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BI NORWEGIAN SCHOOL OF MANAGEMENT

Risk Management with Cash and Insurance in Non-Listed Firms *

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Abstract

I study corporate risk management with property insurance in non-listed small and medium sized firms. I document negative relations between various ownership measures —CEO salary, ownership concentration and aggregate female ownership— and insurance use as well as a positive relation between the number of family owners and insurance use. These relations are consistent with self-insurance among CEO-controlled firms, firms with high ownership concentrations, firms with above average female owners and firms with a small number of family owners, given monopolistic insurance premium pricing practices. Indeed, I show that insurance premium and firm profitability are positively related, implying that insurers raise premium when firm profitability soars or implying that profitable firms demand more coverage and other provisions. The above relations are also consistent with stakeholders stipulating less insurance the higher the CEO salary or the higher the ownership concentration, precisely because these firm characteristics proxy inversely for firm risk. This view is supported by negative relations between these ownership variables and the coefficient of variation of revenues. Further, I provide evidence of strong causal relations between insurance use, leverage and liquidity. Specifically, insurance use and liquidity are risk management complements since insurance use exerts a positive influence on corporate liquidity and liquidity exerts a positive influence on insurance use. Finally, ownership concentration and aggregate female ownership show positive relations with liquidity which is consistent with risk aversion motivated hedges.

Keywords: Corporate Risk Management; Leverage; Liquidity; Property Insurance; Non-Listed Firms

JEL Classification: G22; G32; G33; G35

1 Introduction

In this paper, I provide empirical evidence of a strong negative relation between ownership variables —CEO salary, ownership concentration and aggregate female ownership— and corporate property insurance use, thereby rejecting the hypothesis that managers' and owners' risk aversion provide incentives to increase corporate hedging policies. One plausible interpretation of these relations is that insurers possess and exercise market power, hence corporate hedging with insurance is decreasing in managerial and owners risk aversion. Employing a simultaneous-equations model that recognizes the simultaneity of insurance use, leverage and liquidity shows, among other things, that insurance use and liquidity are risk management complements. Ownership variables show positive relations with liquidity, hereby supporting the hypothesis that managers' and owners' risk aversion provide incentives to implement and to extend corporate hedging policies.

Small and medium-sized firms are most sensitive to changes in exchange rate, interest rate, and other shocks such as catastrophic events. Despite the fact that one single event can wipe out a small business and, thus, small firms have stronger incentives, generally, to hedge than large firms, empirical work on corporate risk management has basically overlooked small firms. In addition, nearly all of the empirical literature on corporate risk management focuses on derivative use. However, small or private firms are not significant users of derivatives. Specifically, insurance use data offers one crucial advantage over derivative use data, namely, that exposures and the extent of hedging are easy to measure. Therefore, in this study, I exploit a unique database from an international insurance broker on property insurance purchases by small and medium-sized private Norwegian firms to study insurance use.[1] According to the accounting data, the average value of the insured assets is forty percent of the total assets. As a result, risk management with insurance is significant to the survival

[1] Accounting as well as ownership data from Scandinavia have received increased attention recently. See for example Bennedsen et al. (2007) employing data from Denmark, Sundgren and Wells (1998) studying Finnish firms, and Thorburn (2000) using data from Sweden. Significantly, in Norway, all limited liability firms, listed and non-listed, face an identical accounting and reporting environment. For further information on the nature of the accounting and ownership data employed in this study, see Berzins et al. (2008).

of the firms in my sample.

An important empirical question is whether managers' and owners' risk aversion (Amihud and Lev (1981), Stulz (1984) and Smith and Stulz (1985)), provide incentives to implement corporate hedging policies. The risk aversion hypothesis implies that ownership variables and the extent of hedging or insurance use are positively related. However, the empirical evidence on the risk aversion hypothesis is mixed. Mayers and Smith (1982), for example, argue that risk aversion cannot explain insurance demand by corporations. Unlike in public firms, owners of small and medium sized firms have, in general, tied their wealth to the firm. In addition, family firms stress survival and the welfare of stakeholders as important concerns and, thus, need to engage in risk management. Another hypothesis is, therefore, that the positive relation between ownership variables and the extent of insurance use is stronger or more relevant for non-listed firms. I, however, provide empirical evidence of a strong negative relation between ownership variables —CEO salary, ownership concentration and aggregate female ownership— and corporate property insurance use.[2] These relations are inconsistent with the risk aversion hypothesis. I also provide empirical evidence of a positive relation between the number of family owners and insurance use. This relation is also inconsistent with the risk aversion hypothesis since the risk aversion motive is expected to diminish in importance as the number of owners increases. Importantly, one cannot attribute these relations to an unobservable adverse private firm effect or to some peculiarity of Norwegian corporations since Aunon-Nerin and Ehling (2008), employing data on U.S. public firms, also find negative relations between managerial ownership and 5% block owners and property insurance coverage.

The above relations between ownership variables and insurance use are consistent with over-insuring by firms with low or below average CEO salary and ownership variables, as well as with self-insurance among CEO or family controlled firms, given monopolistic insurance premium pricing practices. There exists anecdotal as well as empirical evidence on insurers

[2]CEO ownership also shows a negative relation with insurance use. Because CEO ownership substantially reduces the sample size, it is excluded from the main analysis.

possessing and exercising market power. Aunon-Nerin and Ehling (2008), for example, observe increases in property insurance premiums up to 300% within one year. Notably, Dafny (2008) documents that health insurers charge higher premiums to more profitable firms. In my sample, I find that in a regression of changes in premium on a constant, changes in profitability, changes in property plus year and industry dummy variables, changes in profitability show a significantly positive coefficient. This relation implies that the insurers raise property premiums to firms that experience an increase in profits or that profitable firms raise coverage.

The above relations are also consistent with stakeholders stipulating less insurance the higher the CEO salary or the higher ownership concentration, precisely because exposure to firm risk via salary or via ownership proxy inversely for firm risk.[3] Indeed, I show that in a regression of the coefficient of variation of revenues on a constant, industry dummy variables, the firm mean of ownership concentration and the firm mean of CEO salary, ownership concentration and CEO salary show a significantly negative coefficient, implying that firms with high ownership variables are less risky.

I analyze insurance use, leverage and liquidity jointly by employing simultaneous-equation regressions. This is an important matter because hedging, or insuring, may allow firms to increase debt capacity. Further, debt contracts frequently stipulate levels of insurance coverage, Smith (1995). First, non-listed firms insure (hedge), as do listed firms, to increase their debt capacity. For the firms in my sample, it is also true that the debt ratio exerts a positive influence on insurance use. This illustrates that non-listed firms do not differ from public firms in this respect (Graham and Rogers (2002) and Aunon-Nerin and Ehling (2008)). Second, I find that insurance use exerts a positive influence on corporate liquidity. I also find the converse, that corporate liquidity exerts a positive influence on insurance use. This is the first evidence that insurance and liquidity, both forms of active risk management,

[3]These relations are also consistent with a lack of incentive for CEOs and owners with large ownership interests to hedge states with too low cash flow. However, it appears challenging to provide empirical evidence to support this scenario.

are complements. The view that cash and insurance are complements is supported by Rochet and Villeneuve (2008) who find, in a model where the firm's liquidity management interacts with Brownian risk (hedged with derivatives) and with Poisson risk (hedged with insurance), that cash-poor firms should not insure whereas cash-rich firms should insure. Third, although insurance and liquidity are complements, firms do not hold cash to increase debt capacity. Liquidity exerts a negative influence on long-term debt and long-term debt exerts a negative influence on liquidity. Hence, long-term debt and liquidity are substitutes.

