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Evidence of the Value of Enterprise Risk Management

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Interest in enterprise risk management (ERM) has continued to grow in recent years.[1] Increasing numbers of organizations have either implemented or are considering the adoption of ERM programs. At the same time, consulting firms have established specialized ERM units, rating agencies have begun to consider ERM in the ratings process,[2] and universities have developed ERM-related courses and research centers.

Unlike traditional risk management, in which individual risk categories are managed separately in risk "silos," ERM enables companies to manage a wide array of risks in an integrated, enterprise-wide fashion. Academics and industry practitioners and observers have argued that ERM helps increase the value of companies by reducing the volatility of their earnings and stock prices, reducing their costs of external capital, increasing their capital efficiency, and creating synergies among their different risk management activities.[3] More broadly, ERM is said to promote increased risk awareness within the entire organization, which is said to facilitate better operational and strategic decision-making.

Nevertheless—and despite the substantial interest in ERM by academics and practitioners and the abundance of survey evidence on the prevalence and characteristics of ERM programs[4]—there is not much empirical evidence on whether and how such programs affect corporate values.[5] To begin making that case, we began gathering data five years ago. We conducted a study of the extent to which specific companies have implemented ERM programs, and then attempted to assess any effects on value associated with those decisions to adopt ERM. We focused our attention specifically on publicly traded U.S. insurance companies in order to make use of their market-based measures of value and their greater public disclosures of ERM activity, as well as to control for differences that might otherwise arise from regulatory and market differences among industries.

The main finding of our study, which was published in the *Journal of Risk and Insurance* in 2011, was a strong positive correlation between corporate adoptions of ERM and measures of value and effective management, notably Tobin's Q, after controlling for variables known to be associated with both higher values and decisions to adopt ERM. After discussing this association and its implications and most likely causes, we go on to review the more recent success of ERM at a number of insurance companies and the widespread adoption of ORSA standards by insurance regulators in 2015.

Determinants of Traditional Risk Management Activities

While there is little academic literature on why companies adopt ERM, the corporate motives and methods for traditional risk management activities such as hedging and corporate insurance purchases have been well documented. As applied to corporate risk management, finance theory begins with the proposition that corporations should not hedge with derivatives or buy insurance with the aim of minimizing or eliminating all sources of volatility; most such risks are effectively managed, and at much lower cost, by large shareholders who diversify their portfolios while investing in highly liquid equity markets. In this sense, the form of the public corporation is itself a very effective risk management device; it works to limit companies' cost of equity capital in such a way that it reflects mainly just "systematic" or "market" risks.

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* This article draws on and summarizes the findings of our previously published paper, "The Value of Enterprise Risk Management," Journal of Risk and Insurance, 78(4): 795-822, 2011.

1. ERM is synonymous with integrated risk management, holistic risk management, enterprise-wide risk management, and strategic risk management. For consistency, we use the acronym ERM throughout.

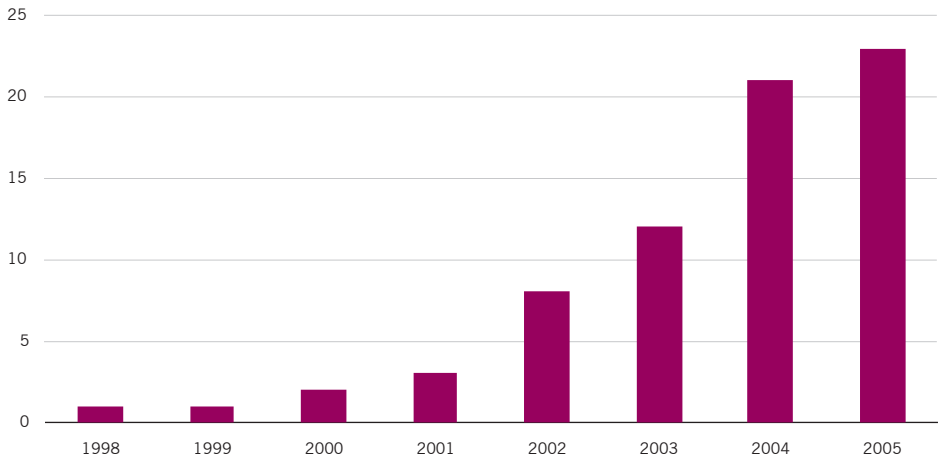
2. In December 2006, S&P upgraded its rating of Munich Reinsurance from A- to AA- while reporting that, in part, the upgrade "reflected a robust enterprise risk management framework."

