห่งที่ไม่ได้จดทะเบียนในตลาดหลักทรัพย์ ผลการวิจัยแสดงให้เห็นว่า สินทรัพย์ถาวรที่จับต้องได้ ขนาดและการเติบโตของบริษัทมีความสัมพันธ์ในทิศทางเดียวกันกับโครงสร้างเงินทุน ส่วนความสามารถในการทำกำไรมีความสัมพันธ์ในทิศทางตรงกันข้ามกับโครงสร้างเงินทุน ผลการวิจัยได้เน้นย้ำถึงลักษณะเฉพาะของอุตสาหกรรมการขนส่งทางทะเลว่ามีความสำคัญมากกว่าการเป็นผู้ประกอบการขนาดกลางและขนาดย่อม ไม่ว่าจะดำเนินธุรกิจแบบครอบครัวหรือไม่ก็ตาม สำหรับกลุ่มตัวอย่างที่เป็นบริษัทครอบครัวนั้น ผลที่ได้สอดคล้องกับกลุ่มตัวอย่างทั้งหมดยกเว้นขนาดของค่าสัมประสิทธิ์ที่ส่งผลกระทบมากขึ้น แสดงว่าความเป็นเจ้าของธุรกิจครอบครัวนั้นมีบทบาทต่อการตัดสินใจในการกำหนดโครงสร้างเงินทุน นอกจากนี้ยังสอดคล้องกับทฤษฎีลำดับขั้นในการจัดหาเงินทุน (Pecking Order Theory) ซึ่งธุรกิจครอบครัวใช้หนี้สินมากขึ้นเพราะต้องการควบคุมความเสี่ยงเอง

คำสำคัญ: โครงสร้างเงินทุน การบริหารการเงินพาณิชยนาวี บริษัทขนส่งทางทะเล ธุรกิจครอบครัว ทฤษฎีโครงสร้างเงินทุนที่เหมาะสม ทฤษฎีลำดับขั้นในการจัดหาเงินทุน

1. Introduction

The maritime industry is an industrial industry, driven by international trade and vice versa. However, the maritime business requires a high value of asset investment, including the building and purchasing of ships, thus making it a capital-intensive business. Therefore, an understanding of the mechanism relating to optimal investment decision making; for example, financing through debt or equity, is crucial especially in light of the slowdown in global trade and global sea freight. Further complicating this trend, a South Korean court in early 2017 declared Hanjin Shipping to be bankrupt due to liquidity shortage and debt restructuring (The Strait Times, 2017). This case of shipping insolvency negatively impacts not only the shippers, but also the creditors and investors. The high level of capital investment, low asset flexibility, and high operating business risk generating low returns are the root factors of the unique character of the maritime business. The firms operate in a perfectly or near perfectly competitive market if they are tramp shipping companies. Consequently, the cash flow generation is uncertain due to the highly volatile market. The business owners need to generate sufficient revenues to cover the operating costs of the vessels and repay the debt. Simultaneously, the ship-owners must retain a sufficiently high collateral value of assets in order to guarantee the loans (Kavussanos and Tsouknidis, 2016). Thus, the unique characteristics of the industry, including the capital intensity, the fragmentation of the industry, which is especially evident in bulk shipping, and the highly volatile financials should be more clearly recognized and understood by practitioners as well as academicians.

Family owned firms have accounted for the largest proportion of maritime business, especially in countries where the maritime sector is large (Giannakopoulou, Thalassinos, and Stamatopoulos, 2016). The same authors suggest that many firms have been able to maintain their business for decades despite the high-risk nature, volatility and capital intensity of this industry. In Thailand, most firms operating in ocean transport services are small and medium enterprises (SMEs). Additionally, it is rare to see these firms raise funds through initial public offerings or exploiting the capital markets. Similar to several other sectors, many firms are family firms, including shipping and coastal transportation business in Thailand. They may have some unique ownership structures in which the family members own the company stocks and are involved in control and management. In general, large shareholders are family owners. They may be conservative in the decision-making process because their wealth and performance are highly sensitive. The authors argue that their financial structure may be more conservative than non-family owned firms in order to reduce their risk exposure. Therefore, this unique characteristic of family firms may influence their financial growth.

A strong motivation for this study comes from the current research published in journals relating to transportation and logistics. For instance, the work of Hofmann and Lampe (2013) provides research opportunities into micro-financial aspects

of asset, capital, liquidity and profitability structure of logistics service providers (LSPs) of non-quoted LSPs. However, previous studies relevant to asset tangibility and capital intensity in shipping companies are limited not only in number, but also in that the findings are rather mixed. Because of the idiosyncratic characteristics of the shipping industry, it is beneficial to investigate the effects of corporate finance. Currently, the body of corporate finance knowledge for the shipping industry in emerging countries is quite limited. As previous studies predominantly use the sample firms from developed countries, we choose to use Thai sea and coastal freight water transport non-listed company data, that of family and non-family business. The purposes of this study is to (1) investigate factors that determine capital structure decisions in the sea and coastal freight water transport non-listed companies in Thailand; and (2) test how the family business structure affects the decision making process.

