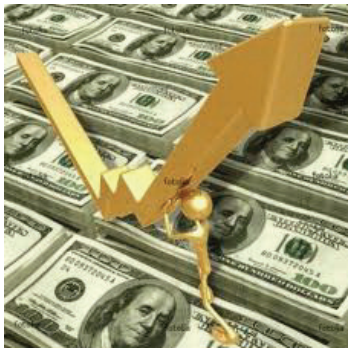
Ownership Structure, Default Probability, and Corporate Value
โครงสร้างผู้ถือหุ้น ความน่าจะเป็นของการล้มละลาย และมูลค่าของกิจการ

Pornpitchaya Kuwalairat[*]
Suparatana Tanthanongsakkun[*]
Sunti Tirapat[**]

บทคัดย่อ

การศึกษานี้ได้ทำการตรวจสอบความสัมพันธ์ระหว่างโครงสร้างผู้ถือหุ้น ความน่าจะเป็นของการล้มละลาย และมูลค่าของกิจการในประเทศไทย โดยพบว่า โครงสร้างผู้ถือหุ้นมีผลกระทบอย่างมีนัยสำคัญทางสถิติต่อความน่าจะเป็นของการล้มละลาย นอกจากนี้การศึกษายังพบว่าโครงสร้างผู้ถือหุ้นและการถือหุ้นจำนวนมากของผู้ถือหุ้น (Block Holdings) มีผลต่อมูลค่าของกิจการ นอกจากนี้ยังพบความสัมพันธ์ที่เป็นบวกระหว่างการถือหุ้นโดยนักลงทุนต่างชาติกับผลการดำเนินงานของกิจการ (Q Ratio) ซึ่งแสดงว่า การถือหุ้นจำนวนมากของผู้ถือหุ้นต่างชาติสามารถในการกำกับดูแลกิจการได้ดีกว่าผู้ถือหุ้นในประเทศ เรายังพบความสัมพันธ์ที่เป็นลบระหว่างความน่าจะเป็นของการล้มละลายและมูลค่ากิจการเพื่อควบคุมผลกระทบทางด้านเอ็นโดจีไนตี้ (Endogeneity)



คำสำคัญ : ความเสี่ยงจากการล้มละลาย โครงสร้างผู้ถือหุ้น มูลค่ากิจการ

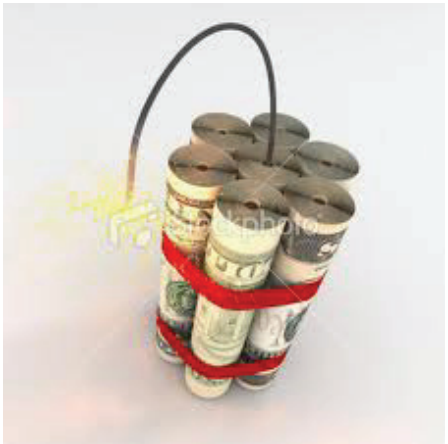
[*] Lecturers, Department of Banking and Finance, Chulalongkorn Business School, Chulalongkorn University.
[**] Associate Professor, Department of Banking and Finance, Chulalongkorn Business School, Chulalongkorn University.

เราได้ทำการตรวจสอบความสัมพันธ์ระหว่างความน่าจะเป็นของการล้มละลาย โครงสร้างผู้ถือหุ้นและมูลค่ากิจการอีกครั้งโดยใช้สมการถดถอยแบบหลายชั้น (Simultaneous Regression) ซึ่งให้ผลแตกต่างจากการใช้สมการถดถอยแบบปกติ (Ordinary Least Squares) โดยพบว่า มูลค่ากิจการมีผลต่อการถือหุ้นของผู้บริหารแต่การถือหุ้นของผู้บริหารไม่มีผลต่อมูลค่ากิจการ นอกจากนี้ยังพบว่าการถือหุ้นของผู้บริหารมีผลทางด้านลบต่อความน่าจะเป็นของการล้มละลายและส่งผลต่อผลการดำเนินงานของกิจการ ผลจากการศึกษานี้ได้นำเสนอทางเลือกในการอธิบายความสัมพันธ์ระหว่างโครงสร้างผู้ถือหุ้นและมูลค่ากิจการ โดยทำการวิเคราะห์ผ่านกรอบความคิดของแบบจำลองออปชั่น โดยโครงสร้างผู้ถือหุ้นกระทบต่อความน่าจะเป็นของการล้มละลายและกระทบต่อผลการดำเนินงานในที่สุด

Abstract

This study examines the association between ownership structure, default probability and corporate value in Thailand. It is found that the ownership structure statistically affects the default probability. In addition, the study finds that managerial ownership and block holdings positively associate with corporate value. Moreover, there is positive association between foreign holdings and the Q ratio. This suggests that foreign block holders are better at monitoring firms than local shareholders. We also find a strong negative association between default probability and corporate value. Finally, to control for the endogeneity effect, we examine the relations of default probability, ownership structure, and corporate value using the simultaneous regression. Unlike the findings obtained from using ordinary least squares, the results show that corporate value affects managerial ownership, but not vice versa. Moreover, it is found that managerial ownership negatively affects default probability which in turn also negatively affects firm performance. Overall our findings provide an alternative explanation of the relationship between ownership structure and corporate value. They suggest that the association between ownership structure and corporate value can be analyzed by the framework of the structural model. Ownership structure affects default probability which in turn affects firm performance.

Keywords : Default Risk, Ownership Structure, Corporate Value



1. Introduction

For a corporation, ownership helps to resolve the incentive problem by aligning managerial interests with shareholders' interest. However, it can lead to other costs resulting from entrenchment. Starting with the seminal works of Demsetz and Lehn (1985) and Morck et al. (1988), the impact of managerial ownership on firm performance has been investigated extensively in the finance literature. These studies suggest that management incentives are aligned at low and high levels of ownership but are entrenched (or pursuing self-interests) at intermediate ownership levels. The concentration of ownership and its impact is addressed by Shleifer and Vishny (1986). Several findings support that large shareholders play an active role in corporate control. For example, Franks and Mayer (1994) find that large shareholders associate with higher turnover of directors. Kaplan and Minton (1994) provide evidence that companies with large shareholders are more likely to replace managers in response to poor performance than firms without them. The effects of institutional holdings and types of block holdings have also been examined in the literature. McConnell and Servaes (1990) find a positive relationship between management concentration and Tobin's Q. Holderness and Sheehan (1988) show that firm performance is lower for firms with individual majority owners than for those with corporate owners. Gorton and Schmid (1996) report that block holdings by banks improve firm performance.

Recently another strand of literature that has emerged and gained attention from academics is the default probability of firms. For example, Vassalou and Xing (2004) show that firm size and the book-to-market ratio (BM ratio) are related to default risk. Using the structural model of Merton (1974) to estimate default probability, they find that within the high-default-risk quintile, small firms with a high BM ratio earn significantly higher returns than big firms with a low BM ratio. They conclude that default risk is a systematic risk and priced in cross-sectional equity returns. In addition, the accuracy of the structural model has been investigated in the literature. Previous studies have found that these structural models tend to systematically underestimate observed (market) yield spreads (see for example Jones et al. (1984), Anderson and Sundaresan (2000), Eom et al. (2004) among others). As suggested by Kealhofer (2003), while most studies using structural models to examine corporate bond pricing obtain poor results, structural models yield excellent results when predicting default risk of corporations (see for example Hillegeist et al. (2004), Vassalou and Xing (2004)).

From the seminal work of Merton (1974), equity holders are call options holders with the underlying asset being the asset value of the company. The default decision is analogous to the exercise decision, which depends on the equity holders. The ownership structure should influence management's decision whether to pay off the loan

or not. As a consequence, based on the structural model, ownership structure should have an effect on default probability and in turn affect firm performance. In this study, we attempt to provide the link between ownership structure, default probability of firms, and their performance. We examine the interaction among default probability, ownership structure, and firm performance using a sample of firms listed on the Stock Exchange of Thailand. The Thai capital market provides an interesting setup to investigate the effect of ownership on default probability since ownership of Thai firms is highly concentrated. Thai firms are mostly owned and managed by individuals, partners, and their families (Kim et al., 2004). As documented by Stulz (2005), for a well-developed capital markets, such as those in the United Kingdom and the United States, insider ownership is at the extreme lower tail of the ownership distribution. Specifically, the fraction of shares held by insiders in the United States in 2002 was 15.68%, while the corresponding number for Thailand was around 56%, the median for the sample of 48 countries being 50.78%. In addition, Thailand is one of the emerging countries which mostly have relatively undeveloped market structure and high degree of information asymmetry among participants. Therefore, concentrated managerial ownership in Thailand might mitigate agency cost thereby increases firm value (Kim et al., 2004). On the other hand, as a result of concentrated managerial ownership, it might also be easier for managers to conduct a non-value maximize behavior (Kim et al., 2004). Thus, it is interesting to study the link between ownership structure, default probability, and firm performance in Thailand.

