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The Effect of Capital Structure on Firm Value for Vietnam's Seafood Processing Enterprises

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Abstract

The purpose of this paper is to investigate whether there is an optimal leverage at which point firm is able to maximize its value. An advanced panel threshold regression model is applied to test the panel threshold effect of capital structure on firm value among 92 Vietnam's seafood processing enterprises (SEAs) from 2005 to 2010. In this study, We use ROE as surrogate for firm value and debt ratio (DA) as surrogate for capital structure and as the threshold variable.

The empirical results strongly indicate that two-threshold effect exists between debt ratio and firm value. Besides, the coefficient is positive when debt ratio is less than 59.27%, which implies that debt financing can improve firm value. The coefficient is negative and presents a decreasing trend when the debt ratio is between 59.27% and 94.60% or above 94.60%, implying that, in that regime, a further increase in debt financing, deteriorates firm value. We, therefore, compelled to conclude that the relationship between leverage and firm value has a nonlinear relationship represents an convex Parapol shape. The findings suggest implications for Vietnam's seafood processing enterprises (SEAs) on flexible usage of financial leverage. Specifically, SEAs should not use loans over 59.27%. To ensure and enhance the Firm value, the scope of the optimal debt ratio should be less than 59.27%.

Keywords: Capital Structure, Firm Value, Panel Threshold Regression Model

1. Introduction

Since the 60 years, the relationship between capital structure and firm value has been a significant, but controversial issue in finance. Theories of this relationship predict positive, negative, or no statistically significant relationship (Modigliani and Miller (1958), Modigliani and Miller (1963), Miller (1977), Myers (1977), Myers and Majluf (1984), Graham (2000)). Similarly, empirical studies have also produced mixed results (Fama and French (1998), Booth et al.(2001), Mesquita and José Edson Lara (2003), Joshua Abor (2005), Mollik (2005), Gulnur Muradoglu and Sheeja Sivaprasad (2006), Pornsit Jiraporn and Yixin Liu (2007), Walaa Wahid ElKelish (2007), Andreas Stierwald (2009)).

The results of these studies indicate that the enterprise value is a linear function of capital structure, means that the slope of the enterprise value is constant in all the different debt ratios. Means that regression functions are identical across all observations in a sample. But in fact each different level of debt ratio, it affects the firm value differently - it can impact positively or negatively to firm value (Chien-Chung Nieh, Hwey-Yun Yau, and Wen-Chien Liu (2008), Tsangyaao Chang, Kuei-Chiu Lee, Yao-Men Yu and Chia-Hao Lee (2009), Yu-Shu Cheng, Yi-Pei Liu and Chu-Yang Chien (2010)).

Vietnam has many outstanding advantages in the industry to develop seafood processing. This is one of the key export sector, contributing about 4% of GDP in the economy in 2010. Currently, Vietnam's aquatic products have been exported to 155 markets around the world, in which three main markets are EU, USA and Japan, accounting for 60.6% of export turnover. EU accounts for 26% share of exports from Vietnam, Japan and the United States accounts for about 17.8% and 16.9%. Characteristics of Vietnam's seafood processing enterprises are small-scale, newly-established, semi-manual labored, backward processing technology. The number of listed companies on the stock market is limited. Further, they present low profitability, high bankruptcy risk (Cuong (2010)) due to continuous natural disasters, output markets of numerous barriers, limited capital and so on. Interest payments are the main section in debt structure. With the increase of interest rates as at present, financial costs have significantly gone up in this year, resulting in decreasing profit of the fisheries industry in 2010, many businesses have closed and declared bankruptcy. From the above practices, study the effect of capital structure on firm value for SEAs will help the enterprises making the decisions of enterprise capital restructuring more suitable. Specifically, how to use debt reasonably, in which case the increasing debt is effective, in which case the debt limit to reduce risk, reduce the risk of damage to enterprises. It is, therefore, of a particular, interest to investigate the relationship between capital structure and firm value in a sample of SEAs.

In this study, for the purpose of indicating the extent of capital structure, the debt will have a positive effect, increasing enterprise value; the extent of capital structure, the debt will have negative effects, reducing the value of the enterprise. This research applies the threshold regression model of Hansen (1999) and refer to the empirical study of Chien-Chung Nieh, Hwey-Yun Yau, and Wen-Chien Liu (2008), Yu-Shu Cheng, Yi-Pei Liu and Chu-Yang Chien (2010) to construct the threshold regression model to investigate the effect of capital structure on firm value for SEAs.

The paper is divided into six sections. The next section reviews the results of previous theoretical and empirical research. The third section provides the sample data and the variables. The fourth section discusses the methodology. Section 5 discusses the empirical results, and the final section summarizes the key findings and implications.