The last two points are related to Acharya et al. (2007) who argue that cash is held as a hedging instrument rather than as negative debt by financially constrained firms. They show theoretically —and provide empirical evidence supporting the theory— that constrained firms with high hedging needs prefer higher cash to lower debt, but firms with low hedging needs prefer lower debt to higher cash. Although the aims of this paper differ from the ones in Acharya et al. (2007), I nevertheless find that cash serves two purposes: it is a hedging instrument (complement with insurance), but may also be interpreted as negative debt (substitute for long-term debt). The latter view is supported by Opler et al. (1999) who show that firm characteristics known to be empirically associated with low debt are also associated with high cash.

To the extent that insurance use, leverage and liquidity are simultaneously determined, these firm policies are likely to be affected by the same variables. Accordingly, it is possible that managerial and owners risk aversion motives matter for leverage and liquidity. Indeed, I find that ownership concentration and aggregate female ownership show positive relations with liquidity, which is consistent with a risk aversion motivated hedge.

The empirical methods used help reduce potential simultaneous-equations bias. In one extension, I employ forecasted firm characteristics rather than prior values for the explanatory variables. This is an important matter as all explanatory variables are at least partially endogenous. Overall, I find that the results of the paper are robust to this extension as well as to various other robustness checks.

The plan of the paper is as follows: Section 2 contains a brief literature review. Section 3 describes the data. Section 4 contains the main empirical analysis. Section 5 contains empirical evidence that explains the negative relation between ownership variables and insurance use. Section 6 contains robustness checks, and conclusions are provided in Section 7. Appendix A provides a detailed description of the data, Appendix B contains sign predictions, while Appendix C briefly describes the data forecasting method.

2 Literature Review

This paper is related to four strands of research and aims at complementing and extending previous works by focusing on private firms and by employing ownership variables such as aggregate female ownership or number of family owners. To my knowledge, none of the papers in the corporate risk management literature treat liquidity as an endogenous variable that interplays with derivative use, insurance use, or leverage. I also extend the literature by providing evidence of a relation between ownership variables and liquidity.

In the derivative use literature, Tufano (1996), Schrand and Unal (1998) and Graham and Rogers (2002), find that hedging increases with managerial ownership. Studies that fail to find a significant relation between managerial risk aversion and hedging with derivatives include Gezcy et al. (1997), Haushalter (2000) and Allayannis and Ofek (2001). Although Tufano (1996) and Haushalter (2000) find that hedging is decreasing in managerial option ownership, it has been argued, Rogers (2002), that the lack of evidence for the risk aversion motive may be a result of poor proxy variables for executive option holdings. Assuming that managerial compensation schemes are jointly determined enables Coles et al. (2006) to show that option delta and vega affect firm policy. On the one hand, these findings suggest that the overall evidence for the risk aversion motive driven by equity exposure is, at best, weak. On the other hand, managerial risk aversion does seem to affect firms' policies, including hedging with derivatives, when managers hold executive options. Note, however,

that executive options are not included in my data.

Another smaller strand of the literature studies corporate risk management with insurance (Mayers and Smith (1982), Mayers and Smith (1987), Mayers and Smith (1990), Yamori (1999), Hoyt and Kang (2000), Zou et al. (2003) and Aunon-Nerin and Ehling (2008)). Within this strand, only Aunon-Nerin and Ehling (2008) analyze managerial ownership, institutional ownership and block-owners' influence on corporate insurance use. They report, consistent with the results presented in this paper, negative relations between block owners and insurance coverage and between managerial ownership and insurance coverage.

To my knowledge, only Vickery (2008) studies risk management practices in non-listed firms by investigating how these firms adjust their interest rate exposure via fixed-rate or variable-rate loans. He provides evidence for why firms engage in risk management through standard arguments, such as due to financial constraints, and draws on two surveys. According to this study, owners do not have a significant effect on the risk management decision. Specifically, Vickery (2008) employs, among other ownership-related variables, the owner's age and the concentration of ownership, but finds no relation. The only evidence supporting the risk aversion motive is that adjustable-rate loans are more common among firms with wealthier owners, which is consistent with the notion that risk aversion is declining with increased wealth.

This paper is also related to the growing literature on corporate liquidity. Recent contributions include Bates et al. (2008) who show that cash ratios increase over time because cash flows of firms become riskier and because firms change, as well as Lins et al. (2008), who show that firms hold more cash in countries with greater agency problems. Other notable papers addressing corporate liquidity include Kim et al. (1998), Opler et al. (1999), Dittmar et al. (2003), Almeida et al. (2004) and Faulkender and Wang (2006).

3 The Data

The insurance data are property insurance contracts of Norwegian non-listed limited liability firms obtained from Aon Grieg, an international insurance broker. Business interruption contracts are separately available and I therefore exclude these contracts from the analysis. The original panel data set contains more than 1,653 firm-year observations, ranging from January, 2003 through May, 2006. The Aon database contains a few publicly-listed companies, but the vast majority of the data is for non-listed firms. Therefore, I focus attention on non-listed firms. To be included in the analysis, each insurance observation is matched with accounting data from the CCGR database, which is based on data from CreditInform,[4] when available.[5] An account of the selection and matching procedure is provided in Appendix A.

Table 1 shows the descriptive statistics of sample firm's property insurance premium data. Premium is the annual insurance premium in Norwegian Kroner (NOK). The final sample contains insurance premiums for 933 firms with 1,855 firm-year observations. The mean (median) for the insurance premium is NOK 192,432 (45,848).[6] The data show wide variation (across firms and to a lesser extent over time) as evidenced by the difference between the minimum (164) and maximum (15,281,813) observation. Firms with positive long-term debt ratio show a mean (median) for the insurance premium of 242,512.60 (68,770) while firms with no long-term debt show a mean (median) for the insurance premium of 127,210.70 (29,240.50). Although firms with positive long-term debt ratio show a substantially higher mean and median premium as well as lower skew in premium than firms with no long-term debt, both group of firms exhibit a similar wide variation in premiums.

I follow Mayers and Smith (1982), Mayers and Smith (1987), Mayers and Smith (1990), Yamori (1999), Hoyt and Kang (2000) and Zou et al. (2003) in interpreting the insurance premium as a proxy for the extent of property coverage. Indeed, Aunon-Nerin and Ehling

[4] See www.creditinform.no.

[5] The accounting and ownership database are maintained at the Centre for Corporate Governance Research (CCGR) at BI - The Norwegian School of Management. For additional information on the data, see Berzins et al. (2008).

[6] EUR 1 = NOK 8.80 on 9 April 2009.

(2008) argue that their results are practically unchanged when replacing coverage with premium. The analysis below also assumes that the leasing of property, which is unobservable, does not systematically affect insurance coverage and, in particular, the simultaneity between cash, debt, and insurance.

Since firms differ in their needs for property insurance, it is important to scale the premium with property, plant and equipment plus inventories (PP&E+I), which represents the dependent variable employed in this study. Because of extreme outliers of the insurance ratio, the smallest and largest one percent are excluded from the analysis and from Table 1. See also Appendix A for further information regarding outliers.

Table 1 also contains the property insurance premium to dividends and the property insurance premium to earnings ratio. Both measures suggest that corporate spending on insurance premiums is economically significant. The value of the insured assets is significant too as the mean of PP&E+I to total assets is greater than thirty percent, reaching forty percent for the subsample with positive long-term debt ratio. This implies that risk management with insurance must be significant to the survival of these firms.

Table 1 also shows the descriptive statistics for two subsamples, namely firms with positive long-term debt and firms with zero long-term debt. Firms with zero long-term debt are smaller (not reported) and pay smaller insurance premium. Another difference between the subsamples, namely the mean of the insurance ratio, which is statistically significant, may be interpreted as implying that firms with zero long-term debt purchase more insurance per unit of property. This interpretation is plausible since most property insurance contracts cover replacement costs: other firm characteristics, such as firm age or the average age of property, are less likely to cause the higher insurance ratio for firms with zero long-term debt. An alternative and also plausible interpretation is that insurers systematically discriminate against smaller firms.