Research targeting capital structure decisions in non-listed companies in emerging markets, particular in shipping sector, is relatively thin. Specifically, the shipping sector plays an important role in the international service trade. Thus, our research contributes to the body of maritime industry information relevant to capital structure in a developing country setting and a capital-intensive industry. Additionally, this study combines the knowledge from corporate finance and literature in shipping business. We find that there are further firm-specific factors which determine capital structure of firms within the shipping sector. Moreover, being family or non-family business is relevant to how firms decide the proportion of debt to equity. This point will help to increase our understanding of financial structure of Thai non-listed companies in the ocean shipping sector.

The paper is structured in the following manner. Section 2 reviews relevant literature on capital structure decisions and develops research hypotheses for each variable. Section 3 describes data, methodology, and model specification. Section 4 provides empirical results and Section 5 concludes and summarizes this study.

2. Literature Review and Hypotheses Development

Three theories frequently used in capital structure decision are namely trade-off theory, pecking order theory, and market timing theory. Trade-off theory proposes that firms use the optimal mix of debt and equity to maximize the value of the firm and shareholders (see Jensen and Meckling, 1976; Jensen, 1986). Pecking order theory does not focus on optimal capital structure decision, but rather states that firms have a hierarchy of finance use, Myers (1984). Firms first use internal funds or retained earnings followed by external funds, debt and then equity, respectively. They do so because they aim to limit adverse selection problems when the firm itself has more information than outside investors. Outsiders will likely assume that a company has financial issues if it raises equity. Retained earnings can be used to avoid the problem whereas issuing debt reduces the problem. The theory particularly fits to SMEs because these firms face even stronger asymmetric

information problems than listed firms. Also, SMEs, mainly run by family-related managers, do not want outsiders to be involved in their business as they can lose control and are afraid of business secrets being stolen. Therefore, they may think of equity funding from outsiders as their last option. Thirdly, market timing theory states that firms tend to issue equity following a stock price run-up. Companies will use the cheapest means to fund their business. The theory, however, is less relevant to non-listed firms. Further details regarding the three theories can be found in Frank and Goyal (2008). However, we use two different theories: trade-off theory and pecking order theory to draw the hypotheses.

Empirical studies focusing on overall non-financial firms can be categorized into four groups. First, many empirical studies on capital structure determinants include Frank and Goyal (2009); Lemmon, Roberts, and Zender (2008), among others. The focal point of all of this research is general industries, excluding financial institutions. Second, many studies investigate SME firms, including Daskalakis and Psillaki (2008), Hall, Hutchinson, and Michaelas (2004), Matias and Serrasqueiro (2017). Hall et al. (2004) conclude that non-listed SME firms have slightly varied capital structure decisions. Thus, investigating the capital structure choices of non-listed companies fills the research gap; the results can provide a better understanding of their capital structure choices. In addition, more researchers have recently placed more emphasis on studying the family firm ownership in the maritime industry (e.g., Giannakopoulou et al., 2016).

Third, some studies relevant to Thai markets include Detthamrong, Chancharat, and Vithessonthi (2017), Haron (2014), Deesomsak, Paudyal and Pescetto (2004), and Wiwattanakantang (1999), but none of these emphasizes the shipping industry. Fourth, in shipping industry, the study of capital structure is relatively new to the field. Some works worth mentioning include Drobetz, Gounopoulos, Merikas, and Schroder (2013) and Yeo (2016). Through these studies, we have collected some factors including tangibility, operating leverage, size, earnings volatility, profitability, and firm growth. We introduce one more variable to the current study, family firm dummy variable.

Tangibility: Tangibility is the measure collateralized value of a firm. Firms with higher tangible assets will be subject to lower financial distress cost leading to lower cost of debt. Therefore, one can expect a positive relationship between tangibility and financial leverage. If following, the pecking order theory, one can infer that tangibility leads to relatively more symmetric information. This leads to lower cost of equity, so firms with higher tangibility should show a negative relationship with leverage. Detthamrong et al. (2017) use 493 non-financial, listed firms in Thailand and report that the tangibility is not related to financial leverage. However, most empirical studies including those that focus on capital structure of shipping companies (Drobetz et al., 2013; Yeo, 2016) report a positive relationship

between tangibility and leverage. Daskalakis and Psillaki (2008), nevertheless, report the opposite result and explain that firms with large amounts of tangible assets may have already found a stable source of return so that they do not need external financing. We follow empirical studies from the global shipping industry and expect the following relationship.