2. Theoretical and Empirical Issues

The capital structure of a firm concerns the mixture of debt and equity the firm uses in its operation. The relationship between capital structure and firm value has been the subject of considerable debate. Throughout the literature, debate has centered on whether there is an optimal capital structure for an firm to maximizes the value of the firm

The debate on the relevance of capital structure to firm value has progressed from academic model to practical reality since Modigliani & Miller's research (1958). In a frictionless and perfect markets world, the irrelevant capital structure of Modigliani and Miller (1958) argued that firm value was independent of firm capital structure, and there was no optimal capital structure for a specific firm. However, Modigliani and Miller's (1958) perfect market assumptions: such as no transaction costs, no taxes, symmetric information and identical borrowing rates, and risk free debt, were contradictory to the operations in the real world.

In their subsequent paper, Modigliani and Miller (1963) relaxed their assumption by incorporating corporate tax benefits as determinants of the capital structure of firms. The key feature of taxation is the recognition of interest as a tax-deductible expense. A firm that pays taxes receives a

partially offsetting interest "tax-shield" in the nature of lower taxes paid. In other words, the firm value is increased through the use of debt in the capital structure, due to the tax deductibility of interest payments on debt. This is a tacit admission in which capital structure affects firm value. Consequently, as Modigliani and Miller (1963) proposed, firms should use as much debt capital as possible to maximize their value.

In analogous to Modigliani and Miller's (1963) propositions, Miller (1977) incorporated both corporate taxes and personal taxes into his model. According to Miller (1977), the value of the firm depends on the relative level of each tax rate, compared with the other two. Miller (1977) indicated that relative level of each tax rate determines firm value, and that the gain from employing debt may be smaller than what was suggested in Modigliani and Miller (1963). In a recent study, Graham (2000) suggested that the capitalized tax benefit of debt was ten percent of firm value and that personal tax penalty reduces this benefit by approximately two-thirds before the tax Reform Act of 1986 and by slightly less than half after reform.

Other theories that have been advanced to explain the capital structure of firms include bankruptcy cost, agency theory, and the pecking order theory. These theories are discussed in turn.

The static trade-off theory was developed by Myers in 1977. Myers (1977) suggests that the optimal capital structure does exist. A value-maximizing firm will find an optimal capital structure by trading off benefits and costs of debt financing. Therefore, it values the company as the value of the firm if unlevered plus the present value of the tax shield minus the present value of bankruptcy and agency costs.

The pecking order theory proposed by Myers (1984) and Myers and Majluf (1984), suggests that there is a hierarchy of firm preferences with regard to the financing of their investments and that there is no well-defined target debt ratio. The conclusion drawn from the pecking order theory is that there is a hierarchy of firm preferences with respect to the financing of their investments. This theory suggests that firms finance their needs, initially by using internally generated funds, i.e. undistributed earnings, where there is no existence of information asymmetry, next by less risky debt if additional funds are needed and lastly by risky external equity issue to cover any remaining capital requirements. The order of preferences reflects relative costs of finance to vary between the different sources of finance.

Fama and French (1998), analyzing the relationship among taxes, financing decisions, and the firm's value, concluded that the debt does not concede tax benefits. Besides, the high leverage degree generates agency problems among shareholders and creditors that predict negative relationships between leverage and profitability. Therefore, negative information relating debt and profitability obscures the tax benefit of the debt.

Graham (2000) concluded in his work that big and profitable companies present a low debt rate. Booth et al. (2001) developed a study attempting to relate the capital structure of several companies in countries with extremely different financial markets. They concluded that the variables that affect the choice of the capital structure of the companies are similar, in spite of the great differences presented by the financial markets. Besides, they concluded that profitability has an inverse relationship with debt level and size of the firm.

Mesquita and Lara (2003) found in their study that the relationship between rates of return and debt indicates a negative relationship for long-term financing. However, they found a positive relationship for short-term financing and equity. A number of other studies as Gulnur Muradoglu and Sheeja Sivaprasad (2006), Andreas Stierwald (2009) also found a negative relationship between profitability and debt ratio.

Joshua Abor (2005), found in his study that a significantly positive relation between the ratio of short-term debt to total assets and ROE. However, a negative relationship between the ratio of long-term debt to total assets and ROE was found. With regard to the relationship between total debt and return rates, the results show a significantly positive association between the ratio of total debt to total

assets and return on equity. Mallik (2005), who discovered that there is a positive association between leverage and performance.

Pornsit Jiraporn and Yixin Liu (2007) analyzing the relationship Capital Structure, Staggered Boards, and Firm Value. The results demonstrate no significant adverse impact on firm value due to excess leverage. Walaa Wahid ElKelish (2007) investigates the impact of financial structure on firm value. Empirical results show that debt to equity ratio has no impact on firm value.

