**Norwegian Management School of BI Master Thesis**

**Major in Financial Economics**

# Does Property Insurance Increase Firm Value?

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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

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

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

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:

$ROA_{adj} = sign(\Delta ROA) * \sqrt{} / \Delta ROA /.$ 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:anyu36is:aam8(easure fi

**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 actib

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.

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 f tined.

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 . Group 1 has 330 observations and presents the firms with negative ROA

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

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 significan

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

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.

**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.

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.

**Table VIII**

**Summary of industry diversification of Subgroup 2 and Subgroup 4.**

**Table IX**

## *Reference*

Aggarwal, R. and N. Kyaw, 2006, Leverage, Investment Opportunities, and Firm Value: A Global Perspective on the Influence of Financial Development, JEL classification: G32

Allayannis, G. and J. Weston, 2001, The Use of Foreign Currency Derivatives and Firm Market Value, Review of Financial Studies 14, 243-276.

Bessembinder, H., 1991, Forward Contracts and Firm Value: Investment Incentive and Contracting Effects, The Journal of Financial and Quantitative Analysis 26, No. 4. (Dec.), 519-532

Briys, E. And H. Louberge, 1985, On the Theory of Rational Insurance Purchasing: A Note, The Journal of Finance 40, No. 2. (Jun.), 577-581

Carter, D., D. Rogers, and B. Simkins, 2006, Does Hedging Affect Firm Value? Evidence from the US Airline Industry, Financial Management, Spring, 53-86

Chen, Ch. And R. PonArul, 1989, On the Tax Incentive for Corporate Insurance Purchase, The Journal of Risk and Insurance 56, No. 2(Jun.), 306-311

Christopher, G., M. Bernadette A, and S. Catherine, 1997, Why Firms Use Currency Derivatives, The Journal of Finance 52, 1323-54

Eisenberg, T., S. Sundgren, and M. Wells, 1998, Larger Board Size and Decreasing Firm Value in Small Firms, Journal of Financial Economics 48, 35-54

Gahin, F., 1967, A Theory of Pure Risk Management in the Business Firm, The Journal of Risk and Insurance 34, No.1. (Mars), 121-129

Griffith, J., 1999, CEO Ownership and Firm Value, Managerial and Decision Economics 20, No. 1. (Feb.), 1-8

Grillet, L, 1992, Organizational Capital and Corporate Insurance Hedging, The Journal of Risk and Insurance 59, No. 3. (Sep.9), 462-469

Hoyt, R. And H. Khang, 2000, On the Demand for Corporate Property Insurance, The Journal Risk and Insurance 67, No. 1, 91-107

Jin, Y. And P. Jorion, 2006, Firm Value and Hedging: Evidence from U.S. Oil and Gas Producers, The Journal of Finance, LXI, No.2, April.

MacMinn, R., 1987, Insurance and Corporate Risk Management, The Journal of Risk and Insurance 54,

658-677

Mayers, D. And C. Smith, 1987, Corporate Insurance and the Underinvestment Problem, Journal of Risk and Insurance 54, 45-54

Mayers, D. and C. Smith, 1990, On the corporate demand for insurance, Journal of Business, vol.63, no. 1, pt. 1

Main, B., 1982, The Firm's Insurance Decision. Some Questions Raised by the Capital Asset Pricing Model, Managerial and Decision Economics 3, No. 1. (Mar.), 7-15

Aunon-Nerin, D. and P. Ehling, 2007, Why Firms Purchase Property Insurance