[Insert Table 1 about here]

Table 2 reports the distribution of sample firms across industries and the number of

observations over time. This table also reports the percent of firms with negative and positive earnings as well as negative and positive equity. The industry classifications are Berzins et al. (2008) classifications that differ from standard Norwegian classification codes. This one digit industry classification system relies on 8 industries instead of the standard approach using 10 industries.[7] Firms that are active in multiple industries are assigned to the Multi Group.

Derivative use work excludes financial firms from the analysis because hedging and sales of derivatives are indistinguishable and because banks are regulated. Initially, I do not exclude financial firms since the firms in my sample do not engage in sales of insurance contracts. In the regressions below, I always exclude the financial industry dummy and the multi group industry dummy since both have small sample size. In the end, financial firms show several missing sales data and are, thus, excluded from the reported regressions. Approximately one third of the data are from the year 2004 and the year 2005. The remaining one third of the firm-year observations are almost equally from years 2003 and 2006. The table also shows that almost seven percent of the firm-year observations are from firms with negative equity.

Table 2 also reports characteristics for the subsamples of firms with positive long-term debt and for firms with zero long-term debt. Overall, the two subsamples do not differ substantially on the reported firm characteristics of Table 2.

[Insert Table 2 about here]

Table 3 summarizes the descriptive statistics (mean, standard deviation, minimum, median, and maximum) of the corporate accounting variables which, according to corporate finance theory, motivate the purchase of insurance. I employ the following explanatory variables related to incentives for corporate insurance use. CASH is cash and equivalents divided by assets. CEOSALARY is the CEO salary divided by assets times 1,000. CONCENTRA-

[7] Of the 1,618 firm-years for which the insurance ratio is available, 299 observations have a missing value for the industry group variable. However, I note that, based on the data available for the period 1994-2006, no firm appears to change the industry classification code in my subsample of the population. Therefore, I fill in missing values with the industry code for the same firm if it is available for at least one year. This results in only 6 cases with missing industry classifications for the sample of firms with available insurance ratio.

TION is the Herfindahl index of equity ownership.[8] DIV is dividends scaled by total equity. FAMILYSIZE is number of family owners of the largest family. LTD stands for the book value of long-term debt divided by assets. FEMALE is aggregate female ownership divided by 100. INSTOWN is institutional ownership divided by 100. INTANGASSETS is intangible assets scaled by total assets. OPEX is operating expenses scaled by sales. PP&E is property, plant, and equipment as a percentage of assets. ROA is the return on assets (operating earnings over assets). SALESGROWTH is the three-year moving average percentage growth in sales. SALES is the logarithm of sales. SIZE stands for the logarithm of assets.

[Insert Table 3 about here]

One can see from Table 3 that firms with zero long-term debt substantially differ from firms with positive long-term debt. For instance, firms with zero long-term debt show a higher mean for CASH, higher mean for CEOSALARY, higher mean for DIV, etc. These differences between means are highly statistically significant.

Because I rely on standard variables for the corporate finance incentives to hedge, or insure, I do not elaborate on the proxies or their sign predictions, and refer the interested reader to the Data Appendix and the literature (Nance et al. (1993), Gezcy et al. (1997), Graham and Rogers (2002), Aunon-Nerin and Ehling (2008)).

In previous versions of this paper, I employed various other standard risk management related variables. These variables, for example, number of employees, did not add explanatory power to the regressions or represent yet another proxy, R&D versus SALES GROWTH, for the same hedging motive. Results with alternative specifications are available upon request.[9]

Finally, untabulated correlation coefficients of the explanatory variables, along with the insurance ratio, are low, mostly insignificant, and thus suggest that colinearity problems will

[8]The findings presented below are robust to various other ways (percentage of the largest owner and logarithm of the number of owners) of calculating ownership concentration.

[9]Variables excluded from the main analysis of the paper include: average family owner size, cash divided by current liabilities, CEO is member of largest family owner, CEO ownership, chair is member of largest family owner, convertible loans divided by the book value of assets, CreditInform debt rating divided by 100, debt equity ratio, direct ownership of all family owners, direct ownership of largest family, dividends per share to earnings per share, logarithm of number of employees, number of seats of largest family owner, regional dummy variables, ultimate ownership of all family owners and ultimate ownership of largest family.

not affect the regressions presented below. The only exception is the rather high correlation, 0.7, between SALES and SIZE. As I argue in Section 6, the high correlation between these two firm characteristics raises the hurdle for finding robust evidence for the various hedging theories and therefore does not drive my results.

4 Empirical Findings

This section studies whether corporate property insurance purchases of non-listed firms are explained by standard proxies that aim at measuring corporate finance hedging motives. Pearson correlation coefficients, OLS regressions, and other regression models are untabulated, but available upon request. I focus the discussion on results of linear GMM simultaneous equations with heteroskedasticity and autocorrelation consistent p-values.[10] I further focus on the insurance use regression and on the simultaneity between capital structure, liquidity (CASH), and insurance. The identifying restrictions I impose should be clear from Tables 4-6.

Many of the explanatory variables are at least partially endogenous. I control for simultaneity between the insurance ratio, liquidity, and capital structure. For exogenous variables, the regressions below are based on lagged data to reduce potential simultaneous-equations bias.

Table 4 presents the first insights into the important question of whether ownership variables exert a significant influence on insurance rates. The dependent variables are insurance premium scaled by PP&E+I, LTD, and CASH. The LTD equation is motivated by Graham and Rogers (2002) and the related literature, while the CASH equation is motivated by Bates et al. (2008) and, to a lesser extent, by Lins et al. (2008).

[Insert Table 4 about here]

CEOSALARY, CONCENTRATION, and FEMALE show negative and significant coeffi-

[10] Regressions with a two-stage estimation technique, 2SLS, are qualitatively similar and available upon request.

cient estimates in the INSURANCE equation of Table 4. These results are inconsistent with the risk aversion motive put forward in Amihud and Lev (1981), Stulz (1984) and Smith and Stulz (1985).

The relation between the dividend yield and insurance use is negative and significant. This result complements the evidence in Aunon-Nerin and Ehling (2008) on public firms. They argue that if dividends and free cash flow are positively related, then a firm with high dividends is less likely to fail to rebuild when a casualty loss occurs. Their argument is consistent with the evidence in Allen and Michaely (2003) that the greater part of total dividends are paid by large and profitable firms with low information asymmetry. The above relation is also consistent with the view that if dividends are high, then the under-investment problem is small due to the negative relation between dividends and the investment opportunity set (Smith and Watts (1992)).

According to Grace and Rebello (1993), favorable information may be signaled through a high level of insurance coverage and vice versa. DeMarzo and Duffie (1991), DeMarzo and Duffie (1995) and Breeden and Viswanathan (1998) also provide models of informational asymmetry that motivate hedging. Informational asymmetries are expected to be lower for firms with high institutional ownership than for firms with low institutional ownership. However, the empirical evidence for this hedging incentive is weak or even inconsistent with the predictions. Aunon-Nerin and Ehling (2008) find no relation between institutional ownership and property insurance coverage. Purnanandam (2008) finds that derivative hedgers have significantly higher institutional shareholdings than non-hedgers. Further, Graham and Rogers (2002) and Rogers (2002) find a positive and significant relation between institutional ownership and the extent of derivative hedging.

The negative relation between INSTOWN and INSURANCE, which is insignificant, in Table 4 appears, at first, to support the informational asymmetry hedging motive. However, it is not clear to whom the firms may signal through insurance. Since non-listed firms rarely attract outside investors, it is more likely that institutional investors either directly

or indirectly influence the firms in my sample to reduce insurance.