Chien-Chung Nieh, Hwey-Yun Yau, and Wen-Chien Liu (2008) investigates the existence of an optimal debt ratio. The result shows that the appropriate debt ratio range for the electronic listed firms in Taiwan should not be over 51.57 percent or below 12.37 percent. To ensure and enhance the firm's value, the optimal range of debt ratio should be within 12.37 percent and 28.70 percent. Yu-Shu Cheng, Yi-Pei Liu and Chu-Yang Chien (2010) analyzed the relationship Capital structure and firm value in China. This study uses the advanced panel threshold regression model to examine the panel threshold effect of leverage on firm value among 650 A-shares of Chinese-listed firms from 2001 to 2006. This study use ROE as surrogate for firm value and debtto-asset ratio as the threshold variable. The empirical results strongly indicate that triple-threshold effect exists between debt ratio and firm value. Besides, the coefficient is positive when debt ratio is less than 53.97%, which implies that debt financing can improve firm value. The coefficient is still positive, but starts to decrease when debt ratio is between 53.97 and 70.48%. The coefficient is negative and presents a decreasing trend when the debt ratio is between 70.48 and 75.26% or above 75.26%, implying that, in that regime, a further increase in debt financing, deteriorates firm value. To ensure and enhance the firm's value, the optimal range of debt ratio should be is less than 70.48%.

In summary, there is no universal theory of the debt-equity choice. Different views have been put forward regarding the financing choice. This research applies the threshold regression model of Hansen (1999) and refer to the empirical study of Chien-Chung Nieh, Hwey-Yun Yau, and Wen-Chien Liu (2008), Yu-Shu Cheng, Yi-Pei Liu and Chu-Yang Chien (2010) to construct the threshold regression model to investigate the effect of capital structure on firm value for SEAs.

3. Data

3.1. Sample Description

In this study, the data set includes a combination of SEAs listed on two Vietnam's stock exchange markets from 2005 – 2010 and several other unlisted seafood processing enterprises. For some enterprises, collected data consists of balance sheets and annual business outcome reports. Following the above sample selection process, a total of 552 samples are collected, including 132 and 420 for listed SEAs and unlisted SEAs respectively across a period of 6 years, equivalent to 22 and 70 for listed SEAs and unlisted SEAs. Sample ratios of industries are presented in the following table:

Table 1: Sample distribution by Vietnam's Seafood processing industry

Enterprises	Observations	Percentage (%)
Listed Vietnam's Seafood Processing Enterprises	132	24%
Unlisted Vietnam's Seafood Processing Enterprises	420	76%
Total	**552**	**100%**

Source: Enterprises listed on two stock exchange markets HoSE and HASTC + Enterprises surveyed

3.2. Variables

3.2.1. Firm Value

When studying the relationship between capital structure and firm value, to measure firm value, Yu-Shu Cheng, Yi-Pei Liu and Chu-Yang Chien (2010) uses return on equity (ROE). Studying the impacts of capital structure on profitability, Joshua Abor (2005) use return on equity (ROE) to measure firm

value. Research by Chien-Chung Nieh, Hwey-Yun Yau, and Wen-Chien Liu (2008) use ROE and EPS to identify firm value. On the other hand, researches by Samy Ben Naceur And Mohamed Goaied (2002), Feng-Li Lin and Tsangyao Chang (2008) adopt the ratio of market-to-book value (MTB) to identify firm value. Additionally, researches by Chung, K. H. and S. W. Pruitt (1994), Feng-Li Lin (2010) use Tobin's q to measure firm value. Alternatively, characteristics of Vietnam's seafood processing enterprises are the number of listed companies on the stock market is limited. The aforementioned argument suggests that the suitable firm value should be based on ROE. Accordingly, we do not market the value of equity to calculate firm value. That is, we only use book value of equity to calculate firm value. The measurement of firm value defined as below:

$$\mathbf{ROE} = \frac{\textbf{Book value of Earnings after taxes}}{\textbf{Book value of equity}}$$

3.2.2. Threshold and Explanatory Variables

There are two categories of explanatory variables in our panel data and threshold regression model. One is the threshold variable, which is the key variable used to assess the optimal capital structure of a firm and to capture the threshold effect of debt on firm value.

The threshold variable is a variable, when threshold variable is bigger or smaller than threshold value (γ), the samples can be divided into two groups, which can be expressed in different slopes β_1 and β_2.

The explanatory variable is a variable, reflecting its impact on the dependent variable. In the threshold regression model, explanatory variable impacts are not fixed but depends on the threshold value of the threshold variable.

When studying the relationship between capital structure and firm value, to measure threshold and explanatory variables, Yu-Shu Cheng, Yi-Pei Liu and Chu-Yang Chien (2010) used total debt on total asset (DA). On the other hand, research by Chien-Chung Nieh, Hwey-Yun Yau, and Wen-Chien Liu (2008) adopted the ratio of total debt on total asset (DA) to identify threshold and explanatory variables.

