Influence of a Board-level Risk Committee on Value

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ABSTRACT

This study finds a negative relation between the use of a board-level risk committee and insurer value. The data are annual observations from 68 publicly traded insurers over years 2016 to 2003. The study examines the impact on value because the arguments favoring the use of a board-level risk committee mostly frame its use in terms of the strategic benefits it confers to the firm. The finding of this study holds under different estimation models, across different sub-periods and with alternative variables. The finding of the study is consistent with available literature on firm risk governance and corporate risk management in well-functioning markets.

Key Words: Risk committee, Value, Insurance

PURPOSE AND HYPOTHESIS

This study investigates whether the use of a board-level risk committee impacts the value of publicly traded insurance firms in the US. This is an unresolved issue. It is important to resolve this issue because scrutiny of an insurer's risk governance will likely intensify, especially in light of the new Corporate Governance Annual Disclosure (CGAD) filing requirement. While the Act authorizing the CGAD does not mandate a governance structure, its presence draws attention to how the board governs an insurer's risk. Furthermore, the enterprise risk management (ERM) framework encourages the use of board-level risk committees, but how the ERM framework impacts value is also unresolved.[2] Since, neither public policy nor the available empirical evidence on risk committees offers clear guidance, this study is a first.

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[2] Evidence suggests that the ERM process improves the tactical performance of a firm (Al-Amri and Davydov, 2016; Grace et al., 2014). Evidence on the ability of the ERM process to deliver value, however, is equivocal. Gordon, Loeb, and Tseng (2009), Hoyt and Liebenberg (2011) and Eckles, Hoyt, and Miller (2014) measure ERM as an index of the risk-related information a firm discloses. Gordon et al. (2009) find no relation between ERM and value while Hoyt and Liebenberg (2011) find a positive relation between ERM and firm value. Beasley, Pagach and Warr (2008) use the appointment of a chief risk officer as a proxy for ERM adoption. They find that equity markets

Public policy diverges across jurisdictions. For example, in Canada, the Office of the Superintendent of Financial Institutions (OSFI) requires a risk committee for all financial institutions, the Australian Prudential Regulation Authority (APRA) requires a risk committee for most of the financial firms it regulates while the US Dodd–Frank Act of 2010 requires a risk committee only for large bank holding companies. The Basel Committee on Banking Supervision, considers the use of a risk committee as best-practice, while a best-practice guide on corporate governance for financial firms from Moody's views a risk committee simply as one choice among alternative choices. In the UK, the Financial Stability Board (FSB) recommends a risk committee for large banking and life insurance firms, but the Financial Reporting Council (FRC) takes the position that individual boards should decide how to exercise their risk management oversight.

Public policy, however, provides clear strategic reasons for the use of a board-level risk committee. For example, the Basel corporate governance principles for banks explain that the risk committee advises the board on the firm's current and future risk appetite and overseas implementation of the firm's risk appetite statements. Risk appetite statements are an attempt to craft risk strategy. Such statements, however, may not be able to guide the creation of value given the difficulty in quantifying risk interactions across the firm as well as allocating embedded options in a firm's operations (Hofmann and Scordis, 2017). Empirical evidence on the attempts of a board-level risk committee to govern risk strategy is mixed. There is not yet a proven way to map accounting profit targets to risk. Thus, a risk committee faces a deficit of precision in evaluating how much risk operating managers expose the firm as they pursuit their accounting performance targets.

Literature that directly examines the efficacy of risk committees in the US is scarce and literature from countries with similar markets to the US offers conflicting evidence. Hines and Peters

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do not react to announcements that a senior executive officer has been appointed to oversee the firms ERM process. Three studies directly measured the quality of a firm's ERM process (McShane, Nair, and Rustambekov, 2011; Lin, Wen, and Yu, 2012; Baxter, Bedard, Hoitash and Yezegel, 2013). They use a firm's ERM quality rating by Standard and Poor's. Lin et al. (2012) find a negative relation between the ERM rating and value, McShane et al. (2011) find a positive relation between an adequate ERM rating and value but no additional increase in firm value for firms achieving a higher ERM rating. Baxter et al. (2013) also find that there is no increased value to a higher ERM rating.

(2015) is the only study of US firms. They find no relation between the use of a board-level risk committee and bank profitability (measured as ROA) or the use of a risk committee and the notional value of a bank's hedging derivatives. They do find, however, that the use of a risk committee increases the amount of non-performing assets held by banks. A similar study is Akbar, Kharabsheh, Poletti-Hughes and Shah (2017) for financial services firms in the UK. Akbar et al. (2017) find that the use of a risk committee increases a firm's probability of insolvency (measured as Altman's Z-score) and its idiosyncratic risk. There are also studies of Australian firms. Buckby, Gallery and Ma (2015) find that firms that use a risk committee disclose more of the items recommended by the Corporate Governance Principles of the Australian stock exchange. But, Tao and Hutchinson (2013) find that while the use of a risk committee by Australian firms has no influence on their earnings per share it increases their systematic risk.

An executive report from RIMS (a preeminent professional organization dedicated to advancing the practice of risk management) affirms that a board-level risk committee "… is most appropriate for an organization that truly understands that management of their risks is an important ingredient for achieving strategy" (Exploring the Risk Committee Advantage, 2015, p.2). This strategic benefit of a risk committee, however, may be negated when independent directors dominate a risk committee. Adams, Hermalin and Weisbach (2010) argue that to effectively oversee complex and specialized firms, their board needs directors with deep firm knowledge. Such knowledge suffers as boards respond to external demands for diversity and independence. The majority of the board-level risk committees in this study's data consist of only independent directors (Table 1).