To control for profitability, I use ROA. In Table 4, ROA shows a significant coefficient estimate with negative sign, which is consistent with the sign of DIV. It is also consistent with the view that high dividends imply greater free cash flow and that dividends are typically paid by profitable firms.

SIZE shows predicted sign but is insignificant. This may be due to the rather small variability of firm size in the data. Recall that the firms in the database need to reach a certain size to justify an insurance broker. This excludes very small firms. Focusing on firms with positive LTD also removes smaller firms. Since insurance data on listed firms is scarce in my sample (and excluded from the analysis), many large firms were automatically excluded. Hence, the nature of my data and the selection procedure implies limited cross-sectional variation in firm size.

The variable SALESGROWTH, a proxy for growth options, shows a negative sign and is insignificant. This hedging argument is based on the idea that it is optimal for firms with growth options to reduce cash flow variability. Note that Aunon-Nerin and Ehling (2008) argue that insurance only affects cash flow variability indirectly, via the insurance deductible. Since I use insurance premium, which proxies for insurance coverage rather than for the insurance deductible, it appears that the insignificant coefficient estimate for SALESGROWTH is plausible.

The simultaneous-equation regressions setting allows for controlling for insurance use due to debt demand. This is an important matter because hedging or insurance may allow firms to increase debt capacity. Too, firms with high debt may be contracted with debtors to insure. I provide the first evidence into this important question for non-listed firms. Indeed, non-listed firms insure (hedge), as suggested by Table 4, to increase their debt capacity. For the firms in my sample, it is also true that the debt ratio exerts a positive influence on insurance use. This shows that non-listed firms do not differ from public firms in this respect, Graham and Rogers (2002) and Aunon-Nerin and Ehling (2008). Next, note that

INSURANCE exerts a positive influence on corporate liquidity, CASH. Significantly, I also find that the insurance-liquidity relation exists in reverse, in that CASH exerts a positive influence on INSURANCE. This is the first evidence that insurance and liquidity, both forms of risk management, are complements. Although insurance and liquidity are complements, firms do not hold cash to increase debt capacity. Table 4 shows that liquidity exerts a negative influence on long-term debt, and that long-term debt exerts a negative influence on liquidity. Therefore, long-term debt and liquidity behave as substitutes.

The view that liquidity serves two purposes, namely to hedge as well as to directly or indirectly reduce debt, is consistent with Acharya et al. (2007). They argue that cash is held as a hedging instrument rather than as negative debt by financially constrained firms with high hedging needs.

Next, I turn to the LTD and CASH regression results in Table 4. The coefficient estimates in the LTD equation, in Table 4, are consistent with the results in Graham and Rogers (2002) with the exception of SALESGROWTH. Graham and Rogers (2002) employ R&D expenditure as a proxy for growth options and report a significantly negative coefficient estimate. I, however, document a significantly positive coefficient estimate for sales growth. The coefficient estimates in the CASH regression are also consistent with the findings reported in Bates et al. (2008). Note, however, that Bates et al. (2008) make their prediction for a dividend payout dummy and, thus, their results cannot be directly compared to the results reported in Table 4. DIV, in Table 4, is highly significant and shows a positive sign whereas Bates et al. (2008) predict and find a negative coefficient for the dividend payout dummy variable.

[Insert Table 5 about here]

To the extent that insurance use, leverage and liquidity are simultaneously determined, these firm policies are likely to be affected by the same explanatory variables. Specifically, what is the influence of managerial and owners' risk aversion for leverage and liquidity? The simultaneous-equation regression model in Table 5 re-estimates the model in Table 4 using

CONCENTRATION and FEMALE also in the LTD and in the CASH equation.

In Table 5, the coefficients yield slightly different results in significance in comparison to those obtained in Table 4. CEOSAL is now insignificant and INSTOWN is only slightly insignificant, whereas in Table 4, INSTOWN shows a p-value of 0.22 in the INSURANCE regression. In the LTD regression, there is almost no change in significance in comparison to those obtained in Table 4, except that the p-value of OPEX drops from 0.14 to 0.11. The coefficients in the CASH regression of Table 5 yield identical results in significance in comparison to those obtained in Table 4. Note also that there is not one single sign change in Table 5 relative to Table 4. Interestingly, CONCENTRATION and FEMALE show positive relations with LTD although CONCENTRATION is insignificant and, as well, positive relations with CASH. The latter relations are consistent with a risk aversion motivated hedge.

[Insert Table 6 about here]

Next, I study the influence of family ownership variables. The CCGR database contains any family's involvement in a firm's ownership. The involvement is classified as a pair in terms of a basic family relation type as of the year-end 2007. These types are parents, grandparents, great-grandparents, great-great-grandparents and marriage. Based on these nuclear family types, 18 types of family relations between two individuals, including relationships like sisters, cousins, uncle/aunt and nephew/niece are included in the database.

Various family ownership variables including ultimate ownership of all family owners and ultimate ownership of largest family show no relations with INSURANCE. The only exception is the number of owners in the largest family. In Table 6, the coefficients yield again slightly different results in significance in comparison to those obtained in Table 4 and Table 5. Overall, the previous results appear robust. The risk aversion hypothesis for owners is expected to become less important when the number of owners increases. FAMILYSIZE, however, shows a significantly positive relation with INSURANCE. This result underscores the coefficient estimates of CONCENTRATION and FEMALE, which also show unexpected sign. Further, FAMILYSIZE shows significantly negative relation with CASH, which is

consistent with a risk aversion motivated hedge.

To sum up, the empirical results suggest that corporate insurance use is affected, and quite significantly so, by ownership structure and the CEO's private motives. In addition, non-listed firms insure to increase their long-term debt capacity; insurance and liquidity are complements; and liquidity and long-term debt are substitutes.

5 Explaining the Negative Relation between Ownership Variables and Insurance

In this section, I present two pieces of empirical evidence that may explain the strong negative relation between ownership variables —CEO salary, ownership concentration and aggregate female ownership— and corporate property insurance use.

Dafny (2008) argues that health insurers exploit more profitable firms. If this is also a common practice in the property insurance industry, then, on the one hand, it is conceivable that firms with low CEO salary, low ownership concentration, low female ownership or a general high dispersion of ownership ignore or even facilitate monopolistic insurance premium pricing practices. On the other hand, firms with high levels of ownership concentration, in one way or another, probably respond to overpriced insurance contracts by cutting back on coverage and thus also on premium. Obviously, the motive to cut back on coverage may be stronger than the risk aversion hedging motive, which then explains the negative relation.

Results in Panel A of Table 7 support the view that insurers exploit more profitable firms. The table contains regressions of changes in premium on a constant, changes in profitability, lagged changes in profitability, changes in PP&E+I and lagged changes in PP&E+I plus year and industry dummy variables. Changes in profitability, lagged changes in profitability or both show significantly positive coefficients, implying that insurers raise property premiums to firms that experience an increase in profits.

Of course, an alternative interpretation, which I cannot rule out, is that profitable firms

raise coverage or incorporate other, potentially expensive provisions, into their property insurance contracts. Importantly, both interpretations help explain why I find a strong negative relation between ownership variables —CEO salary, ownership concentration and aggregate female ownership— and corporate property insurance use. In any case, if profitable firms do raise coverage, this practice would be less common among firms with high ownership concentration.

[Insert Table 7 about here]

Consider that the risk aversion motive is valid. Then, it natural to assume that managers and owners are keen to not only hedge cash flow risk and other sources of risk but also to fundamentally reduce firm risk. If firms with high ownership concentration are indeed less risky, then hedging is needed to a lesser extent. Further, if high CEO salary or high ownership concentration proxy inversely for firm risk, then stakeholders may respond by stipulating less insurance.