In this study, the measurement of threshold and explanatory variables through debt-to-asset ratio. For Vietnam's Seafood Processing Enterprises, short-term debt is the majority of total debt. This is a particular circumstance in SEAs. The aforementioned argument suggests that the suitable debt-ratio should be based on short-term debts. Nonetheless, most SEAs in Viet nam tend to maintain their short-term debt even after the expiration date for another year or so, so that short-term debt can easily become long-term debt over time, although they are still recorded as short-term debt in their balance sheet. For this reason, the total debt is used, rather than short- or long-term debt, to calculate debt ratio. Additionally, characteristics of Vietnam's seafood processing enterprises are the number of listed companies on the stock market is limited. Accordingly, the market value of debt is not applied to calculate debt ratio. That is, only use book value of debt is applied to calculate debt ratio. The measurement of debt ratio defined as below:

$$\mathbf{DA} = \frac{\textbf{Book value of Total debt}}{\textbf{Book value of Total assets}} \textbf{x100\%}$$

3.2.3. Control Variables

On the basis of previous studies, two control variables are used in this research: Enterprise size and firm's growth. Following section will analyze interconnection between those variables relative to firm value.

Enterprise size: Enterprise size (SIZE) is considered one determinant of firm value. Joshua Abor (2005) suggest that enterprises of higher size generally have higher profitability. This suggests a positive relationship between the control variable (enterprise size) and profitability. On the other hand, researches by Feng-Li Lin (2010), Yu-Shu Cheng, Yi-Pei Liu and Chu-Yang Chien (2010) suggest that enterprises of higher size generally have lower firm value. This would suggest a negative relationship

between the control variable (firm size) and firm value. Regard to this variable, we suggest that enterprise size might have either positive or negative relationship with firm value.

To measure enterprise size, there exist different perspectives. According to Fan, Titman & Twite (2003), Shumi Akhtar (2005), Yu-Shu Cheng, Yi-Pei Liu and Chu-Yang Chien (2010), enterprise size is defined by Ln(total asset). Further, Titman and Wessels (1988), Jouhua Abor (2005) show that enterprise size is defined by Ln(total revenue).

In this study, we only use book value of total asset to calculate enterprise size. The measurement of enterprise size defined as below:

SIZE = Ln(Book value of Total assets)

Growth: Growth is considered to be a factor related to firm value. Joshua Abor (2005) suggest that enterprises of higher growth opportunities generally have higher profitability. Additionally, researches by Chien-Chung Nieh, Hwey-Yun Yau, and Wen-Chien Liu (2008), Yu-Shu Cheng, Yi-Pei Liu and Chu-Yang Chien (2010) suggest that enterprises of higher growth rate on operating sales generally have higher firm value. This suggests a positive relationship between the control variable (growth) and firm value. On the other hand, researches by Feng-Li Lin and Tsangyao Chang (2008), Feng-Li Lin (2010) suggest that sales growth is not significantly related to firm value. Regard to this variable, growth might have either positive relationship with firm value or not significantly related to firm value.

To measure growth, there exist different perspectives. According to Joshua Abor (2005), Chien-Chung Nieh, Hwey-Yun Yau, and Wen-Chien Liu (2008), Feng-Li Lin and Tsangyao Chang (2008), Feng-Li Lin (2010), growth is defined by growth rate on operating sales. Further, Yu-Shu Cheng, Yi-Pei Liu and Chu-Yang Chien (2010) show that growth is defined by growth rate of operating sales and growth rate of total assets.

In this study, we only use book value of total revenue to calculate growth ratio. The measurement of growth ratio defined as below:

$$\mathbf{SG} = \frac{\mathbf{Total\ revenue\ (t) - Total\ revenue\ (t-1)}}{\mathbf{Total\ revenue\ (t-1)}}$$

Table 2 presents descriptive statistics of listed SEAs and unlisted SEAs samples. Financial information was collected from balance sheets and annual business outcome reports during 2005 – 2010 period. Total observations in the model are 552 samples, including 132 and 420 for listed SEAs and unlisted SEAs respectively.

Table 2: Descriptive statistics of sample variables

Variables	Minimum	Median	Maximum	Mean	Std. Dev.	Jarque-Bera
ROE_{it}	-2.5905	0.0765	0.9498	0.0852	0.2556	15666.79 ***
DA_{it}	0.0018	0.6176	0.9729	0.5720	0.2479	46.7402 ***
$SIZE_{it}$	20.3455	24.8280	29.3152	24.7566	1.9092	21.0737 ***
SG_{it}	-1.5035	0.0271	1.5878	0.0301	0.2325	4130.252 ***

Notes: Std. Dev. denotes standard deviation, while J-B denotes the Jarque-Bera test for normality. The variables ROE_{it}, DA_{it}, $SIZE_{it}$, SG_{it} represent ROE, debt-to-asset ratio, firm size (natural log form of total assets), growth rate of operating sales, respectively.
***, ** and * indicate significance at the 1%, 5% and 10% level, respectively.