The survey of the empirical evidence Wintoki, Lick and Netter (2012) summarize in their Table 1 (top panel) is consistent with the argument of Adams et al. (2010). This empirical evidence generally finds a negative relation or no relation between the number of independent directors and firm performance (measured variously as ROA, Tobin's Q or market returns). Also, Wintoki et al. (2012) finds no relation between board independence and firm performance (measured as ROA and Tobin's Q). Thus, by extension, it is not clear what benefits a risk committee comprised of independent directors bestows on a firm. The need for firm specific expertise in effectively overseeing a firm's risk reflects Fama and Jensens's (1983, p.314) assertion that a board's "…most influential members are internal managers since they have valuable specific information about the organization's activities."

While the use of a board-level risk committee has the potential of creating value for an insurer, it may also "…represent a symbolic governance practice. Firms could utilize this symbolic practice to convey the perception of taking responsible actions in order to manage the firm's reputational legitimacy even if responsible risk management actions are not actually employed" (Hines and Peters, 2015, p. 288). Therefore, the balance of the available evidence suggests the hypothesis below.

H_o: *The use of a board-level risk committee increases value.*

H_1: *The use a board-level risk committee depresses value or is neutral to value.*

The study finds a negative relation between the use of a board-level risk committee and insurer value except for the years before the great recession where the evidence suggests no relation between the use of a risk committee and value. This result is consistent with H_1 hypothesis.

The study investigates the validity of its hypothesis for a panel of 849 annual observations of publicly traded insurance firms. The earliest data in the panel begins with the first year of the Sarbanes-Oxley (SOX) Act. The SOX Act offers a natural anchor for this investigation. The most recent data in the panel is year-end 2016. The use of a board-level risk committee is measured with a dummy variable. The average board-level risk committee in the data contains an average of 0.5 insiders. Value is measured as Tobin's Q and alternatively as the insurer's market to book ratio. The study uses these market-based measures of value because its view-point is the benefits of a risk committee as an insurer's shareholder perceives them.

The study's analysis controls for an insurer's profitability, leverage, liquidity, growth and size. It also controls for omitted variables and the possibility of endogeneity. The study investigates its hypothesis with the entire panel of data as well as across sub-periods of the data. By dividing the data into subsets to reflect a time after, during and before the great recession the study further controls for the impact of systematic events on the committee-value relation. The study proceeds to use a difference-in-differences (DiD) estimator, a fixed effects (FE) estimator, an instrumental variables (IV) estimator as well as a traditional ordinary least squares (OLS) estimator. Appropriate care is taken so that the estimators estimate correctly coefficients and their standard errors.

The study's finding is robust. This finding holds under different estimation models (Table 4) and with alternative variables (Tables 6a, 6b, 6c). The study's finding also holds across sub-periods of the data (Table 5) except for years before the great recession where the study finds no relation between the use of a board-level risk committee and value. Furthermore, there is no statistical difference in the magnitude of the estimated negative relation between the use of a risk committee and value between years after the great recession and years during the great recession. These results are consistent with the H1 hypothesis. The author is most confident in the results from the FE model of Relation (2) where value is measured as Tobin's Q. According to this set of results the use of a board-level risk committee decreases value (measured by Tobin's Q) by 2.8 percent.

In the following pages, the study proceeds to explain its data, motivate its empirical models and report these results. The study concludes by establishing its external validity by discussing how the study's finding fit within related literature.

DATA, VARIABLES AND MODELS

Data

A panel of 849 annual observations is used. The panel consists of a cross-section of 68 insurers and a time-series over years 2003 to 2016. Not all of the insurers have been in operation during the entire time-series. The time-series begins with the first year of the Sarbanes-Oxley (SOX) Act and terminates with the most recent year available. The enactment of SOX is a natural anchor for the data. The results of Akhigbe, Martin and Whyte (2009) suggest that in the US, disclosure-related benefits associated with stronger governance may have dissipated since the passage of Act in 2002.

There are 92 firms that operate in 2016 with a SIC code 6311 (life insurance) or 6331 (fire, marine and casualty insurance) and file Forms 10K and DEFA14 with the US Securities and Exchange Commission. Insurers with less than four years of data are eliminated. This is an arbitrary screen to season the data. For example, the initial public offering of Athene Holdings was in 2016 while NI Holdings, a mutual, converted to stock in 2016. Furthermore, based on the core activities of the remaining insurers as identified from the information they provide in Item 1 or Item 7 of their Form 10K, the study eliminates insurers not operating as traditional risk pools. For example, ERIE Indemnity is the attorney in fact for the Erie Insurance Exchange and Emergent Capital only manages a purchased portfolio of life settlements. Also eliminated are conglomerated firms if they do not engage in insurance but instead own other publicly traded insurers. For example, Loews Corporation, a conglomerate, owns shares in CNA Financial Corporation. Loews is excluded from the data, but CAN is not. Also eliminated are publicly traded insurers that appear to be conduits to the capital markets for mutual insurers. For example, Donegal Group, a stock insurer, has the same management, employees and facilities as Donegal Mutual. Firms that earn income from non-insurance related business (for example HCI Group) or have missing data are also removed from the data.[3]

Value Variable

An often-used measure of firm value is Tobin's Q (*Q*). The attractiveness of such a measure comes from its ability to capture fundamental drivers in the value of a firm. It also does not require an adjustment for risk. The value of the firm consists of the present value of cash flows generated by its assets-in-place and the present value of cash flows from future growth opportunities. Under the assumption that a firm's share price correctly reflects these present values, *Q* captures the contribution to value of the firm's growth opportunities. When investors anticipate that managers can generate cash flow from growth they pay more for the firm than the residual value of its assets and the ratio exceeds one. For this reason, some have also used *Q* as a measure of a firm's growth opportunities (as for example Klein, 1998 or Scordis and Steinorth, 2012).