In this paper, we first investigate whether ownership structure affects default probability based on the structural model framework. Using the sample of companies listed on the Stock Exchange of Thailand, excluding financial institutions and companies under restructuring plans, during 1995 to 2004, it is found that the ownership structure statistically affects the default probability. In particular, we find a non-linear (convex) relationship between managerial ownership and default probability; i.e. a negative association which turns into a positive association when managers own a higher proportion of shares in the company. Similar results are documented using the piece-wise regression. However, we do not find a statistically significant association between the concentration of ownership (block holdings) and default probability.

Second, we investigate whether there is an effect of ownership structure and default probability on firm performance. For the accounting-based performance measure i.e. return on assets (ROA), we do not find strong evidence in support of the association between ownership structure (managerial and block holdings) and default probability. Moreover, there is no association between default probability and ROA. However, when firm performance is measured by Tobin's Q ratio, we find that managerial ownership and block holdings

positively associate with the firm's performance. It is also found that there is a strong negative association between the default probability and firm performance.

Finally, to control for the endogeneity effect, we examine the relations of default probability, ownership structure, and firm performance using simultaneous regression. Unlike the findings obtained from using ordinary least squares (OLS), the results show that firm performance affects managerial ownership, but not vice versa. Moreover, it is found that managerial ownership negatively affects default probability which in turn also negatively affects firm performance. Overall, our findings provide an alternative explanation of the relationship between ownership structure and firm performance. They suggest that the association between ownership structure and firm performance can be analyzed by the framework of the structural model. Ownership structure affects default probability which in turn affects firm performance.

The paper proceeds as follows: Section 2 briefly reviews why ownership should have effects on default probability, and firm performance. The sample and data as well as descriptive statistics are discussed in Section 3. The results are presented in Section 4 while Section 5 concludes the main findings

2. Why should ownership structure matter?

Ownership structure and firm performance

The idea that ownership structure should matter can be traced back to the work of Berle and Means (1932). They suggest an inverse relation between the diffuseness of shareholdings and firm performance due to the agency problems. However, Demsetz (1983) provides an alternative view, namely that ownership structure does not matter since it is the endogenous outcome of market participants. Hence, there should be no connection between firm performance and observed ownership structure. The relation between ownership structure and performance has been the subject of empirical investigation in the literature. Demsetz and Lehn (1985) investigate the relationship between accounting-based profit rates and ownership by large shareholders (as measured by the percentage of share owned by the top five shareholders; top 20 shareholders; and the Herfindahl index of ownership concentration). They do not find a significant association between them.

In a related study, Morck et al. (1988) also investigate the relationship between board of directors' ownership and market valuation of the firm, as measured by Tobin's Q. They suggest that there are two opposing forces determining the relation between ownership and value of a firm. When level of managerial ownership is low, as managerial ownership increases, their interests are likely to coincide with those of shareholders.

Therefore, an increase in managerial ownership tends to increase firm value. Nevertheless, when the level of managerial ownership is high, as managerial ownership increases, managers might have tendency to allocate the firm's resources in their own best interests, which may conflict with the interests of shareholders. As a result, the firm value is reducing. Thus, the impact of managerial ownership on the firm's value depends on which of those two opposing forces dominates at a particular level of ownership. Hence, it is not possible to predict, a priori, a simple linear relation between ownership and the firm's value. They use a piece-wise linear regression and find that the Q ratio first rises as insider ownership increases up to 5%, then falls as ownership increases to 25%, then rises slightly at higher ownership levels.

McConnell and Servaes (1990) provide additional evidence on corporate value and equity ownership of insiders, block holders, and institutions[1]. In particular, they document that there is a significant curvilinear relation between the Q ratio and the fraction of stock owned by corporate insiders. The curve slopes upward until insider ownership reaches approximately 40%-50% and then slopes slightly downward. They also document a significant positive relation between the Q ratio and the fraction of shares owned by institutional investors.

Cho (1998), using OLS regressions, provides evidence suggesting that ownership structure affects investment which, in turn, affects corporate value. However, results from simultaneous regressions suggest that investment affects corporate value which, in turn, affects ownership structure, but not vice versa. Therefore, when investment is high, it will lead to an increase in corporate value which, in turns, leads to higher level of ownership. Thus, managers in firms that have high corporate values tend to hold larger portion of firm's shares. These findings suggest that the implicit assumption of exogenous ownership structure severely affects the results from OLS regressions and leads to a misinterpretation of the results. Hence, his findings cast some doubt on previous studies, such as Morck et al. (1988), which treat ownership structure as exogenous.

In contrast to previous studies, Himmelberg et al. (1999) use panel data to test for the endogeneity of managerial ownership and firm performance. In particular, they extend the cross-sectional results of Demsetz and Lehn (1985) and use panel data to show that managerial ownership is explained by key variables in the contracting environment in ways consistent with the predictions of principal-agent models. A large fraction of the cross-sectional variation in managerial ownership is explained by unobserved firm heterogeneity.

[1] Insiders are officers and members of the board of directors. Block holders include all stockholders who own 5% or more of the outstanding stock. Institutions are institutional investors as defined by *Value Line*.

Moreover, after controlling both for firm characteristics and firm fixed effects; they cannot conclude that changes in managerial ownership affect firm performance.

McConnell et al. (2008) study changes in insider ownership and changes in the market value of 172 U.S. firms from 1994 to 1999 using fixed effect estimation method. Initially, they use stock price changes around announcements of share purchases by managers and members of the board as a proxy for changes in firm value and a proxy for changes in Tobin's Q. Nevertheless, in order to avoid the possible spurious correlation that might arise when they run firm value against the level of insider ownerships, they use the 6-day interval announcement period abnormal returns (APAR) associated with open market purchase of at least 10,000 shares by officers and directors or corporate insider share purchases over 1994 to 1999 as a proxy for change in firm value. They compute APAR as the sum of a firm's market adjusted returns on the reporting day and five subsequent days. The result shows that there is the curvilinear relationship between the firm value and insider ownership in which the firm value first increases then decreases as insider share ownership increases. In other words, they find the firm value increases at a low initial level of insider ownership and falls at a high level of insider ownership. Therefore, insider ownership can be used to increase firm value only at low initial level of insider ownership. When level of insider ownership reaches a high level, it will actually reduce the firm value.

As for the evidence in emerging market, Chen and Yu (2012) study the relationship between managerial ownership, diversification, and firm performance using sample of 98 emerging market firms listed on the Taiwan Stock Exchange. They argue that emerging markets have ownership structure which mostly characterized by dominance of one primary owner who is typically a founder or a founding family who holds a large number of shares and also have widely dispersed individual investors. In addition, the emerging markets in general suffer from lack of shareholder protections; have weak developed legal systems and weak corporate governance. Therefore, the agency cost is likely to be higher than in developed countries and they expect the relationship between managerial ownership, diversification and firm performance to be different from the evidences found in developed countries. Using multiple regression analysis, they find a U-shape relationship between managerial ownership and corporate diversification which is similar to the findings in previous studies, but the infection point of ownership that they find is lower. In addition, they find corporate diversification has positive relationship with short-term firm performance and has no relationship with mid-term firm performance. In addition, they find firms engaged in unrelated diversification outperform firms that engaged in related diversification.

