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Does Property Insurance Increase Firm Value?

By

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ABSTRACT

Recent studies hypothesize a relation between firm value and risk management. Empirical tests of this relation have only focused on large listed firms and relation between firm market value and the use of financial derivatives. In this article, we explore empirically the cross-sectional relation between firm value and the use of property insurance in a sample of 663 unlisted firms in Norway. Using industry adjusted return on assets as a proxy for firm value, this paper documents that the positive relation between firm value and property insurance holds for firms with above average financial performance and relatively high leverage(measured as long term debt scaled by total assets) in our sample.

Introduction

Risk management plays an increasingly important role in corporate strategy and business management. Firms create value by investments, but this value could be easily jeopardized by different risk factors without a good and integrated risk management. Even worse, some risks could lead the firms go bankruptcy. The recently happened hurricane Katrina (summer 2005 in USA) has already taught a lesson to the firms without an active risk management program in place, thus, raised the importance of risk management for all the firms.

[1]Special thanks are due to CCGR and AON Grieg for their supply of financial data and insurance data of our sample firms. I wound particular like to thank Paul Ehling, my thesis supervisor, for his enthusiasm, advice, and encouragement during the whole thesis process.

Firms are mainly exposed to two types of financial risks: pure risks and speculative risks[2]. The speculative risks are defined as risks that are mainly from firms' core business activities and that involve both a potential loss and gain directly related to the firms' cash flows. These risks can be hedged through contingent claims contracts such as forward, futures, options and swaps. The pure risks are defined as risks related to unexpected natural disasters and accidents such as fire and work injuries. These risks, however, only involve a potential loss to the firms. In order to protect firms' assets against pure risks and ensure the future business continuity, it mainly requires a good insurance policy and management.

But how could risk management directly affect the firm value? There are several recent empirical studies which have already provided evidence that risk management by hedging speculative risks through financial derivatives could increase firm market value. Allayannis and Weston (2001), for example, find a positive relation between firm value (measured by Tobin's Q) and the use of FCDs (foreign currency derivatives) in a sample of 720 large U.S. nonfinancial firms between 1990 and 1995; Carter, Rogers and Simkins (2006) also find that hedging fuel price is positively related to firm market value (Tobin's Q) in American airline industry and conclude that this hedging benefit comes from reduction of underinvestment costs.

However, results of these studies could have different limitations as follows: In most studies, hedging dummy[3] is used as the independent variable to test the relation. Thus, it only gives us the general picture that firms with hedging could have higher market value than firms without hedging in the same industry. Without giving any information of hedging ratio or the risk exposure of firms in the analysis, it is difficult to examine the relation further.

[2] For reference to the two types of risks see Albert H.Mowbray and Ralph H. Blanchard, Insurance (New York: McGraw-Hill Book Company, 1961), pp. 6-7.

[3] For the hedging dummy, these articles set 1 for firms with hedging and 0 for firms without hedging.

Secondly, as Hentschel and Kothari (2001), Allayannis and Ofek (2001) argue, it is difficult to figure out whether firms are hedging or speculating since we do not know the risk exposure of the firms.

Finally, all these studies focus on large listed firms and test how market value is affected by hedging. Due to the difference between public firms and unlisted firms in tax policies, dividend policy, agency problems and information asymmetries, risk management could affect the firm value of unlisted firms in a different way.

Our study extends the current research in the following ways: We consider both risk exposure and hedging ratio in our study. Since we focus on property insurance in this paper, risk exposure is actually BV (book value) of firms' property, plant, and equipment plus inventory; while hedging ratio is defined as insurance ratio, and it is calculated as insurance premium scaled by the risk exposure (PP&E plus inventory). Thus, instead of using hedging dummy, we use the proxy of hedging ratio, and our result would be more comprehensive.

Our sample contains 663 unlisted Norwegian firms across a broad range of industries. Furthermore, we have a mix sample of small, medium and large sized firms (criterion is based on Norwegian Accounting Act 1998), not just large firms as in previous studies.

Last but not the least; we analyze the pure risk management. This is very important because most previous empirical studies focus on the economic contribution of hedging (speculative risk management) to firms. In addition, there are many literature and empirical studies on insurance (pure risk management), but most topics are about firms' corporate demand of insurance. Risk aversion is not enough for explanation of corporate demand of risk management, and most studies argue that insurance could benefit firms through reducing expected bankruptcy costs, eliminating agency problems, etc. if insurance could benefit firms as they argued, it is reasonable to

expect that firm value could increase through pure risk management (insurance). So in this study, we use two empirical models based on different sub samples to directly test the research question.

The article is organized as follows: first, the previous literature and empirical studies review; second, sample description and variable presentations; third, model analysis; fourth, robustness of the test model; and finally, the conclusion of our study.

1. Literature and empirical studies on the relation between Risk Management & Firm Value

1.1 Literature on corporate demand on insurance

In the classic Modigliani and Miller perfect capital market, risk management is irrelevant to firm value. However, in practice, with imperfections in the market such as tax regulations, information asymmetry, transaction costs and arbitrage opportunities, risk management could be a value enhancing strategy for firms. With the development of the modern theory on the corporate demand of insurance, many authors argue that corporate insurance could benefit firms through: reducing expected bankruptcy costs, eliminating agency problems, providing real services, decreasing tax liabilities, and increasing liability capacity[4].

Expected bankruptcy costs

As Myers and Smith (1982, 1990) point out, risk management could increase firm value by reducing probability of bankruptcy. This is due to the fact that when firms purchase the insurance, the probability of incurring the costs is reduced by shifting risk to the insurance company. In addition, according to Warner (1977), there is

[4] See Mayers and Smith (1982, 1987), Main (1983), and Smith and Witt (1985).

negative relation between firm size and the direct bankruptcy costs. This relation suggests that smaller firms will have relatively higher expected bankruptcy costs, thus are more likely to purchase insurance than larger firms.