[3] For American International Group (AIG) data are included only after year 2012. This reflects the fact that AIG is essentially a different firm in terms of the risk challenges its board faces after its reorganization during the financial crisis of 2007-2012. At year end 2008 AIG's liabilities to its market value of equity stood at 188.9. The decision to include AIG data only from 2012 is also supported by the results of a *dffits* test of influential observations. All *dffits* scores in the remaining data are less than one.

The study uses *Q* as a measure of value and alternatively the insurer's market to book (*MB*) ratio. Q is calculated similarly to Hoyt and Liebenberg (2011). It is the sum of the market value of the firm's equity (Compustat/WRDS items CSHO × PRCC_C) plus the book value of its liabilities (LT), divided by the firm's book value of assets (Compustat/WRDS item CEQ) at the end of the year. The market to book ratio is Compustat/WRDS items (CSHO × PRCC_C) divided by item CEQ, at year's end. In the estimation of my models I use a logarithmic transformation of *Q* and MB to aid interpretation of the results from the dummy variable *RC*.

Q and *MB* are market-based measure of an insurer's value. In this study, the alleged benefits from the use of a risk committee are strategic rather than tactical. Thus, the study investigates how shareholders perceive the use of a risk committee which makes market-based measures of performance appropriate. Accounting-based measures of financial performance are not used on the strength of the argument advanced by Gentry and Shen (2010). Gentry and Shen (2010) examine the relation between market- and accounting-based measures of performance for the population of publicly-traded firms in the US over the years 1961 to 2008. Their results establish a *best practice:* Financial performance as captured by accounting profitability measures has little overlap to value as captured by market-based performance measures. Thus, Gentry and Shen (2010) argue that a study should use the performance measures that fully capture the conceptual relation under investigation. Since the focus of this study is the impact of a risk committee on an insurer's value rather than the impact of a risk committee on the risk of an insurer or on the quality of its disclosures or on the pathways by which a risk committee may act on the firm, Q is the appropriate measure the use.

The focus is on value for two reasons: One, it is exceedingly difficult to measure those other quantities with what data are publicly available. Two, the stated goal of boards is to deliver value to shareholders and thus the reason a risk committee should exist is to ultimately deliver such value. There are also concrete difficulties associated with measuring the impact of a risk committee on dimensions other than value as the examples below illustrate:

Despite a large literature that seeks to measure an insurer's risk Cheng and Weiss (2012) conclude that it is inherently difficult to accurately proxy an insurer's risk with accounting-based variables. This is why insurers and regulators are increasingly relying on simulation modeling to judge risk. However, without access to an insurer's private data to establish trends, the investigation of Alm (2015) suggests that (at least for property-liability insurers) it is not possible to simulate insurer risk in a meaningful way.

There are attempts to investigate the pathways by which a risk committee exerts influence in a firm. Laux (2010) develops a conceptual model to argue that when a firm's board is facing increased liability risk the board strengthens its oversight. Thus, a board-level risk committee may mitigate a board's liability risk, which then reduces the cost of litigation and insurance coverage which in turn increases value. But, without direct and open access to boards one can only infer (with an unknown degree of accuracy) these pathways. Ittner and Keusch (2016, p.1) who examine such pathways do so "using novel, proprietary data on corporate risk oversight and risk management processes".

The literature on price synchronicity could be used to construct a test of the impact of a board-risk committee on the flow of information to the market. However, in light of Akhigbe et al. (2009) who suggest that disclosure-related benefits associated with stronger governance may have dissipated since the passage of the SOX Act, such a test should include years before and after SOX. But, the use of a board-level risk committee by insurers is a recent development. Also, there is considerable debate in the literature (see for example Piotroski and Roulston, 2004; Chan and Hameed, 2006; Ferreira and Laux, 2007) whether the established measure for price synchronicity captures a more informative stock price or a richer information environment.

Risk Committee Variable

The study represents the use of a risk committee (*RC*) with a dummy variable. The dummy variable *RC* takes the value of one if a board uses a risk committee in a particular year and zero otherwise. There are no instances in the data where a board, once it begins using a risk committee, discontinues its use at a later time.

Table 1 reports the insurers in the data that use a risk committee, how many years the committee has been in use and whether a risk committee is standing alone or is joint with another committee. When a risk committee is joint it is usually with the finance/investment committee. The membership of the risk committee overlaps other board-level committees. A risk committee is mostly comprised of independent directors. Table 1 also reports on the composition of the risk committee.

For each of the insurers in the data the study identifies whether their boards use a risk committee from the contents of Form DEFA14 they file with the SEC. All the insurers in the data report a risk governance structure. Some, however, provide extensive detail, while others provide only a general summary. For example, Validus (VR) provides a rich description of the role of its risk committee within its ERM framework (2016 Form 10K p. 6-11). Travelers (TRV) simply states that “Board oversight of ERM is provided by the Risk Committee of the board of directors, which reviews the strategies, processes and controls pertaining to the Company's insurance operations and oversees the implementation, execution and performance of the Company's ERM program” (2014 Form 10K, p.36). The insurers that do not use a risk committee oversee risk as an item on the board’s agenda. Eighteen of the insurers in the data use a board-level risk committee.