3. See J. Miccolis, and S. Shah, "Enterprise Risk Management: An Analytic Approach," *Tillinghast – Towers Perrin Monograph*, 2000 (New York, NY); C.M. Cumming and B.J. Hirtle, "The Challenges of Risk Management in Diversified Financial Companies," *FRBNY Economic Policy Review*, 7:1-17, 2001; J. Lam, "The CRO is here to stay," *Risk Management*, 48: 16-20, 2001; Lisa K. Meulbroek, "Integrated Risk Management for the Firm: A Senior Manager's Guide," *Journal of Applied Corporate Finance*, 14: 56-70, 2002; M.S. Beasley, D. Pagach, and R. Warr, "The Information Conveyed in Hiring Announcements of Senior Executives Overseeing Enterprise-Wide Risk Management Processes," *Journal of Accounting, Auditing, and Finance*, 23: 311-332, 2008.

4. See for example Miccolis and Shah (2000); Robert E. Hoyt, B.M. Merkley, and K. Thiessen, "A Composite Sketch of a Chief Risk Officer," *The Conference Board of Canada*, (Toronto), September, 2001; CFO Research Services, "Strategic Risk Management: New Disciplines, New Opportunities," CFO Publishing Corp., New York, NY, 2002; Andre P. Liebenberg, and Robert E. Hoyt, 2003, "Determinants of Enterprise Risk Management: Evidence from the Appointment of Chief Risk Officers," *Risk Management and Insurance Review*, 6: 37-52, 2003; and M.S. Beasley, R. Clune, and D.R. Hermanson, "Enterprise risk management: An empirical analysis of factors associated with the extent of implementation," *Journal of Accounting and Public Policy*, 24: 521-31, 2005.

5. Two exceptions are the recent studies related to Chief Risk Officer appointments by Beasley, Pagach, and Warr (2008); and D. Pagach, and R. Warr, 2011, "The Characteristics of Firms That Hire Chief Risk Officers," *Journal of Risk and Insurance*, 78: 185-211, 2011.

Figure 1 **Cumulative number of sample insurers engaged in ERM by year**



Note: ERM classification is based on a search of SEC filings, annual reports, newswires, and other media.

Take corporate purchases of property and casualty insurance, for example. Such purchases, to the extent they are actuarially "unfair" and build in a premium loading for the insurer, should in theory reduce shareholder value—unless the purchases have other expected beneficial effects on corporate behavior and performance. For example, corporate insurance purchases are said to have the potential to increase value in three main ways: (1) by reducing the firm's tax liabilities (mainly by reducing the possibility of large, insurable losses that create tax-loss carry-forwards that can't be used right away); (2) by making use of insurance companies' comparative advantage in negotiating and processing claims; and (3) by reinforcing management's incentives to fund all positive-NPV projects—even in the face of large insurable losses, when corporate managers might otherwise be tempted to "cut corners."[6] A number of studies have found general support for these theoretical predictions.[7]

Like corporate purchases of insurance, corporate hedging is said to reduce expected financial distress costs by addressing the corporate "underinvestment problem" just described.[8] The hedging of financial price risks, when properly executed, can help ensure that the firm is able to carry out its business plan—and, if necessary, find funding for it—in the event that some price risks materialize. As an example, think about the effects of the recent drop in energy prices on the capital budgets of oil and gas exploration companies. Those companies that chose to hedge some portion of their oil price exposures—particularly those with significant leverage—are better positioned today to continue investing in new drilling that promises to provide adequate rates of return. The empirical evidence is also generally supportive of these theoretical predictions.[9]

How Can ERM Add Value?

While there are advantages to having specialized risk management activities and operations, there are also clear disadvantages to the traditional "silo" approach to corporate risk management. Managing each risk class in a separate silo creates inefficiencies that stem from the lack of coordination between the various risk management departments.

Proponents of ERM argue that by integrating decision making across all risk classes, companies are able to avoid considerable duplication of risk management expenditure by exploiting natural hedges. Companies that practice ERM are also more likely to reach a better understanding of the risks inherent in different business activities and so provide management with a more objective basis for capital allocation. And organizations with greater ability to select investments based on more accurate expectations about their risk-adjusted

6. See David Mayers and Clifford W. Smith, Jr., "On the Corporate Demand for Insurance," *Journal of Business*, 55: 190-205, 1982, which provides a model that describes the effect of corporate insurance on the underinvestment problem described by Stewart Myers in Stewart C. Myers, "The Determinants of Corporate Borrowing," *Journal of Financial Economics*, 4: 147-75, 1977. See also S.G. Ashby and S.R. Diacon, 1998, "The Corporate Demand for Insurance: A Strategic Perspective," *Geneva Papers on Risk and Insurance*, 23: 34-51, 1998; Robert E. Hoyt, and H. Khang, 2000, "On the Demand for Corporate Property Insurance," *Journal of Risk and Insurance*, 67: 91-107, 2000; C. R. Cole, and K.A. McCullough, 2006, "A Reexamination of the Corporate Demand for Reinsurance," *Journal of Risk and Insurance*, 73: 169-192, 2006.