As for the evidence of relationship between managerial ownership and firm performance in Thailand, Kim et al. (2004) study the relationship between managerial ownership and Thai firm

performance after going public using OLS to estimate 133 Thai IPO firms during 1987-1993. They use operating income on total assets (EBIT/TA) and operating cash flow divided by total assets (EBIT + Depreciation) to measure firm operating performance. They argue that operating income on asset provides a measure of the asset utilization efficiency while the operating cash flow divided by total assets is a component to calculate NPV and thus reflects a firm value. They find that firms with low (0%-31%) and high levels of managerial ownership (71%-100%) have positive relationship between managerial ownership and change in firm performance, while firm with intermediate levels of managerial ownership (31%-71%) have negative relationship between managerial ownership and change in performance. According to Kim et al. (2004), the positive relationship between managerial ownership and change in performance at low and high levels of managerial ownership follows alignment of interest hypothesis which predicts the positive relationship between the managerial ownership and firm performance in which the managers engage in firm value maximizing behavior. On the contrary, the negative relationship between managerial ownership and change in performance at intermediate level of managerial ownership follows the entrenchment hypothesis which predicts the negative relationship due to managers follow their self-interests and engage in non-value maximizing behavior. Therefore, according to their findings, the relationship between Thai firm performance after going public and managerial ownership is curvilinear which is consistent with the previous findings by Morck et al. (1988) and Short and Keasey (1999). Thus, they find ownership structure significantly affects post IPO firm performance.

In addition, Margaritis and Psillaki (2010) investigate the relationship between the capital structure, ownership structure, and firm performance using data of French manufacturing firms from different manufacturing industries by employing non-parametric data envelopment analysis methods (DEA) to construct industry's best practice frontier to measure firm productive efficiency based on the distance from the frontier. The industry's best practice frontier is a benchmark for each firm's performance that would be realized if agency cost were minimized. They term the distance or failure to attain the frontier as X-inefficiency. In other word, they use firm productive efficiency as a proxy for firm performance rather than the traditional financial performance indicators. Using sample of French firms from low growth and high growth industries, they find that higher leverage is associated with improve efficiency or firm performance over their entire range of observed data. These findings support the author's argument that high debt ratios may be used as a disciplinary device to reduce unworthy managerial cash flow through the threat of liquidation. This will lower agency cost and reduce inefficiency and thus debt will have positive effects on firm performance in this case. In addition, they find that family firms on average outperform non-family firms in terms of firms' performances. They also find that more debt is associated with more concentrated ownership in general.

Structural model of default probability

The structural approach by Merton (1974) considers the securities issued by a firm as contingent claims on its own value. Specifically, equity is a call option and the underlying asset is the firm's value, with the exercise price equaling to the value of debt payment at maturity. The equity value can be valued using the option pricing model. The probability of not default is analogous to the probability that the option is in the money[2]. Black and Cox (1976) extend Merton's model to a first passage model, whereby the default occurs if its value falls to a specified value (trigger or barrier value). Leland (1994) and Leland and Toft (1996) extend the model further by developing models that endogenize the default barrier. Longstaff and Schwartz (1995) develop a two-factors model to value risky debt. Also, Anderson and Sundaresan (1996) and Mella-Barral and Perraudin (1997) study the importance of strategic debt service on risky debt spreads. Empirically, several studies have found that these structural models tend to systematically underestimate observed (market) yield spreads (see for example, Jones et al. (1984), Anderson and Sundaresan (2000), Eom et al. (2004) among others). Jones et al. (1984) are the first study that extensively examines the accuracy of the structural model in predicting yield spreads. By using the Merton model, the study finds that the Merton model underestimates yield spreads about 4.5 percent on average. Recently, Eom et al. (2004) empirically test five structural models of corporate bond pricing, i.e. Merton (1974), Geske (1977), Longstaff and Schwartz (1995), Leland and Toft (1996) and Collin-Dufresne and Goldstein (2001). Using 182 bond prices of firms with a simple capital structure during 1986 to 1997, they find that predicted spreads generated from the Merton model are too low, whereas most other structural models predict spreads that are on average too high.

As suggested by Kealhofer (2003), while most studies using structural models to examine corporate bond pricing obtain poor results, structural models yield excellent results in predicting default risk of corporations (see for example, Hillegeist et al. (2004), Vassalou and Xing (2004)). The study by Hillegeist et al. (2004), which investigates the likelihood of corporate bankruptcy in the U.S. market, finds that the probability of default estimated from the Black-Scholes-Merton model provides significantly more information than those of the two accounting-based bankruptcy models, namely Altman (1968) and Ohlson (1980). Unlike previous bankruptcy studies that rely on forecasting accuracy tests to examine model performance, the study employs relative information content tests to compare the out-of-sample performance of each bankruptcy model. By using a sample of 78,100 firm-year observations and 756 initial bankruptcies during 1980-2000, log likelihood statistics show

[2] Hence, the default probability is equal to $1-N(d_2)$ or $N(-d_2)$ from the option pricing model.

that the default probability estimated from the structural model contains significantly more information in forecasting bankruptcy than any of the accounting-based bankruptcy models

Although the framework of the structural model suggests that the choice to default depends on equity holders, few studies have related ownership structure to default probability. For example, Ashbaugh-Skaife et al. (2006) investigate whether firms with strong corporate governance[3] benefit from higher credit ratings (a potential proxy of default probability) relative to firms with weaker corporate governance. It is found that firm credit ratings negatively associate with the number of block holders that own at least a 5% ownership in the firm.

Default probability, ownership structure, and firm performance

Based on the structural framework and the literature related to ownership structure and firm performance, the following relations are expected:

First, there should be a non-linear relation between ownership structure and default probability. Since equity holders are residual claimants in the event of default, they will monitor and steer the firm away from bankruptcy. However, limited liability equity holders are holders of call options on the value of firms. This may lead to incentive problems which in turn result in higher default probability. Hence, there is a tradeoff between these two opposing effects. We would expect that the later effect is more pronounced when ownership concentration increases since in a weak corporate governance environment such as Thailand there are several ways to deviate from the absolute priority rule and it is relatively easy to funnel wealth in the event of (or before) bankruptcy. In particular, we would expect a convex relation between ownership structure and default probability.

Second, there should be a negative association between default probability and firm performance. A higher default probability may result in lower credit ratings which would make it more costly for these firms to obtain external financing. This would lead to firms with a high probability of default having a higher cost of capital resulting in lower performance compared to firms with a lower default probability. In addition, Gharghori et al (2009) use default probability derived from two option-based models which are the Merton model (1974) and the Barrier model (Brockman and Turtle, 2003) and find a negative relationship between default probability and stock return. Since one measure of firm performance is Tobin's Q which is related to stock market value, therefore, we would expect a negative relationship between default probability and firm performance.

---

[3] They focus on four major components of governance: ownership structure, financial stakeholder, financial transparency, and board structure.

Third, there should be interactions among firm performance, default probability, and ownership structure. Analogous to the argument of Cho (1998) in explaining the relation between ownership and firm performance, we argue that ownership affects default probability which in turn affects firm performance. In other words, as ownership are more concentrated, manager might have incentive to perform non-value maximizing behavior, which might results in higher default probability and poor firm performance. The extent of the effect of interactions remains an empirical issue which will be investigated in more detail.

3. Sample and data

The sample consists of 438 companies listed on the Stock Exchange of Thailand in 2004. Financial companies i.e. commercial banks, finance companies, securities, and insurance companies as well as companies undergoing restructuring are excluded, leaving 350 companies in the sample, for which data were compiled for the period of 1995 to 2004. Financial statement data are from SETSMART. Market data such as stock prices and market capitalization are from Thomson Financial Datastream. Managerial ownership data are collected from Form 56-1 filed with the Securities and Exchange Commission of Thailand. We use the savings deposit rate as a proxy for the monthly risk-free rate and obtain the data from website of the Bank of Thailand. To ensure that financial statements are observable at the time of calculation, a four-month gap after the fiscal year-end is assumed.

To estimate each month the default probability of a company, daily stock returns and market capitalization for the past 12-months period as well as financial statement data is required. The resulting sample of firms, for which the default probability can be estimated, consists of 2,495 firm-year observations as shown in Table 1.

