THE DETERMINANTS OF ENTERPRISE RISK MANAGEMENT: EVIDENCE FROM THE APPOINTMENT OF CHIEF RISK OFFICERS

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ABSTRACT

Enterprise risk management (ERM) has captured the attention of risk management professionals and academics worldwide. Unlike the traditional "silo-based" approach to corporate risk management, ERM enables firms to benefit from an integrated approach to managing risk that shifts the focus of the risk management function from primarily defensive to increasingly offensive and strategic. Despite the heightened interest in ERM, little empirical research has been conducted on the topic. This study provides an initial attempt at identifying the determinants of ERM adoption. We construct a sample of firms that have signaled their use of ERM by appointing a Chief Risk Officer (CRO) who is charged with the responsibility of implementing and managing the ERM program. We use a logistic regression framework to compare these firms to a size- and industry-matched control sample. While our results suggest a general absence of differences in the financial and ownership characteristics of sample and control firms, we find that firms with greater financial leverage are more likely to appoint a CRO. This finding is consistent with the hypothesis that firms appoint CROs to reduce information asymmetry regarding the firm's current and expected risk profile.

INTRODUCTION

Enterprise risk management (ERM) has been the topic of increased media attention in recent years (see Figure 1).[1] Many organizations have implemented ERM programs, consulting firms have established specialized ERM units, and universities have developed ERM-related courses and research centers. Unlike traditional risk management, where individual risk categories are separately managed in risk "silos," ERM enables firms to manage a wide array of risks in an integrated, holistic fashion. Proponents argue that

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[1] ERM is synonymous with integrated risk management (IRM), holistic risk management, enterprise-wide risk management, and strategic risk management. For consistency, we use the acronym *ERM* throughout this study.

FIGURE 1
Articles Referencing ERM and CROs*
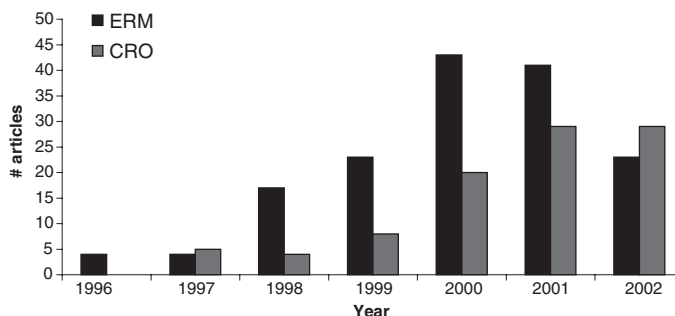
*Search performed in article abstracts and citations using only ABI/INFORM (Complete) and EBSCOHOST (Business Source Premier).

ERM benefits firms by decreasing earnings and stock-price volatility, reducing external capital costs, increasing capital efficiency, and creating synergies between different risk management activities (Miccolis and Shah, 2000; Cumming and Hirtle, 2001; Lam, 2001; Meulbroek, 2002). More generally, ERM is said to promote increased risk management awareness that translates into better operational and strategic decision making. Despite the heightened interest in ERM by academics and practitioners and the abundance of survey evidence on the prevalence and characteristics of ERM programs (see, for example, Miccolis and Shah, 2000; Thiessen et al., 2001; CFO Research Services, 2002; Tillinghast-Towers Perrin, 2002), empirical evidence regarding the determinants of these programs is lacking.

A major obstacle to empirical ERM-related research is the difficulty in identifying firms that are indeed engaging in ERM. Firms typically do not disclose whether they are managing risks in an integrated manner. Much of their risk management disclosure and discussion relates to specific risks and, thus, researchers are unable to distinguish whether firms are managing these risks in a disaggregated or aggregated manner. Absent explicit disclosure of ERM implementation, researchers are forced to either rely on survey data or search for a signal of the existence of ERM programs. While survey evidence has been useful in answering many questions regarding ERM, the nature of our inquiry favors the use of publicly available data and, hence, the identification of an ERM signal. One such signal may come from the creation of a specialized managerial position, the Chief Risk Officer (CRO), which is responsible for ERM implementation and coordination.

The objective of this study is to explore the differences between a sample of firms that have announced the appointment of CROs and a closely matched control sample. Because CROs are generally appointed to implement and manage ERM programs, some of the differences observed are likely to be due to the differential value of ERM to the two groups of firms. Moreover, because there may be value to ERM implementation via a CRO as opposed to the use of ERM-related committees, some of the differences may be due to the differential value of the *CRO position* to the two firm groups. We use a logistic regression framework to test hypotheses related to ERM and CRO appointment.