Results of descriptive statistics in table 2 show that: The mean of debt ratio (DA) and return on equity (ROE) of SEAs are 57,2% and 8,52%. Size by average assets (SIZE) of SEAs is 24,76, equivalent to 56,64 billions VND. Growth rate of operating sales (SG) of SEAs is 3,01%. On the basis of the Jarque-Bera test results, we reject the normality of all the variables.

4. Research Methodologies

According to the "Trade-off Theory" of capital structure, when debt ratio increases, the interest tax shield increases. However, on the other side, leverage related costs increase to offset the positive effect of debt ratio to the firm value. Thus, this paper aims at examining whether threshold effect exists between the capital structure and value. We assume that there exists an optimal debt ratio, and try to use threshold model to estimate this ratio, which can capture the relationship between capital structure and firm value as well as help financial managers make decisions of enterprise capital structuring more suitably. This research applies the threshold regression model of Hansen (1999) and refer to the empirical study of Chien-Chung Nieh, Hwey-Yun Yau, and Wen-Chien Liu (2008), Yu-Shu Cheng, Yi-Pei Liu and Chu-Yang Chien (2010) to construct the panel threshold regression model to investigate the effect of capital structure on firm value for SEAs.

We constructed the following single threshold model:

$$ROE_{it} = \begin{cases} \mu_i + \theta' h_{it} + \beta_1 D_{it} + \varepsilon_{it} & if \quad D_{it} \le \gamma \\ \mu_i + \theta' h_{it} + \beta_2 D_{it} + \varepsilon_{it} & if \quad D_{it} > \gamma \end{cases} \tag{1}$$

Where $\theta = (\theta_1 , \theta_2)'$ and $h_{it} = (SIZE_{it} , SG_{it})'$; ROE_{it} represents firm value and return on equity is used as the proxy; D_{it} (debt ratio) is the explanatory variable and also the threshold variable; γ is the hypothesized specific threshold value. We incorporate two variables (h_{it}) so as to isolate the effects of other factors that have predictable influences on firm value. The three control variables contains $SIZE_{it}$: firm size; SG_{it}: growth rate of operating sales. θ_1, θ_2 represent the coefficient estimates of the control variables. μ_i is a given fixed effect used to grasp the heterogeneity of different companies under different operating conditions; β_1 is the threshold coefficient when the threshold value is lower than γ; β_2 is the threshold coefficient when the threshold value is higher than γ; Error item ε_{it} must comply with the iid assumptions ($e_{it} \sim$ iid $(0, \sigma^2)$), where the average is 0, and variance is σ^2; i represents different firms and t represents different periods.

For the estimation procedures, we first eliminate the individual effect μ_i using the "within Transformation" estimation techniques in the traditional fixed effect model of panel data. By using the ordinary least squares and minimizing the concentrated sum of squares of errors, ($S_1(\gamma)$), we can obtain the estimators of our threshold value and the residual variance, $\hat{\gamma}$ and $\hat{\sigma}^2$, respectively.

For the testing procedures, first, we have to go on to test the null hypothesis of no threshold effect**,** H_0*:* $\beta_1 = \beta_2$, which can be based on the likelihood ratio test: $F_1 = \dfrac{S_0 - S_1(\hat{\gamma})}{\hat{\sigma}^2}$, where S_0 and $S_1(\hat{\gamma})$ are sum of squared errors under null and alternative hypotheses, respectively. However, as the asymptotic distribution of F_1 is non-standard, we use the procedure of bootstrap to construct the critical values and p-value.

Upon the existence of threshold effect, H_0*:* $\beta_1 \neq \beta_2$, we should test for the asymptotic distribution of threshold estimate, H_0*:* $\gamma = \gamma_0$, and adopt the likelihood ratio test: $LR_1(\gamma) = \dfrac{(S_1(\gamma) - S_1(\hat{\gamma}))}{\hat{\sigma}^2}$ with the asymptotic confidence intervals: $c(\alpha) = -2\log(1 - \sqrt{1-\alpha})$.

If there exist double thresholds, the model can be modified as:

$$ROE_{it} = \begin{cases} \mu_i + \theta' h_{it} + \beta_1 D_{it} + \varepsilon_{it} & if \quad D_{it} \le \gamma_1 \\ \mu_i + \theta' h_{it} + \beta_2 D_{it} + \varepsilon_{it} & if \ \gamma_1 < D_{it} \le \gamma_2 \\ \mu_i + \theta' h_{it} + \beta_3 D_{it} + \varepsilon_{it} & if \quad D_{it} > \gamma_2 \end{cases} \tag{2}$$

Where threshold value $\gamma_1 < \gamma_2$. This can be extended to multiple ($\gamma_1, \gamma_2, \gamma_3, \ldots, \gamma_n$).