Variables

The probability of default (PD) is estimated following Merton (1974), using the procedure suggested by Vassalou and Xing (2004). The market equity of a firm can be viewed as a call option on the firm's assets with a strike price equal to the book value of liabilities. At maturity, the value of equity will be equal to the difference between the market value of the firm's assets and the book value of the liabilities. Therefore, this can be written in the form of Black and Scholes (1973)'s formula as follows:

$$V_{E,it} = V_{A,it} N(d_1) - X_{it} e^{-r_{ft}T} N(d_2), \qquad (1)$$

where

$V_{A,it}$ = the market value of assets for company i at time t

$V_{E,it}$ = the market value of equity for company i at time t

X_{it} = the book value of liabilities for company i at time t

r_{ft} = the risk-free rate at time t

$$d_{1,it} = \frac{\ln(V_{A,it} / X_{it}) + (r_{ft} - 0.5\sigma_{A,it}^2)T}{\sigma_{A,it}\sqrt{T}}$$

$d_{2,it}$ = $d_{1,it} - \sigma_{A,it}\sqrt{T}$

$\sigma_{A,it}$ = the instantaneous volatility of the returns on the firm's assets for company i at time t

T = time to maturity

N = the cumulative standard normal distribution function

By following Vassalou and Xing (2004), the book value of liabilities is equal to total current liabilities plus a half of total long-term liabilities. Time to maturity is set to 1 year. To estimate the volatility of the firm's assets (σ_A), the iterative procedure is employed. At the end of each month, using the past 12 months of daily equity returns, the volatility of equity returns (σ_E) is estimated and used as an initial value of the volatility of returns on firm's assets (σ_A). Therefore, for each day in the past 12 month period, the market value of the firm's assets (V_A) can be computed from equation (1). The standard deviation of returns on firm's assets (σ_A) is then re-estimated and used for new iteration. The procedure is repeated until the values of the volatility of returns on firm's assets (σ_A) from two consecutive iterations converge. By keeping the estimation window equal to 12 months, the estimation of the volatility of return on firm's assets (σ_A) is repeated at the end of every month. The estimates of monthly volatility of the firm's assets and the market value of the firm's assets can be obtained.

The probability of default (PD) for firm i at time t can be estimated from the following equation:

$$PD_{it} = N(-d_{2,it}) = N\left(-\frac{\ln(V_{A,it}/X_{it}) + (\mu_{it} - 0.5\sigma_{A,it}^2)T}{\sigma_{A,it}\sqrt{T}}\right) \quad (2)$$

where the instantaneous drift rate of return on the firm's assets (μ_{it}) can be obtained by calculating the mean of the changes of the natural logarithm of the firm's assets.

We define firm size (Size) as the natural logarithm of the market capitalization. Managerial ownership (MOWN) is the proportion of shareholdings owned by directors and management. Tobin's Q ratio (Q) is measured by the sum of book value of liabilities and market equity divided by book value of total assets. Return on assets (ROA) is the ratio of net income to total assets. Block holding (BLOCK) is the fraction of shares held by investors owning 25% or more. The leverage ratio (Leverage) is measured as total liabilities divided by total assets and profitability (Profitability) is the ratio of net income to sales.

Descriptive Statistics

Descriptive statistics of PD, SIZE, MOWN, and Q of all firms are presented in Table 1. Not surprisingly, the mean and the median of PD reach a peak of 0.6179 and 0.7826 respectively in 1997 when the Thai Baht was devalued. The values of PD drop successively in 1998 and 1999. In 2000, PD increases significantly but remains marginally

lower than in 1998. The mean and median of PD are at their lowest in 2003 when their values are equal to 0.0501 and 0.0000 respectively. The value of firm size on average decreased about 50 percent in 1997. The mean and median of these variables decreased from 4,986.77 and 882.52 million Baht in 1996 to 2,648.20 and 342.00 million Baht in 1997. The results also indicate that firm sizes as well as Q have a negative relation with PD. For instance, the mean and median of PD are at their lowest at 0.0501 and 0.0000 in 2003, whereas the mean and median of Q are their highest at 1.8975 and 1.3784 in 2003. However, there is no obvious evidence of a relationship between PD and MOWN. The mean and median of MOWN have the highest values during 1997-1998 and slightly drop at the end of sample period.

Table 2 reports the characteristics of portfolios sorted by PD. At the end of each month during December 1994 and November 2004, firms are divided into quartiles based on their probabilities of default. Within each default portfolio, firms are sorted in four portfolios based on their firm size. In total, 16 portfolios are generated from this procedure. The equally-weighted portfolio returns over the next month period are calculated and shown in Panel A. The results show that most portfolios earn negative average returns. This may result from huge negative returns during the periods of financial crisis whereas the positive returns for the smallest and highest PD portfolio may result from the survivorship bias of small firms. In Panels B and C, firms are sorted in the same manner as in Panel A, but annual data are used for each observation. Panel B reports the average Q ratio for portfolios sorted by PD and firm size. The results support the preliminary findings in Table 1. The average Q of low- PD portfolios is higher than that of high-PD portfolios. Moreover, within each PD quartile, the average Q of portfolios increases monotonically when the size of portfolios increases, except in the high-PD quartile. Panel C provides more evidence of the relationship between MOWN and PD when portfolios are formed by PD and firm size. The results show that the average MOWN in most PD quartiles decreases monotonically when firm size increases. However, the average Q is indifferent across default risk quartiles. The average PD of portfolios sorted solely by firm size during 1995 to 2004 is shown in Panel D. The results support the previous finding that firm size has a negative relationship with PD. This is especially true for the smallest and largest portfolios. For instance, the average PD of the smallest portfolio is equal to 0.3459, whereas the average PD of the largest portfolio was equal to 0.0468 in 2004.

4. Results

The effect of ownership structure on default risk

First we investigate the effect of managerial ownership on firms' default risk. Table 3 reports the coefficients of regressions of the default risk and managerial ownership controlled by observed firm characteristics such as size, profitability, leverage, and capital expenditures. We investigate the effects of managerial ownership by testing the nonlinear relationships as well as the linear piece-wise relationship. To be consistent with previous literature such as Morck et al. (1988), the piecewise of the ranges: 0 – 5%, between 5% and 25%, and beyond are applied in this study. In all regressions, we include dummy variables to control for industry and year effects[4].

The results reported in column (1) of Table 3 show that regarding the nonlinear relationship, the association with managerial ownership (MOWN) is negative and statistically significant while the association is positive and statistically significant for the squared term ($MOWN^2$). Consistent with our hypothesis, this suggests that a moderate level of managerial ownership lowers the default probability of a firm. The negative association of the squared term suggests that entrenchment effects become more pronounced if managers take too much control of the firm. To further investigate the relationship between the firm's performance and managerial ownership, the more general specification suggested by Short and Keasey (1999) is examined[5]. It can be seen that the coefficients of MOWN, $MOWN^2$, and $MOWN^3$ are negative, positive and then again negative, all with statistically significant coefficients. Hence, consistent with the squared regression, a moderate level of managerial ownership helps to reduce the default probability. Ownership beyond certain levels makes management become entrenched, but when the ownership level is high enough it leads to an alignment of incentives. However, the results from the piece-wise regression are slightly different. The coefficient of M1 is negative and statistically significant while those of M2 and M3 are statistically insignificant. Hence, this piece-wise specification suggests that managerial ownership up to 5% helps to lower the default probability. Other control variables in general are consistent with our expectations. For example, it is found that the larger the size of the firm the lower the default probability, and the higher the leverage the higher the default probability.

---

[4] Firms are classified into one of the following industries i.e. Agro and Food Industry, Consumer Product, Industrials, Property and Construction, Resources, Services, and Technology.

[5] This specification allows the coefficients on the managerial ownership variables to determine their own reflection points instead of predetermining the turning points as in the piecewise regression.

Also in Table 3 we investigate the effect of block holdings or concentration of outside holdings. In this study, block holdings (BLOCK) are defined as the fraction of shares held by investors owning 25% or more[6]. It can be seen that for any specifications the coefficients of BLOCK are all statistically insignificant.

This result does not seem to support our expectation that ownership should have an inverse effect on the default probability. Hence, it is of interest to investigate the effect of the type of block holding. The Stock Exchange of Thailand classifies block holdings into three types: Local Institution, Local Individual, and Foreign. In the Thai capital market, it is an anecdotal claim that nominee holdings reflect poor corporate governance. We therefore further investigate the effect of nominee holdings on the default probability.

Table 4 reports the corresponding regressions of those in previous table[7]. Specifically, we investigate the effect of types of block holdings on the probability of default. It can be seen that none of the coefficients of types of block holdings are statistically significant. When nominee holding (NOM) is included in the regressions, its coefficients are positive but statistically insignificant for all specifications. Hence, the results overall are consistent with those in Table 3. We do not find that block holdings or their types affect the default probability. Moreover, we do not find strong evidence to support the notion that nominee holding may reflect weak governance via default probability. Our result does not seem to be consistent with that of Ashbaugh-Skaife et al. (2006) who find negative relations between credit rating and corporate governance variables.