Panel B of Table 7 contains regressions of the coefficient of variation of firm revenues on a constant, firm mean of CEO salary (MEANCEOSAL), firm mean of ownership concentration (MEANCONCENTRATION) and firm mean of institutional ownership (MEANINSTOWN) plus industry dummy variables.[11] MEANCEOSAL shows negative coefficient estimates but is always slightly insignificant. MEANCONCENTRATION shows a significantly negative coefficient, implying that firms with high ownership concentration are less risky. Coefficient estimates of MEANINSTOWN are insignificant and appear only in one out of three regressions with negative sign.

Overall, the evidence in Table 7 supports the view that managers' and owners' risk aversion matter. The negative relation between ownership variables and insurance use may be due to monopolistic insurance premium, waste, negative relation between ownership and firm risk or all of these relations.

[11] Coefficient estimates of female ownership and number of owners in largest family are highly insignificance and thus excluded from the regressions.

6 Robustness

The results presented above are robust to various ways of treating outliers. For example, dropping observations of the insurance variable at 5% (on both sides of the distribution), instead of 1%, or keeping outliers of the explanatory variables in the sample, see Appendix A, does not alter the main findings of this paper.

Next, I address the high correlation between SALES and SIZE. Note that the correlation between these two firm characteristics affects only first-stage estimates since only one of the two variables appears in the three second-stage regressions. This, however, only raises the hurdle for finding robust —that is, significant— evidence for the various hedging theories that are tested for in this paper. Moreover, when I exclude one of the highly correlated variables in each of the three first-stage regressions, I then obtain coefficient estimates in the second-stage which are almost identical to the reported results. Unsurprisingly, the significance of the coefficient estimates is slightly higher in this experiment when compared with the significance of the coefficient estimates in Table 4.

The exogenous variables in Tables 4 to 6 are obtained by using data for the fiscal year-end prior to the start of the insurance contract. First, when the data from the fiscal year-end after the insurance policy was initiated is used, similar results are obtained.

Second, I also construct an additional sample by using a standard practice in the risk management literature: that is, selecting stock data from the financial year before the insurance contract was initiated and flow data from the same year as the insurance contract. This specification assumes that management relies on past stock data but has good estimates available for current flow data. Gezcy et al. (1997), for example, use this procedure. Overall, I find that the qualitative results are unaffected by changes in the matching and selection criteria between the insurance data and the exogenous variables.

Third, the main results also hold if the three-year moving average is used instead of the lagged values for the exogenous variables, or if, alternatively, all variables are averaged across all years for which insurance data is available, resulting in a purely cross-sectional model.

Fourth, since there is substantial time-series dependence in the explanatory variables, it is desirable to incorporate this feature of the data into the empirical analysis. Furthermore, all firm policies, including insurance use, should depend on forecasted firm characteristics rather than on prior or current values. To address these concerns, I predict explanatory variables[12] such as firm size from an ARMA(1,1) model which is fitted to the time-series of each accounting variable. Although employing predicted explanatory variables is more consistent with the notion that firms have well fleshed-out business plans, at least for the near future, it appears that predicted firm characteristics do not outperform lagged balance-sheet-based firm characteristics. One obvious reason predictions perform slightly worse than lagged data is that the prediction itself produces outliers.

To show that the sample is representative, I compare the descriptive statistics of the data to all CCGR data for the relevant years. The firms in the Aon Grieg database show somewhat higher sales and size than the average Norwegian non-listed firm. This is, of course, not surprising since smaller firms do not require an insurance broker. Another notable difference between the sample of firms in the study and the population is that sales growth is lower for firms in this study than in the population, and yet, the median sales growth in my sample and the population are comparable. I, therefore, suspect that the difference is due to a few firms with stellar sales growth in the population group: these firms may be too small for an insurance broker and, thus, should not be in my database. Overall, I find that the firms in my sample do not differ in an economically significant way from the population of non-listed firms in Norway.

Finally, I re-estimate the models in Tables 4 to 6, but include the CEO ownership variable and fill in missing CEO ownership data with zeros.[13] One among the reasons why CEO ownership data is missing is the possibility that CEO ownership is too small to be recorded.

[12]To my knowledge, Graham (1996) is the first work that produces predicted data, namely corporate marginal tax rates, in the empirical corporate finance literature.

[13]I have, in addition, hand-collected CEO ownership data via a questionnaire and replaced missing data with zero when industrial ownership equals 100 percent. Nevertheless, the models in Tables 4 to 6 cannot be identified when the original CEO ownership data are included.

I, therefore, find it plausible to replace missing data with zero. The results in Tables 4 to 6 are practically unchanged and CEO ownership shows a significantly negative coefficient, which is consistent with the results presented in Section 4.

7 Conclusions

I study corporate risk management with property insurance in non-listed small and medium-sized firms. This is important because owners, including the CEO, of small and medium-sized firms have, in general, tied their wealth to the firm. Therefore, it is expected that the risk management motives of owners and managers are much more aligned in small and medium-sized firms than in large public companies. In addition, family firms stress survival and, thus, need to rely on risk management.

I document negative relations between the following ownership variables: CEO salary, ownership concentration and aggregate female ownership and between insurance use. I also document a positive relation between the number of family owners and insurance use. These relations are inconsistent with the risk aversion motive to hedge. However, the relations are consistent with self-insurance among CEO-controlled firms, firms with high ownership concentrations, firms with above average female owners and firms with a small number of family owners, given monopolistic insurance premiums. I provide empirical evidence that supports this view by showing that insurers raise property insurance premiums for firms that experience increases in profits. The above relations are also consistent with stakeholders stipulating less insurance the higher the CEO salary or the higher the ownership concentration. This may be because these firm characteristics proxy for below average firm risk. I also provide empirical evidence that supports this view by establishing that ownership variables and the coefficient of variation of revenues are negatively related.

Moreover, I analyze insurance, capital structure, and liquidity choices jointly by employing simultaneous-equation regressions. This is an important matter because insurance, as

well as liquidity, may allow firms to increase debt capacity. The results suggest that non-listed firms insure to increase their debt capacity. The results also suggest that insurance and liquidity, both forms of risk management, are complements. Although insurance and liquidity are complements, firms do not hold cash to increase debt capacity. I find that long-term debt and liquidity behave as substitutes.

A Data Description

This appendix contains details about the construction of the variables employed in this study. All reported regressions are performed with prior period data. Regression output with a mixture of prior period and current period data (see Aunon-Nerin and Ehling (2008) and Gezcy et al. (1997)), current data and data with predicted explanatory variables are available upon request.

A.1 Insurance Data

The data from Aon Grieg are insurance property premiums. The file contains the firm name, gross premium, net premium, and a few other items. The insurance data are merged with the accounting data by matching with the firm name. Firms that cannot be uniquely identified are removed.

A.2 Explanatory Variables

Item numbers are CCGR variable definitions.

ASSETS: Assets is the sum of current asset and fixed asset. Item 78 + Item 63

CASH: CASH is cash and equivalents divided by assets. (Item 75 + Item 76) / Assets

CEOSALARY: CEO is the CEO salary divided by assets multiplied by 1000. Item 114 / Assets * 1000

CEOSHARE: CEOSHARE is shares owned by the CEO divided by 100. Item 13601 / 100

CEOSHARE2: CEOSHARE2 is shares owned by the CEO divided by 100. Missing data is replaced by zero. Item 13601 / 100

CONCENTRATION: Concentration is the Herfindahl index for ownership. Item 225

DIV: DIV is the dividend yield ratio; usually it is calculated as dividends per share to stock price at the end of the year. However, since we do not observe the stock price, it is given here by total paid-out dividends scaled by total equity. Item 105 / Item 87

FAMILYSIZE: FAMILYSIZE is the number of family owners of the largest family.