Underinvestment problems

Highly leveraged firms face underinvestment problems as a result of interest conflicts between the stockholders and the bondholders. Stockholders of leveraged firms might find that the decision of taking a positive NPV (net present value) project could be a disadvantage to them, because the large portion of benefits accrues to the bondholders who have prior claim on the firm's assets. This is true especially when firms have large debt with great investment opportunities. As Mayers and Smith (1987) argue, the risk management (including insurance) could control this underinvestment incentive. When firms buy insurance against firm-specific risks, the loss would be indemnified by the insurance company, so the incentive to forgo the positive NPV project would be reduced. Thus, we say that insurance could benefit firms through alleviating underinvestment problems.

Ownership Concentration

According to Mayers and Smith (1990), optimal risk sharing is another way that insurance could affect the firm value. Firms with high ownership concentration are more likely to purchase insurance through which the big owners could protect themselves better. They could specialize in risk bearing only in dimensions in which they have expertise and thus a comparative advantage (see Arrow 1974, ch.5).

Real service

As Mayers and Smith (1982), Hoyt and Khang (2000) argue, firms with insurance contract could also benefits from the real services provided by the insurance companies. Insurance companies have relative advantages in real services such as loss control and claims administration because of economic scale, so they could work as

the low-cost suppliers of these services to firms.

In addition, Hoyt and Khang (2000) also state that this advantage is negatively related with firm size. This means that small firms are more likely to purchase insurance and benefits from the low-cost and efficient real services.

1.2 Empirical studies

Many empirical studies have examined the relation between firm value and hedging of speculative risks. In addition, they differentiate themselves by focusing on various industries and different financial derivatives use.

Allayannis and Weston (2001) study the relation between use of foreign currency derivatives and the firm market value in a sample of 720 large U.S. nonfinancial firms between 1990 and 1995. They found a positive relation and concluded that hedging causes an increase in firm value. In addition, Carter, Rogers, and Simkins (2005) examine the relation between firm market value and fuel hedging in American airlines industry, and they found even higher hedging premium than Allayannis and Weston (2001).

However, Jin and Jorion (2006) do not find this positive relation when they study hedging activities of 119 U.S. oil and gas firms from 1998 to 2001. They verify that hedging could reduce the stock price sensitivity to oil and gas prices, but it does not affect market value of these firms as found in previous studies. They argued that the disappearance of the hedging premium is due to the difference between the nature of commodity risk exposure of oil and gas producers and the foreign currency risk exposure of large American firms[5].

This raises the question that different risk management tool could affect firm value

[5] See Jin, Y. and P. Jorion, (2006) for detailed argument.

differently and the relation could also depend on industry characteristics.

Use of insurance differs from financial derivatives in the following ways: Firstly, insurance and financial derivatives are against two different kinds of risks, as stated above. Secondly, firms could choose to hedge or not hedge, but firms do need to purchase insurance, especially property insurance which is quite important for firms' assets. Thirdly, financial derivatives hedging could affect firms' cash flows from operations (selling goods and services) directly. By setting a hedge in the opposite position of firms' business exposure, firms could have smaller volatility of their cash flows. But insurance does not affect firms' operations cash flows. Instead, insurance could be a value-increasing project for firms through financing activities, management, investment decision-making and other corporate governance issues.

2. Data Description and Hypothesis Development

2.1 Sample Description

Our sample is based on two sources of data: accounting data from CCGR[6], which contains financial statements for 813 unlisted firms in Norway (1403 observations) from year 2003 to year 2005; and insurance data from AON Grieg, which contains 1167 firm year insurance data for unlisted firms in Norway.

This sample is a mix of small, medium and large sized unlisted firms. Norwegian Accounting Act 1998 requires that the income statement and balance sheet for small enterprises shall be prepared in accordance with the general provisions while cash flow statement is not a mandatory part of the annual accounts. In this study, we use income statement and balance sheet, so we have available financial statements for all the firms.

[6] Center for Coporate Governance Research at BI Norwegian School of Management

Next, we select the sample of firms that have both accounting data and insurance data available. This process leaves us a sample with 1167 firm-year observations between year 2003 and year 2005. There are 208 observations in year 2003, 495 observations in year 2004, 460 observations in year 2005 and only 76 firms that have available data for all the three years. In addition, only three-year horizon (yearly data) is not enough for a time series study. Thus, we follow the methodology of Eisenberg, Sundgren, and Wells (1998) to use one observation for each firm. But instead of using the most recently available financial data for each firm, we use the average value if firms have more than one observation. The reason behind is that the average financial data could show a better and more general picture of firms' performance than just single year information. This process reduces the number of observations from 1167 to 673. And we also cut 10 observations with total value of Assets less than 1million, thus the sample size decreases from 673 to 663.

Table I shows the statistics description of the whole sample and Table II shows the correlations between variables.

In this sample of 663 observations, we have a mean BV (book value) of assets of 235 million NOK (about $35 million)[7] while the median BV is 45 million NOK (about $7 million). These figures are quite small when compared with large public U.S. firms samples that are used in several previous studies. However, according to Norwegian Accounting Act 1998, our sample represents both large and medium-small firms in Norwegian market. The statistic of BV of total assets have wide range (see from Table 1): the minimum BV of assets is 1.08 million NOK while the maximum BV is 10590 million NOK.

Finally, firms are from different industries. They are Agriculture, forestry, fishing,

[7] According to Statistic Norway, the foreign exchange rate of NOK/USD from 2003 to 2005 is 7.08, 6.74 and 6.44 separately. For simplicity, we use the average exchange rate during these three years which is 6.75 for the calculation.

mining; Manufacturing, chemical products; Energy; Construction; Service; Trade; Transport; and Multi group (this group contains firms in multiple industries). In addition, firms are not evenly spread in these industries. We have most firms in Manufacturing, chemical product industry (226), Service industry (168) and Trade industry (163).

Table III shows the statistic description of sub samples based on industries.