5. Empirical Results

5.1. Panel Unit Root Test Results

Hansen's (1999) panel threshold regression model is an extension of the traditional least squared estimation method, in fact. It requires that variables considered in the model need to be stationary in order to avoid the so-called spurious regression. Thus, the unit root test is first processed in this study. The null hypothesis of non-stationary versus the alternative in which variable is stationary, was tested using the group mean panel unit root test. This study, we first perform the panel unit root test by the Levin- Lin-Chu ADF (Levin et al., 2002) and the IPS ADF (Im et al.,2003) approaches. Table 3 reports both panel unit root test results.

Table 3: Panel unit-root test results

Variables	LLC		IPS	
	t-statistic	P-value	t-statistic	P-value
ROE_{it}	-22.4021	0.0000***	-10.2489	0.0000***
DA_{it}	-34.7593	0.0000***	-11.7595	0.0000***
$SIZE_{it}$	-90.4260	0.0000***	-81.6431	0.0000***
SG_{it}	-59.2924	0.0000***	-19.1145	0.0000***

Notes: LLC and IPS represent the Levin et al. (2002) and Im et al. (2003) panel unit-root test, respectively. The variables ROE_{it} , DA_{it}, $SIZE_{it}$, SG_{it} represent ROE, debt-to-asset ratio, firm size (natural log form of total assets), growth rate of operating sales, respectively.
***, ** and * indicate significance at the 1%, 5% and 10% level, respectively.

As shown in Table 3, the nulls of the unit root are all rejected, which indicates that all the variables are stationary, that is, I(0). Accordingly, we proceed with full analysis.

5.2. Tests of Threshold Effect

In this study, we follow the bootstrap method proposed by Hansen (1999) to obtain the approximations of the F statistics and then calculate the p-values. The bootstrap procedure is repeated 500 times for each of the three panel threshold tests. The F statistics contains F_1, F_2 and F_3 to assess the null hypotheses of none, one and two thresholds, respectively. Table 4 presents the test statistics F_1, F_2, and F_3, along with their bootstrap P-values.

Table 4: Tests for threshold effects between debt ratio and ROE

Threshold value	F-statistic		Test critical values		
	F	P-value	1%	5%	10%
Single threshold effect test					
0.9460	**37.9633**	**0.0200****	47.4235	21.7655	14.8743
Double threshold effect test					
0.5927 0.9460	**33.9600**	**0.0020*****	25.1524	17.1861	12.4142
Triple threshold effect test					
0.5927 0.8198 0.9230	4.5002	0.7900	25.3053	17.3599	13.8576

Notes: F-statistics and p-values are from repeating bootstrap procedures 500 times for each of the three bootstrap tests.
***, ** and * indicate significance at the 1, 5 and 10% level, respectively.

Results of tests for threshold effects between debt ratio and ROE in table 4 show that: The single-threshold effect is first tested to see if it exists. By using bootstrap to make 500 times, F-tatistics (F_1) of 37.9633 and P-value of 0.0200 are respectively yielded. They show significance under 5% significant level and reject the null hypothesis of no threshold effect. Likewise, bootstrap is used to

make 500 times and respectively yields F-statistics (F_2) of 33.9600 and P-value of 0.0020. They show significance under a 1% significant level and reject the null hypothesis of one threshold. Finally, triple-threshold effect is tested to see if it exists. Similarly, bootstrap is used to make 500 times and respective yields F-statistics (F_3) of 4.5002 and P-value of 0.7900. The results reject the null hypothesis of three thresholds. In conclusion, the aforementioned statistic analysis articulately shows that an asymmetric relationship of two thresholds in three regimes is significantly formed.

Table 4 also presents the estimated values of two thresholds, which are 59,27% and 94,60%, respectively. All observations are objectively and passively split into three regimes depending on whether the threshold variable it d is smaller or larger than the threshold value ($\hat{\gamma}_1, \hat{\gamma}_2$). Accordingly, we define three regimes formed by two threshold values to be debt if their debt ratio within the ranges (0 – 59,27%), (59,27% – 94,60%) and exceed 94,60%. Figure 1 shows the confidence interval construction in single theshold model.

