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Above-Average Debt Ratio and the Relationship with Return on Equity: The Case of the Vietnamese Listed Seafood Enterprises

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Abstract

Many studies have presented the relationship between the leverage of firms and return on equity (ROE) in order to analyze how significant leverage has influence on the ROE of enterprises. Exploring the data set from financial statements and annual reports of the Vietnamese listed seafood enterprises from 2009 to 2013, the paper aims to examine the determinants of these firms having a greater debt ratio than the average of the industry. In addition, the relationship between ROE and a firm's leverage is analyzed by applying a fixed-effects regression. It can be found that firms having an above-average debt ratio have a lower ROE than their counterparts by 50.94%.

Keywords: Debt ratio; average level; fixed-effects regression; seafood enterprises; Vietnam.

1. Introduction

Capital structure is pondered as the mixture of debt and equity (Brigham and Daves, 2003). The capital structure decisions made by a firm include a firm's choice of a target capital structure, the average maturity of its debt, and the specific sources of financing it chooses at any given time. This is one of the three most fundamental issues in corporate finance management (Damodaran, 2001). Hence, this theme has been researched on many different aspects in many countries over time.

Modern financial theory has recorded different opinions on capital structure decisions, in which the three main pillars widely used to lay the foundation for further studies include the M&M theory (Modigliani and Miller, 1958; 1963), the Agency theory (Jensen and Mekling, 1976), and the Pecking-order theory (Myers and Majluf, 1984). Given that, capital structure decisions are the trade-off between benefits from using debt, such as tax shields, and other related costs, particularly bankruptcy costs and agency costs. Concurrently, due to asymmetric information, firms tend to prefer issuing debt rather than common stocks (Brigham and Daves, 2003). Nonetheless, the decisions to select a specific proportion of debt and equity depend on a firm's characteristics by virtue of the difference in conditions among countries as well as sectors. (Deesomsak et al., 2004).

Considered as a major export field in the Vietnamese economy, the seafood industry has been thoughtfully concerned by the government. Presently, seafood enterprises have been facing a lot of difficulties and challenges in their businesses, particularly the issue of using much debt in their capital structure. In this paper, we measure the probability of firms having higher debt ratios than the average level of the seafood industry during the period of 2009 through 2013. In other words, the determinants for a firm having above-average debt ratios are expected to be thoroughly examined. Theories on capital structure decision-making are also applied in determining the factors which have significant impacts on the debt ratio of each firm, compared to the average of this industry. An additional aspect that we consider is the impact of an above-average debt ratio on the ROE of the Vietnamese listed seafood enterprises. Hence, the main hypothesis of this study is as follows: *"There exists a significant relationship between ROE and the debt threshold of a firm if it has a higher debt ratio than the average of the sector"*. In sum, by building up two models of probit and fixed-effects, this research aims to address the following questions:

- Which factors have influence on the likelihood that a listed seafood company has a debt ratio greater than the average of the industry?

- Does the above average debt ratio of a firm affect its return on equity?

These questions are raised with a view to finding out the determinants of the capital structure of the Vietnamese listed seafood enterprises over the past five years, particularly the debt-using decision-making. This capital structure decision, as expected, has a significant impact on the ROE of the listed seafood companies in Vietnam. Therefore, in order to address these issues thoroughly, a panel data set of five years from 2009 to 2013 is explored so as to draw a comprehensive picture of the seafood enterprises' capital structure.

Accordingly, this study is organized into five

sections. After the introduction presented in the first section, the second section provides a literature review. The third section indicates the methodology including the data set and models used in the paper. Research results are analyzed in the fourth section, whilst discussion and conclusions are demonstrated at the end.

2. Literature review

2.1. Determinants of capital structure

By reviewing a number of studies on capital structure in companies over the world, the main factors influencing the capital structure of firms are discovered as follows:

Tangibility

Studies by Bradley et al. (1984), Titman and Wessels (1988), Rajan and Zingales (1995) in America and the G-7 economies documented an existence of a positive relationship between tangibility and firm leverage, in which tangibility is defined as a ratio of fixed assets to total assets. Furthermore, according to theories of Scott (1977), Williamson (1988), Harris and Raviv (1990), Rajan and Zingales explained that such a relationship leads to the fact that firms with high amounts of collateral upon which to secure debt find it easier to borrow, hence reducing agency problems.

Profitability

Myers (1984) presented that past profitability might be an important factor having influence on firms' current capital structure. Given his explanation, once firms are making a profit, they prefer first using retained earnings, then borrowing, and then issuing new equity, which is based on the Pecking-order theory (Myers and Majluf, 1984) and other evidence from studies by Donaldson (1961), Brealey and Myers (1984). Defined as a ratio of earnings before interest, tax and depreciation to total assets, profitability is found to have an inverse relation to gearing through a number of studies (Toy et al., 1974; Kester, 1986; Titman and Wessles, 1988; Rajan and Zingales, 1995).

Liquidity

Similar to profitability, the association between liquidity and leverage is clarified by the Pecking-order theory (Myers and Majluf, 1984). Accordingly, firms with high liquidity will borrow less. Deesomsak et al. (2004), in their study, provided evidence of a negative relationship between liquidity, which is defined as a ratio of current assets to current liabilities, and a firm's leverage.

Firm size

According to the Trade-off theory developed by Modigliani and Millers and their followers, big firms usually face a lower bankruptcy risk and their relative bankruptcy cost is also lower than small firms. Moreover, such large companies have low agency costs of debt, low monitoring costs, less volatile cash flows, and find it easier to approach the credit market. Thus, they tend to use more debt in order to utilize benefits from the tax shield. This basically means that firm size is expected to have a positive relationship with debt ratio. In empirical studies, firm size might be measured by the natural logarithm of sales – LnS (Rajan and Zingales, 1995), quit rates – QR (Titman and Wessles, 1988), or the natural logarithm of assets – LnA (Deesomsak et al., 2004). However, regarding the cost of issuing debt and equity securities, Smith (1997) found that small companies could have to pay higher costs to issue new equity and long-term debt in particular cases. There-

fore, these small companies may have a higher leverage level than the big ones, and they prefer using short-term debt rather than long-term.

In addition, given our predictions based on fundamental theories on capital structure as well as other studies, the following determinants are expected to impact firm's capital structure decisions.

Risk

Similar to the above explanation, risk is predicted to have a relationship with leverage. Bradley et al. (1984) found that the higher the risk, the lower the debt ratio. Two years later, Kim and Sorensen (1986) showed a positive association between risk and debt ratio. This can be explained by the inconsistency among the methods to measure risk as well as the incorrectness of results. In Nguyen's (2011) study, risk is estimated by standard deviation of cash flow, whilst Le (2014) measured risk by coefficient of variation of Return on Assets (ROA). In this paper, we use beta, which is further explained in the next section, to represent a firm's risk.

Risk attitude of corporate managers

Originally, capital structure decisions are the trade-off between risk and return, so in terms of behavioral finance, such decisions may depend on the attitude to risk of corporate managers. Accordingly, preferred-risk managers tend to use more debt than prudent ones. More simply, risk attitude could be measured by the age and gender of the managers. Barber and Odean (2001) found that the overconfidence level of young investors is greater than that of older investors. Also, the young are more easily caught up in risky activities (Kumar and Charles, 2006). Concerning gender, Barber and Odean (2001) and Pulford and Colman (1997) concluded that males are more self-confident than females, and ready to risk more.