Hypothesis 1: Asset tangibility has a positive relationship with company capital structure.

Operating leverage: Although operating leverage is not tested in regular capital structure studies, it is documented as an important factor to determine capital structure in capital-intensive industries. Operating leverage can be viewed as a measure of a company's business risk. If there is higher operating leverage, the trade-off theory suggests that a firm will have a higher financial distress cost, leading to a negative relationship between this variable and debt ratio. Using capital-intensive real estate investment trusts (REITs) industry data from the U.S., Harrison, Panasian, and Seiler (2011) report that operating leverage is inversely related to capital structure decision. Drobetz et al. (2013) also provide evidence that global-listed shipping companies have a negative relationship between operative leverage and debt ratio. Following their research, we hypothesize the same relationship.

Hypothesis 2: Operating leverage has a negative relationship with company capital structure

Firm size: Firms with greater size tend to be more diversified and have lower cost of capital, leading to a positive relationship between firm size and debt use. However, if following the pecking order theory, the larger the firm size, the more information there is available to outsiders. Less asymmetric information leads to less cost of equity, so bigger firm should have lower leverage. Frank and Goyal (2009), among others, report evidence on firm size evidence to capital structure decision. Research using Thai public firm dataset including Wiwattanakantang (1999), Deesomsak et al. (2004), Haron (2014) and Detthamrong, et al. (2017) find that firm size is positively correlated with a firm's financial leverage. We also expect a direct association between firm size and capital structure decision.

Hypothesis 3: Firm size has a positive relationship with company capital structure.

Earnings volatility: Firms with higher volatility should have higher bankruptcy cost, leading to higher cost of debt. When viewed through the trade-off theory, this suggests a negative relation between volatility and financial leverage. Drobetz et al. (2013) use an unleveraged annualized standard deviation of a firm's daily stock price returns as a proxy of company risk and find an inverse relationship between risk and capital structure decisions. Rather, Yeo (2016), using global listed shipping company data defines risk as earnings volatility and finds a positive relationship. This supports the pecking order theory. He explains that outside investors avoid volatile shipping

companies so that firms have to borrow even if borrowing costs are high. As the majority of our data is comprised of family firms, we follow variable definition as of Yeo (2016) and conjecture a negative relationship.

Hypothesis 4: Earnings volatility has a negative relationship with company capital structure.

Profitability: Trade-off theory suggests that a firm with high profitability should be able to borrow at a lower cost compared to firms with lower profitability. Firms should then prefer the use of debt over equity which will lead to higher financial leverage. Pecking order theory, instead, suggests that more profitable firms will become less levered over time. Firms with high profits can easily use internal funds, creating a situation with almost no need to raise capital, leading to lower financial leverage ratio. Empirical evidence, including data from non-financial companies (see, e.g., Lemmon et al., 2008, Frank and Goyal, 2009; Haron, 2014), shipping companies (Drobetz et al., 2013), listed companies in Thailand (Detthamrong et. al. 2017) and SMEs (see, e.g., Daskalakis and Psillaki, 2008; Matias and Serrasqueiro, 2017) supports the pecking order theory. Therefore, we expect the following association.

Hypothesis 5: Profitability has a negative relationship with company capital structure.

Firm growth: Growing firms have higher cash flows and can use them to internally fund their future business. Therefore, the variable should have a negative relationship with capital structure decisions. Yeo (2016) confirms the hypothesis using global listed shipping company data. We hypothesize the following:

Hypothesis 6: Firm growth has a negative relationship with company structure.

Family business: Family firm is defined as a firm in which the majority of shareholders has family ties with other shareholders. As stated earlier, the pecking order theory, rather than trade-off theory, should associate more closely with family firm capital structure decision. King and Santor (2008) and González, Guzmán, Pombo and Trujillo (2013) document the importance of family business in capital structure decision. They find direct association between family ownership and financial leverage. They also conclude that the rationale behind increasing debt level is the family firm's need to finance growth without losing control. Therefore, family business is directly relevant to test whether capital structure decision follows pecking order theory. Overall, we expect family dummy to positively affect company use of financial leverage.

Hypothesis 7: Being a family business has a positive relationship with capital structure.

3. Data and methodology

3.1 Data

We collect annual financial data of Thailand's shipping companies from Business Online (BOL) database with TSIC code of 50121 (Sea and coastal freight water transport). We only select firms which have more than 20 million Baht in revenues. The

data ranges from 2007 to 2016, including both active and inactive firms with a total of 71 firms and 615 firm-year observations. The information was streamlined by removing data for firms with missing information, firms with visible accounting errors, and extreme outliers for all variables. We have chosen unbalanced panel data in order to get rid of survival bias.