7. See Smith and Stulz (1985); R. D. MacMinn, "Insurance and Corporate Risk Management," *Journal of Risk and Insurance*, 54: 658-77, 1987; T. S. Campbell, and W.A. Kracaw, "Corporate Risk Management and the Incentive Effects of Debt," *Journal of Finance*, 45: 1673-86, 1990; H. Bessembinder, "Forward Contracts and Firm Value: Investment Incentive and Contracting Effects," *Journal of Financial and Quantitative Analysis*, 26: 519:32, 1991; Kenneth A. Froot, David S. Scharfstein, and Jeremy Stein, "Risk management: Coordinating corporate investment and financing policies," *Journal of Finance*, 48: 1629-58, 1993; Deana R. Nance, Clifford W. Smith, Jr., and Charles W. Smithson, 1993, "On the Determinants of Corporate Hedging," *Journal of Finance*, 48: 267-284.

8. See Nance, Smith, and Smithson (1993); L.L. Colquitt, and R.E. Hoyt, 1997, "Determinants of Corporate Hedging Behavior: Evidence from the Life Insurance Industry," *Journal of Risk and Insurance*, 64: 649-671, 1997; and Charles W. Smithson and Betty J. Simkins, "Does Risk Management Add Value? A Survey of the Evidence," *Journal of Applied Corporate Finance*, 17: 8-17, 2005.

9. See Meulbroek (2002).

rates of return are likely to be more consistently successful in creating shareholder wealth.[10]

ERM combines all risk management activities into one integrated framework that allows decision-makers to see links among risks across divisions and activities that might go unnoticed in the traditional risk management model. And rather than just reducing earnings and cash flow volatility from particular sources (such as hazard risk and interest rate risk), an ERM strategy aims to reduce volatility at the level of the entire enterprise by managing the net effects of all the firm's major risks. ERM programs may also enable financially and operationally complex firms to provide better information about the company's financial strength and its various risks to outsiders. Through more and better disclosure, ERM can signal management's commitment to effective risk management and so reduce the potential costs of supervision by regulators as well as external capital markets.[11]

Consistent with these arguments, the major ratings agencies have for some time now been increasing their focus on risk management and ERM in their financial reviews of insurance companies. As far back as October 2005, Standard & Poor's announced that, with the emergence of ERM, risk management would become a separate major category of its analysis. And early in 2006, A.M. Best released a special report describing its increased focus on ERM in the rating process.[12] Both of these rating agencies have continued to expand their focus on risk management as part of the ratings process.

More recently, a number of financial and regulatory bodies have adopted requirements that have increased the attention paid to risk management. For example, the New York Stock Exchange now requires audit committees to discuss company policies with respect to financial risk assessment and risk management. Dodd-Frank has a statutory requirement for a risk committee. And the SEC requires that the proxy statements discuss company policies and practices as they relate to risk management and disclose the extent of the board's role in risk oversight.

And in a very recent development, U.S. insurance regulators have devised and mandated what are called "Own Risk and Solvency Assessment" (ORSA) requirements that are effective for statutory filings in 2015. These ORSA requirements provide additional motivation for corporate adoption of ERM programs. Insurers are expected to have a risk management framework if they have annual premium revenue of at least $500 million or if the consolidated premiums of the insurer's group are at least $1 billion. Inspired by Basel II and Solvency II in Europe, the primary goals of the ORSA reporting requirements are to foster an effective level of ERM and to provide a group-level perspective on risk and capital. More specifically, the ORSA summary reports are expected to provide the following: (1) a description of the insurer's "risk management framework"; (2) the insurer's assessment of its "risk exposure"; and (3) a group-wide assessment of "risk capital and prospective solvency."