Return on Assets

For the dependent variable in this study, we use return on assets (ROA) as the proxy of firm value. The other commonly used proxies of firm value are Tobin's Q and return on equity (ROE). Tobin's Q is calculated as the ratio of the MV (market value) of financial claims on the firm to the current replacement cost of the firm's assets. Since all the firms in our sample are not publicly owned, we could not measure their performance by market-based valuation data. Thus, ROA and ROE could be used as the proxies for unlisted firms. ROA is return on assets and is calculated as earnings before interests and tax (EBIT) divided by BV of total assets; ROE is return on equity and is calculated as earnings after tax divided by BV of equity.

The difference between ROA and ROE is mainly from firms' leverage. When the firm is highly leveraged, the use of ROE could mislead the stakeholders by showing quite high return on equity ratio while the firm might face great financial distress costs. This is because ROE has equity as divisor while ROA has assets (Equity plus Liability) as divisor, and for firms with high leverage (say, firms that have large debt in the capital structure), debt amplifies ROE in relation to ROA. In addition, ROE weights net income only against owners' equity, it doesn't show how efficiently the firms use their financing from debt, while ROA considers both shareholders' and debtholders' interests.

Furthermore, our sample of 663 unlisted firms shows quite high leverage in capital structure. From Table I, we see that our sample has a mean value of DE ratio (it is defined as total debt scaled by total assets) of 0.70 while the median is 0.72. So based on the argument above, we choose to use ROA as the proxy of firm value instead of ROE.

ROA measures how effectively the company is converting the money of investors into net income. The higher ROA the better: the firm is earning more money on less investment. In our sample of 663 firms, we have a mean value of ROA of 0.05 with the median value of 0.07. The minimum ROA is negative (-2.71) while the maximum is closed to one (0.95). This big difference could due to the firms' own characteristics and the industrial factors. In the further regression analysis, we use control variables to explain how ROA depends on the firms' own characteristics such as capital structure and dividend payout policy, and here we discuss about the industry effect on ROA in the following part.

We find that ROA is quite different across these eight industries. See Table III in Appendix for the statistic description of ROA. For example, industry of agriculture, forestry, fishing and mining has a negative mean value of ROA (-0.07); industry of energy has the highest mean value of ROA (0.09) among these eight industries; while industry of trade, industry of construction and industry of manufacturing, chemical products share the similar mean value of ROA. The difference of ROA among various industries could due to the effect of industry conditions and general economic conditions. As we know, Energy industry is one of the leading industries in Norway, a country with abundance of natural resources such as petroleum and hydro. Thus it is reasonable that our sample shows a relatively high ROA for this industry. Meanwhile, agriculture industry contributes only 2.3%[8] to the GDP of Norway, and has suffered

[8] According to information from Statistics Norway

relative decline compared with other industries in recent years. Our sample also strengthens this fact by showing the lowest ROA of this industry. In conclusion, even though the sample only contains 673 unlisted firms in Norway, it shows quite good picture of the industry characteristics in this country.

In order to control the industry effects on the firm value, many empirical studies use industry adjusted proxies for firm value. Such as Eisenberg, Sundgren, and Wells (1997) used industry-adjusted measures of return on assets to measure firm performance, and Allayannis and Weston (2001) used industry-adjusted Tobin's Q as the proxy of firm value. In our study, we follow the methodology of constructing ROAadj by Eisenberg, Sundgren, and Wells (1997).

ROA_{adj} is defined as follows:

$ROA_{adj} = \text{sign}(\Delta ROA) * \sqrt{\ } /\Delta ROA/.$ Equation (1)

ΔROA is calculated as the difference between firm ROA and the industry's median ROA. And industry's median ROA ratios are calculated based on firms' ROA within each industry in our sample. The reason why we use median instead of mean is: mean is an optimal estimator if in fact the data is normal distributed. However, in practice, financial data is seldom normal distributed. In addition, our data sample for each industry group contains also outliers and ROAs for all the groups are left skewed. Outliers could greatly influence the mean and thus the description is distorted. Thus, we use median instead of mean to calculate the industry adjusted return on assets (ROA_{adj}).

Furthermore, after we use ROA_{adj} instead of raw ROA ratio, the dependent variable are more symmetric.

Insurance ratio

The property insurance data is provided by AON Grieg. In this study, we use insurance premium to calculate the independent variable of insurance ratio. Insurance premium is the actual amount of money charged by insurance company for active coverage. See from Table I in Appendix, we have mean value of insurance premium of 0.2 million NOK. The maximum premium is 6 million NOK while the minimum is only 502 NOK.

We define the insurance ratio as insurance premium each firm paid every year divided by BV of property, plant and equipment plus inventory (PP&E+I). This variable could be considered as the proxy of hedging ratio in the risk management as stated above.

With the sample of 663 firm observations, we have a mean value of 0.1319 as insurance ratio while the median is 0.01. The minimum is 9.32031E-6 while the maximum is 35.39 (the method of dealing with outliers is given afterwards). In this sample, we find two main issues to explain the different insurance ratio among firms: industry effect and Firm size effect.

Industry effect:

Usually, firms in the capital-intensive industries such as manufacturing industry would buy much insurance. This is showed by the relatively high insurance ratio (0.18) of this industry with 226 observations (34% of the total sample size)[9]. Furthermore, the industry of Service has the highest insurance ratio (0.21) in the sample. The Service industry is composed of many firms from real estate segment whose property requires high demand of insurance.

Firm size:

[9] For the statistic description of Insurance ratio for different industry groups, see Table III in Appendix.

As we stated above, firm size affect the insurance purchase of firms. The relation between firm size (measured as logarithm of BV of total assets) and insurance (measured as the logarithm of insurance ratio) is shown with the significant but negative coefficient of -0.31[10] in our sample. It shows that smaller firms are more likely to buy insurance.

Finally, as shown by the statistics above, we have outliers in the insurance ratio variable (kurtosis is 462, and it is right skewed). As Eisenberg, Sundgren, and Wells (1998), Jin and Jorion (2006), we take the logarithm of insurance ratio as the independent variable to deal with the outlier problem. As a result, the distribution of the insurance ratio independent variable becomes more symmetric.