The effect of default risk on firms' performance

We next investigate whether firm performance is affected by ownership structure and default probability. First we investigate the accounting performance of firm as measured by return on assets (ROA). Then the performance using the market value as measured by the Q ratio is investigated. Table 5 reports the results of the regression using ROA as dependent variable and control variables such as size, leverage, and capital expenditures. For the control variables, the results are similar to those found in the previous analysis reported in Table 3 and 4. It is found that for the nonlinear regression none of the coefficients of the managerial ownership variables are statistically significant. However, for the piece-wise regression, we find that the coefficients of M1 and M2 are statistically significant with positive and negative sign respectively. The result suggests that alignment takes effect first and then the entrenchment effect

[6] We use the high level of concentration since ownership in the Thai market is more concentrated than in well developed capital markets.

[7] We drop the cube specification since the result is quite similar to the squared regression.

subsequently dominates. This seems to be consistent with the results of previous studies. However, when the BLOCK variable is included, the coefficient of M1 is still positive but does not statistically significant. It should be noted that the coefficients of BLOCK as well as the probability of default (PD) are not statistically significant in any of the regression specifications. These results suggest that there does not seem to be an association between ownership structure, default probability, and firm operating performance as measured by ROA. This may be due to the nature of accounting measurement that reflects the past performance of the firm. We now turn to investigating the effects of default probability and managerial ownership on firm performance using the market value measure.

Table 6 reports the results for the corresponding regressions of Table 5. Here, the dependent variable is the Q ratio instead of ROA. For the nonlinear specification, the results show that there is a positive association between MOWN and firm performance. However, the coefficient of $MOWN^2$ is negative but statistically insignificant. Moreover, as expected, there is a negative association between the default probability and the Q ratio. When the block holdings variable is added in the regression, there is a positive association between BLOCK and the Q ratio. The results clearly suggest that ownership structure positively affects firm performance, while default probability negatively affects firm performance. For the piece-wise specification, it is found that the coefficients of M2 and M3 are positive and statistically significant. The coefficient of PD is negative with statistical significance. Moreover, when we add block holdings in the regressions, the coefficients of BLOCK are positive and statistically significant. These results, consistent with those of the nonlinear regression, suggest that managerial ownership and block holdings have a positive influence on firm performance while default probability negatively affects firm performance. Since it is found that there is an association between firm performance and block holdings, it is of interest to further investigate the effect of the types of block holdings as well as nominee holdings.

Table 7 reports the same regressions as in Table 6, except that we use the types of block holdings here. Consistent with the previous results, there is a positive relation between managerial ownership and firm performance while there is a negative relation between default probability and firm performance, in all regression specifications. The coefficients of BLOCK_FOR are positive and statistically significant for the nonlinear specification. In the piece-wise regression, the relation seems to be less strong but still positive. For other types of block holdings such as institution (BLOCK_INS) and individual (BLOCK_IND) the coefficients are positive but not statistically significant in any of the specifications. Hence, contrary to the results of previous studies such as McConnell and Servaes (1990) and Del Guercio and Hawkins (1999), our results suggest that institutional investors do not

provide better monitoring. However, the finding is consistent with the anecdotal belief that foreigners provide better monitoring control for firms than local shareholders. We also investigate the effects of nominee holdings and firm performance and find that there is no statistically significant association between them.

The interaction effects

The previous results do not control for endogeneity. In this section, we investigate the interaction effects among the ownership structure, probability of default, and firm value. Specifically, the following system of equations is estimated using the two-stages least square regression:

$$MOWN_{it} = \alpha_1 + \beta_1 Size_{it} + \beta_2 CAPEX_{it} + \beta_3 Q_{it} \quad (1)$$

$$Q_{it} = \alpha_2 + \beta_4 MOWN_{it} + \beta_5 MOWN^2{}_{it} + \beta_6 PD_{it} + \beta_7 CAPEX_{it} \quad (2)$$

$$PD_{it} = \alpha_3 + \beta_8 Size_{it} + \beta_9 Leverage_{it} + \beta_{10} MOWN_{it} \quad (3)$$

Table 8 reports the results of estimating the two-stages least square (TSLS) regression.

In Panel A, from equation 1, it can be seen that the coefficient of Q is positive and statistically significant. This suggests that the better the firm performs the higher managerial ownership. From equation 2, neither the coefficient of MOWN nor $MOWN^2$ is statistically significant. The results are interpreted to mean that firm performance (Q) has a positive influence on determining managerial ownership but not vice versa. In other words, high firm performance induces managers to increase their holdings but managerial ownership does not affect firm performance. Moreover, equation 2 shows that the coefficient of PD is negative and statistically significant. Consistent with our previous analysis, this suggests that the higher the default probability the lower firm performance. Finally, in equation 3 the coefficient of MOWN is statistically significant and negative. The negative association between MOWN and default probability is consistent with our hypothesis that the higher managerial ownership, the lower the default probability of the firm. Hence, our results show that managerial ownership is indirectly associated with firm performance. Ownership negatively influences the default probability which in turn affects firm performance. Moreover, firm value affects ownership, but not vice versa.

Using the piece-wise regression in Panel B, we find somewhat weaker results. From equation 3 in Panel B, it can be seen that the coefficient of MOWN is negative and statistically significant while none of the coefficients of M1 to M3 is significant in equation 2. However, the coefficient of the default probability is not statistically significant although the sign is negative. For equation 1, we find a positive association between Q and managerial ownership as before.

In Panel C we replace managerial ownership with block holdings (equations 1 and 3) and use the types of block holdings in equation 2. The results provide even weaker results since in equations 2 and 3 none of the coefficients of block holdings are statistically significant. Moreover, it is rather surprising that there is a significant negative

association between Q and BLOCK in equation 1. This means that the better the firm performs the lower the fraction of block holdings. This issue will be further investigated in a future study.

Overall, the results may provide an alternative explanation of ownership and performance. Consistent with Cho (1998)'s result, we find that ownership structure is endogenously determined. Cho (1998) suggests that investment affects corporate value which, in turn, affects ownership structure, but not vice versa. However, based on the structural model by Merton (1974), we provide an alternative explanation of the relation between ownership structure and firm performance. Our results show that managerial ownership affects the default probability which in turn affects firm performance.

5. Conclusion

The ownership structure and its impact on firm performance have been investigated extensively in the finance literature starting with the seminal works by Demsetz and Lehn (1985) and Morck et al. (1988). In this study, we provide an alternative explanation of the relation between ownership structure and firm performance via the default probability. In particular, the study examines the association of ownership structure, default probability and firm performance in Thailand. Using a sample of companies listed on the Stock Exchange of Thailand, excluding financial institutions and companies under restructuring plans during 1995 to 2004, the results show that the ownership structure statistically affects the default probability. In particular, we find a non-linear (convex) relationship between managerial ownership and default probability; a negative association that turns positive when managers own a higher proportion of shares in a company. Similar results are documented using the piece-wise regression. However, in general we do not find a statistically significant association between the concentration of ownership (block holdings) and default probability. The same results hold when we classify block holdings into three types: individual, institution, and foreign holdings.

Furthermore we investigate the effect of ownership and default probability on firm performance. For the accounting performance measure i.e. return on assets (ROA), we do not find strong evidence to support the association between managerial ownership and firm performance. There is no association between block holdings and firm performance for any of the regression specifications. Moreover, we do not find that there is an association between default probability and ROA. However, when firm performance is measured by Tobin's Q ratio, we find that managerial ownership and block holdings are positively associated with the firm's performance. The result is consistent with the findings in previous studies. Moreover, we also find that there is a positive association between foreign holdings and Q. This suggests that foreign block holders are better at monitoring firms than local shareholders. It is also found, as expected, that there is a strong

negative association between default probability and firm performance.

Finally, to control for the endogeneity effect, we examine the relations of default probability, ownership structure, and firm performance using simultaneous regressions. The results, unlike those obtained from using ordinary least squares, show that firm performance affects managerial ownership, but not vice versa. Moreover, it is found that managerial ownership negatively affects default probability which in turn also negatively affects firm performance. Overall our findings provide an alternative explanation for the relationship between ownership structure and firm performance. They suggest that the association between ownership structure and firm performance can be analyzed by the framework of the structural model. Ownership structure affects the default probability which in turn affects firm performance.