Our 2011 Study

In conducting our study of insurance companies mentioned earlier, we wanted to see whether companies pursuing ERM programs enjoyed higher valuations than their competitors who did not. After searching for evidence of use of ERM programs among 117 publicly traded U.S. insurance companies, we identified 23 insurers that adopted such programs at some point between the years 1998 and 2005. While controlling for many factors, we regressed firm value against engagement in ERM. As a proxy for value, we chose Tobin's Q, a widely used ratio that compares the market value of a firm's assets to their replacement cost.[13] To deal with a possible "endogeneity" bias, we used a model that jointly estimates the decision to engage in ERM and the effect of that decision on Q in a two-equation system.[13]

In the first of the two equations, which attempts to link firm value to the use of ERM, we estimated the effect of ERM adoption on value while controlling for variables that included size, leverage, sales growth, profitability (ROA), diversification (either in terms of industry or internationally), dividends, insider stock ownership, whether a company was a life insurer or not, and firm risk (as measured by its beta). We expected larger and more diversified insurers to have lower values of Tobin's Q, on average.[14] However, we were unsure about to the direction of the expected effects of leverage, dividends, and insider ownership[15] on firm value.

In the second of the two equations, we explained the likelihood of companies' adopting ERM using measures of firm size, leverage, diversification (including diversification across lines of insurance business), opacity,[16] institutional ownership, use of reinsurance, financial slack, earnings and stock return volatility, whether the firm was a life insurer, and

10. See Meulbroek (2002).

12. A.M. Best, 2006, "A.M. Best Comments on Enterprise Risk Management and Capital Models," World Wide Web: *http://www.ambest.com/ratings/methodology/enterpriserisk.pdf*, *BestWeek*.

13. Because insurance companies mark most assets to market, their book values are much closer to replacement costs than would be the case for non-financial firms. Tobin's Q reflects future expectations of investors and is relatively free from managerial manipulation. We defined Tobin's Q as the market value of equity plus the book value of liabilities divided by the book value of assets. See J.D. Cummins, C. Lewis, and R. Wei, "The Market Impact of Operational Risk Events for U.S. Banks and Insurers," *Journal of Banking and Finance*, 30: 2605-2634, 2006.

14. This model is known as a maximum-likelihood treatment effects model.

15. See Larry Lang and Rene Stulz, "Tobin's q, diversification, and firm performance," *Journal of Political Economy*, 102: 1248-1280, 1994; G. Allayannis and J. Weston, "The Use of Foreign Currency Derivatives and Firm Market Value," *Review of Financial Studies*, 14: 243-276, 2001; J.D. Martin and A. Sayrak, "Corporate Diversification and Shareholder Value: A Survey of Recent Literature," *Journal of Corporate Finance*, 9: 37-57, 2003.

16. Evidence suggested to us that low levels of insider ownership are sufficient to align managerial and shareholder interests but that very high levels of ownership make managers excessively risk averse. Accordingly, we expected Tobin's Q to be positively related to the percentage of insider ownership but negatively related to the square of the percentage of insider ownership. See J. McConnell, and H. Servaes, "Additional evidence on equity ownership and corporate value," *Journal of Financial Economics,* 27: 595-612, 1990.

Table 1

Variable Name	Definition	Source
Q	(Market value of equity + Book value of liabilities)/Book value of assets	Compustat [(data24*data25+data6-data60)/data6]
ERM	=1 for firm-years >= year of first identifiable ERM activity, 0 otherwise	Lexis-Nexis, SEC filings, other media
Size	ln(Book value of assets)	Compustat [data6]
Leverage	Book value of liabilities/Market value of equity	Compustat [(data6-data60)/data24*data25]
ROA	Net Income/Book value of assets	Compustat [data18/data6]
Div_Int	=1 if positive sales outside of North America, 0 otherwise	Compustat Segment Database
Div_Ind	=1 if positive sales in non-insurance SIC codes (<6311, >6399), 0 otherwise	Compustat Segment Database
Dividends	=1 if firm paid dividends in that year, 0 otherwise	Compustat [data21>0]
Insiders	Percentage of outstanding shares owned by insiders	Compact Disclosure SEC
Insiders_Sq	=Insiders*Insiders	Compact Disclosure SEC
Institutions	Percentage of outstanding shares owned by institutions	Compact Disclosure SEC
Salesgrowth	$(Sales_t - Sales_{t-1})/Sales_{t-1}$	Compustat $[(data12_t - data12_{t-1}) / data12_{t-1}]$
Life	=1 if primary SIC code=6311, 0 otherwise	Compustat Segment Database
Reinsuse	Reinsurance ceded/(direct premiums written + reinsurance assumed)	NAIC Infopro L/H and P/C
Div_Ins	1 - Herfindahl index of premiums written across all lines of insurance	NAIC Infopro L/H and P/C
Slack	Cash and short-term investments/Book value of assets	Compustat [data1/data6]
Opacity	Intangible assets/Book value of assets	Compustat [data33/data6]
ValueChange	Firm value in year t - firm value in year t-1/firm value in year t-1	Compustat $[data24_t*data25_t - data24_{t-1}*data25_{t-1}]$
CV(EBIT)	Coefficient of variation of earnings before interest and taxes	Compustat data23
Beta	Covariance(firm excess returns, market returns)/Variance(market returns)	CRSP monthly stock files, Federal Reserve Board
lagInsdret	Lag(ln(Standard deviation of monthly returns))	CRSP monthly stock files