2.2 Control Variables

To explore the relationship between firm value and insurance ratio, we also need to control the effect of other variables that could have impact on firm value. In this study, we include commonly used control variables that contribute to firm value (see, for example, Allayannis and Weston, 2001; Hoyt and Khang, 2000). The control variables are as follows:

Firm size:

There is ambiguous evidence on the relationship between firm's profitability and firm size. In addition, according to Mayers and Smith (1990), and Warner (1977), both real services and bankruptcy costs hypotheses suggest a negative relationship between firm size and the amount of corporate insurance. In this study, we use logarithm of BV of total assets as the proxy of firm size.

Leverage:

Prior literatures have argued that relation between leverage and firm value could

[10] See Table II for variable description and correlation.

depend on different factors. Such as McConnell and Servaes (1995) found that leverage could increase firm value (measured as Tobin's Q) for firms with low market growth (measured as P/E ratio) and reduce firm value for firms with high market growth in a sample of U.S. firms. This contribution is due to the monitoring function of debt in firms. In addition, Aggarwal and Kyaw (2006) in their study of firms from twenty six countries argue that this leverage and firm value relation also depends on other factors such as countries' characteristics and industry effects.

Norway is a country with quite sound financial development, good stock and bond market development, and good investor protection system (Norway has common law regime which provides better investor protection than civil law).

Furthermore, it is quite reasonable to focus on the long term debt when measure the leverage of firms since short term debt usually would not cause bankruptcy problem. We use LTD as the leverage control variable, and it is defined as long-term debt divided by BV of total assets of the firm.

Growth Opportunities:

According to Myers (1977) and Smith and Watts (1992), the investment opportunities may also be related to the firm value. R&D expenditure scaled by total assets or sales is commonly used proxy for growth opportunities, such as Allayannisa and Weston (2001). In our sample of 663 firms, there are many firms report zero sales. In this case, we use R&D expenditure scaled by total assets as the growth opportunities variable. Furthermore, there are 505 out of 663 firms have zero R&D expenditures in the sample period, which means that most firms have relatively low growth opportunities in the sample period.

Credit Rating

Many studies on relation between corporate governance and firm value have also

included the credit rating as the control variable, and they have argued that the credit rating contributes to the firm value in a positive way. In our sample, we get the credit rating data from CCRG. This rating is from 0 to 100, and higher number means higher credit rating for the firms.

Liquidity

We also contain liquidity as the control variable, and it is defined as QUICK and is calculated as cash divided by current liabilities.

Concentration

Ownership concentration also affects firm value. In addition, as stated above, firms with high concentration are more likely to purchase insurance because of the advantage of optimal risk sharing. We use Herfindahl index of equity ownership to measure the concentration for our sample firms.

Earnings dummy

Firms have large earnings are usually considered as firms with good operational performance. As stated above, we use ROA_{adj} (industry adjusted return on assets) as the proxy of firm value. This variable is defined as EBIT (earnings before interest and taxes) scaled by total assets. So we expect a positive relation between earnings and firm value. Furthermore, we have quite many observations have negative earnings in our sample. It is reasonable to create earnings dummy by setting observations with non-negative earnings as 1 and 0 otherwise.

3. Multivariate Test Analysis

Since we are interested in whether insurance could increase firm value, we directly test this relation in two empirical models. In addition, we set control variables discussed above in all these models.

3.1 Model 1

In this model, we use the whole sample of 663 unlisted firms, and test Null hypothesis that insurance could not affect firm value.

Model1: $ROA_{adj} = \alpha + \beta_1 loginsu + \beta_2 FirmSize + \beta_3 Concentration + \beta_4 QUICK + \beta_5 DIV + \beta_6 RATING + \beta_7 Earningsdummy + \beta_8 Growth + \beta_9 LTD$

Null Hypothesis: $\beta_1=0$; insurance is irrelevant for firm value.

Table IV presents the results of Ordinary Least-Squares regression on Model 1. The main explanatory variable we use to test Null Hypothesis is loginsu (it is logarithm of insurance ratio). Theories of risk management on market imperfection (see literature review above) imply that insurance could increase firm value. However, the coefficient of loginsu on ROA_{adj} is significant and has negative sign (-0.022). This result rejects the Null Hypothesis that insurance could not affect firm value, but indicates that insurance reduces firm value measured as industry adjusted return on assets for our sample firms in Model 1.

Several control variables are statistically significant and have expected sign. We find that firm size (Firm size) has negative relation with firm value (-0.042); dividend yield ratio (DIV) has positive sign (0.140): usually, firms that payout much dividends are those who have good economic profitability; credit rating (CREDIT) has positive sign (0.501) and it shows that firms with good credit quality usually have better financial performance; Earningsdummy has also positive sign (0.445): firms with positive earnings should have higher firm value than firms with negative earnings. Leverage (LTD) has significant but unexpected negative relation (-0.109) to firm value. Other control variables such as Concentration, QUICK and Growth are not significant in the test of Model 1.

In conclusion, the significant but negative coefficient between loginsu and ROA_{adj} in Model 1 suggest that insurance destroys firms' value and could be considered as a waste for firms. However, the relation of firm value and insurance could depend on other factors.

3.2 Model 2

Firstly, several studies have argued that the impact of corporate governance on firm value could be affected by firms' profitability (see Raj and Kyaw (2006), McConnell and Servaes (1995)). Usually, if a firm reports sound growth and profit, it could be a signal that this firm is well organized and functioned. It is reasonable to assume in this paper that firms with good financial performance are firms with good management. In addition, if we consider risk management as a project with initial investment (insurance premium), whether this project would increase firm value is partially dependent on firms' management. So we expect that risk management could work better in well organized firms.