Control Variables

The value of a firm reflects its current and future profitability which in turn is influenced by the firm’s leverage and liquidity. This is why seminal studies that measure a firm’s market-based value, all control for the firm’s profitability, leverage growth and liquidity (for example Allayannis and Weston, 2001; Jin and Jorion, 2006; Hoyt and Liebenberg, 2011). They also control for the firm’s asset size under the assumption that size confers strategic scale and scope advantages other than what are reflected in a firm’s current profitability.

Following Allayannis and Weston (2001), Jin and Jorion (2006) and Hoyt and Liebenberg (2011) the study calculates the control variables below.

Profitability: Insurers that report a higher accounting profitability are more likely to have higher value than insurers that report a lower profitability. Profitability is the accounting ratio return on assets (ROA) and the accounting return on equity (ROE). Net income is Compustat/WRDS item NI. It is divided by the book value of assets and the book value of equity (Compustat/WRDS items AT and CEQ, respectively) at year-end.

Leverage: The effect of leverage on value is ambiguous. There are competing views of how firms decide their degree of leverage and subsequently how leverage impacts value. In the signaling view, leverage ameliorates the consequences of information asymmetry and it thus has a positive impact on value. In the agency cost view, leverage creates tradeoffs. It positively impacts value as it mitigates potential costs from managerial discretion but it negatively impacts value as it sets the economic interests of shareholders against those of the debtholders. In the tax view of leverage, whether leverage impacts value positively or negatively depends on its tax benefits. Leverage is the ratio of year-end liabilities to the market value of equity (*LMVE*) as well as the ratio of liabilities to assets (*LA*). The use of total liabilities is consistent with Staking and Babbel (1995) who view the sale of policies as analogous to issuing privately placed bonds with stochastic payoffs. Since an insurer's total liabilities represent both outstanding debt and a best estimate of future liabilities to policyholders, the use of liabilities combines in the numerator of the leverage ratio the insurer's financial leverage and insurance leverage (as Cummins and Lamm-Tennant (1994) argue). The use of the market value of equity and book value of assets are traditional quantities used in the calculation of leverage as Frank and Goyal's (2009) survey suggests. The book value of liabilities, market value of equity and book value of assets are Compustat/WRDS items LT, (CSHO × PRCC_C) and AT, respectively.

Growth: In the case of an insurer, the amount of capital it holds in excess of its liabilities (its book value of equity) limits its ability to underwrite new polices. In fact, it is not uncommon for insurers to express their long-term goal in Form 10K in terms of growing their book value of equity. There is an expectation that increased growth has a positive relation to value. *Growth* is the percentage increase in book value from year-end to year-end (Compustat/WRDS items $CEQ_t - CEQt_{-1}$ divided by Compustat/WRDS item CEQ_{t-1}).

Table 1
Use of board-level risk committee (RC) and its characteristics as of year 2016.

As of year, 2016

Ticker	Years *RC* is in use	Size of *RC*	Members of *RC* on other committees	Non-independent directors on *RC*
ACGL	[J]1	5	4	2
AEL	[S]1	3	1	1
AGII	[S]3	5	5	0
AHL	[S]14	5	5	0
AIG	[J]6	5	5	0
ALL	[J]4	5	5	0
AXS	[S]7	5	5	1
CB	[J]5	5	5	0
EIG	[S]1	4	4	2
GBLI	[J]7	3	3	1
HIG	[J]7	4	5	0
MET	[J]11	5	5	0
PRU	[S]2	5	5	0
STFC	[S]3	3	3	0
TRV	[S]13	5	5	1
UFCS	[S]7	5	5	0
VR	[S]7	4	5	1
XL	[J]6	5	5	0

J Risk committee is joint with another board-level committee.
S Stand-alone risk committee.

Note: TPRE, a firm excluded from the data, is the only excluded insurer that uses a board-level risk committee. It is a stand alone committee in use for 4 years. It has 3 members, all independent directors and also members of other committees.

Liquidity: An insurer that faces capital constraints may forgo profitable opportunities (projects with positive net present value). Alternatively, because the firm is constrained it may select only the most profitable opportunities. Thus, liquidity can impact value positively or negatively. Liquidity is the ratio of cash and short term investments (Compustat/WRDS item CHE) divided by the book value of assets (Compustat/WRDS item AT) at year-end.

Size: Empirical evidence on the effect of firm size on value is ambiguous. For example Allayannis and Weston (2001) find a negative relation between size and Q, Jin and Jorion (2006) find a positive relation while Hoyt and Liebenberg (2011) find no relation between size and Tobin's Q. *Size* is the logarithm of the book value of assets (Compustat/WRDS item AT) at year-end.

There are also numerous other control variables that can be motivated by the literature. Such control variables, however, are not consistently significant across studies (for example Table 7, Model 1 in Jin and Jorion, 2006 or Table 5 Equation 1 in Hoyt and Liebenberg, 2011). Perhaps the significance of ad hoc control variables on market-based measures of value such as *Q* and *MB* varies across studies because they may be mediated by profitability, leverage, growth and liquidity.

Hoyt and Liebenberg (2011) use the percentage ownership by an insurer's directors and officers as an additional control variable. They explain that as managerial ownership increases, the interests of managers and stockholders get better aligned and as a result firm value increases since agency costs stemming from information asymmetry decrease. on the value of the firm. Another example is Adams, Almeida and Ferreira (2005) who argue for the CEO's stock ownership percentage relative to the percentage ownership of the board as another control variable. However, such ownership percentages, for a given insurer, do not significantly change from year to year. This lack of variation over time makes the use of such control variables problematic within the context of the study's panel data. The study does use however, regression estimators that mitigate the impact from possible omitted variables.