Table 1 lists the variables and their definitions used in this study. Independent variables are defined as follows: tangibility is the ratio of fixed assets to total assets; operating leverage is the ratio of operating expenses to total assets; profitability is the operating income before depreciation and amortization to total assets; firm size is the natural logarithm of total assets; earnings volatility is the percentage change of operating income; growth is percentage change of total assets. The dummy variable of one represents a family firm and zero represents a non-family firm.

Table 2 reports the descriptive statistics for the variables used in the analyses. We report the number of observations, mean, median, standard deviation, 25^{th} and 75^{th} percentile values over the entire period from 2007 to 2016. Panel A of Table 2 displays all firms whereas Panel B and Panel C reports subgroups of non-family and family firms, respectively. On average, the firms in our sample have debt-to-asset ratio of 26.6 percent, showing that slightly more than one fourth of the firm's use of capital structure comes from a combination of short-term and long-term debts. This number is less than the 37.6 percent reported in Wiwattanakantang (1999) who uses Thai listed companies in her study, and 40.7 percent from Drobetz et al. (2013) who use global listed shipping

Table 1 Result summary of variables' effect comparing with expectations

Variable	Notation	Measurement	Expected sign
Dependent variables			
Debt-to-asset ratio	DTA	Total debt/total assets	
Long-term debt to assets	LTD	Long-term debt/total assets	
Independent variables			
Tangibility	TANG	Fixed assets/total assets	+
Operating leverage	OPER	Operating expense/total assets	–
Firm size	SIZE	Natural logarithm of total assets	+
Profitability	PROFIT	Earnings before interest, taxes, depreciation, and amortization/total assets	–
Earnings volatility	EVOL	Percentage change in operating income	–
Growth	GROWTH	Percentage change in total assets	–
Family	FAM	0 if family firm, 1 if non-family firm	+

company data. Considering only long-term debt to asset, we found that on average, firms use 18.9 percent to fund their long-term business.

We choose the selected shipping firms that use fixed assets on average of 53.8 percent to total assets. Deesomsak et al. (2004) and Detthamrong et al. (2017) report average tangibility of Thai listed firms (excluding financial firms) of 43.3 percent and 38.0 percent respectively, whereas Drobetz et al. (2013) evidence the ratio of 63.0 percent. In other words, Thai sea and coastal freight water shipping companies in the selected period depend more on fixed assets compared to most Thai listed firms, but they are still conservative when compared with global firms. Operating leverage equals 22.2 percent compared with 50.0 percent from Drobetz et al. (2013). The profitability figure from our data is 13.2 percent, not much different from 11.3 percent as the global benchmark. From the total amount of data included in this research, 64.6 percent, or almost two thirds, are considered as family firms whereas the rest are non-family firms. Overall, dependent and independent variables' standard deviations vary extremely. This result is not shocking bearing in mind the nature of SMEs and non-listed firms.

Table 2 Descriptive statistics

The descriptive statistics exhibit the number of firm-year observations (N), the mean, the standard deviation (SD), the median, the 25th and 75th percentile value of each variable. The sample consists of 71 non-listed shipping companies from BOL database with TSIC code of 50121 (Sea and coastal freight water transport) during the period from 2007 to 2016. Except for family dummy variable, the information was streamlined by removing data for firms with missing information, firms with visible accounting errors, and extreme outliers for all variables.

Panel A: All firms	N	Mean	SD	P25	P50	P75
Dependent variables						
DTA	615	0.266	0.292	0.000	0.140	0.547
LTD	615	0.189	0.255	0.000	0.000	0.393
Independent variables						
TANG	615	0.538	0.353	0.158	0.639	0.855
OPER	615	0.222	0.333	0.032	0.078	0.261
SIZE	615	18.826	1.535	17.989	19.140	19.979
EVOL	615	–1.302	10.820	–1.090	–0.271	0.398
PROFIT	615	0.132	0.350	–0.002	0.054	0.168
GROWTH	615	0.223	1.126	-0.097	–0.019	0.151
FAM	615	0.646	0.479	0.000	1.000	1.000

Table 2 Descriptive statistics (Cont.)