Secondly, as we stated in the literature review, leverage provides important incentive for firms to purchase insurance due to the potential financial distress and underinvestment problems. Our sample of 663 firms shows quite high leverage in the capital structure. We have a mean value of debt to asset ratio (DE) as 0.70, while the LTD (long term debt) to asset ratio is around 0.20. It is obvious that most firms in our sample have quite high short-term liabilities which should be paid off within one year. Even though short-term liabilities usually would not cause firms to go bankruptcy, but huge short term obligation together with long term debt could cause debt overhang problem which leads to potential underinvestment problem in our sample firms. Furthermore, LTD variable in our sample are widely spread: the minimum is 0 while

the maximum is 2.3[11]. So we need to group these observations based on LTD as well in order to get more precise analysis.

Based on arguments above, we divide the sample based on firm performance and leverage. Firstly, we divide the sample according to ROA_{adj}. Group 1 has 330 observations and presents the firms with negative ROA_{adj}; while Group 2 has 333 observations and is composed of firms with non-negative ROA_{adj}. Non-negative ROA_{adj} means that these firms have above average financial performance in the total sample of 663 unlisted firms.

Table V (in Appendix) gives the description of these two groups. As shown, these two groups share similar mean value of Concentration and Growth variables while have quite different values for other control variables. For example, Group 2 has higher ROA, DIV, QUICK, CREDIT, and Firm size (comparison is based on the mean value of these variables) while Group 1 firms have larger LTD and insurance ratio.

These findings are reasonable because firms with better financial performance usually payout higher dividends (DIV), have higher credit rating (CREDIT), and better leverage capabilities (LTD). So grouping the whole sample according to ROAadj provides us a good method to control the profitability effect on the relation between insurance use and firm value.

Secondly, within each group, firms are ranked according to leverage (LTD variable). The top 30% firms are considered as firms with relatively high leverage and the bottom 30% firms are considered as relatively low leverage. Since we do not have many observations in each group (333 observations in Group 1 and 330 observations in Group 2), we choose 30% of top and bottom firms as the sub sample to do OLS

[11] See Table I in Appendix for statistic description.

analysis.

Thus, in Model 2, we run Ordinary Least-Squares regressions for four subgroups to test if firms could benefit from risk management through reducing potential underinvestment costs associated with investment opportunities. These four subgroups are:

Subgroup 1: Firms with under average performance and low leverage

Subgroup 2: Firms with under average performance and high leverage

Subgroup 3: Firms with above average performance and low leverage

Subgroup 4: Firms with above average performance and high leverage

Model 2: $ROA_{adj} = \alpha + \beta_1 loginsu + \beta_2 FirmSize + \beta_3 Concentration + \beta_4 QUICK + \beta_5 DIV + \beta_6 RATING + \beta_7 Earningsdummy + \beta_8 Growth + \beta_9 LTD$

Null Hypothesis: $\beta_1 = 0$; insurance is irrelevant for firm value.

Table VI (in Appendix) represents these regression results.

For Group 1: OLS result of Subgroup 2 (firms with under average performance and high leverage) shows a significant but negative correlation between insurance and firm value (correlation is -0.042). The result is consistent with Model 1.

Results of control variables differ in Subgroup 1 and Subgroup 2:

Firms with under average performance and low leverage (Subgroup 1): credit rating (CREDIT) (0.322) and Earnings dummy (0.229) have significant and positive correlation with firm value. This result is consistent with Model 1 and relevant literature on firm value. Concentration is negatively correlated (-0.109).

Firms with under average performance and high leverage (Subgroup 2): Credit rating (CREDIT) (-0.41) and LTD (-0.4) have significant and negative correlation with firm value while FirmSize (0.088) and Earnings dummy (0.301) are significant and

positive related.

For Group 2:

We find that insurance is significant and positive related with firm value for Subgroup 4 (firms with above average performance and high leverage). The coefficient is 0.027 (significant at 10% level).

Results of control variables are different in Subgroup 3 and Subgroup 4:

Firms with above average performance and low leverage (Subgroup 3): we find that FirmSize (-0.057) has significant and negative relation with firm value while DIV (0.1) and CREDIT (0.377) have significant and positive coefficients.

Firms with above average performance and high leverage (Subgroup 4): DIV (0.111) is significant and positively related with firm value while LTD (-0.125) has significant but negative coefficient with firm value.

In this following part, we go further with the analysis of Subgroup 2 and Subgroup 4 because both subgroups show significant relation between firm value and insurance but with different sign.

The common characteristic between Subgroup 2 and Subgroup 4 is that they both represent firms with relatively high leverage. Table VII gives us the statistic descriptions of these two subgroups. According to that, the mean values of LTD for these two subgroups are 0.58 and 0.42 separately. As stated in the theory review, highly leveraged firms could benefit through risk management by reducing the underinvestment problems. And we find the positive relation between firm value and insurance use in OLS result of Subgroup 4. This means that risk management (insurance) could help firm reduce the expected financial distress associated with long

term debt by maintaining great short term liquidity (measured by QUICK[12]), and alleviate potential underinvestment problems by maintaining great development opportunities (measured by Growth).

However, Subgroup 2 does not show the same sign of coefficient between firm value and insurance even though firms within this group also have relatively high leverage. This result leads us to investigate the main difference between these two subgroups: financial performance. Subgroup 2 are firms with below average performance (ROA_{adj} is -0.304) while Subgroup 4 are firms with above average performance (ROA_{adj} is 0.231). Subgroup 4 also has other characteristics that belong to firms with good performance such as relatively higher dividends (DIV) and higher credit rating (CREDIT).

We check the industry diversification within these two subgroups and find that industries are spread similarly in these two subgroups (it is shown in Table VIII). This result excludes the industry effect on the difference of financial performance. Based on the assumption above that good firms are firms with good management, it is reasonable to say that Subgroup 4 (with above average financial performance) represents firms with relatively good management and risk management (insurance) could work better within these firms compared with Subgroup 2(with under average financial performance).