Table 2 **Summary statistics (N=687)**

	1st Quartile	Mean	Median	3rd Quartile
Q	0.974	1.089	1.036	1.144
ERM	0.000	0.087	0.000	0.000
Size	6.586	8.039	7.908	9.372
Leverage	1.622	6.270	2.983	6.735
ROA	0.005	0.015	0.017	0.034
Div_Int	0.000	0.058	0.000	0.000
Div_Ind	0.000	0.271	0.000	1.000
Dividends	0.000	0.722	1.000	1.000
Insiders	0.350	13.326	2.505	16.110
Institutions	11.755	42.010	40.635	68.645
Salesgrowth	0.601	13.791	8.743	20.406
Life	0.000	0.176	0.000	0.000
Reinsuse	0.050	0.171	0.117	0.227
Div_Ins	0.457	0.606	0.682	0.830
Slack	0.041	0.094	0.071	0.119
Opacity	0.000	0.021	0.005	0.025
ValueChange	-0.147	0.161	0.061	0.323
CV(EBIT)	0.119	0.203	0.326	0.837
Beta	0.256	0.502	0.453	0.673
lagInsdret	-4.010	-3.716	-3.746	-3.428

Note: Q is a proxy for firm value and calculated as [(Market value of equity + Book value of liabilities)/Book value of assets]. ERM is a dummy variable equal to 1 for firm-years greater than, or equal to, the first year of identifiable ERM activity, 0 otherwise. ERM classification is based on SEC filings, annual reports, newswires, and other media. Size is equal to the natural log of the book value of assets. Leverage is equal to the ratio of the book value of liabilities to the market value of equity. ROA is equal to net income divided by the book value of assets. Div_Int reflects international diversification and is a dummy variable equal to 1 for firm-years with sales outside of North America, 0 otherwise. Div_Ind reflects industrial diversification and is a dummy variable equal to 1 for firm-years with positive sales in non-insurance SIC codes (<6311, >6399), 0 otherwise. Dividends is a dummy variable equal to 1 for firm-years in which dividends are paid, 0 otherwise. Insiders is the % of outstanding shares owned by insiders. Institutions is the % of outstanding shares owned by institutions. Salesgrowth is equal to (Salest-Salest-1)/Salest-1. Life is an indicator variable equal to 1 for firms whose primary SIC code is 6311, 0 otherwise. Reinsuse is equal to [reinsurance ceded/(direct premiums written + reinsurance assumed). Div_Ins is equal to the complement of the Herfindahl index of premiums written across all lines of insurance. Slack is equal to cash and short term investments divided by the book value of assets. Opacity is equal to intangible assets divided by the book value of assets. ValueChange is equal to (firm valuet-firm valuet-1)/firm valuet-1. CV(EBIT) is equal to the coefficient of variation of earnings before interest and taxes. Beta reflects return volatility and is equal to the covariance between firm excess returns and market excess returns, divided by the variance of market returns. lagInsdret is equal to the prior year's natural log of the standard deviation of monthly stock returns. Accounting and market data are from the Compustat Industrial and Compustat Segments databases. Firm and market returns are taken from the CRSP monthly stock database. Ownership data are taken from Compact Disclosure SEC. Statutory insurance data are from the NAIC Infopro database.