Panel A: All firms	N	Mean	SD	P25	P50	P75
Panel B: Non-family firms						
Dependent variables						
DTA	218	0.281	0.296	0.000	0.182	0.561
LTD	218	0.198	0.250	0.000	0.000	0.390
Independent variables						
TANG	218	0.505	0.368	0.088	0.649	0.851
OPER	218	0.327	0.433	0.032	0.092	0.603
SIZE	218	18.411	1.770	17.245	18.433	19.763
EVOL	218	–2.253	13.140	–1.214	–0.265	0.388
PROFIT	218	0.109	0.299	–0.006	0.069	0.192
GROWTH	218	0.257	1.097	–0.096	–0.000	0.256
Panel C: Family firms						
Dependent variables						
DTA	397	0.258	0.290	0.000	0.119	0.544
LTD	397	0.184	0.258	0.000	0.000	0.404
Independent variables						
TANG	397	0.556	0.344	0.241	0.636	0.865
OPER	397	0.164	0.243	0.033	0.070	0.136
SIZE	397	19.053	1.337	18.341	19.288	20.063
EVOL	397	–0.779	9.280	–1.025	–0.275	0.398
PROFIT	397	0.144	0.375	–0.001	0.050	0.151
GROWTH	397	0.205	1.143	–0.099	–0.022	0.100

Panel B and C of Table 2 differentiate between non-family and family firms in order to discover if these two groupings have different characteristics. Capital structure measured by total debts and long-term debts of non-family and family firms does not differ much between the two groups (28.1 percent for non-family firms and 25.8 percent for family firms). However, operating leverage and earnings volatility of the two groups exhibit clear differences.

Table 3 displays correlation coefficients among our interested variables. Except for the size variable, correlations among the rest of the independent variables are generally below 50.0 percent. This leads us to believe that the issue of multicollinearity is not of great concern. We confirm this by conducting a variance inflation factors (VIF) test and find that test statistics are below 10, indicating no serious multicollinearity problem. Debt-to-asset and long-term debts to assets are highly correlated. This prompts us to use one of them as our dependent variable. However, we reserve another for robustness check as well.

Table 3 Correlations

The table reports pairwise correlation coefficients for debt-to-asset ratio and firm-specific determinants of capital structure. The sample period is from 2007 to 2016. Except for family dummy variable, the information was streamlined by removing data for firms with missing information, firms with visible accounting errors, and extreme outliers for all variables. Numbers in italics below the coefficients indicate p-values. See Table 1 for variable definitions.

	DTA	LTD	TANG	OPER	SIZE	EVOL	PROFIT	GROWTH	FAM
DTA	1.000								
LTD	0.847	1.000							
	0.000								
TANG	0.380	0.407	1.000						
	0.000	*0.000*							
OPER	–0.188	–0.173	–0.325	1.000					
	0.000	*0.000*	*0.000*						
SIZE	0.379	0.397	0.606	–0.558	1.000				
	0.000	*0.000*	*0.000*	*0.000*					
EVOL	–0.129	–0.129	–0.088	0.047	–0.074	1.000			
	0.000	*0.000*	*–0.007*	*–0.147*	*–0.023*				
PROFIT	–0.186	–0.134	0.076	–0.019	0.100	0.025	1.000		
	0.000	*0.000*	*–0.019*	*–0.568*	*–0.002*	*–0.441*			
GROWTH	0.257	0.259	0.055	–0.074	0.103	–0.338	–0.018	1.000	
	0.000	*0.000*	*–0.095*	*–0.023*	*–0.002*	*0.000*	*–0.587*		
FAM	–0.075	–0.023	0.035	–0.188	0.155	0.040	0.046	0.010	1.000
	–0.022	*–0.489*	*–0.283*	*0.000*	*0.000*	*–0.226*	*–0.155*	*–0.752*	

3.2 Methodology

We will apply panel data with company and year fixed effects. The general model to be estimated is of the following form:

$$Lev_{it} = c + \sum_{j=1}^{J} \beta_j X_{it}^j + \varepsilon_{it}, \quad \varepsilon_{it}, = \nu_i + \upsilon_{i,t} \qquad (1)$$

where Lev_{it} is the financial leverage, defined as total debt to total assets, of firm i at time t, with $i = 1,..., N$, $t = 1,..., T$, c is a constant term, X_{it}'s are the explanatory variables and ε_{it} the disturbance, with ν_i the unobserved firm-specific heterogeneity and $\upsilon_{i,t}$ the idiosyncratic error.

We also form another model, bringing in the family dummy variable to test whether it affects capital structure decision and, if so, how it relates to the decision. Equation 2 shows effect of family business to capital structure decisions of shipping firms in Thailand. Due to econometric construction of fixed effect model, time-invariant variables (family firm dummy in this research) cannot be used directly as variables. Thus, we use family firm dummy as interaction effect with other variables.

$$Lev_{it} = c + \sum_{j=1}^{J} \beta_j X_{it}^j + \beta X_{it}^j \times FAM_{it} + \varepsilon_{it}, \quad \varepsilon_{it}, = \nu_i + \upsilon_{i,t} \qquad (2)$$

After we investigate the relationship among independent variables, we will compare the results with relevant empirical studies, including regular capital structure studies, those that focus on shipping industry and those that focus on the financial leverage of SMEs.