References

Altman, E. I., 1968. Financial ratios, discriminant analysis, and the prediction of corporate bankruptcy. **Journal of Finance** 23, 589-609.

Anderson, R., Sundaresan, S., 1996. Design and valuation of debt contracts. **Review of Financial Studies** 9, 37-68.

Anderson, R., Sundaresan, S., 2000. A comparative study of structural models of corporate bond yields: An exploratory investigation. **Journal of Banking and Finance** 24, 255-269.

Ashbaugh-Skaife, H., Collins, D. W., LaFond, R., 2006. The effects of corporate governance on firms' credit ratings. **Journal of Accounting and Economics** 42, 203-243.

Berle, A., Means, G., 1932. The modern corporation and private property, **Macmillan,** New York.

Black, F., Cox, J. C., 1976. Valuing corporate securities: Some effects of bond indenture provisions. **Journal of Finance** 31, 351-368.

Black, F., Scholes, M., 1973. The pricing of options and corporate liabilities. **Journal of Political Economy** 81, 637-659.

Brockman, P., Turtle, H. J, 2003. A barrier option framework for corporate security valuation. **Journal of Financial Economics** 67, 511-529.

Chen, C. J., Yu, C. M. J., 2012. Managerial ownership, diversification, and firm performance: Evidence from an emerging market. **International Business Review** 21, 518-534.

Cho, M., 1998. Ownership structure, investment, and the corporate value: An empirical analysis. **Journal of Financial Economics** 47, 103-121.

Collin-Dufresne, P., Goldstein, R. S., 2001. Do credit spreads reflect stationary leverage ratios? **Journal of Finance** 56, 1929-1957.

Del Guercio, D., Hawkins, J., 1999. The motivation and impact of pension fund activism. **Journal of Financial Economics** 52, 293-340.

Demsetz, H., 1983. The structure of ownership and the theory of the firm. **Journal of Law and Economics** 26, 375-90.

Demsetz, H., Lehn, K., 1985. The structure of corporate ownership: causes and consequences. **Journal of Political Economy** 93, 1155-1177.

Eom, Y. H., Helwege, J., Huang, J. Z., 2004. Structural models of corporate bond pricing: An empirical analysis. **Review of Financial Studies** 17, 499-544.

Franks, J., Mayer, C., 1994. The ownership and control of German corporation. **Working Paper** (London Business School).

Gharghori, P., Chan, H., Faff, R., 2009. Default risk and equity returns: Australia evidence. **Pacific-Basin Finance Journal** 17, 580-593.

Geske, R., 1977. The valuation of corporate liabilities as compound options. **Journal of Financial and Quantitative Analysis** 12, 541-552.

Gorton, G., Schmid, F.A., 1996. Universal banking and the performance of German firms. **Working Paper** (University of Pennsylvania).

Hillegeist, S. A., Keating, E., Cram, D., Lundstedt, K., 2004. Assessing the probability of bankruptcy. **Review of Accounting Studies** 9, 5-34.

Himmelberg, C., Hubbard, R. G., Palia, D., 1999. Understanding the determinants of managerial ownership and the link between ownership and performance. **Journal of Financial Economics** 53, 353-384.

Holderness, C. G., Sheehan, D.P., 1988. The role of majority shareholders in poblicly held corporations. **Journal of Financial Economics** 20, 317-346.

Jones, E. P., Mason, S. P., Rosenfeld, E., 1984. Contingent claims analysis of corporate capital structures: An empirical investigation. **Journal of Finance** 39, 611-625.

Kaplan, S., Minton, B., 1994. Appointments of outsiders to Japanese boards : Determinants and implications for managers, **Journal of Financial Economics** 36, 225-257.

Kealhofer, S., 2003. Quantifying credit risk I: Default prediction. **Financial Analysts Journal** 59, 3-44.

Kim, K. A., Kitsabunnarat, P., Nofisnger, J.R., 2004. Ownership and operating performance in an emerging market: evidence from Thai IPO firms. **Journal of Corporate Finance** 10, 355-381

Leland, H. E., 1994. Corporate debt value, bond covenants, and optimal capital structure. **Journal of Finance** 49, 1213-1252.

Leland, H. E., Toft, K. B., 1996. Optimal capital structure, endogenous bankruptcy, and the term structure of credit spreads. **Journal of Finance** 51, 987-1019.

Longstaff, F., Schwartz, E., 1995. A simple approach to valuing risky fixed and floating rate debt. **Journal of Finance** 50, 789-819.

Margaritis, D., Psillaki, M., 2010. Capital Structure, equity ownership and firm performance. **Journal of Banking and Finance** 34, 621-632

Mella-Barral, P., Perraudin, W., 1997. Strategic debt service. **Journal of Finance** 52, 531-566.

McConnell, J., Servaes, H., 1990. Additional evidence on equity ownership and corporate value. **Journal of Financial Economics** 27, 595-613.

McConnell, J., Servaes, H., Lins, K.V., 2008. Changes in insider ownership and changes in the market value of the firm. **Journal of Corporate Finance** 14, 92-106.

Merton, R. C., 1974. On the pricing of corporate debt: The risk structure of interest rates. **Journal of Finance** 28, 449-470.

Morck, R., Shleifer, A., Vishny, R., 1988. Management ownership and market valuation: An empirical analysis. **Journal of Financial Economics** 20, 293-315.

Ohlson, J., 1980. Financial ratios and the probabilistic prediction of bankruptcy. **Journal of Accounting Research** 19, 109-131.

Shleifer, A., Vishny, R., 1986. Large shareholders and corporate control. **Journal of Political Economy** 94, 461-488.

Short, H., Keasey, K., 1999. Managerial ownership and the performance of firms: Evidence from the UK. **Journal of Corporate Finance** 5, 79-10.

Stulz, R. M., 2005. The limits of financial globalization. **Journal of Finance** 60, 1595-1638.

Vassalou, M., Xing, Y., 2004. Default risk in equity returns. **Journal of Finance** 59, 831-868.

Table 1: Descriptive Statistics of the Sample

Using a sample of companies listed on the Stock Exchange of Thailand during the period 1995 to 2004, the number of companies each year, for which the probability of default (PD) can be calculated is presented in the second column. Descriptive statistics of probability of default (PD), firm size measured by market capitalization, managerial ownership (MOWN), and Tobin's Q ratio (Q) are presented respectively.

Year	No of Firms	PD				Firm Size (THB: millions)				MOWN				Q			
		Max	Min	Mean	Median	Max	Min	Mean	Median	Max	Min	Mean	Median	Max	Min	Mean	Median
1995	220	0.9850	0.0000	0.1142	0.0106	170,059.40	52.79	7,451.54	1,267.00	0.9249	0.0000	0.2154	0.1016	7.0080	0.2908	1.5883	1.2540
1996	242	1.0000	0.0000	0.2847	0.0987	118,930.40	46.93	4,986.77	882.52	0.9130	0.0000	0.2263	0.1390	8.6120	0.1825	1.2557	0.9655
1997	246	1.0000	0.0000	0.6179	0.7826	127,099.90	13.00	2,648.20	342.00	0.9234	0.0000	0.2406	0.1469	5.3406	0.3056	0.9128	0.7754
1998	243	1.0000	0.0000	0.5465	0.5692	83,456.00	15.15	2,777.52	357.47	0.9240	0.0000	0.2286	0.1584	5.3737	0.2226	0.9490	0.8693
1999	245	1.0000	0.0000	0.2716	0.1526	121,499.90	8.40	4,418.04	473.28	0.9630	0.0000	0.2210	0.1383	7.4520	0.2737	1.0829	0.9331
2000	238	1.0000	0.0000	0.4522	0.4508	97,199.94	27.30	2,813.26	428.50	0.9138	0.0000	0.1629	0.0844	8.7995	0.1316	1.0525	0.8717
2001	241	0.9999	0.0000	0.1944	0.0330	119,601.20	13.53	3,628.92	588.00	0.8438	0.0000	0.1685	0.0960	12.0126	0.1769	1.1574	0.9510
2002	246	0.9982	0.0000	0.1244	0.0039	140,639.90	9.53	4,544.48	959.51	0.9109	0.0000	0.1708	0.0885	19.8272	0.2870	1.2768	1.0053
2003	275	1.0000	0.0000	0.0501	0.0000	517,490.40	20.40	10,891.58	2,070.62	0.9414	0.0000	0.1769	0.0821	23.0768	0.3270	1.8975	1.3784
2004	299	1.0000	0.0000	0.1538	0.0099	483,923.40	19.40	9,793.96	1,746.14	0.9417	0.0000	0.1862	0.0935	28.5725	0.3097	1.4843	1.1255
Whole Period	2495	1.0000	0.0000	0.2766	0.0629	517,490.40	8.40	5,565.41	825.00	0.9630	0.0000	0.1985	0.1128	28.5725	0.1316	1.2724	0.9932

Table 2: Characteristics of Probability of Default

For the period between December 1994 and November 2004, at the end of each month, the study firstly sorts all portfolios into quartiles based on their probabilities of default (PD). Within each default risk portfolio, all stocks are then sorted into four portfolios based on their firm size measured by market capitalization. Equally-weighted portfolio returns over the next month's period are then calculated as shown in Panel A. Panels B to C are sorted in the same manner by using yearly data. Panel D reports average default probabilities of portfolios sorted by market capitalization.