The study is structured as follows. First, we provide a brief summary of the literature regarding the determinants of two traditional risk management activities—insurance and hedging. We then discuss the forces that have driven the popularity of ERM and the perceived benefits of using an ERM approach. Third, we describe the role of the CRO. Fourth, we develop our hypotheses by describing the determinants of CRO appointment. Fifth, we describe our sample, data, empirical methodology, and results. Finally, we conclude by summarizing our results and discussing avenues for further research.

DETERMINANTS OF TRADITIONAL RISK MANAGEMENT ACTIVITIES

Much of the documented evidence regarding various aspects of ERM is limited to the trade press and industry surveys. Due to a lack of academic literature regarding the determinants of ERM, we look to the literature that deals with determinants of traditional risk management activities such as hedging and corporate insurance demand. The determinants of these traditional risk management activities are well documented. Corporate insurance demand by firms with well-diversified shareholders is not driven by risk aversion. Since sophisticated shareholders are able to costlessly diversify idiosyncratic risk, insurance purchases at actuarially unfair rates reduce stockholder wealth. However, when viewed as part of the firm's financing policy, corporate insurance may increase firm value through its effect on investment policy, contracting costs, and the firm's tax liabilities (Mayers and Smith, 1982). Thus, the theory suggests that firms should purchase insurance because it potentially reduces (1) the costs associated with conflicts of interest between owners and managers[2] and between shareholders and bondholders,[3] (2) expected bankruptcy costs, (3) the firm's tax burden, and (4) the costs of regulatory scrutiny.[4] A number of studies have found general support for these theoretical predictions (see Mayers and Smith, 1990; Ashby and Diacon, 1998; Hoyt and Khang, 2000).

As with corporate insurance purchases, corporate hedging reduces expected bankruptcy costs by reducing the probability of financial distress (Smith and Stulz, 1985). Furthermore, the hedging literature suggests that, much like corporate insurance, this form of risk management potentially mitigates incentive conflicts, reduces expected taxes, and improves the firm's ability to take advantage of attractive investment opportunities (see Smith and Stulz, 1985; MacMinn, 1987; Campbell and Kracaw, 1990; Bessembinder, 1991; Froot et al., 1993; Nance et al., 1993). Empirical evidence generally supports these theoretical predictions (see Nance et al., 1993; Colquitt and Hoyt, 1997).

The traditional risk management approach has been characterized as a highly disaggregated method of managing firm risks. Under this approach, various categories of risk are managed in separate units within the firm. Financial firms often manage market, credit, liquidity, and operational risk separately in individual risk silos. Traditionally, nonfinancial firms have followed a similar approach to hazard, financial, operational, and strategic risks. An enterprise-wide approach to risk management treats each of these risk classes as part of the firm's overall risk portfolio that is managed holistically (Miccolis and Shah, 2000; Cumming and Hirtle, 2001; Lam, 2001; Meulbroek, 2002).

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[2] As discussed by Jensen and Meckling (1976).

[3] An example is Myers' (1977) underinvestment problem. Mayers and Smith (1987) provide a model that describes the effect of corporate insurance on the underinvestment problem.

[4] Mayers and Smith (1982) describe other benefits of corporate insurance not discussed here, such as real service efficiencies and comparative advantage in risk-bearing.

Driving Forces Behind ERM

The trend toward the adoption of ERM programs is usually attributed to a combination of external and internal factors. The major external influences that have driven firms to approach risk management in a more holistic manner are a broader scope of risks arising from factors such as globalization, industry consolidation, and deregulation; increased regulatory attention to corporate governance; and technological progress that enables better risk quantification and analysis (Miller, 1992; Lam and Kawamoto, 1997; Miccolis and Shah, 2000). Internal factors are centered on an emphasis to maximize shareholder wealth. ERM proponents argue that an integrated approach increases firm value by reducing inefficiencies inherent in the traditional approach, improving capital efficiency, stabilizing earnings, and reducing the expected costs of external capital and regulatory scrutiny (Miccolis and Shah, 2000; Cumming and Hirtle, 2001; Lam, 2001; CFO Research Services, 2002).

The nature of risks facing financial firms has changed due to the recent wave of industry consolidation that has resulted in more complex financial institutions. Financial conglomerates offer a wide array of products that imply potential liabilities and risks that are increasingly interdependent (Cumming and Hirtle, 2001), and deregulation of the energy industry has forced utilities to become more efficient and more profitable. In general, increased competition has shifted the emphasis of risk management from a defensive focus to one that is more offensive and strategic (Meulbroek, 2002). While traditional risk management is largely concerned with protecting the firm against adverse financial effects of risk, ERM makes risk management part of the firm's overall strategy and enables companies to make better risk-adjusted decisions that maximize shareholder value (Lam and Kawamoto, 1997; Meulbroek, 2002).