Table 2 defines the variables in the study and shows descriptive statistics for the panel. Table 2a shows the means of the variables for the observations with a board-level risk committee (*RC*=1) and without (*RC*=0) and reports on the statistical difference between the observed means in these two groups. The p-values shown in Table 2a indicate the probability of obtaining a difference between the two means if the null hypothesis of no difference is true. Table 3 shows the coefficients of correlation among each pair of variables for the panel.

Models

The insurers in the data represent boards that content with very similar risk challenges. The use of highly similar data is a common technique to control unobserved heterogeneity as for example Miller and Yang (2015) explain.

Furthermore, there is no prior expectation that simultaneity in the relation between the use of risk committee and value is present. If boards choose to use a risk committee to achieve a particular level of firm value then the reverse will also be true—the use of a risk committee should be driven by firm value. If this is the case, however, there should be instances of both risk committee formation and risk committee dissolution. There are no instances in the data of a risk committee disbanding. In fact, a Hauseman test for endogeneity suggests that variable *RC* does not suffer from endogeneity (the p-value of the estimated coefficient of the residuals from the first-stage of the test is 0.926). Thus, assuming that the correct conclusion is the absence of endogeneity, the study proceeds to estimate a difference-in-differences (DiD) regression. Also, the study uses a fixed effects (FE) regression where the fixed effects are both the individual groups of insurers in the data and each of the years in the data. Further, the study uses an instrument variable (IV) regression where an indicator variable for year is the exogenous instrumental variable. The FE and IV regression mitigate the impact of omitted variables and they remain consistent estimators under the assumption that endogeneity is in fact present. The most confident results are those from the FE model of Relation (2).

The differences-in-differences (DiD) model is:

$$\mathrm{Ln}(Q)_{it} = \beta 0 + \beta 1\ (RC)_{it} + \beta 2\ (RCA)_{it} + \beta 3\ (RC \times RCA)_{it} + \boldsymbol{\beta}\ (\boldsymbol{Controls})_{it} + \varepsilon_i \qquad (1)$$

Variable *RCA* takes the value of one (and zero otherwise) for an individual insurer across all years of the data if the insurer uses a risk committee. Variable *RC* take the value of one (and zero otherwise) only for the years the individual insurer uses a risk committee. Thus, the estimated coefficient of the interaction variable *RC*×*RCA* is the difference-in-difference estimator. Its sign is the effect of the use of a risk committee on value. Since *RCA* equals one when *RC* also equals one, the size of the relation between the use of a risk committee and value (δLogQ/δRC) is the sum of the estimated coefficients of *RC* and RC×*RCA*.

The fixed effects (FE) and the instrumental variable (IV) models are:

$$Ln(Q)_{it} = \beta 0 + \beta 1\ (RC)_{it} + \boldsymbol{\beta}\ (\textbf{\textit{Controls}})_{it} + (Firm)_{i} + (Year)_{t} + \varepsilon_{it} \qquad (2)$$

$$Ln(Q)_{it} = \beta 0 + \beta 1\ (\breve{RC})_{it} + \boldsymbol{\beta}\ (\textbf{\textit{Controls}})_{it} + \varepsilon_{i} \qquad (3)$$

In Relation (3), variable $\breve{RC}$ is the fitted values of the first-stage

$$(RC)_{it} = \beta 0 + \beta 1\ (Time)_{t} + \boldsymbol{\beta}\ (\textbf{\textit{Controls}})_{it} + \varepsilon_{i} \qquad (4)$$

The FE model in addition to its overall constant term (β0), has a group effect (Firm) for each firm and a time effect (Time) for each year. The model's time effect reflects arguments such as those in Wen and Born (2005) that the performance of an insurer is sensitive to systematic and catastrophic events during the year of analysis. The model's group effect reflects the impact of firm-specific ad hoc controls that the model does not explicitly account for. In the models, ε is the general error term. The (IV) model is exactly identified. Its first-stage has an F-test of 30.3. Based on the work of Staiger and Stock (1997) the prevailing view is that a first stage F-test of less than 10 is an indication of a weak instrument.

Multicollinearity does not appear to be an issue in the data. The largest variance inflation factor in the control variables is 1.5. Also, the *dffits* diagnostic does not reveal influential observations. The largest *dffits* value is 0.588 (FNHC for year 2004) and the second largest is 0.476 (KINS for year 2004.

Table 2
Variable definitions and descriptive statistics for the panel.
Variable *RC* takes the value of one if a board uses a risk committee in a particular year and zero otherwise. There are 109 observations where *RC* equals one out of a total of 849 observations.

		Minimum	Median	Maximum	Mean	Standard deviation
Tobin's Q	$\frac{\text{MV of equity} + \text{BV of Liabilities}}{\text{BV of Assets}}$	0.593	1.010	1.896	1.042	0.139
MB	$\frac{\text{MV of equity}}{\text{BV of equity}}$	0.185	1.055	4.712	1.176	0.573
ROA	$\frac{\text{Net income}}{\text{BV of Assets}}$	-0.192	0.020	0.143	0.022	0.028
ROE	$\frac{\text{Net income}}{\text{BV of Equity}}$	-0.696	0.019	0.779	0.087	0.111
LMVE	$\frac{\text{BV of Liabilities}}{\text{MV of equity}}$	0.210	2.838	78.574	5.434	7.303
LA	$\frac{\text{BV of Liabilities}}{\text{BV of Assets}}$	0.300	0.765	0.982	0.754	0.122
Liquidity	$\frac{\text{Cash} + \text{ST investments}}{\text{BV of Assets}}$	0.001	0.068	0.839	0.114	0.273
Growth	Percentage change in book value of equity	-0.972	0.062	2.372	0.099	0.273
Size	Log(Assets)	0.974	3.839	5.955	3.811	0.945

Table 2a
Difference in means.