Firm age

A firm's age is expected to have a positive relationship with debt ratio, derived from a study by Stinchcombe (1965). Given that long-lasting firms accumulate experience from economies, then they should be able to avoid unfortunate risks and achieve better performance. As a result, such companies would have access to the credit market more easily (Rao et al., 2007) and tend to use more debt in their capital structure.

In sum, studies worldwide have provided evidence on the relationship between different factors and the capital structure of firms. A common point of these empirical studies is that most of them explored the data set of companies in major developed markets such as America (Titman and Wessles, 1988; Denis and Mckeon, 2012), the United Kingdom (Bevan and Danbolt, 2002), or G-7 economies (Rajan and Zingales, 1995). There are a few studies examining the capital structure of firms in the Asian Pacific region, which mainly focuses on Thailand (Wiwattanakantang, 1999), Singapore (Deesomsak et al, 2004), Malaysia (Suto, 2003), and Australia (Cassar and Holmes, 2003; Zoppa and McMahon, 2002). Therefore, the aforementioned evidence may not adequately explain the capital structure decisions of firms outside these markets, with their different business conditions and legal environments (Deesomsak et al, 2004).

2.2. Impact of capital structure on Return on Equity

In addition to examining the determinants of capital structure decisions, on another as-

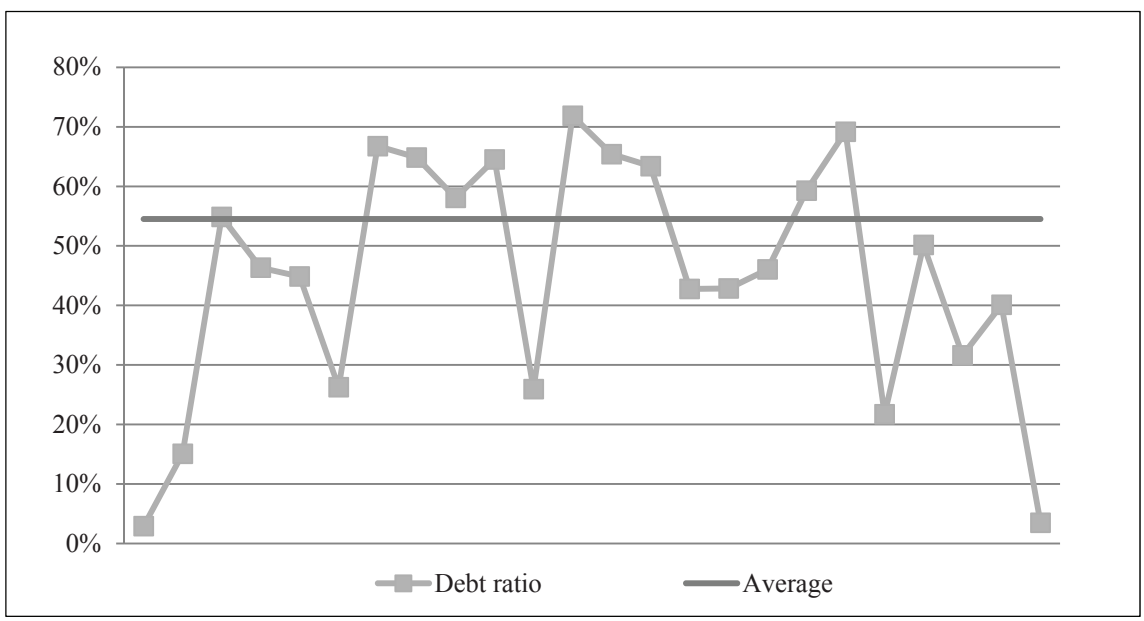
pect, researchers have investigated the impact of capital structure on the value and business performance of firms. Accordingly, Modigliani and Miller (1958, 1963) pioneered in affirming that a firm's value is unaffected by its capital structure in the no-corporate-taxes condition. Conversely, if corporate taxes are considered, a levered firm's value will be raised thanks to utilizing the debt tax shield. However, the Agency theory (Jensen and Mekling, 1976) proved that using debt over the optimal point leads to an increase of bankruptcy costs and agency costs, which decrease the firm's value. From their empirical results, Zeitun and Teian (2007), Margaritis and Psillaki (2007) showed a positive relationship between capital structure and a firm's operational efficiency measured by the market value indicator of Tobin's Q and by book values of ROA and ROE. Nevertheless, Ratha et al.'s (2003) findings presented a negative impact of financial leverage on business performances in developing countries. To conclude, it is necessary to further examine empirical results on the impact of capital structure on the ROE to see how significantly the capital structure has influence on the ROE.

3. Methodology

3.1. Overview of capital structure and Return on Equity of the Vietnamese listed seafood companies from 2009 to 2013

In Vietnam, there are a few quantitative studies on capital structure of seafood companies. Le and Dang (2013) applied fixed-effects and random-effects models to find out the determinants of the financial structure of the listed seafood companies, including firm size, growth rate, business efficiency, and liquidity. Phan and Nguyen (2013) demonstrated the necessity

Figure 1: Debt ratio in the period of 2009 through 2013



Source: Authors' calculation from financial statements and annual reports of the listed seafood enterprises.

Figure 2: ROE in the period of 2009 through 2013

Source: Authors' calculation from financial statements and annual reports of the listed seafood enterprises.

of using debt for seafood enterprises along with managing costs and assets to enhance ROE. In another study on the bankruptcy risk of the seafood companies, Nguyen and Pham (2010) suggested to raise the level of state-owned capital in seafood firms' capital structure. In contrast, Nguyen and Vu (2012) proposed to decrease short-term debt in total liabilities. Overall, these studies show that the listed seafood enterprises use much debt, mostly short-term debt, which is consistent with statistical data from 2009 to 2013 in this paper (see Figure 1). Deriving from the fact that a high debt ratio impacts a firm's sustainable development and increases bankruptcy hazard, the authors above suggested to change the capital structure, yet they did not clearly explain the effect of this resolution on the seafood companies' business performances. As seen in Figure 2, the average ROE of the fisheries industry over the past five years was merely 2.96%[1]. Hence, it is essential to clarify the influential factors of debt-using decision-making of the Vietnamese listed seafood companies, particularly in comparison with the average level of the sector. Also, determinants of ROE in correlation with a firm's leverage are supposed to be evaluated in order to propose ROE improvement resolutions.

3.2. Data set

3.2.1. Data sources

This study relies on the data from financial statements and annual reports between 2009 and 2013 of 24 listed seafood enterprises in Vietnam (see Table 8 in the Appendix for the list). The information and data used in the research includes financial indicators, which are

Table 1: Variables used in the research

Variables	Description
Financial variables	
ROE	Return on equity, measured by the ratio of earnings after tax to total equity.
Leverage	Dummy variable with 0 for firms having a below-average debt ratio[2] and 1 for those having an above-average one.
Tangibility	The ratio of fixed assets[3] to total assets.
Profitability	The ratio of earnings before interest, tax, depreciation and amortization (EBITDA) to total assets.
Liquidity	The ratio of current assets to current liabilities.
Cash turnover	The ratio of sales[4] to cash and equivalents.
Inventory turnover	The ratio of cost of goods sold to inventories.
Receivables turnover	The ratio of sales to receivables.
Firm size	The natural logarithm of total assets, calculated at the accounting year-end.
Beta	Beta is used as a measure of the volatility, or systematic risk, of a security or a portfolio in comparison to the market as a whole[5].
Non-financial variables	
VNR500	Dummy variable with 1 if firms are ranked in the VNR500 Board[6] and 0 if firms are not.
Age	Age of the board chairman of each listed firm.
Gender	Gender of the board chairman of each listed firm. This dummy variable gets 1 if the chairman is male and 0 otherwise.
Years of establishment	The number of years since a company was established until the year-end.
JSC years	The number of years since a joint stock company (JSC) was shifted from a stated-owned enterprise, or since it was first established as a joint stock company until the year-end.