Many commentators have identified increased stringency of regulatory oversight as a major external factor that has driven the trend toward ERM. Existing corporate governance requirements regarding specific internal control reporting appear to be more prescriptive in the United Kingdom and Canada than in the United States.[5] In Canada, the Dey report was followed by the Canadian Institute of Chartered Accountants' "Guidance on Control" report that specified reporting on risk assessment and risk management (Toronto Stock Exchange, 1994). In the United Kingdom, the "Combined Code" adopted by the London Stock Exchange consolidates previous reports on corporate governance and makes directors responsible for internal control systems including risk management (Miccolis and Shah, 2000). In the United States, the Committee of Sponsoring Organizations of the Treadway Commission (COSO) report "Internal Control—An Integrated Framework" (1994) sets out a framework for ERM within an organization. While these reports do not mandate ERM, they do create public pressure for more systematic

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[5] Survey evidence seems to support this difference in regulatory requirements relating to ERM between U.S. firms and their Canadian and English counterparts. The 2002 Tillinghast-Towers Perrin survey "Enterprise Risk Management in the Insurance Industry" documents that less than half of the U.S. respondents cited regulatory pressure and corporate governance guidelines as a motivator for ERM, while more than 70 percent of Canadian respondents cited these factors as motivations for ERM. Similarly, the 2002 CFO Research Services survey "Strategic Risk Management: New Disciplines, New Opportunities" notes that European companies are somewhat ahead of North American firms, largely because of Europe's corporate governance rules and guidelines.

risk management systems and disclosure.[6] Institutional shareholders, who have greater ability to influence firm risk management policy, are likely to be responsible for much of this external pressure.

Advances in information technology have enabled firms to model complex risks and better understand interdependencies between firm-wide risks (Jablonowski, 2001). The increased availability of outsourcing options for modeling activities has made ERM available to a wider range of firms that lack the otherwise necessary level of specialized human and technological capital. However, recent survey evidence suggests that the implementation of ERM programs continues to be stalled by a perceived lack of technological tools (Miccolis and Shah, 2000).

Profit-maximizing firms should consider implementing an ERM program only if it increases expected shareholder wealth. The following represent ways in which commentators argue that ERM should increase value. While the individual advantages of different risk management activities are clear, there are disadvantages to the traditional silo approach to risk management. Managing each risk class in a separate silo creates inefficiencies due to lack of coordination between the various risk management departments. By integrating decision making across all risk classes, firms can avoid duplication of risk management expenditures by exploiting natural hedges. Firms that engage in ERM are able to better understand the aggregate risk inherent in different business activities. This provides them with a more objective basis for resource allocation, thus improving capital efficiency and return on equity. Organizations with a wide range of investment opportunities are likely to benefit from being able to select investments based on a more accurate risk-adjusted rate than is available under the traditional risk management approach (Meulbroek, 2002).

While individual risk management activities may reduce earnings volatility by reducing the probability of catastrophic losses, potential interdependencies between risks exist across activities that might go unnoticed in the traditional risk management model. ERM provides a structure that combines all risk management activities into one integrated framework that enables the identification of such interdependencies. Thus, while individual risk management activities can reduce earnings volatility from a specific source (hazard risk, interest rate risk, etc.), an ERM strategy reduces volatility by preventing the aggregation of risk across different sources.

A further source of value from ERM programs arises due to improved information about the firm's risk profile. Outsiders are more likely to have difficulty in assessing the financial strength and risk profile of firms that are highly financially and operationally complex. ERM enables these financially opaque firms to better inform outsiders of their risk profile and also serves as a signal of their commitment to risk management. By improving risk management disclosure, ERM is likely to reduce the expected costs of regulatory scrutiny and external capital (Meulbroek, 2002).

THE ROLE OF THE CRO

Proponents of ERM agree that firms choosing to adopt an ERM strategy need a person or group of persons responsible for the coordination of the ERM program and the

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[6] See Miccolis and Shah (2000) for a summary of corporate governance developments in these and several other countries.

communication of goals and results to the board. The responsible party or group also needs to promote ERM to management and elevate the risk management function to one that informs the firm's overall corporate and financial strategy. However, consensus is lacking on the structure or body that is best suited to implement and manage a firm's ERM program. Some commentators favor the use of ERM committees over the use of a single individual as the party responsible for leading the ERM function. Others argue that it is better to manage these risks via a single organizational unit that bears direct responsibility for supervising the entire process rather than via a committee or group of committees (Haubenstock, 1999).