As we stated above, the efficiency and effectiveness of risk management could depend on the internal management of firms. Thus, we expect that risk management will have better function in well organized and well managed firms. This argument is shown by the OLS result of Subgroup 2. With similar leverage, growth opportunities, firm's value does not increase with the insurance use, reversely, there is a negative relation between firm value and insurance use in Subgroup 2. In addition, we find

[12] See Table VII for statistic description of Subgroup 4.

relatively high insurance ratio in Subgroup 2 compared with Subgroup 4. This result tells us that "higher insurance ratio, higher firm value" does not hold for all kinds of firms. This is consistent with our argument that a well-organized company could have better risk management function and benefit more from its risk management strategy and policy, while poorly-organized company only takes the risk management as the burden or cost. In conclusion, insurance could be a value-increasing project for firms with above average financial performance and high leverage in our sample firms.

4. Robustness of Test Models

In this part, we address the main issue that whether our results are representative. We compare the statistics of our study sample (663 firms) with the statistics of original data (813 firms). Table IX shows the statistics description of 1403 firm-year observations, and we find that most variables have similar means cross these two sample pools. Only Earningsdummy and QUICK have quite different mean values.

Study sample has relatively higher Earningsdummy (0.78) and lower QUICK ratio (0.43) than the original sample between original sample (Earningsdummy is 0.21 and QUICK is 0.82). Since these two variables are control variables, and we do not think that it could affect our result representative much.

Overall, we say that our sub sample of 663 firms could represent firms in the original data of 813 firms.

5. Conclusion

In this article, we examine the relation between risk management (property insurance) and firm value (measured as industry adjusted return on assets) in a sample of 663 unlisted firms in Norway. This sample is cross different capitalization and industry classifications.

The results of Subgroup 4 in Model 2 show us positive relation between insurance use and firm value. However, this relation depends on two issues: firms' financial performance and leverage policy. With control for these two issues (ROAadj for performance control and LTD for leverage control), we find that this relation holds only for firms with sound performance and high leverage.

Firms with high leverage are more likely to have potential financial distress and underinvestment problems associated with higher investment opportunities. In our Model 2 test, we compare the sub group of firms with under average performance and high leverage (Subgroup 2) and sub group of firms with above average performance and high leverage (Subgroup 4), and find that firms with good performance and high leverage have better risk management function. This is shown by the positive coefficient of loginsu. and ROA_{adj} in OLS result for Subgroup 4. Thus, we say that these firms benefits from the risk management (property insurance) by reducing potential underinvestment problems.

Appendix

Table I

Summary of Explanatory Variables

This table summarizes statistical descriptive of financial characteristics for 663 unlisted Norwegian firms. The sample consists of 663 firm-year observations from 2003 to 2005. All the accounting data is from CCGR (Center for Corporate Governance Research at BI Norwegian School of Management) and insurance data is from AON Grieg.

Assets/m is BV of assets in millions. EBIT is earnings before interests and taxes. Bruttopremie is insurance premium firms pay to insurance company every year. ROA is return to assets and defined as EBIT scaled by BV of total assets. ROA adj is industry adjusted return on assets, as defined in Eq. (1). Insurance ratio is Bruttopremie divided by BV of property, plant and equipment plus inventory (PP&E+I). Loginsu. is logarithm of insurance ratio. FirmSize is logarithm of BV of total assets. Concentration is the Herfindahl index of equity ownership. QUICK is cash divided by current liabilities. DIV is dividends yield and is defined as dividends scaled by BV of total equity. CREDIT is the credit rating given in the financial data from CCGR (Center for Corporate Governance at BI Norwegian School of Management). Earnings dummy is defined as 1 for firms with non-negative earnings and 0 for firms with negative earnings. LTD is long term debt ratio and is defined as long term liabilities scaled by total assets. Growth is R&D expenditure scaled by BV of total assets. DE is debt equity ratio and is defined as total debt scaled by BV of total assets.

Firms des.	N	Mean	Std. Deviation	Minimum	Median	Maximum
Assets/m	663	234.95	668.92	1.08	44.83	10590.00
EBIT	663	21224293	136000000	-694000000	2094333	2730000000
Bruttopremie	663	193616	502646	502	64174	6283748
Variables						
ROA	663	0.05	0.22	-2.71	0.07	0.95
ROAadj	663	-0.01	0.34	-1.66	0.00	0.95
Insuranceratio	663	0.13	1.50	0.00	0.01	35.39
loginsu.	663	-2.17	0.82	-5.03	-2.21	1.55
Firm size	663	7.68	0.76	5.87	7.65	10.02
Concentration	663	0.80	0.30	0.00	1.00	1.00
QUICK	663	0.43	0.95	0.00	0.70	12.30
DIV(dividend yield)	663	0.17	0.55	0.00	0.00	5.99
CREDIT	663	0.68	0.19	0.14	0.70	0.99
Earningsdummy	663	0.78	0.42	0	1	1
LTD	663	0.19	0.25	0.00	0.07	2.30
Growth	663	0.02	0.07	-0.01	0.00	0.64
DE ratio	663	0.70	0.26	0.01	0.72	3.29

Table II

This table shows the correlation of the explanatory variables for 663 unlisted firms in Norway. It contains 663 firm-year observations from 2003 to 2005.

ROA adj is industry adjusted return on assets, as defined in Eq.(1). Loginsu is logarithm of insurance ratio, which is premiums divided by BV of property, plant and equipment plus inventory (PP&E+I). FirmSize is logarithm of BV of total assets. Concentration is the Herfindahl index of equity ownership. QUICK is cash divided by current liabilities. DIV is dividends yield and is defined as dividends scaled by BV of total equity. CREDIT is the credit rating given in the financial data from CCGR (Center for Corporate Governance at BI Norwegian School of Management). Earnings dummy is defined as 1 for firms with non-negative earnings and 0 for firms with negative earnings. LTD is long term debt ratio and is defined as long term liabilities scaled by total assets. Growth is R&D expenditure scaled by BV of total assets. DE is defined as total debt scaled by BV of total assets.