Note: Variables used in this paper are calculated from the financial statements and annual reports from 2009 to 2013 of the Vietnamese listed seafood enterprises. Two variables, namely beta and VNR500 are collected from other sources, in which beta is measured through the historical prices of firms' stocks and the VNR500 Board which is reported on the webpage www.vnr500.com.vn.

calculated from financial data in the firms' statements, and non-financial information, which is collected from reliable webpages and edited afterwards. The list of 24 seafood companies is made based on the classification at www.cophieu68.vn. Stocks of these enterprises are quoted on two formal stock exchanges in Vietnam, namely Hanoi Stock Exchange (HNX) and Hochiminh Stock Exchange (HOSE).

The five-year data set is explored from audited balance sheets and income statements of the listed fisheries enterprises, which reflect the most important financial statistics such as revenue, earnings, corporate tax, total assets, total liabilities, etc. From these fundamental data, we calculate other financial indicators presented in Table 1.

The non-financial information is collected from annual reports of the listed enterprises and from the webpages www.cafef.vn and www.vnr500.com.vn. The former is modelled on the world's financial websites such as Financial Times and Bloomberg in order to provide database systems on financial performanc-

es of listed enterprises in Vietnam. Meanwhile, the latter is formulated by annual research results and independent assessment according to financial standards by The Vietnam Report Company since 2007. Additionally, data and information were taken from the webpage of the VNDIRECT Securities Corporation.

3.2.2. Description of variables

To have a better view of the regression models built up in this paper, we classify the variables into two groups of financial and non-financial ones. Table 1 presents all the variables used in the research. Notably, amongst financial variables, the firm's leverage is not measured by the value of debt ratio, which is the ratio of mobilized liabilities to total assets, but it is considered as a dummy variable standing for the likelihood that a listed seafood company has a debt ratio above that of the average for the industry.

3.3. Models

As mentioned in the introduction section, the study aims to examine determinants of the likelihood that a listed seafood enterprise will have an above average debt ratio during the period of 2009 through 2013. The average debt ratio of the sector in this five-year period, which is determined based on annual financial statements of the fisheries sector, is regarded as a key threshold for firms' debt ratios to be coded 0 and 1. For this purpose, a probit model is defined as in Equation (1).

Model 1: Probit model

Provided to reach a more specific approach to the likelihood of having an above average debt ratio, we propose a probit model where the response variable can only take two values. Within the scope of this study, we select the average debt ratio of the seafood sector from 2009 to 2013, that is, 54.51%[7], to become a threshold to code the debt ratios of the separate enterprises. The model is shown in Equation (1) below:

$$P(L = 1) = F(\alpha_0 + \alpha_i X_i + \varepsilon_i) \quad (1)$$

In which:

P(L) is the probability of firms having a higher debt ratio than the average level of the seafood industry from 2009 to 2013. P(L) receives two values as follows:

$$P(L) = \begin{cases} 1, \textit{if Leverage} > \textit{Average debt ratio} \\ 0, \textit{otherwise} \end{cases}$$

X_i is a set of vectors which, in this study, includes financial variables and non-financial ones. Financial variables used in the probit model are namely tangibility, profitability, liquidity, firm size, and beta. Non-financial variables can be listed as VNR500, showing whether a firm is ranked in the VNR500 Board or not, age of the board chairman, gender of the board chairman, and years of establishment.

ε_i is the residual which follows a normal distribution and captures the effects of unobserved variables.

Afterwards, the impact of this likelihood on ROE is also estimated with the hypothesis that *an above average debt ratio of Vietnamese listed seafood enterprises has a significant impact on their ROE*, which is regressed by a fixed-effects model as in Equation (2).

Model 2: Fixed-effects regression

In order to estimate the influence of the average debt ratio on return on equity (ROE), a fixed-effects regression is modeled to eliminate time-invariant unobserved variables. The model is defined in Equation (2). The explained

variable in the second model is the ROE of 24 listed seafood enterprises in Vietnam over the past five years.

$$ROE_{it} = \beta_0 + \beta_1 L_{it} + \beta_2 P_{it} + \beta_3 FS_{it} + \beta_4 CT_{it} + \beta_5 IT_{it} + \beta_6 RT_{it} + \beta_7 JY_{it} + c_i + u_{it} \quad (2)$$

In which:

ROE_{it} is the return on equity of firm i at time t (in the period of 2009 through 2013).

L_{it} is firm-leverage dummy variable, which is greater or lower than the average level of the seafood industry in a given period.

P_{it} and FS_{it} are profitability and firm size of firm i at time t correspondingly.

CT_{it}, IT_{it}, and RT_{it} stand for cash turnover, inventory turnover, and receivables turnover respectively, whilst JY_{it} is the number of years since a joint stock company was shifted from a stated-owned enterprise, or since it was first established as a joint stock company until the year-end.

c_i is time-invariant unobserved variables and u_{it} is time-variant ones.

In this second regression, we mainly focus on examining the effect of an average level on a firm's ROE, particularly in the seafood sector in Vietnam. Within the scope of this research, we do not investigate the value of debt ratio of each fisheries company but the probability of the firm having a debt ratio greater than the average. Afterwards, we estimate the impact of this probability on ROE. By using the fixed-effects regression, time-invariant unobserved variables are controlled with the purpose to eliminate the correlation between these variables and a firm's leverage by time, which can affect the robustness of estimation results on the explained variable. This is an important matter caused by exploring panel data. Hence, the fixed-effects regression is modeled with two purposes: (i) to ameliorate the problem which cannot be resolved if using the OLS regression; and (ii) to strengthen the model's appropriateness and reliability.

In conclusion, whilst determinants of the probability of having an above-average debt ratio are highlighted in the first model, the second one aims to explain the importance of such a probability in impacting a firm's ROE. Financial and non-financial variables are expected to have significant impacts on the explained variables in the two models.

4. Research results

4.1. Descriptive statistics

A summary of descriptive statistics of all the variables used in the study are shown in Table 2. It can be observed that two categories of firms are classified regarding their debt ratios over years (see Figure 4 in the Appendix for the distribution of debt ratio), in which the number of observations getting an above-average debt ratio (ADR) is 45, accounting for 37.5%. Remarkably, the ROE of the above ADR group was substantially lower than that of the below-ADR one during the five-year period. Whilst the mean value of ROE of the below-ADR group reached 11.66%, merely -13.70% of ROE of the above-ADR group was recorded over the past five years. Moreover, the minimum and maximum values of ROE between these two groups were considerably different with a large amplitude oscillation. In general, mean values of most financial variables of the above-ADR group are lower than those of its counterparts, except receivables turnover.