Recent survey evidence suggests that firms view CROs and ERM committees as complements rather than alternative management bodies (Tillinghast-Towers Perrin, 2002). Because firms do not publicly announce the formation or existence of an ERM committee, we use CRO announcements as a signal of ERM. Unlike traditional risk managers,[7] CROs are typically board-level appointees who report directly to the CEO or CFO. These individuals often hold advanced degrees and possess a high level of technical expertise (Thiessen et al., 2001). Furthermore, CROs likely have the necessary communication skills that are required to promote the importance of ERM to the board and to inform outside stakeholders of the firm's risk profile. The following excerpts from announcements of CRO appointments highlight the role of CROs in the ERM process:

> [The new CRO] will be responsible for identifying, assessing, reporting and supporting the management of [the company's] worldwide risk issues and opportunities. (PR Newswire, 2001)

> [The CRO] will be responsible for recognizing and evaluating [the company's] total corporate risk. [The CRO] will be charged with identifying and assessing risks that cut across the organization and then advising the best way to manage them. [The CFO] said the new position is necessary for several reasons. "Collectively these changes [growth, complexity, innovation] increase the potential for risks aggregating across all operational areas in unexpected ways." (PR Newswire, 2000)

> [The creation of the CRO position] puts accountability where it belongs—with the leadership team. Risk and opportunity will be measured and managed as a cornerstone of how we do business. (PR Newswire, 2002)

The first two excerpted announcements are typical of the majority of early announcements and emphasize the CRO's role as manager of the firm's ERM program. The third announcement is the most recent of the three and reflects a change in the CRO's perceived responsibility in post-Enron corporate America. Whereas earlier announcements concentrated on the CRO's role as risk champion, several of the latest announcements place greater emphasis on the CRO's responsibility and accountability for good corporate governance.

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[7] See Colquitt et al. (1999) for a characterization of the "traditional" risk manager.

DETERMINANTS OF CRO APPOINTMENT

As is suggested by the announcements excerpted above and by the general trade press, firms appoint CROs to implement and manage an ERM program. In this way, the announcement of a new CRO appointment is a signal that the firm is establishing an ERM program. While firms with CROs are most likely engaging in ERM, it does not follow that firms without CROs do not have an ERM program in place. Firms without CROs may in fact have a risk champion who goes by a different title to CRO but is a de facto CRO. Some firms might use the committee system, and others might include the ERM responsibility in the CFO or CEO function. Unfortunately, we cannot observe directly whether CEOs, CFOs, risk managers, or risk committees are in fact charged with the ERM responsibility. We can, however, observe firms that have appointed CROs and can reasonably infer that these firms are engaging in ERM. Creating a CRO position signals the importance of ERM to an organization and would represent one way that the firm could capture various benefits associated with ERM.

Reduced earnings volatility is often cited as a primary benefit of ERM. While the hedging of risks in traditional silos has been shown to reduce earnings volatility, some have argued that ERM further stabilizes earnings by reducing losses that arise from interdependencies between traditional risk classes.[8] Therefore, we expect that firms with higher earnings volatility will value ERM more than other firms and are thus more likely to appoint a CRO. Similarly, we expect a positive relation between stock price volatility and the likelihood of appointing a CRO. We measured earnings volatility as the coefficient of variation of quarterly earnings for the three years prior to the year of the CRO appointment. We measured stock price volatility as the coefficient of variation of the firm's stock price for the year prior to the appointment.

Cumming and Hirtle (2001) and Meulbroek (2002) suggest that ERM programs provide a way for firms to reduce the potential costs arising from the well-established risk-shifting—or asset-substitution—problem. Shareholders have an incentive to alter the firm's risk profile after contracting with fixed claimants such as debt holders. Because debt holders anticipate such behavior, they increase their required rate of return on credit provided to the firm. In this way, the agency costs are ultimately borne by shareholders. The likelihood of firms altering their risk profile is positively related to their existing leverage and may be particularly high for financial firms that can quickly change their risk profiles. ERM systems provide a way for firms to make a credible commitment against such behavior because they facilitate better disclosure of the firm's risk exposure. Moreover, the appointment of a CRO signals a firm's commitment to an ERM approach and provides the external capital market with a senior, easily identifiable source of information regarding the firm's current and expected risk profile. For this reason, we would expect that more highly leveraged firms will gain more from the appointment of a CRO. We measured leverage as the ratio of long-term debt to total firm value. We expected a positive relation between leverage and the likelihood of appointing a CRO.