	RC=1 (n=109)		RC=0 (n=740)		
	Mean	Standard deviation	Mean	Standard deviation	Difference in means (p-value)
Tobin's Q	0.981	0.065	1.052	0.145	-0.070*** (0.000)
MB	0.931	0.242	1.212	0.598	-0.281*** (0.000)
ROA	0.021	0.019	0.021	0.030	0.000 (1.000)
ROE	0.083	0.059	0.087	0.111	-0.004 (0.713)
LMVE	5.806	6.883	5.379	7.365	0.427 (0.569)
LA	0.742	0.128	0.756	0.121	-0.014 (0.263)
Liquidity	0.132	1.138	0.111	0.105	0.021* (0.063)
Growth	0.046	0.175	0.107	0.284	-0.061* (0.029)
Size	4.558	0.844	3.701	0.909	-0.061*** (0.000)

The asterisks indicate significance at the traditional levels of one (***), five (**) and ten (*) percent.

Table 3
Correlation values.

	Q	*MB*	*ROA*	*ROE*	*LMVE*	*LA*	*Liq.*	*Grow*	*Size*
Tobin's Q	1.000								
MB	0.885	1.000							
ROA	0.322	0.341	1.000						
ROE	0.099	0.112	0.804	1.000					
LMVE	-0.229	-0.329	-0.310	-0.183	1.000				
LA	-0.077	0.016	-0.326	-0.023	0.614	1.000			
Liquidity	-0.049	-0.033	0.085	-0.034	-0.240	-0.471	1.000		
Growth	0.040	0.173	0.352	0.313	-0.055	0.065	0.024	1.000	
Size	-0.009	-0.014	-0.058	0.052	0.384	0.451	-0.329	-0.071	1.000

RESULTS

The signs of all estimated coefficients are consistent across all models. Estimated effect $\partial \text{Ln}Q/\partial RC$ or $\partial \text{Ln}MB/\partial \text{R}C$ is always negative and significant. The estimated coefficients of *ROA* or *ROE* are always positive. The estimated coefficients of *LMVE* or *LA*, when significant, are always negative. The estimated coefficients of variable *Size*, when significant, are mostly positive. Control variables *Liquidity* and *Growth* are not generally significant. These estimated coefficients are as expected. The amount of control variables that is significant is consistent with results from the literature. For example, Hoyt and Liebenberg (2011, Table 5, Equation 1) and Jin and Jorion (2006, Table 7, Model 1).

Table 4 reports the results from the DiD, FE and IV models estimated over all data. Profitability (*ROA*) has a positive impact on value and leverage (*LMKV*) has a negative impact on value. At the mean of the data, a 1 percent increase in *ROA* increases Ln*Q* by 1.05, 0.74 and 1.06 percent according to models DiD, FE and IV, respectively. At the mean of the data, a 1 percent increase in *LMKV* decreases Ln*Q* by 0.49, 0.33 and 0.49 percent according to models DiD, FE and IV, respectively. To convert the estimated coefficients to a percentage multiply the estimated coefficient by the mean value of their respective variable divided by the mean value of ln*Q* (which for the panel is 0.033).

Table 4 shows that the relation between the use of a board-level risk committee and value is negative. According to the results of the DiD model, an insurer that uses a board level risk committee have a reduction in value (*Q*) of 3.9 percent as compared to insurers that do not use a board-level risk committee. This reduction in value is 2.8 percent and 12.9 percent, respectively, for the results of the FE and IV models. This negative relation between the use of a risk committee and value is also consistent with the differences in means reported in Table 2a. In that table, the mean value of observations where a risk committee (*RC*=1) is in use is significantly smaller than the mean value of observations without (*RC*=0). In Table 2a the mean *Q* for insurers with a risk committee is 6.65 percent smaller than the mean *Q* for insurers without a risk committee.

The data spans three sub-periods: After the great recession (years 2016 to 2013), during the great recession (years 2012 to 2007) and before the great recessions (years 2007 to 2003). It is not possible to re-estimate the models from Table 4 for these sub-periods because of issues of miss-specification arise. For example, for the DiD model there are instances where *RC* and *RCA* are both equal to one for an entire sub-period. The F-test in the FE model for the sub-period before the great recession is not significant. The first-stage F-test in the IV model for the sub-period after the great recession is less than 10. It is possible, however, to estimate a traditional pooled OLS model across each of the sub-periods (and across all data as a way of comparison with the results in Table 4). Table 5 shows the results from estimating such a pooled OLS model.

The signs of the estimated coefficients across the sub-periods in Table 5 are identical across each sub-period as well for estimating the OLS model across all data. These signs are also identical to those reported in Table 4. Variable *ROA* has a positive impact on value and *LMKV* has a negative impact on value. Variables *Liquidity* and *Size*, when significant have a negative and positive impact on value, respectively. The relation between the use of a board-level risk committee and value is negative except for the sub-period before the great recession where the estimated coefficient of *RC* is not statistically significant.

Table 4
Estimated coefficients for the DiD, FE and IV models.