FEMALE: FEMALE is aggregate female ownership divided by 100. Item 221 / 100

INSTOWN: INSTOWN is shares owned by institutional investors divided by 100. Item 218 / 100

LTD: LTD is the long-term debt ratio, which is given by the book value of long-term debt divided by total Assets. Item 98 / Assets

ROA: ROA is the return on assets; it is calculated as the operating earnings divided by assets. Item 19 / Assets

SALES GROWTH: SALES GROWTH is the three-year backward-moving average percentage growth in sales. Missing values are not propagated, which means that the average may be calculated over less than three observations. Item 9 (sales revenue) has a total of 7,710 non-missing values for the whole sample (1994-2005); out of these, in 2,991 cases, Item 9 is equal to 0. When zero sales occur at the beginning or at the end of the sample period, I use the original data; otherwise, zero sales are replaced by values obtained by means of linear interpolation of surrounding non-zero values (the series thus created is named Item 9i, and is also used in constructing the OPEX and SALES variables). This transformation aims to correct what seem to be typing mistakes while it also does not significantly influence the results.

SIZE: Size is the logarithm of total assets. Log(Item 63 + Item 78)

INTANGASSETS: INTANGASSETS is intangible assets scaled by total assets. Item 46 / Assets

OPEX: OPEX is operating expenses scaled by sales, with the sales series transformed as explained under SALES GROWTH above. (Item 12 + Item 13 + Item 14 + Item 15 + Item 16 + Item 17 + Item 18)/Item 9i

PP&E: PP&E is property, plant, and equipment as a percentage of total assets. Item 51 / Assets

SALES: SALES is the logarithm of sales revenue, with the sales series transformed as explained under SALES GROWTH above. log(Item 9i)

A.3 Outliers

The insurance ratio (INSURANCE) presents outliers and I therefore remove data below 1 percent values and above 99 percent values. Moreover, because of the small sample, for the explanatory variables, it is more convenient to remove outliers individually for each series, as follows:

CASH: I eliminate the 6 cases in which CASH is higher than 1.

DIV: I allow the dividend-to-equity ratio to be less than 4, removing a total of 18 observations.

INTANGASSETS: Negative intangible assets are removed.

LTD: I eliminate the 16 observations for which LTD is larger than 3. Cases with long-term debt ratio higher than 1 (but lower than 3) are kept in the sample, in order to capture the effects of severe financial distress.

OPEX: I remove operating expenses to sales ratio at 99 percent. In addition, cases with negative operating expenses are set to missing.

ROA: I remove one observation with an ROA of -28.

SALES GROWTH: Observations for which the percentage growth in sales in a given year is higher than 10 (1000 percent) are eliminated. This reduces the number of observations of the SALES GROWTH variable by one percent.

B Sign Predictions

This appendix contains the predictions for the variables used in the study.

B.1 Insurance equation

Sign predictions for the insurance equation are as follows:

CEOSALARY: positive influence (risk aversion motive).

DIV: negative influence.

FAMILYSIZE: negative influence (risk aversion motive).

FEMALE: positive influence (risk aversion motive).

INSTOWN: negative influence.

CEOSHARE: positive influence (risk aversion motive).

CONCENTRATION: positive influence (risk aversion motive).

LTD: positive influence.

CASH: positive influence.

ROA: negative influence.

SALES GROWTH: positive influence.

SIZE: negative influence.

B.2 LTD equation

Sign predictions for the LTD equation are as follows:

CASH: variable is not included in LTD regressions in Aunon-Nerin and Ehling (2008) and Graham and Rogers (2002).

INSURANCE: positive influence, see Aunon-Nerin and Ehling (2008).

SALES GROWTH: negative influence, see Graham and Rogers (2002).

INTANGASSETS: positive influence, see Graham and Rogers (2002).

OPEX: no prediction.

SALES: negative influence, see Graham and Rogers (2002).

PP&E: positive influence, see Graham and Rogers (2002).

B.3 CASH equation

Sign predictions for the CASH equation are as follows:

DIV: negative influence dividend dummy variable, see Bates et al. (2008).

LTD: negative influence, see Bates et al. (2008).

INSURANCE: no prediction.

SALES GROWTH: positive influence, see Bates et al. (2008).

C Time Series Forecasts

Time series forecasts are performed for the accounting time series employed as exogenous variables. I use fitted values for an ARMA(1,1) model, with a constant estimated for each firm. This avoids endogeneity problems that arise when using current values, and is more refined than using simple lags.

I produce two additional versions of the ARMA(1,1) model forecasts. First, when the forecasts are lower than the minimum of the actual time-series or when the forecasts are higher than the maximum of the actual time-series, then these observations are assumed to be missing. Second, when the forecasts are lower than the minimum of the actual time-series or when the forecasts are higher than the maximum of the actual time-series, then these forecasts are replaced with the minimum or maximum of the actual series.

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Table 1: **Insurance Data.** The table summarizes descriptive statistics of property insurance premium for 933 non-listed Norwegian firms. The sample consists of 1855 firm-year observations (*All firms*); 993 firm-year observations (*Firms with positive long-term debt*); and 738 firm-year observations (*Firms with zero long-term debt*) ranging from January, 2003 through May, 2006. The premium is the annual insurance premium in Norwegian Kroner (NOK). The insurance ratio is premium scaled by property, plant and equipment plus inventory (PP&E +I in NOK). Insurance data are from AON Grieg Norway. Accounting data are from CreditInform and my own calculations.

	N	Mean	Std. Dev.	Min.	Median	Max
All firms						
Premium in NOK	1855	192432.00	732789.80	164.00	45848.00	15281813.00
Insurance ratio	1618	0.03	0.10	0.00	0.01	1.69
Premium to dividends	347	0.16	1.20	0.00	0.01	20.94
Premium to earnings	1458	0.07	1.23	0.00	0.00	45.09
(PP&E + I) / Assets	1732	0.33	0.29	0.00	0.27	1.00
Firms with positive long-term debt						
Premium in NOK	993	242512.60	817263.50	164.00	68770.00	13654878.00
Insurance ratio	946	0.02	0.07	0.00	0.00	1.69
Premium to dividends	192	0.11	0.47	0.00	0.02	5.88
Premium to earnings	810	0.09	1.62	0.00	0.00	45.09
(PP&E + I) / Assets	993	0.41	0.30	0.00	0.42	1.00
Firms with zero long-tern debt						
Premium in NOK	738	127210.70	643418.00	211.00	29240.50	15281813.00
Insurance ratio	672	0.04	0.13	0.00	0.01	1.50
Premium to dividends	155	0.22	1.72	0.00	0.01	20.94
Premium to earnings	645	0.04	0.39	0.00	0.00	7.60
(PP&E + I) / Assets	738	0.22	0.24	0.00	0.13	0.99

Table 2: **Industry Classifications, Firm-Years, and Negative Equity.** This table summarizes descriptive statistics of industry classifications, firm-years and negative equity for 933 non-listed Norwegian firms. The sample consists of 1855 firm-year observations (*All firms*); 993 firm-year observations (*Firms with positive long-term debt*); and 738 firm-year observations (*Firms with zero long-term debt*) ranging from January, 2003 through May, 2006. Industry classifications are from Berzins et al. (2008). Multi Group contains firms in multiple industries. Other data are from CreditInform and my own calculations.