	Small			Big
	1	2	3	4
Panel A: Average Return				
Low PD 1	-0.0028	-0.0062	-0.0038	-0.0027
2	-0.0005	-0.0046	-0.0122	-0.0108
3	0.0043	-0.0086	-0.0092	-0.0177
High PD 4	0.0199	0.0050	-0.0083	-0.0093
Panel B: Average Q				
Low PD 1	1.0514	1.3117	1.7664	2.4747
2	0.9661	0.9949	1.1363	1.3091
3	0.8303	0.9458	1.0371	1.0900
High PD 4	0.9239	0.8972	1.1847	1.1790
Panel C: Average MOWN				
Low PD 1	0.2549	0.2045	0.1792	0.1248
2	0.2418	0.2231	0.1878	0.1020
3	0.2099	0.2338	0.1844	0.1172
High PD 4	0.2612	0.2278	0.2186	0.1589
Panel D: Average PD				
Year	Small 1	2	3	Big 4
1995	0.2326	0.0970	0.1025	0.0102
1996	0.5032	0.3509	0.1690	0.1147
1997	0.9173	0.6553	0.5240	0.3873
1998	0.8723	0.6482	0.4609	0.2456
1999	0.5659	0.3031	0.1773	0.1215
2000	0.7917	0.4498	0.3868	0.2831
2001	0.3998	0.2627	0.1213	0.0570
2002	0.3359	0.1055	0.0692	0.0292
2003	0.1207	0.0253	0.0079	0.0459
2004	0.3459	0.1123	0.1221	0.0468
Whole Period	0.6066	0.2763	0.1671	0.0961

Table 3: The Effects of Managerial Ownership and Block Holdings on Default Risk

The table examines the effects of managerial ownership and block holdings on default risk. We define Size as the natural logarithm of market value of equity, Profitability by the ratio of net income to sales, Leverage as the ratio of total liabilities divided by total assets, investment (CAPEX) as the ratio of net cash flow from investment to total assets, MOWN as managerial ownership, BLOCK as the fraction of shares held by investors owning 25% or more, and PD as default probability estimated by Merton (1974) model. We also test non-linear effects of managerial ownership by including the squared term ($MOWN^2$) and cubic term ($MOWN^3$) in equations 1-3 and investigate piece-wise-linear relations (M1: M1<=0.05, M2: 0.05<M2<=0.25, and M3: M3>0.25) in equation 4-5. T-values are in parentheses and estimated by the Newey-West standard errors.

Coefficients	(1)	(2)	(3)	(4)	(5)
Constant	0.7366	0.7524	0.7458	0.7600	0.7525
	(18.00)	*(18.14)*	*(17.64)*	*(18.11)*	*(17.56)*
Size	-0.0855	-0.0862	-0.0864	-0.0864	-0.0866
	(-23.98)	*(-24.11)*	*(-24.01)*	*(-24.14)*	*(-24.02)*
Profitability	0.0007	0.0007	0.0010	0.0007	0.0010
	(0.94)	*(0.92)*	*(1.24)*	*(0.92)*	*(1.24)*
Leverage	0.2412	0.2394	0.2336	0.2393	0.2335
	(15.47)	*(15.35)*	*(14.79)*	*(15.34)*	*(14.78)*
CAPEX	0.0006	0.0006	0.0007	0.0007	0.0007
	(0.37)	*(0.42)*	*(0.45)*	*(0.44)*	*(0.47)*
MOWN	-0.2040	-0.5016	-0.4734		
	(-2.73)	*(-3.34)*	*(-3.04)*		
$MOWN^2$	0.3099	1.4360	1.3750		
	(2.82)	*(2.84)*	*(2.67)*		
$MOWN^3$		-1.0096	-0.9733		
		(-2.29)	*(-2.18)*		
M1				-0.9749	-0.8956
				(-2.64)	*(-2.38)*
M2				-0.0222	-0.0217
				(-0.22)	*(-0.21)*
M3				0.0940	0.0937
				(1.82)	*(1.80)*
BLOCK			0.0066		0.0054
			(0.27)		*(0.22)*
Adjusted R^2	0.4990	0.4990	0.4999	0.5001	0.5036

Table 4: The Effects of Managerial Ownership, Types of Block Holdings and Nominee Holdings on Default Risk

This table reports the effect of managerial ownership, types of block holdings and nominee holdings on default risk. Specifically, we test the effects of types of block holdings classified by domestic institution (BLOCK_INS), domestic individual (BLOCK_IND), and foreign investors (BLOCK_FOR) on the default probability. In addition, the effect of nominee holdings (NOM) is also investigated. T-values are in parentheses and estimated by the Newey-West standard errors.

Coefficients	(1)	(2)	(3)	(4)
Constant	0.7312	0.7343	0.7545	0.7571
	(17.55)	*(17.61)*	*(17.58)*	*(17.63)*
Size	-0.0859	-0.0878	-0.0866	-0.0885
	(-23.90)	*(-23.27)*	*(-24.03)*	*(-23.39)*
Profitability	0.0010	0.0010	0.0010	0.0010
	(1.26)	*(1.27)*	*(1.24)*	*(1.25)*
Leverage	0.2350	0.2351	0.2328	0.2329
	(14.88)	*(14.89)*	*(14.73)*	*(14.74)*
CAPEX	0.0007	0.0006	0.0008	0.0007
	(0.45)	*(0.41)*	*(0.51)*	*(0.47)*
MOWN	-0.1791	-0.1738		
	(-2.28)	*(-2.21)*		
$MOWN^2$	0.2790	0.2749		
	(2.44)	*(2.41)*		
M1			-0.8771	-0.8665
			(-2.32)	*(-2.29)*
M2			-0.0260	-0.0211
			(-0.25)	*(-0.20)*
M3			0.0952	0.0955
			(1.68)	*(1.69)*
BLOCK_INS	0.0330	0.0401	0.0237	0.0307
	(1.10)	*(1.33)*	*(0.78)*	*(1.01)*
BLOCK_IND	0.0135	0.0139	0.0033	0.0040
	(0.27)	*(0.27)*	*(0.06)*	*(0.08)*
BLOCK_FOR	-0.0212	-0.0194	-0.0275	-0.0256
	(-0.55)	*(-0.50)*	*(-0.71)*	*(-0.66)*
NOM		0.1737		0.1685
		(1.69)		*(1.64)*
Adjusted R^2	0.5025	0.5030	0.5034	0.5038

Table 5: The Effects of Managerial Ownership and Default Risk on Firm Performance Measured by ROA

In this table, we test the effects of managerial ownership and default risk on firm performance measured by return on assets (ROA). We define ROA as the ratio of net income to total assets. In addition, firm size (Size), leverage, and firm investment (CAPEX) are used as control variables. T-values are in parentheses and estimated by the Newey-West standard errors.