	ROAadj	Concentration	DE	DIV	Loginsu.	FirmSize	LTD	Growth	QUICK
Concentration	-0.03								
DE	-0.25	0.06							
DIV	0.34	-0.13	0.11						
Loginsu.	-0.07	-0.05	0.08	0.07					
FirmSize	0.11	-0.01	-0.25	-0.10	-0.31				
LTD	-0.23	-0.13	0.43	-0.09	-0.09	0.06			
Growth	-0.04	0.08	-0.03	-0.07	-0.08	0.15	0.08		
QUICK	0.04	-0.05	-0.17	0.02	-0.01	0.02	0.13	0.00	
CREDIT	0.51	0.06	-0.59	0.05	-0.16	0.52	-0.32	0.01	0.09

Table III

This table gives the statistic description of firms in industry classifications (mean value). Industry classifications are from CCGR. Multi Group contains firms in multiple industries.

Industries	II	%of sample(663)	ROA	Bruttopremie	Insuranceratio
Agriculture, forestry, fishing, mining	29	4.37	-0.07	124636	0.01
Manufacturing, chemical products	226	34.09	0.06	256695	0.18
Energy	19	2.87	0.09	171806	0.04
Construction	25	3.77	0.06	299941	0.19
Service	168	25.34	0.03	142338	0.21
Trade	163	24.59	0.08	144276	0.03
Transport	20	3.02	0.01	202868	0.04
Multi Group	13	1.96	0.07	345366	0.04

Table IV

Property insurance use and firm value: cross-section results: Model 1

This table gives us the OLS result of model1 for the whole sample of 663 unlisted firms in Norway. ROA adj is industry adjusted return on assets, as defined in Eq. (1). Loginsu is logarithm of insurance ratio, which is premiums divided by BV of property, plant and equipment plus inventory (PP&E+I). FirmSize is logarithm of BV of total assets. Concentration is the Herfindahl index of equity ownership. QUICK is cash divided by current liabilities. DIV is dividends yield and is defined as dividends scaled by BV of total equity. CREDIT is the credit rating given in the financial data from CCGR (Center for Corporate Governance at BI Norwegian School of Management). Earnings dummy is defined as 1 for firms with non-negative earnings and 0 for firms with negative earnings. LTD is long term debt ratio and is defined as long term liabilities scaled by total assets. Growth is R&D expenditure scaled by BV of total assets.

Model1: whole sample of 663 unlisted firms

Dependent variable: ROAadj

	Coefficients	*P-value*
Constant	-0.408	0.000
Loginsu	-0.022	0.045
Firm size	-0.042	0.004
Concentration	-0.023	0.415
QUICK	-0.003	0.704
DIV	0.140	0.000
CREDIT	0.501	0.000
Earningsdummy	0.445	0.000
LTD	-0.109	0.004
Growth	0.081	0.491
Observations		663
R-square		0.6

We accept at a 10% significant level in our OLS result.

Table V

Summary of Explanatory Variables for Group1 and Group2

This table summarizes statistical descriptive of financial characteristics for group1 (330 observations) and group2 (333 observations). Group1 is sample of firms with negative ROAadj while Group2 is sample of firms with non-negative ROAadj. All the accounting data is from CCGR and insurance data is from AON Grieg.

Assets/m is BV of total assets in million nok. EBIT is earnings before interests and taxes. Bruttopremie is insurance premium firms pay to insurance company every year. ROA is return to assets and defined as EBIT scaled by BV of total assets. ROA adj is industry adjusted return on assets, as defined in Eq. (1). Insurance ratio is Bruttopremie divided by BV of property, plant and equipment plus inventory (PP&E+I). Loginsu. is logarithm of insurance ratio. FirmSize is logarithm of BV of total assets. Concentration is the Herfindahl index of equity ownership. QUICK is cash divided by current liabilities. DIV is dividends yield and is defined as dividends scaled by BV of total equity. CREDIT is the credit rating given in the financial data from CCGR (Center for Corporate Governance at BI Norwegian School of Management). Earnings dummy is defined as 1 for firms with non-negative earnings and 0 for firms with negative earnings. LTD is long term debt ratio and is defined as long term liabilities scaled by total assets. Growth is R&D expenditure scaled by BV of total assets.

	Group1		Group2	
	Firms w. Low ROAadj		Firms w. High ROAadj	
Firms des.	N	Mean	N	Mean
Assets/m	330	212.63	333	257.06
EBIT	330	-3665064	333	45889421
Bruttopremie	330	173312	333	213738
Variables				
ROA	330	-0.067	333	0.168
ROAadj	330	-0.303	333	0.278
Insuranceratio	330	0.198	333	0.067
loginsu.	330	-2.166	333	-2.181
Firm size	330	7.651	333	7.708
Concentration	330	0.802	333	0.795
QUICK	330	0.405	333	0.456
DIV(dividend yield)	330	0.044	333	0.300
CREDIT	330	0.598	333	0.755
LTD	330	0.227	333	0.150
Growth	330	0.023	333	0.016

Table VI

Property insurance use and firm value: cross-section results: Model 2

This table gives us the OLS result of Model 2 for four subgroups. Subgroup 1 is a sample of firms with negative ROAadj and relatively low leverage while Subgroup 2 is a sample of firms with negative ROAadj and relatively high leverage. Subgroup 3 is a sample of firms with non-negative ROAadj and relatively low leverage while Subgroup 4 is a sample of firms with non-negative ROAadj and relatively high leverage.

ROAadj is industry adjusted return on assets, as defined in Eq. (1). Loginsu is logarithm of insurance ratio, which is premiums divided by BV of property, plant and equipment plus inventory (PP&E+I). FirmSize is logarithm of BV of total assets. Concentration is the Herfindahl index of equity ownership. QUICK is cash divided by current liabilities. DIV is dividends yield and is defined as dividends scaled by BV of total equity. CREDIT is the credit rating given in the financial data from CCGR (Center for Corporate Governance at BI Norwegian School of Management). Earnings dummy is defined as 1 for firms with non-negative earnings and 0 for firms with negative earnings. LTD is long term debt ratio and is defined as long term liabilities scaled by total assets. Growth is R&D expenditure scaled by BV of total assets.