Industry	*All firms*		*Firms with positive long-term debt*		*Firms with zero long-term debt*	
	N	% of sample (N=1618)	N	% of sample (N=946)		% of sample (N=672)
Agriculture, forestry, fishing, mining	60	3.71%	48	5.07%	12	1.79%
Construction	40	2.47%	27	2.85%	13	1.93%
Energy	36	2.22%	32	3.38%	4	0.60%
Financial	6	0.37%	4	0.42%	2	0.30%
Manufacturing	429	26.51%	254	26.85%	175	26.04%
Service	361	22.31%	221	23.36%	140	20.83%
Trade	341	21.08%	156	16.49%	185	27.53%
Transport	38	2.35%	26	2.75%	12	1.79%
Multi Group	8	0.49%	4	0.42%	4	0.60%
Sum	1319	81.52%	772	81.61%	547	81.40%

Year	N	% of sample (N=1618)	N	% of sample (N=946)		% of sample (N=672)
2003	217	13.41%	135	14.27%	82	12.20%
2004	555	34.30%	313	33.09%	242	36.01%
2005	549	33.93%	327	34.57%	222	33.04%
2006	297	18.36%	171	18.08%	126	18.75%

	N	% of sample (N=1618)	N	% of sample (N=946)		% of sample (N=672)
Negative earnings	0	0.00%	0	0.00%	0	0.00%
Negative equity	111	6.86%	78	8.25%	33	4.91%
Positive earnings and equity	1306	80.72%	727	76.85%	579	86.16%

Table 3: **Summary of Explanatory Variables.** This table summarizes descriptive statistics of financial characteristics for 933 non-listed Norwegian firms. The sample consists of 1855 firm-year observations (*All firms*); 993 firm-year observations (*Firms with positive long-term debt*); and 738 firm-year observations (*Firms with zero long-term debt*) ranging from January, 2003 through May, 2006. CASH is cash and equivalents divided by assets. CEOSALARY is the CEO salary divided by assets times 1000. CONCENTRATION is the Herfindahl index of equity ownership. DIV is dividends scaled by total equity. FEMALE is aggregate female ownership divided by 100. INSTOWN is institutional ownership divided by 100. INTANGASSETS is intangible assets scaled by total assets. FAMILYSIZE is the number of family owners of largest family. LTD stands for book value of long-term debt divided by assets. OPEX is operating expenses scaled by sales. PP&E is property, plant and equipment scaled by assets. ROA is the return on assets (operating earnings over assets). SALES is the logarithm of sales. SALESGROWTH is the three-year backward moving average percentage growth in sales. SIZE stands for the logarithm of assets. The data are from CreditInform and my own calculations.

	All sample firms						*Sample firms with positive long-term debt*						*Sample firms with zero long-term debt*					
Variable	N	Mean	STD	Min.	Med.	Max.	N	Mean	STD	Min.	Med.	Max.	N	Mean	STD	Min.	Med.	Max.
CASH	3364	0.15	0.20	0.00	0.06	1.00	1974	0.10	0.15	0.00	0.04	1.00	1388	0.22	0.25	0.00	0.12	1.00
CEOSAL	2865	0.04	0.10	0.00	0.01	2.17	1653	0.03	0.05	0.00	0.01	0.94	1210	0.06	0.14	0.00	0.02	2.17
CONCENTRATION	3213	0.80	0.31	0.00	1.00	1.00	1909	0.76	0.33	0.00	1.00	1.00	1302	0.87	0.27	0.00	1.00	1.00
DIV	3349	0.13	0.43	0.00	0.00	3.95	1971	0.10	0.36	0.00	0.00	3.95	1372	0.17	0.51	0.00	0.00	3.93
FEMALE	3213	0.03	0.14	0.00	0.00	1.00	1909	0.03	0.14	0.00	0.00	1.00	1302	0.02	0.13	0.00	0.00	1.00
INSTOWN	3213	0.02	0.13	0.00	0.00	1.00	1909	0.03	0.15	0.00	0.00	1.00	1302	0.01	0.10	0.00	0.00	1.00
INTANGASSETS	3364	0.02	0.08	0.00	0.00	0.78	1972	0.02	0.09	0.00	0.00	0.78	1390	0.01	0.06	0.00	0.00	0.76
FAMILYSIZE	1629	2.36	1.45	1.00	2.00	9.00	1155	2.49	1.51	1.00	2.00	9.00	474	2.04	1.25	1.00	2.00	7.00
LTD	3365	0.21	0.30	0.00	0.05	2.80	1975	0.35	0.32	0.00	0.28	2.80	1390	0.00	0.00	0.00	0.00	0.00
OPEX	2835	-1.29	1.82	-21.63	-0.98	0.00	1622	-1.33	1.79	-21.03	-0.98	0.00	1208	-1.24	1.86	-21.63	-0.97	0.00
PPE	3367	0.21	0.26	0.00	0.09	1.00	1975	0.28	0.29	0.00	0.18	1.00	1390	0.11	0.17	0.00	0.04	0.99
ROA	3367	0.04	0.40	-15.88	0.05	7.04	1975	0.03	0.20	-2.98	0.04	0.96	1390	0.06	0.56	-15.88	0.07	7.04
SALES	2881	17.48	2.13	6.91	17.72	23.38	1648	17.55	2.19	6.91	17.72	23.38	1223	17.40	2.03	6.91	17.73	22.39
SALESGROWTH	2774	0.14	0.70	-1.00	0.05	9.42	1589	0.14	0.68	-1.00	0.05	9.42	1175	0.15	0.73	-1.00	0.05	7.11
SIZE	3366	17.42	1.97	9.55	17.44	23.79	1975	17.83	1.91	12.35	17.76	23.79	1389	16.85	1.89	10.17	16.97	22.32

Table 4: **Simultaneous Analysis of Debt Ratio, Insurance Ratio, and Liquidity I** This table reports linear GMM coefficient estimates from a simultaneous equation model for debt (LTD), for insurance (INSURANCE) and for liquidity (CASH), with a total of 663 firm-year observations with non-zero LTD. The p-values are heteroskedasticity and autocorrelation consistent. CASH is cash and equivalents divided by assets. CEOSAL is the CEO salary divided by assets times 1000. CONCENTRATION is the Herfindahl index of equity ownership. DIV is dividends scaled by total equity. FEMALE is aggregate female ownership divided by 100. INSTOWN is institutional ownership divided by 100. INSURANCE is the insurance premium over property, plant and equipment plus inventories. INTANGASSETS is intangible assets scaled by total assets. LTD stands for book value of long-term debt divided by assets. OPEX is operating expenses scaled by sales. PP&E is property, plant, and equipment as a percentage of assets. ROA is the return on assets (operating earnings over assets). SALES is the logarithm of sales. SALESGROWTH is the three-year moving average percentage growth in sales. SIZE is the logarithm of assets. Industry dummie variables are as in Table 2. The superscript (*) denotes endogenous variables. The endogenous variables are measured as of fiscal year-ends after the starting date of the insurance contract, (-1). Insurance data are from AON Grieg Norway. Accounting data are from CreditInform, and my own calculations.

	INSURANCE		LTD		CASH	
Variable	Coefficient	Prob.	Coefficient	Prob.	Coefficient	Prob.
Constant	-0.0190	0.63	0.2718	0.04	0.0919	0.00
CASH*	1.1285	0.00	-0.2718	0.06		
CEOSAL(-1)	-0.3071	0.03				
CONCENTRATION(-1)	-0.0206	0.03				
DIV(-1)	-0.0552	0.00			0.0609	0.00
FEMALE(-1)	-0.0833	0.01				
INSTOWN(-1)	-0.1262	0.22				
INSURANCE*			3.6656	0.00	0.5009	0.00
INTANGASSETS(-1)			0.5380	0.00		
LTD*	0.1463	0.00			-0.1655	0.00
OPEX(-1)			-0.0104	0.29		
PPE(-1)			0.5182	0.00		
ROA(-1)	-0.0821	0.01				
SALES(-1)			-0.0100	0.14		
SALESGROWTH(-1)	-0.0295	0.00	0.0454	0.03	0.0264	0.01
SIZE(-1)	-0.0018	0.32				
Dummy variables						
Industry dummies	Y		Y		Y	
Year dummies	Y		Y		Y	

Table 5: **Simultaneous Analysis of Debt Ratio, Insurance Ratio, and Liquidity II** This table reports linear GMM coefficient estimates from a simultaneous equation model for debt (LTD), for insurance (INSURANCE) and for liquidity (CASH), with a total of 663 firm-year observations with non-zero LTD. The p-values are heteroskedasticity and autocorrelation consistent. CASH is cash and equivalents divided by assets. CEOSAL is the CEO salary divided by assets times 1000. CONCENTRATION is the Herfindahl index of equity ownership. DIV is dividends scaled by total equity. FEMALE is aggregate female ownership divided by 100. INSTOWN is institutional ownership divided by 100. INSURANCE is the insurance premium over property, plant and equipment plus inventories. INTANGASSETS is intangible assets scaled by total assets. LTD stands for book value of long-term debt divided by assets. OPEX is operating expenses scaled by sales. PP&E is property, plant, and equipment as a percentage of assets. ROA is the return on assets (operating earnings over assets). SALES is the logarithm of sales. SALESGROWTH is the three-year moving average percentage growth in sales. SIZE is the logarithm of assets. Industry dummie variables are as in Table 2. The superscript (*) denotes endogenous variables. The endogenous variables are measured as of fiscal year-ends after the starting date of the insurance contract, (-1). Insurance data are from AON Grieg Norway, accounting data are from CreditInform, and my own calculations.