Table 3 demonstrates the correlation matrix among the variables used in the probit model to

Table 2: Descriptive statistics of variables

Variables		Obs	Mean	Std. Dev.	Min	Max
(1)		(2)	(3)	(4)	(5)	(6)
Financial variables						
ROE	Above-ADR obs	45	-0.1370	0.9743	-4.4766	0.4425
	Below-ADR obs	75	0.1166	0.1248	-0.3947	0.4619
Tangibility	Above-ADR obs	45	0.2800	0.1556	0.1366	0.8802
	Below-ADR obs	75	0.2876	0.1438	0.0822	0.8333
Profitability	Above-ADR obs	45	0.1905	0.0851	0.0594	0.4971
	Below-ADR obs	75	0.2234	0.1070	0.0456	0.5680
Liquidity	Above-ADR obs	45	1.0214	0.2983	0.0938	2.0948
	Below-ADR obs	75	1.8460	1.5073	0.2410	8.2009
Cash turnover	Above-ADR obs	45	85.0757	118.7267	3.3227	632.6636
	Below-ADR obs	75	85.6671	230.3591	3.5723	1912.9760
Inventory turnover	Above-ADR obs	45	3.8926	2.5739	0.4138	12.8396
	Below-ADR obs	75	4.5309	2.6646	0.3737	16.1050
Receivables turnover	Above-ADR obs	45	7.5988	4.6239	1.5981	16.6356
	Below-ADR obs	75	6.7399	6.3741	0.4693	49.2426
Firm size	Above-ADR obs	45	13.4202	1.0905	10.9755	15.8499
	Below-ADR obs	75	13.4353	1.1048	11.5752	16.1171
Beta	Above-ADR obs	45	0.6700	0.4408	-0.1042	1.5304
	Below-ADR obs	75	0.6507	0.4098	-0.0675	1.7625
Non-financial variables						
Age	Above-ADR obs	45	51.9778	4.4797	39.0000	70.0000
	Below-ADR obs	75	50.8400	6.6150	30.0000	59.0000
Gender	Above-ADR obs	45	0.7778	0.4204	0.0000	1.0000
	Below-ADR obs	75	0.8000	0.4027	0.0000	1.0000
Years of establishment	Above-ADR obs	45	18.1111	10.6114	5.0000	38.0000
	Below-ADR obs	75	17.2000	12.9197	4.0000	56.0000
JSC years	Above-ADR obs	45	5.2000	2.1700	2.0000	11.0000
	Below-ADR obs	75	6.2533	3.6469	0.0000	15.0000

Source: Authors' calculation from financial statements and annual reports of the listed seafood enterprises.

Note: Table 2 presents descriptive statistics of 9 financial variables and 4 non-financial ones used in the study. Column (2) calculates 120 observations in the data sample of 24 listed seafood companies from 2009 to 2013. Columns (3) and (4) depict the mean value and standard deviation correspondingly, whilst column (5) shows the minimum value and column (6) indicates the maximum value of the variables.

test the probability of a listed seafood company having a debt ratio above the average. As shown in Table 3, only the two variables of profitability and liquidity have a significant relationship with the firm's leverage at the 90% and 99% confidence levels correspondingly. Concurrently, these values are negatively recorded at -0.159 for profitability and -0.316 for liquidity. The correlation matrix is also run as a tool to check the multi-collinearity amongst variables used in the probit. Results in Table 3 show that most correlation coefficients amongst pairs of variables are small and their absolute values are all below 0.8. Thus, this reflects that the probability of getting multi-collinearity in the model is considerably low.

As indicated in Table 4, the values of less than 0.8 are recorded amongst the correlation coefficients of variables applied to the fixed-ef-

Table 3: Correlation matrix of variables (the 1st model): Relationship between above-average debt ratio and determinants

	Leverage	Tangibility	Profitability	Liquidity	VNR500	Age	Gender	Beta	Firm size	Est. years
Leverage	1.000									
Tangibility	-0.025	1.000								
Profitability	-0.159*	-0.242***	1.000							
Liquidity	-0.316***	-0.274***	0.224**	1.000						
VNR500	-0.009	-0.454***	0.115	0.080	1.000					
Age	0.094	-0.160*	-0.248***	0.161*	0.140	1.000				
Gender	-0.027	0.052	-0.162*	0.119	-0.003	0.156*	1.000			
Beta	0.022	0.015	-0.075	-0.036	-0.002	0.117	-0.072	1.000		
Firm size	-0.007	-0.475***	-0.209**	-0.106	0.564***	0.296***	0.034	0.202**	1.000	
Est. years	0.037	0.000	0.425***	0.007	-0.051	-0.341***	0.081	-0.141	-0.292***	1.000

Source: Authors' calculation from financial statements and annual reports of the listed seafood enterprises.

*Note: *, **, and *** denote the significance at 90%, 95%, and 99% confidence levels respectively. See Table 1 and 2 for details on the data samples.*

fects model, which is regressed to test whether the above-average debt ratio impacts the ROE. This demonstrates that there will not be the multi-collinearity amongst these variables in the second regression. At the 95% confidence level, the variables for a firm having an above-average debt ratio and cash turnover, have a negative association with ROE. Whereas, at the 99% confidence level, the tangibility variable witnesses an inverse relation with ROE and the profitability positively correlates with ROE in contrast.

As shown in Table 2, the mean value of ROE of the above-ADR group is smaller than that of the counterparts. In order to test whether there exists a significant difference in ROE between these two groups, a T-test of equality in means is applied with the purpose of providing an overview of the relationship between ROE and leverage of the listed firms. The result is presented in Table 5.

It can be seen in Table 5 that the difference value of ROE between the two groups is 25.36% at the confidence level of 95%. Put another way, there is a significant difference between the two group means, which depicts that firms with lower debt ratio than the average reach higher ROE than those having above-average leverage.

Generally, the simple T-test above is used to initially affirm the descriptive statistics in Table 2 that those having an under-average debt ratio secure greater ROE than their counterparts. The hypothesis of this difference is accepted at a 95% confidence level. Furthermore, it can be further examined whether the average debt ratio of the seafood industry is plausibly considered as a thresh-

Table 4: Correlation matrix of variables (the 2nd model): Return on equity and determinants

	ROE	Leverage	Profitability	Firm size	Cash Tov.	Inv. Tov.	Rec. Tov.	JSC years
ROE	1.000							
Leverage	-0.201**	1.000						
Profitability	0.251***	-0.159*	1.000					
Firm size	0.097	-0.007	-0.209**	1.000				
Cash Tov.	-0.199**	-0.002	-0.103	-0.116	1.000			
Ivt. Tov.	0.119	-0.118	0.199**	-0.241***	-0.136	1.000		
Rec. Tov.	0.044	0.072	0.603***	-0.116	-0.002	0.159*	1.000	
JSC years	-0.010	-0.160*	0.445***	-0.178*	0.209**	0.099	0.479***	1.000

Source: Authors' calculation from financial statements and annual reports of the listed seafood enterprises.
*Note: *, **, and *** denote the significance at 90%, 95%, and 99% confidence levels respectively. See Tables 1 and 2 for details on the data samples.*

old to affect the wealth of shareholders, which is normally reflected by ROE.