Group1: firms with negative(ROAadj)					**Group2: firms with positive (ROAadj)**			
	subgroup1 (Firms with low LTD)		**subgroup2** (Firms with high LTD)		**subgroup3** (Firms with low LTD)		**subgroup4** (Firms with high LTD)	
Dependent variable: ROAadj	*Coefficients*	*P-value*	*Coefficients*	*P-value*	**Dependent variable: ROAadj** *Coefficients*	*P-value*	*Coefficients*	*P-value*
Constant	-0.356	0.007	-0.763	0.000	0.435	0.019	0.164	0.130
Loginsu	-0.004	0.827	-0.042	0.045	-0.020	0.247	0.027	0.076
Firm size	-0.023	0.277	0.088	0.003	-0.057	0.054	0.009	0.571
Concentration	-0.109	0.015	-0.068	0.255	-0.077	0.161	0.054	0.111
QUICK	-0.036	0.260	0.008	0.519	0.011	0.681	0.013	0.223
DIV	0.111	0.194	0.014	0.888	0.100	0.002	0.111	0.000
CREDIT	0.322	0.002	-0.410	0.002	0.377	0.021	0.069	0.382
Earningsdummy	0.229	0.000	0.301	0.000	0.000	#NUM!	0.000	#NUM!
LTD	0.000	#NUM!	-0.400	0.000	0.000	#NUM!	-0.125	0.063
Growth	0.126	0.695	0.175	0.321	0.418	0.216	-0.113	0.364
Observations		99		99		100		100
R-square		0.64		0.59		0.17		0.29

We accept at a 10% significant level in our OLS result.

Table VII

Summary of Explanatory Variables for Subgroup 2 (firms with high leverage in Group 1) and Subgroup 4(firms with high leverage in Group 2).

This table summarizes statistical descriptive of financial characteristics for Subgroup 2 (top 30% firms in Group1 which is ranked in long term debt/ total assets) and Subgroup 4(top 30% firms in group2 with same ranking method). Group1 is sample of firms with negative ROAadj while Group2 is sample of firms with non-negative ROAadj. All the accounting data is from CCGR and insurance data is from AON Grieg.

Assets/m is BV of total assets in million nok. Bruttopremie is insurance premium firms pay to insurance company every year. ROA is return to assets and defined as EBIT scaled by BV of total assets. ROA adj is industry adjusted return on assets, as defined in Eq. (1). Insurance ratio is Bruttopremie divided by BV of property, plant and equipment plus inventory (PP&E+I). Loginsu. is logarithm of insurance ratio. FirmSize is logarithm of BV of total assets. Concentration is the Herfindahl index of equity ownership. QUICK is cash divided by current liabilities. DIV is dividends yield and is defined as dividends scaled by BV of total equity. CREDIT is the credit rating given in the financial data from CCGR (Center for Corporate Governance at BI Norwegian School of Management). Earnings dummy is defined as 1 for firms with non-negative earnings and 0 for firms with negative earnings. LTD is long term debt ratio and is defined as long term liabilities scaled by total assets. Growth is R&D expenditure scaled by BV of total assets.

	Subgroup2	Subgroup4
Firms des.	**Mean**	**Mean**
Assets/m	290.64	415.29
Bruttopremie	197907.64	247928.52
Variables		
ROAadj	-0.304	0.231
Insuranceratio	0.486	0.035
loginsu.	-2.348	-2.357
Firm size	7.717	7.846
Concentration	0.766	0.698
QUICK	0.594	0.555
DIV(dividend yield)	0.040	0.196
CREDIT	0.550	0.698
LTD	0.581	0.423
Growth	0.030	0.028
Observations	99	100
% in group sample	30%	30%

Table VIII

Summary of industry diversification of Subgroup 2 and Subgroup 4.

Industries	II	II
	Subgroup 2	Subgroup 4
Agriculture, forestry, fishing, mining	5	8
Manufacturing, chemical products	30	30
Energy	7	7
Construction	1	2
Service	32	28
Trade	17	17
Transport	4	5
Multi Group	3	3

Table IX

Summary of Explanatory Variables for firms in original sample with 813 unlisted Norwegian firms

This table summarizes statistical descriptive of financial characteristics in the original sample. This sample contains 1403 firm year financial data from CCGR and 1167 firm year insurance data from AON Grieg.

Assets/m is BV of total assets in million nok. ROA is return to assets and defined as EBIT scaled by BV of total assets. Loginsu. is logarithm of insurance ratio which is Bruttopremie divided by BV of property, plant and equipment plus inventory (PP&E+I). FirmSize is logarithm of BV of total assets. Concentration is the Herfindahl index of equity ownership. QUICK is cash divided by current liabilities. DIV is dividends yield and is defined as dividends scaled by BV of total equity. CREDIT is the credit rating given in the financial data from CCGR (Center for Corporate Governance at BI Norwegian School of Management). Earnings dummy is defined as 1 for firms with non-negative earnings and 0 for firms with negative earnings. LTD is long term debt ratio and is defined as long term liabilities scaled by total assets. Growth is R&D expenditure scaled by BV of total assets.

Firms des.	N	Mean	Std. Deviation	Minimum	Median	Maximum
Assets/m	1403	259.77	953.65	0.00	39.48	18250.00
Variables						
ROA	1402	0.05	0.36	-2.98	0.06	7.65
loginsu.	1167	-2.19	0.89	-5.03	-2.22	2.94
Firm size	1369	7.24	0.97	4.30	7.23	10.01
Concentration	1289	0.80	0.31	0.00	1.00	1.00
QUICK	1394	0.82	5.65	0.00	0.19	138.00
DIV(dividend yield)	1402	0.16	0.61	0.00	0.00	9.10
CREDIT	1343	0.66	0.20	0.00	0.69	1.00
Earningsdummy	1402	0.21	0.69	0	0.04	23.57
LTD	1403	0.21	0.69	0.00	0.04	23.57
Growth	1402	0.02	0.07	-0.01	0.00	0.73

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