4. Empirical results

4.1 Standard capital structure regressions

Table 4 shows fixed effect regressions based on equations (1) and (2). Standard errors are clustered at the firm level to account for heteroskedasticity and autocorrelation of errors. We report the results for the standard specification as in columns 1 and 2 and for an extended model, including interaction terms between relevant variables and family dummy variable as in columns 3 and 4. Columns 2 and 4 show regressions with year fixed effects. The fixed effect results in Columns 1 and 2 indicate that the estimated coefficients on all standard capital structure variables other than growth, exhibit the same signs as in general capital structure studies (Lemmon et al., 2008; Frank and Goyal, 2009) and in the shipping industry's financial leverage studies (Drobetz et al., 2013). Tangibility effect signifies a positive relationship between fixed assets use and capital structure decisions, implying that collateral assets make companies more confident to accept higher levels of debt. This gives statistical support to hypothesis 1. The coefficient sign is similar to Drobetz et al. (2013), however the magnitude is different. Whereas they report the coefficient of 0.283 (Table 5, column 4), we report the coefficient of 0.214, an amount that represents three fourths of their results. The relationship is also in line with many pieces of existing literature, implying that the industry follows the trade-off theory for this variable. This indicates that assets are used as collateral for loans. In other words, the higher the investment that firm has in tangible assets, the higher the leverage of the firm will be. However,

Table 4 Standard regressions

The table shows the results of standard leverage regressions using a sample of 71 non-listed shipping companies from BOL database with TSIC code of 50121 (Sea and coastal freight water transport) during the period from 2007 to 2016. Except for family dummy variable, the information was streamlined by removing data for firms with missing information, firms with visible accounting errors, and extreme outliers for all variables. The dependent variable is financial leverage, defined as the ratio of total debt to total assets. See Table 1 for independent variable definitions. The t-statistics based on standard errors robust to clustering by firms are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Dependent variable: DTA	(1)	(2)	(3)	(4)
TANG	0.235***	0.248***	0.201***	0.214***
	(5.05)	(4.92)	(4.07)	(4.01)
OPER	–0.004	–0.006	–0.048	–0.070
	(–0.08)	(–0.11)	(–0.76)	(–0.99)
SIZE	0.088***	0.083***	0.065***	0.055***
	(5.02)	(4.32)	(3.67)	(2.94)
EVOL	0.000	0.000	–0.001	–0.001
	(0.41)	(0.61)	(–0.90)	(–1.11)
PROFIT	–0.213***	–0.206***	–0.210***	–0.201***
	(–9.27)	(–6.96)	(–8.44)	(–6.59)
GROWTH	0.038***	0.035***	0.035***	0.032***
	(6.20)	(5.63)	(5.49)	(4.93)
OPER * FAM			0.104	0.172*
			(1.16)	(1.76)
SIZE * FAM			0.063**	0.069**
			(2.35)	(2.64)
EVOL * FAM			0.001	0.002*
			(1.45)	(1.97)
Constant	–1.493***	–1.438***	–1.810***	–1.752***
	(–4.66)	(–4.16)	(–6.37)	(–5.47)
Observations	615	615	615	615
Adj. R-squared	0.523	0.530	0.529	0.539
Number of firms	71	71	71	71
Company fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	No	Yes	No	Yes

our result contradicts with Detthamrong et al. (2017) who report insignificance of tangibility to financial leverage.

Our sample data rejects hypothesis 2. Operating leverage is negatively related with capital structure choices, but the result is insignificant. This variable was confirmed by Lemmon et al. (2008) and Drobetz et al. (2013) to be inversely related with capital structure decisions. This implies that our sample firms with a high degree of operating leverage reflect a high degree of operating risk. Thus, this result supports the nature of high business risk.

Size (hypothesis 3) and profitability (hypothesis 5) are statistically significant and consistent with results from both recent capital structure literature (Lemmon et al., 2008; Frank and Goyal, 2009) and specific work related to Thai public firms (Wiwattanakantang, 1999; Deesomsak et al., 2004; Detthamrong, et al., 2017). Unlike the previous mentioned studies, our results demonstrate that growth has a positive relationship with capital structure choices. This may be possibly that we have a different definition. However, we find that earnings volatility (hypothesis 4) is statistically insignificant related to financial leverage decision, whereas the majority of other papers have found a negative relationship. One possible explanation is that our definition of the variable differs from that of the existing literature which defines asset risk as proxy of risk.