4.2. Empirical results

As stated earlier, the first model demonstrates the likelihood that a listed seafood company will have a higher debt ratio than the average level of the sector. Result after running the probit model is presented in Table 6. Average marginal effects of all variables are also indicated in this table.

It is noted that most explanatory variables have significant impacts on the probability of having an above-average debt ratio, except the two variables of beta and gender of the board chairman. From Table 6, four variables, namely tangibility, profitability, liquidity, and firm size have negative impacts on the likelihood over the past five years.

Tangibility is calculated by the ratio of fixed

Table 5: Relationship between ROE and debt ratio of the listed firms

	Below-ADR firms	Above-ADR firms	Difference
	(1)	(2)	(3)
Number of observations	75	45	
Mean	0.1166	-0.1369	0.2536
Standard Error	0.0144	0.1452	0.1137
Standard Deviation	0.1248	0.9743	
t = 2.2300**			

Source: Calculation from financial statements and annual reports of the listed seafood enterprises.
*Note: Table 5 indicates the relationship between ROE and debt ratio of the listed firms in correlation with that of the entire seafood sector. ** denotes the significance at 95% confidence level. (3) = (1) - (2). The t-test hypothesis is as follows: H_0: difference = 0; H_a: difference > 0. See Tables 3 and 4 for details on the data samples.*

Table 6: Results from Probit model: Probability of enterprises having an above-average debt ratio

Explanatory variables	Coefficients	Average marginal effects
Tangibility	-7.0039***	-1.5621***
	(1.7945)	(0.2801)
Profitability	-3.9006**	-0.8700**
	(1.9418)	(0.4361)
Liquidity	-3.7055***	-0.8265***
	(0.9995)	(0.1489)
Firm size	-0.6112**	-0.1363***
	(0.2400)	(0.0513)
VNR500	0.8176**	0.1824**
	(0.3550)	(0.0762)
Age	0.0569**	0.0127**
	(0.0239)	(0.0054)
Gender	0.3421	0.0763
	(0.3789)	(0.0824)
Beta	0.4806	0.1072
	(0.3387)	(0.0737)
Years of establishment	0.0456***	0.0102***
	(0.0160)	(0.0035)
Intercept	10.4419***	-
	(3.6984)	

Source: Authors' calculation from financial statements and annual reports of the listed seafood enterprises.
*Note: Heteroskedasticity robust standard errors are in parentheses. Dependent variable is firm's leverage with 0 for those having a below-average debt ratio and 1 for those having an above-average debt ratio between 2009 and 2013. The number of observations is 120. ** and *** denote the significance at 95% and 99% confidence levels correspondingly.* $R^2 = 41.08\%$. *Wald* $chi^2 (9) = 37.64$***.

assets to total assets of a firm. At the 99% confidence level, it is found that the higher the tangibility, the less probable it is that a listed seafood firm will have a greater debt ratio than the average. In other words, a one percent increase of the tangibility ratio decreases the probability of having an above-average debt ratio by 1.56 times. It can be explained that long-term assets in general and fixed-assets in particular are normally invested by long-term liabilities and an owner's equity in the enterprises. Nonetheless, for the Vietnamese listed seafood companies, the liabilities are mostly short-term debt, which accounts for a big proportion in total liabilities (see the annual balance sheets of the Vietnamese listed seafood enterprises from 2009 to 2013 at www.vndirect.com.vn). Therefore, the fixed assets of these companies are mainly invested by owner's equity. This fact re-affirms that the higher the tangibility is, the less chance there is that the debt ratio will be above average.

From Table 6, *profitability* and *liquidity* are inversely related to the probability of the seafood firms having an above average debt ratio at 95% and 99% confidence levels respectively. The former can be interpreted as that a one percent increase of profitability ratio, which is measured by the ratio of EBITDA to total assets, reduces the likelihood of having above-average leverage by 87%. Mean-

while, the average marginal effect of the latter is 82.65%, which technically means that the greater the liquidity is, the more decreased the probability is of there being an above-average debt ratio, with the estimation value of 82.65%. Additionally, there is a negative relationship between *firm size* and the probability of having above-average leverage, which is the reverse as expected. According to the trade-off theory, firm size normally has a positive impact on debt, because large companies usually have low costs and a low risk of bankruptcy. Furthermore, such companies have low agency costs of debt and a less varied cash flow, thus they tend to use more liabilities to benefit more from the tax shield (Wiwattanakantang, 1999). Nevertheless, Bevan and Danbolt (2002) pointed out that firm size has a negative impact on short-term debt, which is fully consistent with our finding as most liabilities of the Vietnamese listed seafood enterprises are short-term debt in a given period.

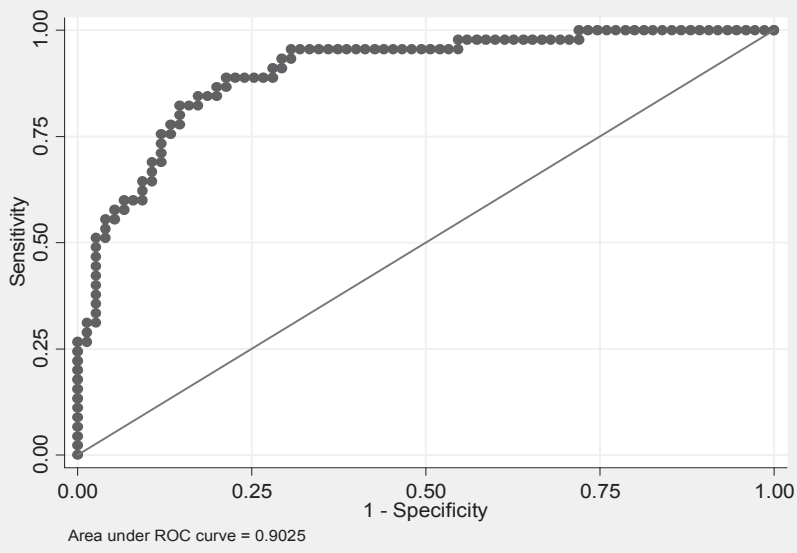
Amongst the independent variables, all the non-financial ones have a positive impact on the likelihood of having a higher debt ratio than the average. The positive coefficient of *VNR500* shows that the better the financial capacity of the listed firms is, the higher the probability of them having an above-average debt ratio. The average marginal effect of VNR500 seen in Table 6 presents that those with better financial capacity get 18.24% of chances to reach an above-average debt ratio higher than their counterparts.

Age and *gender* of the board chairman are expected to represent the capital structure decision-making of a listed firm. Between these two variables, it is only age that has a significant effect on the probability that the firm uses more debt. A one unit increase in age raises such a probability by 1.27%. Our finding lies in line with Nguyen (2012) that the age of the investors has a positive relationship with the optimism and confidence of psychological factor groups. Specifically, older investors are more optimistic, more confident and their risk aversion is lower, that means the probability that they decide to face risks when using debt is higher.

Beta has an insignificant impact on the likelihood of there being an above-average debt ratio in the firms. Hence, in the context of the Vietnamese listed seafood companies over the past five-year period, there is insufficient evidence to conclude that beta represents the risk of these firms. It can be clarified by the two following main reasons: (i) *Firstly,* the equation to estimate beta, which is a linear function of market return (Elton et al., 2010), is not perfectly adequate, so it can affect the research result of beta and make it insignificant in representing a firm's risk; or (ii) *Secondly,* the method to collect the market indexes of the HNX-Index and the VN-Index is not completely correct as there is lack of information in such a Vietnamese context. These facts can be considered as two main reasons for the insignificance of beta in the first model.