Coefficients	(1)	(2)	(3)	(4)
Constant	0.0771	0.0827	0.0711	0.0772
	(1.71)	*(1.71)*	*(1.51)*	*(1.50)*
Size	0.0055	0.0055	0.0057	0.0057
	(2.41)	*(2.43)*	*(2.50)*	*(2.51)*
Leverage	-0.1300	-0.1316	-0.1299	-0.1314
	(-2.97)	*(-2.99)*	*(-2.97)*	*(-2.98)*
CAPEX	0.0003	0.0003	0.0003	0.0003
	(1.71)	*(1.78)*	*(1.45)*	*(1.50)*
MOWN	0.0033	-0.0119		
	(0.09)	*(-0.23)*		
$MOWN^2$	-0.0086	0.0114		
	(-0.19)	*(0.18)*		
M1			0.2832	0.2515
			(2.04)	*(1.39)*
M2			-0.0679	-0.0777
			(-2.07)	*(-2.04)*
M3			0.0116	0.0166
			(0.87)	*(0.95)*
BLOCK		-0.0160		-0.0149
		(-0.98)		*(-0.82)*
PD	0.0200	0.0188	0.0205	0.0192
	(1.06)	*(1.01)*	*(1.11)*	*(1.05)*
Adjusted R^2	0.0974	0.0978	0.0978	0.0981

Table 6: The Effects of Managerial Ownership and Default Risk on Firm Performance Measured by Q

This table shows the results from examining the effects of managerial ownership and default risk on firm performance measured by Tobin's Q ratio. We also include firm size (Size), leverage, and firm investments (CAPEX) as control variables. T-values are in parentheses and estimated by the Newey-West standard errors.

Coefficients	(1)	(2)	(3)	(4)
Constant	-0.7523	-0.8430	-0.7192	-0.8212
	(-3.32)	*(-3.58)*	*(-3.22)*	*(-3.49)*
Size	0.2072	0.2113	0.2054	0.2104
	(11.98)	*(12.02)*	*(12.05)*	*(12.13)*
Leverage	1.0094	1.0294	1.0080	1.0280
	(2.94)	*(3.00)*	*(2.93)*	*(3.00)*
CAPEX	0.0010	0.0011	0.0011	0.0012
	(0.70)	*(0.82)*	*(0.78)*	*(0.84)*
MOWN	0.5529	0.6973		
	(2.48)	*(3.04)*		
$MOWN^2$	-0.1519	-0.3465		
	(-0.49)	*(-1.10)*		
M1			-0.1405	0.4212
			(-0.13)	*(0.38)*
M2			0.5380	0.5670
			(2.17)	*(2.23)*
M3			0.4615	0.4225
			(3.18)	*(2.85)*
BLOCK		0.1891		0.1763
		(2.65)		*(2.40)*
PD	-0.2929	-0.2771	-0.2969	-0.2795
	(-2.41)	*(-2.40)*	*(-2.45)*	*(-2.43)*
Adjusted R^2	0.3749	0.3829	0.3746	0.3824

Table 7: The Effects of Managerial Ownership, Default Risk, Types of Block Holdings and Nominee Holdings on Firm Performance Measured by Q

This table presents the results from investigating the effects of managerial ownership (MOWN), default risk (PD), types of block holdings (domestic institution (BLOCK_INS), domestic individual (BLOCK_IND), and foreign investors (Block_FOR)) and nominee holdings (NOM) on firm performance measured by Tobin's Q ratio. T-values are in parentheses and based on Newey-West standard errors.

Coefficients	(1)	(2)	(3)	(4)
Constant	-0.8435	-0.8458	-0.8216	-0.8238
	(-3.56)	*(-3.57)*	*(-3.48)*	*(-3.49)*
Size	0.2115	0.2127	0.2105	0.2118
	(12.13)	*(11.79)*	*(12.23)*	*(11.88)*
Leverage	1.0294	1.0292	1.0281	1.0279
	(3.00)	*(3.00)*	*(2.99)*	*(2.99)*
CAPEX	0.0011	0.0011	0.0011	0.0012
	(0.75)	*(0.77)*	*(0.78)*	*(0.79)*
MOWN	0.6874	0.6845		
	(2.97)	*(2.94)*		
$MOWN^2$	-0.3580	-0.3558		
	(-1.12)	*(-1.12)*		
M1			0.3860	0.3796
			(0.36)	*(0.35)*
M2			0.5652	0.5623
			(2.21)	*(2.19)*
M3			0.4006	0.4003
			(2.44)	*(2.43)*
BLOCK_INS	0.1663	0.1622	0.1545	0.1502
	(1.70)	*(1.67)*	*(1.60)*	*(1.56)*
BLOCK_IND	0.2389	0.2387	0.2210	0.2206
	(1.43)	*(1.43)*	*(1.28)*	*(1.28)*
BLOCK_FOR	0.1992	0.1982	0.1881	0.1869
	(2.12)	*(2.11)*	*(1.96)*	*(1.94)*
NOM		-0.1007		-0.1035
		(-0.37)		*(-0.38)*
PD	-0.2766	-0.2759	-0.2790	-0.2783
	(-2.41)	*(-2.40)*	*(-2.44)*	*(-2.43)*
Adjusted R^2	0.3824	0.3822	0.3818	0.3816

Table 8: The Endogeneity Effects of Managerial Ownership, Default Risk, and Firm Performance

The table shows the results from investigating endogeneity effects of managerial ownership, default risk, and firm performance. Specifically, we test the system of equations as follows:

$$MOWN_{it} = \alpha_1 + \beta_1 Size_{it} + \beta_2 CAPEX_{it} + \beta_3 Q_{it} \quad (1)$$

$$Q_{it} = \alpha_2 + \beta_4 MOWN_{it} + \beta_5 MOWN^2{}_{it} + \beta_6 PD_{it} + \beta_7 CAPEX_{it} \quad (2)$$

$$PD_{it} = \alpha_3 + \beta_8 Size_{it} + \beta_9 Leverage_{it} + \beta_{10} MOWN_{it} \quad (3)$$

where Q is the Tobin's Q ratio, Size is defined as the natural logarithm of the market value of equity, Leverage is total liabilities divided by total assets, investment (CAPEX) is defined as net cash flow from investment to total assets, MOWN is managerial ownership, and PD is default probability. In panel B, MOWN and $MOWN^2$ in equation (2) is replaced by the piece-wise-linear relations (M1: M1<=0.05, M2: 0.05<M2<=0.25, and M3: M3>0.25). In panel C, MOWN and $MOWN^2$ in equation (2) is replaced by types of block holdings (domestic institution (BLOCK_INS), domestic individual (BLOCK_IND), and foreign investors (Block_FOR)), and MOWN in equation (3) is replaced by block holdings (BLOCK) which is fraction of shares held by investors owning 25% or more. T-values are in parentheses and based on Newey-West standard errors.

Panel A: Managerial Ownership (Nonlinear)

Coefficients	(1)	(2)	(3)
Constant	0.9814	1.7208	1.4187
	(2.65)	*(6.15)*	*(5.59)*
Size	-0.1269		-0.1420
	(-2.10)		*(-7.81)*
PD		-2.5832	
		(-2.65)	
CAPEX	0.0013	-1.3888	
	(0.76)	*(-0.40)*	
Leverage			0.2246
			(6.77)
MOWN		1.1631	-1.4232
		(0.27)	*(-2.37)*
$MOWN^2$		-0.6481	
		(-0.13)	
Q	0.0724		
	(1.96)		

Panel B: Managerial Ownership (Piecewise)

Coefficients	(1)	(2)	(3)
Constant	0.9814	1.5316	1.4187
	(2.65)	*(0.77)*	*(5.59)*
Size	-0.1269		-0.1420
	(-2.10)		*(-7.81)*
PD		-2.8264	
		(-0.80)	
CAPEX	0.0013	-2.0866	
	(0.76)	*(-0.17)*	
Leverage			0.2246
			(6.77)
MOWN			-1.4232
			(-2.37)
M1		11.3726	
		(0.12)	
M2		-0.3711	
		(-0.07)	
M3		0.8183	
		(0.50)	
Q	0.0724		
	(1.96)		

Panel C: Block Holdings

Coefficients	(1)	(2)	(3)
Constant	-6.9375	1.6002	0.8195
	(-6.08)	*(3.70)*	*(30.63)*
Size	1.1356		-0.1014
	(6.25)		*(-29.61)*
PD		-1.9743	
		(-2.54)	
CAPEX	-0.0028	1.2216	
	(-0.24)	*(0.48)*	
Leverage			0.2820
			(16.72)
BLOCK			0.0441
			(1.79)
BLOCK_INS		1.0379	
		(0.51)	
BLOCK_IND		0.5383	
		(0.67)	
BLOCK_FOR		-0.2144	
		(-0.34)	
Q	-0.5278		
	(-5.73)		