In light of the results from the previous section, we observe distinct differences between the data from family and non-family businesses. For this reason, we include three interaction terms to help explain the effect of being a family firm on capital structure decisions via size, operating leverage, and earnings volatility. Columns 3 and 4 of Table 4 exhibit models with interaction terms between relevant variables and family dummy variable. Through interaction with these variables, we find positive impacts for all of them, indicating the positive effect of family firms to capital structure decisions. This supports our hypothesis 7 that being a family firm increases the use of debt. Also, the adjusted R-squared values of the models with interaction terms improve from 53.0 percent to 53.9 percent, showing that the adjusted model adds more statistical explanation. The importance of the family dummy variable from Table 4 lets us do further regression by differentiating between non-family and family company observations.

4.2 Family firm effects

Table 5 exhibits fixed effect regression the same as in equation (1). Here, we separate two groups of observations. Columns 1 and 2 show results based on non-family firm observations, whereas columns 3 and 4 show observations based on family firms. Columns 2 and 4 display regressions with year fixed-effects. The results from Table 5 deserve to be explained in further details. First, operating leverage and earnings volatility have negative relationships with capital structure decisions for non-family firms whereas these variables have positive relationships with capital structure decisions for family firms. The results correspond to our hypotheses 2, 4, and

7, respectively. However, they are no longer significant in both groups. The insignificance is possibly the result of the lower number of firms in our sample.

In addition, it can be seen from Table 5 that the size effect of family firms increases more than 50.0 percent when compared with family firms. To be exact, the coefficients increase from 0.073

Table 5 Non-family and family regressions

The table shows the results of standard leverage regressions using a sample of 71 non-listed shipping companies from BOL database with TSIC code of 50121 (Sea and coastal freight water transport) during the period from 2007 to 2016. Except for family dummy variable, the information was streamlined by removing data for firms with missing information, firms with visible accounting errors, and extreme outliers for all variables. The dependent variable is financial leverage, defined as the ratio of total debt to total assets. See Table 1 for independent variable definitions. The t-statistics based on standard errors robust to clustering by firms are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Dependent variable: DTA	Non-family firms		Family firms	
	(1)	(2)	(3)	(4)
TANG	0.214**	0.195*	0.191***	0.215***
	(2.31)	(1.78)	(3.35)	(3.72)
OPER	–0.053	–0.080	0.054	0.113
	(–0.80)	(–1.09)	(0.86)	(1.59)
SIZE	0.064***	0.073**	0.130***	0.119***
	(3.31)	(2.43)	(5.95)	(5.15)
EVOL	–0.001	–0.001	0.001	0.001
	(–1.11)	(–1.15)	(1.02)	(1.58)
PROFIT	–0.243***	–0.271***	–0.199***	–0.178***
	(–4.41)	(–4.51)	(–7.74)	(–5.43)
GROWTH	0.032***	0.024**	0.036***	0.035***
	(3.03)	(2.24)	(4.47)	(4.16)
Constant	–0.966***	–1.094**	–2.320***	–2.170***
	(–2.85)	(–2.25)	(–5.82)	(–5.18)
Observations	218	218	397	397
Adj. R-squared	0.421	0.443	0.570	0.586
Number of firms	27	27	44	44
Company fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	No	Yes	No	Yes

(column 2) to 0.119 (column 4). The coefficient magnitude of family firms is closer to what reported by studies using data of publicly listed companies in Thailand (see, e.g., Wiwattanakantang, 1999; Deesomsak et al., 2004; Haron, 2014). In shipping sector, our study suggests that the capital structure decisions of the non-listed family firms are dissimilar to large firms in the sense of the common business characteristics. Lastly, growth has a significantly positive relation to capital structure decisions for both groups, but the coefficient value of family firms is greater than that of non-family firms. An explanation of this may be that the family firms are confident in their ability to pay back bank loans.

Overall results of non-family firms in this subsection are equivalent to those using publicly held companies (see, e.g., Lemmon et al., 2008) and Drobetz et al. (2013) who use globally-listed shipping companies. Only growth factor is different in terms of coefficient sign compared to the abovementioned papers. We can summarize that the fact that these companies are in the capital-intensive shipping sector plays a more important role than the fact that they are operated by SMEs. These firms act more like large firms and can be loosely explained by the trade-off theory rather than pecking order theory. However, when family dummy variable is added to our model, overall coefficients positively increase in magnitude, suggesting a rise in use of debt. The family firms do not want to lose control, a desire held by any small and medium family firm. This is consistent with the findings of Giannakopoulou et al. (2016), that a family firm with a high degree of control can influence decisions.