Figure 1: Confidence Interval Construction in Single Threshold Model

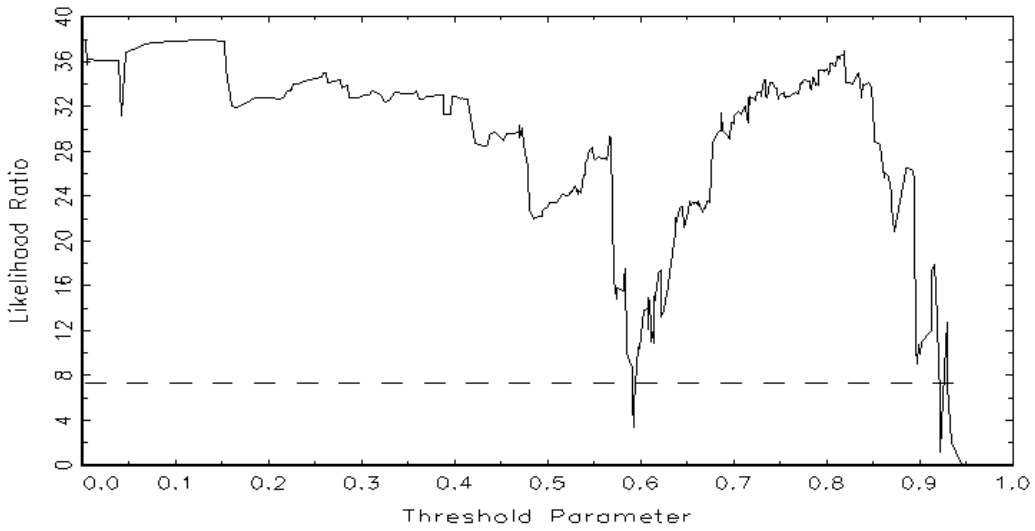

Figure 2 shows the confidence interval construction in double theshold model.

Figure 2: Confidence Interval Construction in Double Threshold Model

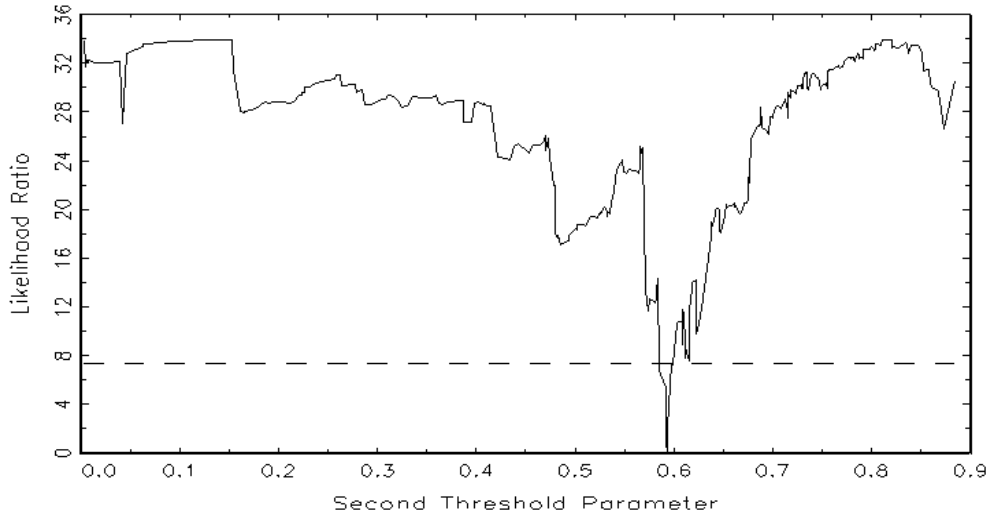

Table 5 reports the regression slope coefficients, conventional OLS standard errors, and White-corrected standard errors for three regimes. The estimated model from the empirical findings can be expressed as follows:

In the first regime, where the debt ratio is less than 59.27%, the estimated coefficient $\hat{\beta}_1$ is 0.1737 and is significant at the 10% level, indicating that ROE increases by 0.1737% with an increase of 1% in debt ratio.

Table 5: Estimated coefficients of ROE

Coefficients	Estimated value	OLS SE	t_{OLS}	White SE	t_{White}
$\hat{\beta}_1$	0.1737	0.0928	1.8718*	0.0848	2.0483**
$\hat{\beta}_2$	– 0.1067	0.0936	– 1.1400	0.0840	– 1.2702
$\hat{\beta}_3$	– 0.7953	0.1550	– 5.1310***	0.4023	– 1.9769**

Notes: $\hat{\beta}_1, \hat{\beta}_2, \hat{\beta}_3$ are the coefficient estimates that are smaller and larger than the threshold value γ . OLS SE and White SE represent conventional OLS SEs (considering homoscedasticity) and White-corrected SEs (considering heteroscedasticity), respectively.
***, ** and * indicate significance at the 1, 5 and 10% level, respectively.

The negative effects of debt on firm value are found in the second and last regime, respectively. In the second regime, where the debt ratio is between 59.27% and 94.60%, the estimated coefficient $\hat{\beta}_2$ is – 0.1067 and is insignificant, indicating that there is no relationship between debt ratio and firm value. In the third regime, where the debt ratio is greater than 94.60%, the estimated coefficient $\hat{\beta}_3$ is – 0.7953 and is significant at the 1% level, indicating that ROE decreases by 0.7953% with an increase of 1% in debt ratio. Therefore, the results clearly suggest that the relationship between debt ratio and ROE (that is, the slope value) varies in accordance with different changes in debt structure, and that debt structure has a nonlinear relationship with firm value.