Table 3 **Univariate differences across ERM status (1998-2005)**

	(1) ERM=1		(2) ERM=0		Difference (1)-(2)			
Variable	Mean	Median	Mean	Median	Mean		Median	
Q	1.128	1.078	1.085	1.028	0.043	*	0.051	***
Size	10.315	10.227	7.827	7.703	2.488	***	2.524	***
Leverage	4.485	2.760	6.436	3.002	-1.951	**	-0.242	
Opacity	0.014	0.008	0.021	0.004	-0.007	**	0.004	
Div_Int	0.083	0.000	0.056	0.000	0.027		0.000	
Div_Ind	0.333	0.000	0.266	0.000	0.068		0.000	
Div_Ins	0.621	0.755	0.604	0.675	0.016		0.080	
Institutions	55.097	73.590	40.790	39.199	14.307	***	34.391	***
Life	0.183	0.000	0.175	0.000	0.008		0.000	
Reinsuse	0.116	0.105	0.176	0.117	-0.060	***	-0.012	
Slack	0.071	0.069	0.096	0.071	-0.025	***	-0.003	
CV(EBIT)	0.321	0.308	0.192	0.326	0.129		-0.018	
lagInsdret	-3.997	-3.991	-3.690	-3.722	-0.307	***	-0.268	***
ValueChange	0.163	0.095	0.160	0.049	0.002		0.046	*
# firm-year obs.	60		627					

Note. Note: ERM is a dummy variable equal to 1 for firm-years greater than, or equal to, the first year of identifiable ERM activity, 0 otherwise. ERM classification is based on a search of SEC filings, annual reports, newswires, and other media. Q is used as a proxy for firm value and is calculated as [(Market value of equity + Book value of liabilities)/Book value of assets]. Size is equal to the natural log of the book value of assets. Leverage is equal to the ratio of the book value of liabilities to the market value of equity. Opacity is equal to intangible assets divided by the book value of assets. Div_Int reflects international diversification and is a dummy variable equal to 1 for firm-years with sales outside of North America, 0 otherwise. Div_Ind reflects industrial diversification and is a dummy variable equal to 1 for firm-years with positive sales in non-insurance SIC codes (<6311, >6399), 0 otherwise. Div_Ins is equal to the complement of the Herfindahl index of premiums written across all lines of insurance. Institutions is equal to the percentage of outstanding shares owned by institutions. Life is an indicator variable equal to 1 for firms whose primary SIC code is 6311, 0 otherwise. Reinsuse is equal to [reinsurance ceded/(direct premiums written + reinsurance assumed). Slack is equal to cash and short term investments divided by the book value of assets. CV(EBIT) is equal to the coefficient of variation of earnings before interest and taxes. lagInsdret is equal to the prior year's natural log of the standard deviation of monthly stock returns. ValueChange is equal to (firm valuet-firm valuet-1)/firm valuet-1. Accounting and market data are from the Compustat Industrial and Compustat Segments databases. Firm and market returns are taken from the CRSP monthly stock database. Ownership data are taken from Compact Disclosure SEC. Statutory insurance data are from the NAIC Infopro database. ***, **, and * denotes statistical significance at the 1, 5, and 10 percent levels respectively. Statistical significance of difference in means is based on a t-test. Statistical significance of difference in medians is based on a non-parametric Wilcoxon rank sum test.

whether its stock had declined significantly in the last year. We expected firms that were larger and more diversified to be more likely to have ERM programs because they faced a more complex range of risks.[17] We also expected insurers to be more likely to implement ERM programs if they had more opaque assets, a higher percentage of institutional share ownership,[18] or if their stock price had declined significantly in the prior year.[19] (For definitions and summary statistics of all variables used in our study, see Tables 1 and 2.)

How many of the insurers in our sample used ERM? ERM users accounted for 8.5 percent of all the firm-years in our sample. This relatively low percentage reflects the fact that our study captures the early years when firms were just beginning to adopt ERM programs. The proportion would clearly be much higher in recent years. It is also worth noting that our measure likely underestimates the number of ERM adopters because we required public disclosure of the programs.

What evidence do we have that the companies in our sample were representative of the rest of the industry? The mean and median values of Q for our sample were 1.089 and 1.036, respectively, which are in the same range as those reported in earlier studies of insurance companies. This finding suggests that there were no unusual developments that were specific to our particular sample or the time period of our study that might have distorted our findings. Finally, the median level of institutional ownership for our sample companies was 40.6%, and the mean beta was 0.5.[20]

In Table 3 we compare means and medians of firm value and ERM-determinants between insurers that implemented ERM programs and those that did not. First, our univariate

17. See D. Pagach and R. Warr, "The Effects of Enterprise Risk Management on Firm Performance," (April 10, 2010). Available at SSRN: http://ssrn.com/abstract=1155218. We recognize that this measure captures only one aspect of opacity.