The final variable which has a positive association with the response variable is *years of establishment*. As seen in Table 6, a one unit increase of this variable leads to a 1.02% increase in the probability of the seafood firms having above-average debt ratios. This is regarded as one of our new findings, in which the number of years since a company was established has

Figure 3: Estimation of model appropriateness



Source: Authors' calculation from financial statements and annual reports of the listed seafood enterprises.
Note: The figure illustrates the estimation of model appropriateness with 90.25% of area under ROC curve. The vertical axis shows the possibility of success (p), whilst the horizontal one depicts the possibility of failure (1-p).

a positive relationship with its debt ratio. Such a fact can be clarified that long-lasting companies are able to develop their firm's partnerships with creditors, which may lead to easier borrowing at lower prices. Hence, there might be a positive correlation between the firm's age and leverage. Also, in an experimental study, Stinchcombe (1965) showed that long-lasting firms may accumulate experience based on the economy and could avoid unnecessary troubles as well as having better business performance. Such performance, therefore, may facilitate these firms' borrowing more easily (Rao et al., 2007).

In order to test the model appropriateness visually, Figure 3 is graphed in the post-estimation stage after running the probit model. Equally important, it presents a binomial experiment, in which there are two mutually exclusive outcomes of the possibilities *(p)*, often referred to as *success* and *failure*. The area under ROC curve reaches 90.25%, showing that the probit model is highly appropriate in estimating the likelihood of Vietnamese listed seafood companies having above-average debt ratios in a given period of five years.

In the second model, we aim at testing the relationship between the average debt ratio and the ROE of the Vietnamese listed seafood enterprises from 2009 to 2013. Table 7 shows the results from the fixed-effects regression. So as to select the fixed-effects regression, the Hausman's specification test is used to test the appropriateness of the fixed-effects estimator (see

Table 10 in the Appendix).

As previously presented, the main purpose of the second regression model is to examine whether the probability of having above-average leverage affects the ROE of the listed seafood companies in Vietnam. It can be seen as a highly statistically significant coefficient of the predictor of *leverage* in Table 7, which means the leverage that a firm gets over the average has a negative influence on the ROE at the 99% confidence level. It can be found that firms that have an above-average debt ratio have a lower ROE than those that have a below-average level by 50.94%. The negative coefficient of leverage shows that these firms' debt ratio exceeded the optimal capital structure point. This finding lies in line with that of Cai and Ghosh (2003) that firms tend to move faster to the point of optimal capital structure once they are at above-average leverage than when they are at a below-average level. This may imply that firms do not consider how much debt they use if their debt ratio is lower than the average level of the sector.

At the 95% confidence level, the predictor of *profitability* has a positive influence on the ROE of the listed seafood companies. Results from Table 7 demonstrate that firms with an above-average debt ratio have greater ROE than their counterparts by 3.67 times. Similarly, the positive coefficient of *firm size* presents the 1.32-time difference of ROE, inclined to the larger scale companies. In addition, there is a positive association between the regressor of *receivables turnover* and ROE. Given that, those with higher receivables turnover have a higher ROE than the rest by 1.61%. Extracted from the Dupont formula, receivables are decomposed as a component of ROE (Phan,

Table 7: Fixed-effects regression of the relationship between average debt ratio and ROE

Explanatory variables	Coefficients
Leverage	-0.5094***
	(0.1614)
Profitability	3.6704**
	(1.7526)
Firm size	1.3246***
	(0.4675)
Cash turnover	-0.0005
	(0.0005)
Inventory turnover	0.0395
	(0.0300)
Receivables turnover	0.0161**
	(0.0076)
JSC years	-0.2311***
	(0.0727)
Intercept	-17.2401**
	(6.2439)

Source: Authors' calculation from financial statements and annual reports of the listed seafood enterprises.
*Note: Heteroskedasticity robust standard errors are in parentheses. The dependent variable is firms' ROE during the period of 2009 through 2013. The number of observations is 120. ** and *** denote the significance at 95% and 99% confidence levels correspondingly. R^2 = 45.90%; F(7, 23) = 2.89**.*

2011), thus the receivables turnover is expected to have a significant influence on ROE. Such an effect is pointed out for the case of the Vietnamese listed seafood companies from 2009 to 2013, shown in Table 7.

Conversely, the number of years since a firm was established as a joint stock company has a negative association with ROE. In this model, we use the variable of *JSC years* instead of years of establishment because the matter of stockholder wealth maximization is the key objective in capital structure decision-making (Damodaran, 2001) since becoming a joint stock company. Moreover, ROE is selected as an inevitable tool to measure the profitability for shareholders (Ugur, 2006), which reflects how well a company uses investment funds to generate earnings growth. Therefore, the study explores the variable of JSC year and finds out a negative relationship between this predictor and the ROE of firms. The result is fully consistent with Phan and Nguyen (2014)'s study which draws a conclusion about the negative impact of JSC years on ROE.

Overall, the two proposed models have explained several factors that influence the probability of the listed seafood companies having above-average debt ratios and its impact on ROE in association with other determinants. At the confidence level of 99%, the result indicates that average debt ratio has had a significant impact on the ROE of these enterprises over the past five years.

5. Discussion and conclusion

5.1. Discussion

Capital structure is one of the fundamental principles of corporate finance, which have been researched since the last century (Agarwal and Gort, 1996). Regarding the capital structure decision-making, particularly using debt in a firm's capital structure, Deesomsak et al. (2004) pointed out several determinants of the leverage ratio, or debt to capital ratio, including tangibility, profitability, firm size, and liquidity. In the first model of the study, our findings lie in line with them in that these four variables have significant impacts on the debt-using decision-making of Vietnamese listed seafood enterprises from 2009 to 2013, particularly the probability of them having above-average debt ratios.

As explained above, there is a negative relationship between leverage and *tangibility* in the first model of this paper for Vietnamese listed fisheries companies, which is fully consistent with Booth et al. (2001) who found a negative relationship for Thai firms. It is, nonetheless, in contrast with Deesomsak et al. (2004) who showed a positive influence of tangibility on leverage for Australian firms. Furthermore, the finding that *profitability* has a negative effect on leverage is consistent with Deesomsak et al.'s (2004) conclusion for Malaysian companies. This is in contrast with Booth et al. (2001) who reported a significant effect of profitability on leverage. The negative and significant result for Vietnamese listed fisheries firms from 2009 to 2013 is consistent with the predictions of the pecking order theory, showing that firms prefer to use internal sources of funding when their profits are high.

In our research, *firm size* has a negatively significant impact on leverage in the listed fisheries companies. This finding is in contrast with Deesomsak et al. (2004) who pointed out a positive relationship between firm size and

leverage of Singaporean companies, where firms receive government support and thus face less risk of financial distress whatever their size (p.14). Bevan and Danbolt (2002), however, concluded that firm size has an inverse relation to short-term debt, which is fully consistent with our result, as most of the Vietnamese listed seafood enterprises have maintained a large proportion of short-term debt in total liabilities in the given period.