Table 6 presents the estimated coefficients of two control variables. As shown in Table 6, the estimated coefficient of firm size ($\hat{\theta}_1$) is – 0.0205 and is insignificant, indicating that there is no relationship between firm size and firm value. The estimated coefficient of growth rate of operating sales ($\hat{\theta}_2$) is – 0.0486 and is insignificant, indicating that there is no relationship between growth rate of operating sales and firm value. Empirical finding is consistent with Feng-Li Lin (2010).

Table 6: Estimated coefficients of the control variables

Coefficients	Estimated value	OLS SE	t_{OLS}	White SE	t_{White}
$\hat{\theta}_1$	– 0.0205	0.0248	– 0.8266	0.0302	– 0.6788
$\hat{\theta}_2$	– 0.0486	0.0476	– 1.0210	0.0418	– 1.1627

Notes: $\hat{\theta}_1$, $\hat{\theta}_2$ represent estimated coefficients of firm size, growth rate of operating sales. OLS SE and White SE represent conventional OLS SEs (considering homoscedasticity) and White-corrected SEs (considering heteroscedasticity), respectively.
***, ** and * indicate significance at the 1, 5 and 10% level, respectively.

The estimated model from the empirical results is represented as follows:

$$ROE_{it} = \mu_i - 0.0205SIZE_{it} - 0.0486SG_{it} + 0.1737D_{it}I(D_{it} \le 0.5927) - 0.1067D_{it}\,I(0.5927 < D_{it} \le 0.9460) - 0.7953D_{it}I(D_{it} > 0.9460)$$

Where I (.) is an objective function.

Table 7 reports the percentage of firms which fall into the three regimes each year. As shown in Table 7, it found that approximately 46% SEAs fall in the first regime, where the debt ratio is less than 59.27% (that is, about 38 – 47 companies fall in the first regime each year), 53% of companies fall in the second regime, where the debt ratio is between 59.27% and 94.60% (that is, about 44 – 52 companies fall in the second regime each year) and 1% of companies fall in the third regime, where the debt ratio is greater than 94.60% (that is, about 0 – 2 companies fall in the third regime each year).

Table 7: Number (percentage) of firms in each regime by year

Year	$D_{it} \leq 59.27\%$		$59.27\% \leq D_{it} \leq 94.60\%$		$D_{it} \geq 94.60\%$	
	Number of firms	**Percentage of firms (%)**	**Number of firms**	**Percentage of firms (%)**	**Number of firms**	**Percentage of firms (%)**
2005	41	45%	50	54%	1	1%
2006	45	49%	47	51%	0	0%
2007	47	51%	44	48%	1	1%
2008	41	45%	50	54%	1	1%
2009	39	42%	51	55%	2	2%
2010	38	41%	52	57%	2	2%
Total	**251**	**46%**	**294**	**53%**	**7**	**1%**

6. Conclusions and Implications

The capital structure decision is crucial for any business organization. The decision is important because of the need to maximize returns to various organizational constituencies, and also because of the impact such a decision has on an organization's ability to deal with its competitive environment.

This study uses the advanced panel threshold regression model to examine the panel threshold effect of leverage on firm value among 92 SEAs from 2005 to 2010. We use ROE as surrogate for firm value and debtto-asset ratio (DA) as the threshold variable. The result shows that there exists double thresholds effect between debt ratio and firm value. Besides, the coefficient is positive when debt ratio is less than 59.27%, which implies that debt financing can improve firm value. The coefficient is negative and presents a decreasing trend when the debt ratio is between 59.27% and 94.60% or above 94.60%, implying that, in that regime, a further increase in debt financing, deteriorates firm value. It is, therefore, compelled to conclude that the relationship between leverage and firm value has a nonlinear relationship represents an convex Parapol shape. Thus, it is concluded that there exists an optimal debt ratio is less than 59.27% that increases firm value. These results are more consistent with the trade-off theory (Myers, 1977), Yu-Shu Cheng, Feng-Li Lin (2010) and Yi-Pei Liu and Chu-Yang Chien (2010) for which firm may search a "balance" that the interest tax shield is equal to the incremental costs through debt financing. Moreover, the size and growth rate of operating sales are shown to have no significant effect on firm value. This implies that expanding size and growth rate of operating sales does not necessarily increase firm value. Empirical finding is consistent with Feng-Li Lin (2010).

From the above-mentioned findings, there will be several implications for Vietnam's seafood processing enterprises in using financial leverage. *First,* SEAs should not use loans over 59.27%. To ensure and enhance the Firm value, the scope of the optimal debt ratio should be less than 59.27%. *Second,* for SEAs currently have debt ratios greater than 59.27%, managers can apply the models that are developed here in order to set a target level, and then gradually move towards it so as to maximize firm value. *Third,* from the above findings, we will study the factors affecting capital structure for each group of SEAs in each specific debt ratio threshold. The upcoming study is expected to offer practical implications to restructuring capital in order to help increase firm value of Vietnam's seafood processing enterprises.

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