	Dependent variable: Ln(*Q*)			
Independ variables	DiD Model		FE Model	IV model
	Estimates	$\frac{\delta LogQ}{\delta RC}$		
Constant	-0.029		-0.226***	-0.042
	(0.232)		(0.005)	(0.179)
RC	0.029*	-0.039	-0.028**	-0.129**
	(0.083)		(0.024)	(0.019)
RCA	-0.032***			
	(0.000)			
RC × *RCA*	-0.068***			
	(0.000)			
ROA	1.581***		1.109***	1.591***
	(0.000)		(0.000)	(0.000)
LMVE	-0.003***		-0.002***	-0.003**
	(0.000)		(0.006)	(0.000)
Liquidity	-0.081**		-0.027	-0.057
	(0.028)		(0.581)	(0.226)
Growth	0.012		0.013	0.006
	(0.436)		(0.237)	(0.709)
Size	0.018***		0.066***	0.022**
	(0.001)		(0.002)	(0.012)
F-test	35.6		21.1	30.3#
	(0.000)		(0.000)	(0.000)
Adjusted R^2 (%)	24.6		67.3	14.7#

First stage F-test and R^2.

The asterisks indicate significance at the traditional levels of one (***), five (**) and ten (*) percent.

Table 5
Estimated coefficients for the traditional OLS model.

	Dependent variable: Ln(*Q*)			
Independ variables	A All years 2016 to 2003	B After recession 2016 to 2013	C During recession 2012 to 2007	D Before recession 2006 to 2003
Constant	-0.017	0.007	-0.135***	0.104*
	(0.481)	(0.853)	(0.000)	(0.063)
RC	-0.069***	-0.076***	-0.081***	-0.030
	(0.000)	(0.000)	(0.000)	(0.293)
ROA	1.587***	1.837***	0.955***	2.291***
	(0.000)	(0.000)	(0.000)	(0.000)
LMVE	-0.003***	-0.005***	-0.002***	-0.004*
	(0.000)	(0.000)	(0.000)	(0.099)
Liquidity	-0.089**	-0.039	-0.030	-0.213**
	(0.015)	(0.452)	(0.562)	(0.048)
Growth	0.010	0.038	-0.014	0.004
	(0.512)	(0.214)	(0.551)	(0.918)
Size	0.014***	0.012	0.035***	-0.009
	(0.010)	(0.130)	(0.000)	(0.393)
Observations	842	267	374	208
F-test	45.5	16.8	18.9	17.1
	(0.000)	(0.000)	(0.000)	(0.000)
Adjusted R^2 (%)	24.0	26.3	22.4	31.9

The asterisks indicate significance at the traditional levels of one (***), five (**) and ten (*) percent.

The estimated coefficients of RC in column A, B and C are not statistically different from each other. The p-value that there is a difference between coefficients *RC* in columns A and B is 0.487. The p-value that there is a difference between coefficients *RC* in columns A and C is 0.271. The p-value that there is a difference between coefficients *RC* in columns B and C is 0.384.

Table 6a
Re-estimated coefficients for the DiD model under alternative variables.

	Ln(*Q*)		Ln(*MB*)			
Constant	0.055 (0.217)	-0.078 ** (0.097)	-0.290*** (0.000)	-0.042 (0.000)	-0.306*** (0.000)	-0.425*** (0.004)
RC	-0.024*** (0.005)	-0.041*** (0.000)	0.276*** (0.000)	-0.128*** (0.000)	0.266*** (0.000)	-0.222*** (0.000)
RCA	-0.033*** (0.000)	-0.035*** (0.000)	-0.066** (0.044)	-0.079** (0.024)	-0.070** (0.047)	-0.091** (0.019)
RC × *RCA*	-0.018 (0.204)	0.003 (0.823)	-0.487*** (0.000)	-0.051 (0.371)	-0.491*** (0.000)	0.054 (0.374)
ROA		1.958*** (0.000)			3.866*** (0.000)	6.394*** (0.000)
ROE	0.472*** (0.000)		1.635*** (0.000)	2.149*** (0.000)		
LMVE			-0.025*** (0.279)		-0.027*** (0.000)	
LA	-0.107** (0.043)	0.076 (0.194)		-0.372** (0.016)		1.182 (0.780)
Liquidity	-0.075* (0.091)	-0.036 (0.401)	-0.124 (0.000)	-0.079 (0.531)	-0.183 (0.142)	0.041 (0.780)
Growth	-0.016 (0.336)	-0.004 (0.769)	-0.068 (0.268)	-0.148** (0.022)	0.094 (0.197)	-0.001 (0.990)
Size	-0.011* (0.060)	0.008 (0.158)	-0.109*** (0.000)	0.069*** (0.003)	0.129*** (0.000)	0.067*** (0.006)
F-test	27.1	31.0	69.9	38.8	54.1	24.2
Adj. R^2 (%)	19.8	22.1	39.4	26.0	33.4	17.9

The asterisks indicate significance at the traditional levels of one (***), five (**) and ten (*) percent.

Table 6b
Re-estimated coefficients for the FE model under alternative variables.

	Ln(Q)		Ln(MB)			
Constant	0.164*	-0.210**	-0.462*	-0.746***	-0.450*	-0.828***
	(0.055)	(0.011)	(0.066)	(0.010)	(0.072)	(0.005)
RC	-0.031**	-0.029**	-0.124***	-0.128***	-0.121***	-0.119***
	(0.014)	(0.019)	(0.001)	(0.003)	(0.002)	(0.008)
ROA		1.070***			2.153***	2.767***
		(0.000)			(0.000)	(0.000)
ROE	0.475***		0.572***	0.995***		
	(0.000)		(0.000)	(0.000)		
LMVE			-0.028***		-0.030***	
			(0.000)		(0.000)	
LA	-0.226***	-0.106*		-0.164		0.033
	(0.000)	(0.052)		(0.370)		(0.865)
Liquidity	-0.043	-0.027	-0.087	-0.037	-0.071	-0.020
	(0.399)	(0.581)	(0.569)	(0.831)	(0.643)	(0.912)
Growth	0.021*	0.016	-0.001	-0.035	0.023	0.036
	(0.086)	(0.159)	(0.983)	(0.393)	(0.512)	(0.368)
Size	0.095***	0.080***	0.171***	0.228***	0.171***	0.215***
	(0.000)	(0.000)	(0.009)	(0.003)	(0.009)	(0.006)
F-test	18.8	20.9	32.7	23.7	33.1	22.3
Adj. R^2 (%)	64.6	67.1	76.5	69.9	76.7	68.6

The asterisks indicate significance at the traditional levels of one (***), five (**) and ten (*) percent.