18. See L.L. Colquitt, R.E. Hoyt, and R.B. Lee, "Integrated Risk Management and the Role of the Risk Manager," *Risk Management and Insurance Review*, 2: 43-61, 1999; Liebenberg and Hoyt (2003); and Beasley et al.(2005); Standard and Poor's, 2005. Additionally, internationally diversified firms that operate in the UK and Canada, where regulated corporate governance regarding risk management control and reporting historically has been more stringent, should be more likely to adopt an ERM program. Similarly, Beasley et al. (2005) find that US-based firms are less likely to be in advanced stage of ERM than are their international counterparts.

19. See J. Lam, and B.M. Kawamoto, "Emergence of the Chief Risk Officer," *Risk Management*, 44: 30-34, 1997; and Lam (2001).

20. ERM adoption might be related to sharp declines in shareholder value if firms feel under pressure to show shareholders that they are taking corrective steps to prevent further losses. See D. Pagach, and R. Warr, "The Characteristics of Firms That Hire Chief Risk Officers," *Journal of Risk and Insurance*, 78: 185-211, 2011.

Table 4 **Full Maximum-Likelihood Treatment Effects estimates**

	ERM		Q	
	(Equation 2)		(Equation 1)	
ERM			0.19884	[0.05031]***
Size	0.37912	[0.11279]***	-0.00031	[0.00836]
Leverage	-0.09579	[0.03973]**	-0.00004	[0.00011]
Salesgrowth			-0.00001	[0.00014]
ROA			0.32591	[0.32539]
Div_Int	-0.80753	[0.45220]*	0.05242	[0.05930]
Div_Ind	0.18514	[0.27978]	0.00136	[0.02864]
Dividends			0.04985	[0.02896]*
Insiders			0.00214	[0.00141]
InsidersSq			-0.00003	[0.00002]**
Life	0.43295	[0.30998]	-0.04798	[0.03329]
Beta			0.0105	[0.02609]
Opacity	-8.08611	[4.98017]		
Div_Ins	-0.39761	[0.38319]		
Institutions	0.01887	[0.00753]**		
Reinsuse	-3.18867	[1.45578]**		
Slack	-0.64388	[1.41135]		
CV(EBIT)	0.00004	[0.00380]		
lagInsdret	0.19784	[0.20080]		
ValueChange	0.32285	[0.16541]*		
Constant	-3.64765	[1.13572]***	1.0137	w[0.07571]***
# Observations		687		
# Clusters		117		
Log pseudolikelihood		120.81		
Wald test of independent equations		8.33***		

findings (which do not hold constant other determinants of value) support the contention that ERM enhances firm value. Both the mean and median values of Tobin's Q are significantly higher for ERM firms. On average, insurers with ERM programs are valued approximately 4% higher than other insurers. Second, the average ERM user is larger, less leveraged, less opaque, and has less financial slack and lower stock return volatility than the average non-user. Furthermore, ERM users tend to have higher levels of institutional ownership, suggesting that sophisticated investors take a favorable view of ERM. Finally, the average ERM user relies less on reinsurance than the average non-user; and the annual change in value is greater for the average ERM user than for the average non-user.

Table 4 shows the results from the model in which the ERM and Q equations are estimated jointly. As in the case of our "univariate" results, size, leverage, opacity, institutional shareholders, use of reinsurance, and recent stock price declines are all significantly correlated with decisions to adopt ERM programs. The results reported here were generally consistent with our expectations as described above. That is, larger firms with lower levels of leverage, higher levels of institutional ownership, and lower levels of reinsurance use were all more likely to be users of ERM.

But the most important finding of our study, given its aim of detecting a relationship between ERM and value, was the positive and significant coefficient on *ERM* in the Q equation—a coefficient that can be interpreted as saying that insurers using ERM are valued as much as 20% higher than other insurers, after controlling for other factors. This "multivariate" result is substantially larger than the univariate comparison; and as such, it suggests the importance of holding constant the effect of other value determinants when estimating the effect of ERM. We also found some evidence that insider share ownership is generally associated with higher values (though the relation becomes less positive when insider ownership becomes "too high"). Finally, we found a positive relation between paying dividends and firm value, suggesting that dividends reduce the agency costs of free cash flow.