Identically, *liquidity* has a negative and significant relationship with leverage in the listed fisheries companies in Vietnam. Our finding confirms the postulated hypotheses that firms tend to use their liquid assets to finance their investment in preference to raising external debt, and that they tend to prefer equity to debt when share prices are rising (Deesomsak et al., 2004). Such a conclusion is consistent with Wiwattanakantang (1999) who found that in Thai firms, there exists a negatively significant association between liquidity and a firm's leverage.

In addition to using financial variables in the model, we also put non-financial ones so as to find out non-financial factors which can affect the debt-using decision-making of the firms. Given that, the three predictors of VNR500, age of the board chairman, and the years of establishment have positively significant impacts on a firm's leverage. Amongst these variables, *VNR500* is supposed to represent the financial capacity of the firms, which facilitates them to borrow more easily, if the capacity is strong enough (Tran, 2006). Meanwhile, our finding of the *age* variable is completely consistent with Nguyen (2012) who showed a positive correlation between the age of investors and their financial investment decisions. Last but not least, a new contribution of our paper is the positive relationship between *establishment years* and firm's leverage, which lies in line with Le's (2014) opinion that the more long-lasting the firms are, the less asymmetric the market information is. Thus, such firms prefer using more debt, thanks to the reduction of asymmetric information once they have worked for a long-lasting period.

5.2. Conclusion

The seafood sector is regarded as a major export industry in Vietnam, which has received much concern and priority from the government. One of the important strategies to sustainably develop the seafood industry in social, economic, and environmental aspects is to codify *"The Project of restructuring of the fisheries sector towards improving the added value and sustainable development"* under Decision No.2760/QD-BNN-TCTS on 22 November 2013. Accordingly, it is necessary for Vietnamese seafood enterprises to build up their own business strategies in order to satisfy the industry's development requirements. Thus, investigating their leverage in comparison with the sector's average level and examining determinants of ROE are essential items to be researched with a view to proposing recommendations to improve the capital structure decision-making and business performance of these firms. Several key conclusions and contributions of the study are drawn from the empirical results shown in the above section.

Conclusion 1: Financial and non-financial factors have opposite effects on the probability of Vietnamese listed seafood enterprises having above-average debt ratios.

Accordingly, the financial variables are inversely related to such likelihood, whilst all the financial ones have a positively significant impact on this probability, except the two predictors of beta and gender of the board chairman. This fact requires corporate managers to concurrently focus on these two factor groups once they plan on changing the capital structure as well as business performance.

Conclusion 2: Tangibility is the most influentially significant factor to impact the likelihood of having a debt ratio more than the average.

It is found that tangibility has the biggest negative impact on the likelihood of having above-average leverage at the 99% confidence level. From the statistical result, the coefficient of tangibility shows that a one percent increase in the tangibility ratio decreases the probability of having an above-average debt ratio by 1.56 times. Therefore, a recommendation for Vietnamese listed seafood enterprises is that they should gradually reduce the proportion of debt, particularly short-term debt, in total liabilities towards the balance between fixed assets and long-term capital, including long-term debt and owner's equity.

Conclusion 3: Leverage has a negatively significant influence on ROE.

In the case of Vietnamese listed seafood companies in the past five-year period, firms with above-average debt ratios have lower ROE than firms that are below the average level by 50.94%. By using a fixed-effects regression model, we found an inverse relation between leverage and ROE at the confidence level of 99%. In other words, the more debt the fisheries firms use, the less ROE they can get. This result may affect the key objective of corporate finance management, that is, to maximize the stockholder's wealth. To address this issue, it is essential for these enterprises to reduce the debt proportion in their capital structure, hence an increase of ROE is expected to rise.

Moreover, the study presents a probit model to investigate determinants of the probability of an above-average debt ratio of the listed fisheries companies in Vietnam during five years. In addition, a fixed-effects regression is applied to draw a picture of the effects of influential factors, particularly leverage of firms, on ROE. These econometric models figure out the different impacts of the determinants of leverage and ROE. This can be pondered as an important contribution of the study in modeling influential factors on firm's leverage and ROE by selecting the average debt ratio of the seafood industry as a key threshold. Furthermore, all the explanatory variables are classified into two categories, namely, financial and non-financial predictors. Compared to previous studies that only measured financial variables, the classification of regressors into two groups and applying them in the models remarkably contributes to drawing a comprehensive picture of all factors impacting the debt-using decision-making as well as the ROE of firms.

Nevertheless, this research, due to the limitation of data availability, could not widen the data sample to include all the seafood companies, both the listed and non-listed ones. For further studies, if the data set can be collected for more than 24 listed seafood firms in five years, the research can explore a wider sample and get a more comprehensive result on seafood firm's leverage and ROE. If so, we are expected to propose more specific implications and recommendations for the seafood industry to improve their business performances as well as to maximize the stockholder's wealth.

APPENDIX

Table 8: List of the Vietnam listed seafood enterprises

No.	Stock code	Name
1	AAM	Mekong Fisheries JSC.
2	ABT	Aquatex Bentre JSC.
3	ACL	Cuu Long – An Giang Fish Import - Export Corporation
4	AGD	Go Dang JSC.
5	AGF	An Giang Fisheries Import - Export JSC.
6	ANV	Nam Viet JSC.
7	ATA	NTACO JSC.
8	AVF	Viet An JSC.
9	BAS	Basa JSC.
10	BLF	Bac Lieu Fisheries JSC.
11	CAN	Ha Long Canned Food JSC.
12	CMX	Ca Mau Frozen Seafood Processing Import - Export Corporation
13	FDG	Docimexco JSC.
14	FMC	Sao Ta Foods JSC.
15	HVG	Hung Vuong JSC.
16	ICF	Investment Commerce Fisheries Corporation
17	IDI	International Development & Investment Corporation
18	MPC	Minh Phu Seafood Corporation
19	NGC	Ngo Quyen Processing Export JSC.
20	SJ1	Seafood JSC. No.1
21	TS4	Seafood JSC. No.4
22	VHC	Vinh Hoan JSC.
23	VNH	Viet Nhat Seafood Corporation
24	VTF	Viet Thang Feed JSC.

Source: VNDIRECT Securities Corporation

Table 9: Comparison amongst Fixed-effects, Random-effects, and OLS regressions: Relationship between average debt ratio and ROE

Explanatory variables	Coefficients		
	Fixed-effects	Random-effects	OLS
Leverage	-0.5094***	-0.2298	-0.1851
	(0.1614)	(0.1602)	(0.1179)
Profitability	3.6704**	2.4906*	1.9981**
	(1.7526)	(1.3564)	(0.9536)
Firm size	1.3246***	0.1141	0.0793
	(0.4675)	(0.0716)	(0.0498)
Cash turnover	-0.0005	-0.0004	-0.0004
	(0.0005)	(0.0007)	(0.0007)
Inventory turnover	0.0395	0.0179	0.0182
	(0.0300)	(0.0174)	(0.0221)
Receivables turnover	0.0161**	-0.0042	-0.0101
	(0.0076)	(0.0099)	(0.0089)
JSC years	-0.2311***	-0.0442*	-0.0174
	(0.0727)	(0.0265)	(0.0166)
Intercept	-17.2401**	-1.7040*	-1.2692
	(6.2439)	(1.0177)	0.7975
R^2	45.90%	25.49%	15.50%
Number of observations	120	120	120
Number of groups	24	24	-