Table 6c
Re-estimated coefficients for the IV model under alternative variables.

	Ln(*Q*)		Ln(*MB*)			
Constant	0.062	-0.066	-0.433***	-0.052	-0.471***	-0.463***
	(0.149)	(0.148)	(0.000)	(0.655)	(0.000)	(0.001)
RC	-0.121*	-0.105*	-0.663***	-0.608***	-0.731***	-0.513**
	(0.057)	(0.089)	(0.000)	(0.004)	(0.000)	(0.035)
ROA		1.941***			3.909***	11.066***
		(0.000)			(0.000)	(0.000)
ROE	0.469***		1.591***	2.122***		
	(0.000)		(0.000)	(0.000)		
LMVE			-0.027***		-0.028***	0.014
			(0.000)		(0.000)	(0.211)
LA	-0.136**	0.050		-0.552***		
	(0.033)	(0.526)		(0.002)		
Liquidity	-0.063	-0.029	0.076	0.038	0.043	0.132
	(0.191)	(0.526)	(0.631)	(0.810)	(0.804)	(0.539)
Growth	-0.019	-0.007	-0.089	-0.164**	0.060	-0.176*
	(0.242)	(0.626)	(0.162)	(0.014)	(0.428)	(0.056)
Size	0.015	0.009	0.154***	0.114***	0.180***	0.073
	(0.163)	(0.359)	(0.000)	(0.002)	(0.000)	(0.146)
F-test#	37.8	37.9	30.4	37.8	30.3	30.3
Adj. R^2 (%)#	17.8	17.9	14.8	17.8	14.7	14.7

First stage F-test and R^2.

The asterisks indicate significance at the traditional levels of one (***), five (**) and ten (*) percent.

The estimated coefficients for variable *RC*, however, are not statistically different from period to period: The p-value that there is a difference between coefficients *RC* in columns A and B is 0.487. The p-value that there is a difference between coefficients *RC* in columns A and C is 0.271. The p-value that there is a difference between coefficients *RC* in columns B and C is 0.384.

Furthermore, the study re-estimates the DiD, FE and IV models using the alternative market to book (*MB*) variable for value, variable *ROE* for profitability and variable *LA* for leverage. These results are reported in Tables 6a, 6b and 6c. In all of these tables, the estimated coefficient of *RC* is negative.

CONCLUSION

Hines and Peters (2015) examine how the use of a risk committee impacts a US bank's return on assets, the amount of its non-performing assets and asset write-offs and the nominal amount of hedging instruments the bank uses. They also measure the use of a risk committee with a dummy variable. They only find a positive relation between the use of a risk committee and non-performing assets (their table 9). Akbar et al. (2017), for publicly traded financial firms in the UK find that the use of a risk committee (which they also measure as a dummy variables) increases both insolvency risk and overall risk (their table 7). To the extent that increases in non-performing assets and increases in risk can be associated with lower firm value, then this study's finding is consistent with Hines and Peters (2015) as well as with Akbar et al. (2017).

This study's finding is also consistent with arguments in a working paper by Ittmer and Keusch (2016). Their proprietary data allows them to conclude that a firm achieves more tangible risk management outcomes when the entire board retains a firm's risk oversight while maintaining on-going communication with the firm's senior risk experts. This conclusion by Ittmer and Keusch (2016) is identical to the position of Brown, Steen and Foreman (2009). They posit that a firm facing a high/complex risk environment (a description that fits well an insurance firm) is best served by establishing a risk committee of specialists (rather than a board-level committee) that is in regular and open communication with the firm's board. This idea, that to effectively oversee a firm's risk one requires deep expertise in how a firm engages with that risk, is reminiscing of Adams et al. (2010). They argue that as board diversity and independence increases the board's firm-specific expertise decreases, and thus its effectiveness decreases. Such argument is indeed empirically supported in Wintoki et al. (2012). Thus, the study's conclusion that the use of a board-level risk committee (which contains no or few insiders) reduces firm value is also consistent with conceptual arguments on the tightly-coupled relation that seems to exist between a firm, its risks and its value.

Furthermore, the argument originating with Schrand and Unal (1998) that risk managers create value by allocating optimally the firm's risk instead of reducing overall risk, is also consistent with this study's finding. Schrand and Unal (1998, p.980) explain that "firms earn rents or economic profits for bearing risk related to activities in which the firm has a comparative informational advantage." Schrand and Unal (1998) provide evidence that the risks taken by financial cooperatives after their conversation to stock ownership change. These newly converted firms increase the risk they take. The increase in risk comes from taking on informationally advantageous risk. Kleffner and Doherty (1996) offer a similar justification to explain why among competing insurers, some underwrite earthquake risks while others do not. Studies by Dolde and Knopf (2010) for real estate investment trusts, Erhemjamts and Phillips (2012) for life insurers and McShane, Zhang and Cox (2012) for all insurers confirm that firms use their risk management tools to trade overall risk for core risk. Thus, if a board-level risk committee—since it contains no or few insiders and thus lacks deep firm-specific expertise—is less able to correctly allocate risk as compared to its alternatives, then its use reduces value even if it effectively oversees the insurer's overall risk management process.

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