Some commentators argue that ERM is especially important for managing risks caused by growth (see Hovey, 2000). Firms with greater growth opportunities face more uncertainty and require better risk management not only to control risks that emerge but also to guide growth in the best direction based on the impact of various opportunities on

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[8] As alluded to in the second announcement excerpted above.

enterprise-wide risk. These firms have greater incentives to invest in ERM and are more likely to appoint a CRO. We used the market-to-book ratio as a signal of growth opportunities. We expected a positive relation between growth opportunities and the likelihood of appointing a CRO.

An important part of the CRO's role is to communicate risk management objectives and strategies to outside stakeholders. This activity is expected to have greater value for firms whose financial health is opaque to investors. Morgan (2002) finds that banks and insurance companies have the highest degree of financial opacity owing to the complexity of their financial makeup and relative lack of tangible assets. Morgan observes that S&P and Moody's rating agencies disagree more often on bond ratings for these firms than any other. We measured opacity as the degree of disagreement on financial strength by these two rating agencies in the three-year period preceding the appointment of a CRO. Firms with greater financial opacity should derive greater benefit from the CRO's ability to communicate the firm's risk profile to these agencies—thus reducing uncertainty regarding the firm's true financial health. We used an indicator variable for financial opacity that is equal to one if rating agencies (S&P and Moody's) disagreed on the firm's new debt issues. For firms that appointed a CRO, we considered ratings on the last three debt issues prior to announcing the CRO appointment. We investigated opacity for control firms in the same time period. Because S&P and Moody's use different letter ratings, we compared the ratings using the matching provided in the New Basel Capital Accord that allows direct comparison on their respective letter ratings. We expected this variable to be positively related to the probability of appointing a CRO.

Pressure from external stakeholders is regarded as an important driving force behind the adoption of ERM programs and the appointment of CROs to run these programs (Lam and Kawamoto, 1997; Miccolis and Shah, 2000; Lam, 2001). Regulatory pressure is likely to have a similar impact on all competitors within a given industry, while shareholder pressure may differ depending on the relative influence of different shareholder groups for each firm. Institutions are relatively more influential than individual shareholders and can exert greater pressure for the adoption of an ERM program. Therefore, we expected that firms with a higher percentage of institutional share ownership would be more likely to appoint a CRO.

Regulated corporate governance regarding risk management control and reporting has historically been more stringent in the United Kingdom and Canada than in the United States. U.S. firms that operate in these countries are, therefore, deemed more likely to adopt an ERM program and appoint a CRO. We used an indicator variable equal to one if a firm owned one or more subsidiaries in the United Kingdom or Canada to proxy for a firm's exposure to these regulatory regimes. Table 1 provides a description of the variables that we used to test our hypotheses.

SAMPLE, DATA, EMPIRICAL METHODOLOGY, AND RESULTS

We defined our sampling population as the set of all U.S. firms that announced the appointment of a CRO between 1997 and 2001.[9] While some firms may not have a position of "Chief Risk Officer," they may have a de facto CRO who serves under a different title, such as VP Risk Management, Risk Management Director, etc. Therefore, we identi-

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[9] These data are well suited for an event-study analysis of the announcement effects. Our research in this regard is the topic of a separate study and lies beyond the scope of our present inquiry.

TABLE 1
Hypothesis and Variable Description

Hypothesis	Variable	Definition	Source
	CRODUMMY	Dummy variable = 1 if firm announced the appointment of a CRO.	Dow-Jones/ Lexis-Nexis
	Size	ln (book value of total assets) averaged over three years prior to CRO appointment.	Compustat
	Financial Services Dummy	Dummy variable = 1 if firm is in the financial services industry.	Compustat
1. Firms with greater earnings and stock price volatility are more likely to appoint a CRO.	Earnings Volatility	Coefficient of variation of quarterly EBIT for three years prior to CRO appointment.	Compustat
1. Firms with greater earnings and stock price volatility are more likely to appoint a CRO.	Stock Price Volatility	Coefficient of variation of daily stock prices for the calendar year preceding the CRO appointment.	CRSP
2. Firms that are more highly leveraged are more likely to appoint a CRO.	Average Leverage	Book value of long-term debt/(long-term debt + market value of equity) averaged over three years prior to CRO appointment.	Compustat
3. Firms with greater growth opportunities are more likely to appoint a CRO.	Average Market-to-Book Ratio	(Market value of equity + book value of liabilities)/book value of total assets averaged over three years prior to CRO appointment.	Compustat
4. Firms that are more financially opaque are more likely to appoint a CRO.	Financial Opacity	Dummy variable = 1 if difference exists between S&P and Moody's ratings for debt issued in the year prior to CRO appointment.	SDC Platinum
5. Firms with a higher percentage of institutional shareholdership are more likely to appoint a CRO.	Average % Institutional Ownership	Average percentage of firm's outstanding shares owned by institutions for three years preceding CRO appointment.	Compact Disclosure SEC
6. Firms that have subsidiaries in the United Kingdom or Canada are more likely to appoint a CRO.	U.K./Canadian Subsidiary Dummy	Dummy variable = 1 if firm had a subsidiary in the United Kingdom or Canada in the calendar year preceding CRO appointment.	Compact Disclosure SEC