To check for robustness regarding capital structure definitions, financial leverage can be defined as long-term debt to assets ratio (LTD). We regress by the same model using LTD as the dependent variable and find that results are robust with the case of debt-to-asset ratio. Interestingly, growth of family firms has a significant positive impact on LTD while non-family firms do not have such a relation with the decisions. Family owners keep business running which makes sense to use long-term debt with more commitment, while non-family firms may switch use between short-term and long-term debt. Another possible justification is the family firm reputation, allowing to use long term debt. The results are shown in Table 6.

Table 6 Non-family and family regressions with LTD as dependent variables

The table shows the results of standard leverage regressions using a sample of 71 non-listed shipping companies from BOL database with TSIC code of 50121 (Sea and coastal freight water transport) during the period from 2007 to 2016 Except for family dummy variable, the information was streamlined by removing data for firms with missing information, firms with visible accounting errors, and extreme outliers for all variables. The dependent variable is financial leverage, defined as the ratio of long-term debt to total assets. See Table 1 for independent variable definitions. The t-statistics based on standard errors robust to clustering by firms are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Dependent variable: DTA	Non-family firms		Family firms	
	(1)	(2)	(3)	(4)
TANG	0.222***	0.217**	0.177***	0.163***
	(2.93)	(2.46)	(3.63)	(3.01)
OPER	–0.016	–0.030	0.024	0.044
	(–0.27)	(–0.49)	(0.36)	(0.67)
SIZE	0.057**	0.074**	0.095***	0.090***
	(2.38)	(2.09)	(4.01)	(3.46)
EVOL	–0.000	–0.001	–0.000	0.000
	(–0.55)	(–0.80)	(–0.24)	(0.35)
PROFIT	–0.239***	–0.254***	–0.178***	–0.162***
	(–4.82)	(–4.57)	(–7.10)	(–5.40)
GROWTH	0.005	–0.006	0.035***	0.037***
	(0.22)	(–0.29)	(5.98)	(5.72)
Constant	–0.935**	–1.210*	–1.715***	–1.623***
	(–2.17)	(–2.01)	(–3.91)	(–3.42)
Observations	218	218	397	397
Adj. R-squared	0.399	0.407	0.475	0.492
Number of firms	27	27	44	44
Company fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	No	Yes	No	Yes

5. Discussion and Conclusion

This study examines capital structure decisions of Thai non-listed shipping companies. We find that tangibility, size, and growth are statistically and positively associated with capital structure whereas profitability is statistically but negatively related with capital structure. Except for positive relationship between asset growth and capital structure decision, other variables are in line with current studies using public firms as their observations. In other words, the impact of being in the shipping sector is greater than being an SME. This follows the trade-off theory rather than the pecking order theory, which at first appeared more applicable to capital structure decision of relatively smaller firms. In summation, smaller firms do not behave differently from large firms in terms of capital structure decisions. This can possibly be explained by (1) their high tangibility ratio, accounting for 53.8 percent, which is consistent with Hofmann and Lampe (2013) and (2) high financial leverage due to the capital-intensive nature of the shipping sector.

Interestingly, compared with non-family firms, the family firms appear to more actively monitor the operating leverage ratio. Although the coefficient value is not strong, we can add to our understanding of the importance of family participation in capital structure determinations. In other words, this implies that family firms can adjust their choices between equity and debt financing more adeptly than non-family firms. However, being a family firm leads to a more complicated interpretation in the sense that it adds both long-term debt and total debt use against shareholder's equity. This can be viewed as a support for pecking order theory as family firms are afraid of losing management control to outside investors or having business secrets stolen by competitors.

It should be noted that some variables in our research differ from most literature that collects public firm data. These listed companies have market capitalization data, providing a variety of financial leverage definitions. Apart from using equity book value as part of assets, most researchers also define asset value using market value of equity. This, however, is limited to our study as our samples are private firms. Further, growth, which is generally defined by market to book value of equity in existing literature, follows a different definition in our study. This may be one of the reasons why our results report that growth has positive relationship with capital structure choices. Changes in variable definition can play important roles in our results both in terms of significance, coefficient signs and magnitudes compared to existing literature. Second, although we assume there is no change in shareholding structure of selected firms, it is interesting to see if shareholding evolution may affect capital structure decision. This again, is limited to our study because we cannot find such information in the past.

Third, it is well-known that current corporate finance literature has moved to dynamic panel

data regression to deal with potential endogeneity problems which may reduce reliability of statistical results. Endogeneity has its roots from omitted variables, reversal causality, and measurement errors. Unfortunately, these symptoms are typical in capital structure literature (see, e.g., Roberts and Whited, 2013). Therefore, to improve confidence in results, it is recommended that further studies use more advanced econometric techniques that can specifically deal with such problems. Finally, further research on capital structure decisions of non-listed companies in other transport sectors would be useful, as this area is still understudied.

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