Some Additional Insights and Developments Since Our 2011 Study

A good example of an insurance company that reaped the benefits of implementing an ERM program is the ACE Group. ACE began to implement ERM in late 2002 by hiring Donald Watson, former director of S&P's North American Insurance practice, as Vice-President of Enterprise Risk. Under Watson's

leadership, the firm focused its ERM program on identifying and managing critical risks, and providing the board and executive management with a comprehensive view of ACE's risk profile. In an interview with *Rough Notes Magazine* in 2004, Watson described how the ERM function had a tangible effect on firm value by increasing awareness of $15 billion in reinsurance recoverables and implementing a strategy to reduce the amount and riskiness of its recoverables.[21] According to Watson, the insurer began to focus both on seeking higher quality reinsurance (that is, with lower credit risk) and on increasing retention (relying less on reinsurers). Ultimately, Watson argued that the improvement in reinsurance recoverables increased investor trust and contributed directly to improvements in ACE's share price, which exceeded that of its peers. Indeed, ACE's market value of equity increased by 50% from 2002 to 2003; and by the end of our sample period (2005), it had more than doubled.

The recognition by ACE's management of the strategic value of ERM was reinforced by the following statement in the firm's recent (2013) 10-K:

"As an insurer, ACE is in the business of profitably managing risk for its customers. Since risk management must permeate an organization conducting a global insurance business, we have an established Enterprise Risk Management (ERM) framework that is integrated into management of our businesses and is led by ACE's senior management. As a result, ERM is a part of the day-to-day management of ACE and its operations."

Allstate is another insurer in our sample that experienced a significant increase in market value following implementation of its ERM program. And in the company's most recent (2014) 10-K, Allstate's management emphasized that it has an "Enterprise Risk and Return Management framework" that is "used by senior leaders and business managers to provide risk and return insight and drive strategic and business decisions."

What's more, in a recent report covering 146 insurers, the insurance consulting firm Milliman noted that "Standard & Poor's five-year-old 'ERM opinion' rating program for North American and Bermudian insurance companies likewise has reported a stronger positive change in equity prices and lower stock volatility in most years for insurers that it rates as having 'excellent' or 'strong' ERM programs."[22] In the same report, Joe Celentano, the senior vice president and chief risk officer at Pacific Life Insurance Company, observes that "defining our risk appetite more clearly has really helped us develop our business strategy…. That's some of the value we see in ERM."

Moreover, in the past year or so, we have been working with other researchers to deepen our understanding of the connections between ERM and value. In a working paper now circulating, we use dispersion in analyst earnings forecasts as a proxy for transparency and find that firm-level transparency increases following adoption of an ERM initiative, and that the increase in transparency is greatest for firms that, like insurers and banks, are operationally and financially opaque.[23]

Finally, in a study published in the *Journal of Banking and Insurance* last year, one of us argued—as we do in these pages—that ERM represents a major shift from managing risks individually to managing risks collectively.[24] In that article, we also provide evidence for the following: (1) ERM allows firms to produce greater risk reduction (as reflected in lower volatility of stock returns) per dollar spent; (2) this reduction in return volatility for ERM-adopting firms becomes stronger over time; and (3) operating profits per unit of risk increase after implementing ERM.

Conclusion

Past surveys of companies provide valuable descriptive information about ERM use but fail to shed light on whether ERM enhances shareholder wealth. By contrast, our study of insurance companies during the early stages of ERM's development provided persuasive evidence that ERM can be used to increase the value of insurance companies. The valuation premium we found for insurers adopting ERM was both statistically and economically significant. Other more recent studies by us and others confirm our initial findings and extend our understanding of the benefits of ERM.

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21. These values are consistent with those reported by R.T. Shortridge, and S.M. Avila, "The Impact of Institutional Ownership on the Reinsurance Decision," *Risk Management and Insurance Review*, 7: 93-106, 2004; and J.D. Cummins, and R.D. Phillips, "Estimating the cost of equity capital for property-liability insurers," *Journal of Risk and Insurance*, 72: 441-478, 2005; and is reflective of the fact that we focused on insurers in this study.

22. Michael J. Moody, "ERM and Value Creation: ACE executive discusses the company's ERM strategies and progress," Rough Notes Magazine, June, 2004.

23. See Milliman, "Creating Value Through Enterprise Risk Management," 2014; and Standard & Poor's, "Process Improvements and Regulation Drive ERM of North American and Bermudian Insurers Forward," Standard & Poor's Rating Services (April 18, 2013).

24. See Chip Wade, Robert E. Hoyt, and Andre P. Liebenberg, 2015, "Does Enterprise Risk Management Increase Transparency?," Working Paper.

25. David L. Eckles, Robert E. Hoyt, and Steve M. Miller, "The Impact of Enterprise Risk Management on the Marginal Cost of Reducing Risk: Evidence from the Insurance Industry," *Journal of Banking and Finance*, 43, 247-261; 2014.

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