fied and examined announcements of appointments to various senior risk management positions. Where it was clear that these personnel were responsible for implementing an ERM program, we included them in the sample (this is only the case for two announcements). We initially identified 33 announcements of CRO appointments by U.S. firms by performing extensive searches on Lexis-Nexis, Dow Jones, and PR Newswire. We removed firms lacking data on stock prices, financial characteristics, and ownership composition from the sample. This process resulted in a final sample of 26 firms. We constructed a control sample by ranking firms that did not appoint a CRO during the entire sample period by size and 4-digit SIC code for each year in which a CRO was announced.[10] We matched firms that have appointed CROs with a control firm in the same 4-digit SIC code that had total assets closest to the CRO firm in the year preceding the appointment.

Table 2 shows univariate statistics for the CRO sample and the control sample. The magnitude of the average firm size reflects the fact that firms appointing CROs (and hence the matching firms as well) are generally among the largest in their particular industry. Fifteen of the 26 firms that appointed CROs are in the financial services industry (SIC codes 6000 to 6099). Ten of the remaining 11 firms with CROs are in the energy industry, and one firm is in the airline industry. This concentration of CRO announcements within the financial services and energy industries is consistent with previous survey evidence (see Thiessen et al., 2001). As predicted by the financial opacity hypothesis, CRO appointment announcements are most prevalent among less transparent firms—such as those in the financial services and utilities industries. Table 3 provides correlation results for the variables that are included in the study.

We performed a multivariate analysis using a logistic regression framework that further investigated the differences in firm characteristics between firms that appoint CROs and those that do not. The categorical dependent variable assumed a value of one if a firm had appointed a CRO and zero for control firms. Table 4 shows the regression results.

Our model measures the impact of leverage, institutional ownership, U.K./Canadian regulation, earnings and stock price volatility, and growth opportunities on the likelihood of appointing a CRO, controlling for size and industry affiliation.[11] We found a general absence of significant explanatory variables in our regression model. It is important to note that by closely matching on size and 4-digit SIC code, we biased against finding significant differences in financial characteristics between our CRO sample firms and the control firms.[12] Furthermore, the typical size and industry affiliation of these firms is such that it is likely that most of the firms are hedgers and that they already have a fairly comprehensive risk management program in place. It is also possible that some of our control firms engage in unobserved ERM.

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[10] We also investigated these control firms for other obvious signals of the existence of an ERM program.

[11] Our proxy for financial opacity did not enter the regression model because bond ratings data were available for only 15 pairs of firms. We attempted to use an alternative proxy, the dispersion of analyst earnings forecasts, but these data were also unavailable for several sample firms.

[12] The significance of our size control variable is most likely due to variation introduced by our inability to obtain a sufficiently close match for all sample firms. Given that the majority of sample firms appointing CROs are among the largest in their respective industries, the best matching firm was often significantly different in size than the sample firm.

TABLE 2
Univariate Statistics

Variable	N	CRODUMMY = 1				CRODUMMY = 0			
		Mean	Std. Dev.	Minimum	Maximum	Mean	Std. Dev.	Minimum	Maximum
Average Total Assets ($m)	26	36,072	51,003	225	215,887	58,708	91,297	1,351	379,167
Size (ln[average total assets])	26	9.56	1.69	5.41	12.26	9.84	1.60	7.19	12.84
Financial Services Dummy	26	0.58	0.50	0.00	1.00	0.58	0.50	0.00	1.00
Earnings Volatility	26	0.74	0.78	0.03	3.14	0.66	0.77	0.16	4.13
Stock Price Volatility	26	0.15	0.09	0.06	0.41	0.13	0.08	0.05	0.47
Average Leverage	26	0.38	0.18	0.00	0.76	0.30	0.16	0.02	0.65
Average Market-to-Book Ratio	26	1.14	0.13	0.91	1.45	1.17	0.11	0.93	1.40
Financial Opacity Dummy	15	0.60	0.51	0.00	1.00	0.60	0.51	0.00	1.00
Average % Institutional Ownership	26	52.90	20.11	9.25	84.47	48.71	20.76	4.48	96.52
U.K./Canadian Subsidiary Dummy	26	0.12	0.33	0.00	1.00	0.08	0.27	0.00	1.00