	INSURANCE		LTD		CASH	
Variable	Coefficient	Prob.	Coefficient	Prob.	Coefficient	Prob.
Constant	-0.0193	0.65	0.2786	0.04	0.0675	0.00
CASH*	1.0769	0.00	-0.5094	0.06		
CEOSAL(-1)	-0.1959	0.21				
CONCENTRATION(-1)	-0.0436	0.03	0.0313	0.34	0.0293	0.11
DIV(-1)	-0.0515	0.00			0.0571	0.00
FEMALE(-1)	-0.1903	0.00	0.1828	0.01	0.1905	0.00
INSTOWN(-1)	-0.1473	0.14				
INSURANCE*			3.6464	0.00	0.5681	0.00
INTANGASSETS(-1)			0.5060	0.00		
LTD*	0.1551	0.00			-0.1724	0.00
OPEX(-1)			-0.0068	0.46		
PPE(-1)			0.4967	0.00		
ROA(-1)	-0.0689	0.02				
SALES(-1)			-0.0106	0.11		
SALESGROWTH(-1)	-0.0297	0.00	0.0535	0.01	0.0270	0.01
SIZE(-1)	-0.0009	0.64				
Dummy variables						
Industry dummies	Y		Y		Y	
Year dummies	Y		Y		Y	

Table 6: **Simultaneous Analysis of Debt Ratio, Insurance Ratio, and Liquidity III**
This table reports linear GMM coefficient estimates from a simultaneous equation model for debt (LTD), for insurance (INSURANCE) and for liquidity (CASH), with a total of 526 firm-year observations with zero and non-zero LTD. The p-values are heteroskedasticity and autocorrelation consistent. CASH is cash and equivalents divided by assets. CEOSAL is the CEO salary divided by assets times 1000. CONCENTRATION is the Herfindahl index of equity ownership. DIV is dividends scaled by total equity. FAMILYSIZE is the number of family owners of largest family. FEMALE is aggregate female ownership divided by 100. INSURANCE is the insurance premium over property, plant and equipment plus inventories. INTANGASSETS is intangible assets scaled by total assets. LTD stands for book value of long-term debt divided by assets. OPEX is operating expenses scaled by sales. PP&E is property, plant, and equipment as a percentage of assets. ROA is the return on assets (operating earnings over assets). SALES is the logarithm of sales. SALESGROWTH is the three-year moving average percentage growth in sales. SIZE is the logarithm of assets. Industry dummie variables are as in Table 2. The superscript (*) denotes endogenous variables. The endogenous variables are measured as of fiscal year-ends after the starting date of the insurance contract, (-1). Insurance data are from AON Grieg Norway. Accounting data are from CreditInform, and my own calculations.

	INSURANCE		LTD		CASH	
Variable	Coefficient	Prob.	Coefficient	Prob.	Coefficient	Prob.
Constant	-0.6951	0.02	-0.3046	0.41	0.1331	0.00
CASH*	2.2285	0.00	-0.7958	0.00		
CEOSAL(-1)	-0.5007	0.00				
CONCENTRATION(-1)	0.0106	0.22				
DIV(-1)	-0.0722	0.00			0.0415	0.00
FAMILYSIZE	0.0199	0.01	-0.0111	0.24	-0.0094	0.04
FEMALE(-1)	-0.2603	0.00	0.2740	0.00	0.1737	0.00
INSURANCE*			3.6174	0.00	0.4028	0.09
INTANGASSETS(-1)			0.4662	0.00		
LTD*	0.2566	0.01			-0.1512	0.00
OPEX(-1)			-0.0143	0.21		
PPE(-1)			0.7709	0.00		
ROA(-1)	-0.2393	0.00				
SALES(-1)			0.0216	0.22		
SALESGROWTH(-1)	-0.0154	0.03	-0.0040	0.83	0.0126	0.19
SIZE(-1)	0.0227	0.02				
Dummy variables						
Industry dummies	Y		Y		Y	
Year dummies	Y		Y		Y	

Table 7: **Insurance Premium and Profitability — Firm Risk and Ownership Structure** Panel A reports coefficient estimates from three difference in difference models for changes in property insurance premium. The premium is the annual insurance premium in Norwegian Kroner (NOK). Profits is results from operations. PP&E +I (NOK) is property, plant and equipment plus inventory. Panel B reports coefficient estimates for variations in revenues. CVAR REVENUES is the coefficient of variations of revenues. MEANCEOSAL is the firm mean of CEO salary. MEANCONCENTRATION is the firm mean of ownership concentration. MEANINSTOWN is the firm mean of institutional ownership. Insurance data are from AON Grieg Norway. Accounting data are from CreditInform and my own calculations.

	Panel A					
	Δ ln(Premium)		Δ ln(Premium)		Δ ln(Premium)	
Variable	Coefficient	Prob.	Coefficient	Prob.	Coefficient	Prob.
Constant	2.5746	0.07	4.4417	0.01	0. 2088	0.94
Δ Profits	0. 4809	0.00			0.4589	0.01
Δ Profits(-1)			0.5672	0.01	0.2751	0.06
Δ (PP&E + I)	-0. 0001	0.28			-0.0001	0.07
Δ (PP&E + I)(-1)			0.0003	0.02	0.0003	0.03
Dummy variables						
Industry dummies	Y		Y		Y	
Year dummies	Y		Y		Y	
N. of OBSERVATIONS	230		212		110	
Adj R-squared	0.30		0.35		0.39	

	Panel B					
	CVAR REVENUES		CVAR REVENUES		CVAR REVENUES	
	Coefficient	Prob.	Coefficient	Prob.	Coefficient	Prob.
Constant	1.0229	0.00	1.0102	0.00	1.4236	0.00
MEANCEOSAL	-0.3996	0.18	-0.4405	0.13		
MEANCONCENTRATION					-0.5011	0.00
Dummy variables						
Industry dummies	N		Y		N	
N. of OBSERVATIONS	851		848		859	
Adj R-squared	0.00		0.10		0.04	
Constant	1.3617	0.00	1.0225	0.00	1.0613	0.00
MEANCONCENTRATION	-0.3844	0.00				
MEANINSTOWN			0.1305	0.74	0.0751	0.84
Dummy variables						
Industry dummies	Y		N		Y	
N. of OBSERVATIONS	856		859		856	
Adj R-squared	0.12		0.00		0.10	
Constant	1.3937	0.00				
MEANCEOSAL	-0.4433	0.13				
MEANCONCENTRATION	-0.4115	0.00				
MEANINSTOWN	-0.4170	0.25				
Dummy variables						
Industry dummies	Y					
N. of OBSERVATIONS	840					
Adj R-squared	0.12					

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