Source: Authors' calculation from financial statements and annual reports of the listed seafood enterprises.
*Note: Heteroskedasticity robust standard errors are in parentheses. The dependent variable is firm's ROE during the period of 2009 through 2013. The number of observations is 120. *, **, and *** denote the significance at 90%, 95%, and 99% confidence levels correspondingly.*

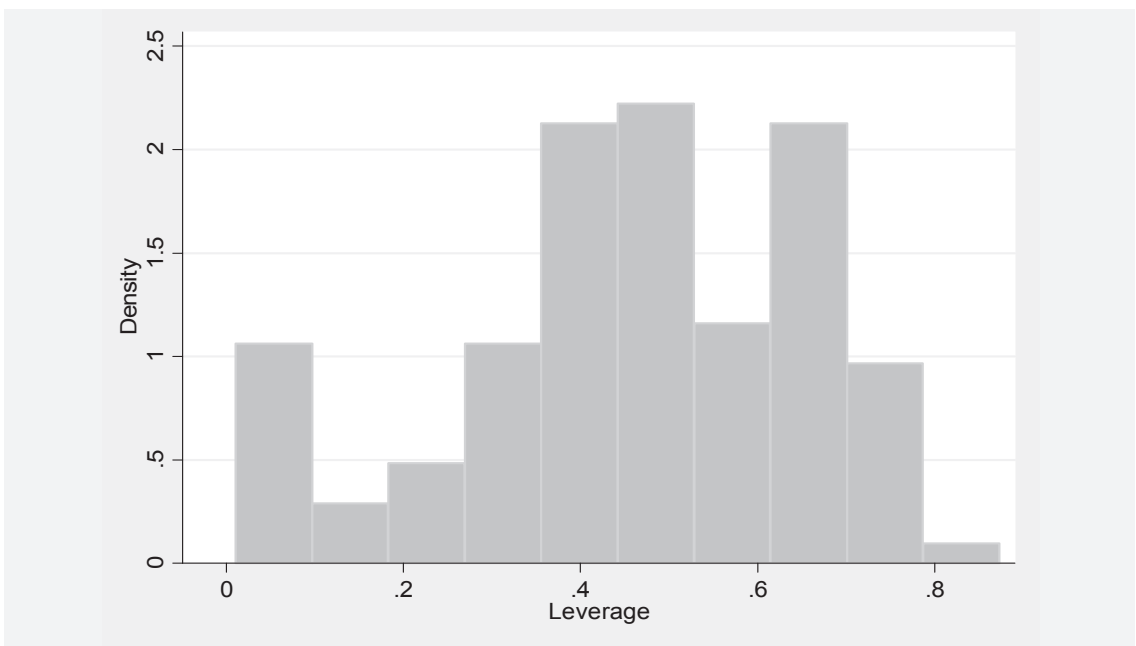
Table 10: Hausman's specification test

	Coefficients			
	(b)	(B)	(b-B)	sqrt(diag(V_b-V_B))
	Fixed effect	.	Difference	S.E.
Leverage	-0.5094	-0.2298	-0.2796	0.1624
Profitability	3.6704	2.4906	1.1798	0.3588
Firm size	1.3246	0.1141	1.2105	0.1983
Cash turnover	-0.0005	-0.0004	-0.0001	.
Inventory turnover	0.0395	0.0179	0.0216	0.0097
Receivables turnover	0.0161	-0.0042	0.0203	0.0019
JSC years	-0.2311	-0.0442	-0.1869	0.0299
$Chi^2(7) = 152.27$***				

Source: Authors' calculation from financial statements and annual reports of the listed seafood enterprises.

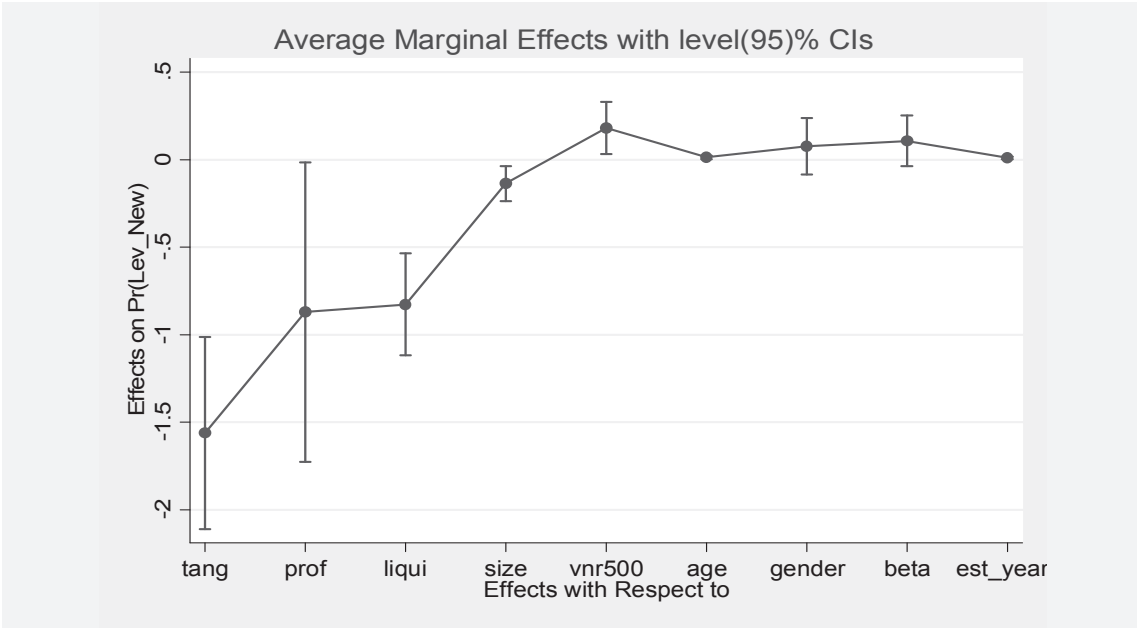
Note: b is consistent under H_o and H_a; obtained from panel-data regression.
B is inconsistent under H_a, efficient under H_o; obtained from panel-data regression.
The Hausman's hypothesis is H_o: difference in coefficients not systematic.
**** denotes the significance at 99% confidence level.*

Figure 4: Distribution of leverage of the listed seafood enterprises from 2009 to 2013



Source: Authors' calculation from financial statements and annual reports of the listed seafood enterprises.

Figure 5: Average marginal effects on probability of firms having above-average debt ratio



Source: Authors' calculation from financial statements and annual reports of the listed seafood enterprises.

Notes:

1. This ratio is calculated by collecting financial data from annual financial statements of the seafood sector between 2009 and 2013, published on the webpage www.cophieu68.vn.
2. Debt ratio is calculated by the ratio of mobilized liabilities to total assets. Mobilized liabilities are measured by total liabilities subtracting accounts payable and notes payable.
3. Total fixed assets are measured by the sum total of tangible fixed assets, intangible fixed assets, and leasing fixed assets.
4. Sales are calculated by total sales excluding sale-deductible amounts.
5. Sharpe (1970) in his study on portfolio theory.
6. VNR500 is a list of the top 500 largest private enterprises in Vietnam based on the Fortune-500 model.
7. This ratio is calculated by collecting financial data from annual financial statements of the seafood sector between 2009 and 2013, published on the webpage www.cophieu68.vn.

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