CRO Dummy = 1 for firms that announced CRO appointments, 0 for firms in the control sample. Financial Services Dummy = 1 if firm is in SIC industry 6000 to 6999, 0 otherwise. Source: Compustat. Average % Institutional Ownership is the average percentage of outstanding shares held by institutional investors for three years prior to the announcement year. Source: Compact Disclosure. U.K./Canadian Subsidiary Dummy = 1 if firm has a subsidiary located in Canada and/or the United Kingdom in the year immediately preceding the appointment announcement. Source: Compact Disclosure. Stock Price Volatility is measured as the coefficient of variation of the firm's daily stock price for the year (254 trading days) prior to the appointment year. Source: CRSP. Earnings Volatility is measured as the coefficient of variation of the firm's quarterly EBIT for three years (12 quarters) prior to the appointment year. Source: Compustat. Average Market-to-Book is measured as the ratio of market value of assets to book value of assets for three years prior to the appointment year. Source: Compustat. Average Total Assets is the average annual total assets reported for three years prior to the appointment year. Source: Compustat. Average Leverage is measured as the average of the ratio of long-term debt to total firm value for three years prior to the appointment year. Source: Compustat. Financial Opacity Dummy = 1 if disagreement exists between S&P and Moody's ratings of new debt issues in the year prior to CRO appointment, 0 otherwise. Source: SDC Platinum.

TABLE 3
Pearson Correlation Coefficients (N = 52), Prob > |r| under H_0: Rho = 0

	CRODUMMY	ln (Average Total Assets)	Financial Services Dummy	U.K./Canadian Subsidiary Dummy	Avg. % Institutional Ownership	Earnings Volatility	Stock Price Volatility	Average Leverage	Average Market-to-Book Ratio
CRODUMMY	1.0000								
ln (Average Total Assets)	−0.0874 0.5379	1.0000							
Financial Services Dummy	0.0000 1.0000	−0.0027 0.9850	1.0000						
U.K./Canadian Subsidiary Dummy	0.0652 0.6459	0.3946 0.0038	0.1473 0.2975	1.0000					
Avg. % Institutional Ownership	0.1077 0.4474	0.2712 0.0518	0.0208 0.8836	0.3261 0.0183	1.0000				

Earnings Volatility	0.0545 (0.7011)	−0.0893 (0.5288)	−0.2723 (0.0508)	−0.1486 (0.2932)	−0.0699 (0.6223)	1.0000		
Stock Price Volatility	0.1060 (0.4547)	0.0846 (0.5510)	0.1175 (0.4070)	−0.0812 (0.5670)	0.1300 (0.3582)	0.0040 (0.9775)	1.0000	
Average Leverage	0.2519 (0.0717)	0.1315 (0.3528)	−0.3667 (0.0075)	−0.1936 (0.1691)	−0.1096 (0.4393)	0.3439 (0.0126)	−0.1199 (0.3972)	1.0000
Average Market-to-Book Ratio	−0.1352 (0.3393)	−0.0696 (0.6238)	−0.1918 (0.1732)	−0.0096 (0.9464)	0.0002 (0.9988)	−0.0384 (0.7871)	−0.2402 (0.0863)	−0.2741 (0.0493) 1.0000

CRO Dummy = 1 for firms that announced CRO appointments, 0 for firms in the control sample. Financial Services Dummy = 1 if firm is in SIC industry 6000 to 6999, 0 otherwise. Source: Compustat. Average % Institutional Ownership is the average percentage of outstanding shares held by for three years prior to the announcement year. Source: Compact Disclosure. U.K./Canadian Subsidiary Dummy = 1 if firm has a subsidiary located in Canada and/or the United Kingdom in the year immediately preceding the appointment announcement. Source: Compact Disclosure. Stock Price Volatility is measured as the coefficient of variation of the firm's daily stock price for the year (254 trading days) prior to the appointment year. Source: CRSP. Earnings Volatility is measured as the coefficient of variation of the firm's quarterly EBIT for three years (12 quarters) prior to the appointment year. Source: Compustat. Average Market-to-Book is measured as the ratio of market value of assets to book value of assets for three years prior to the appointment year. Source: Compustat. Average Total Assets is the average annual total assets reported for three years prior to the appointment year. Source: Compustat. Average Leverage is measured as the average of the ratio of long-term debt to total firm value for three years prior to the appointment year. Source: Compustat.

TABLE 4
Logistic Regression Results (Dependent Variable = CRO Dummy)

	Expected Sign	Parameter Estimate	$Pr > \chi^2$
Intercept		0.21	0.962
Average Size		−0.43*	0.076
Financial Services Dummy		0.41	0.565
Earnings Volatility	+	−0.17	0.700
Stock Price Volatility	+	4.94	0.213
Average Leverage	+	5.75**	0.020
Average Market-to-Book Ratio	+	0.20	0.946
Average % Institutional Ownership	+	0.02	0.306
U.K./Canadian Subsidiary Dummy	+	1.69	0.173

* = significant at the 0.1 level.
** = significant at the 0.05 level.

CRO Dummy = 1 for firms that announced CRO appointments, 0 for firms in the control sample. Financial Services Dummy = 1 if firm is in SIC industry 6000 to 6999, 0 otherwise. Source: Compustat. Average % Institutional Ownership is the average percentage of outstanding shares held by institutional investors for three years prior to the announcement year. Source: Compact Disclosure. U.K./Canadian Subsidiary Dummy = 1 if firm has a subsidiary located in Canada and/or the United Kingdom in the year immediately preceding the appointment announcement. Source: Compact Disclosure. Stock Price Volatility is measured as the coefficient of variation of the firm's daily stock price for the year (254 trading days) prior to the appointment year. Source: CRSP. Earnings Volatility is measured as the coefficient of variation of the firm's quarterly EBIT for three years (12 quarters) prior to the appointment year. Source: Compustat. Average Market-to-Book is measured as the ratio of market value of assets to book value of assets for three years prior to the appointment year. Source: Compustat. Average Total Assets is the average annual total assets reported for three years prior to the appointment year. Source: Compustat. Average Leverage is measured as the average of the ratio of long-term debt to total firm value for three years prior to the appointment year. Source: Compustat.

Notwithstanding the bias against finding statistically significant differences, leverage was positive and significant, implying that more highly leveraged firms are more likely to appoint a CRO than other firms of a similar size that operate in the same industry. Because firms appointing CROs are more likely to be engaging in ERM than control firms, this result supports the contention of Cumming and Hirtle (2001) and Meulbroek (2002) that ERM programs enable a reduction of agency costs associated with the risk-shifting problem. Highly leveraged firms face greater expected agency costs resulting from incentive conflicts between shareholders and fixed claimants. By appointing a CRO, these firms simultaneously signal to lenders their commitment to ERM and provide a senior, easily identifiable source of information regarding the firm's current and expected risk profile.

CONCLUSION

This study provides an initial attempt to identify the determinants of ERM adoption. Our empirical results suggest an absence of systematic differences between firms that signal their use of ERM by appointing a CRO and other firms of a similar size and industry

affiliation. However, we did find that more highly leveraged firms are more inclined to appoint CROs. These firms are likely to derive greater value from the CRO's ability to reduce the costs associated with the risk-shifting problem and to communicate the firm's risk profile to external stakeholders. The recent wave of corporate governance scandals further amplifies the need for firms to signal their commitment to risk management and compliance to a wide range of stakeholders. Future research is necessary in order to better understand the determinants of ERM and the method of its implementation. Important determinants not investigated here might include the organizational structure of the firm as well as the structure of the existing risk management function.

REFERENCES

Ashby, S. G., and S. R. Diacon, 1998, The Corporate Demand for Insurance: A Strategic Perspective, *Geneva Papers on Risk and Insurance*, 23: 34-51.

Bessembinder, H., 1991, Forward Contracts and Firm Value: Investment Incentive and Contracting Effects, *Journal of Financial and Quantitative Analysis*, 26: 519-532.

Campbell, T. S., and W. A. Kracaw, 1990, Corporate Risk Management and the Incentive Effects of Debt, *Journal of Finance*, 45: 1673-1686.

Canadian Institute of Chartered Accountants, 1995, *Guidance on Control* (Toronto: CICA).

CFO Research Services, 2002, *Strategic Risk Management: New Disciplines, New Opportunities*, CFO Publishing Corp., March. World Wide Web: http://www.aon.com/about/publications/pdf/issues/aon_cfo_report.pdf.

Colquitt, L. L., and R. E. Hoyt, 1997, Determinants of Corporate Hedging Behavior: Evidence from the Life Insurance Industry, *Journal of Risk and Insurance*, 64: 649-671.

Colquitt, L. L., R. E. Hoyt, and R. B. Lee, 1999, Integrated Risk Management and the Role of the Risk Manager, *Risk Management and Insurance Review*, 2: 43-61.

Committee of Sponsoring Organizations of the Treadway Commission, 1994, *Internal Control – An Integrated Framework*, (New York: American Institute of Certified Public Accountants).

Cumming, C. M., and B. J. Hirtle, 2001, The Challenges of Risk Management in Diversified Financial Companies, *FRBNY Economic Policy Review*, March, 1-17.

Froot, K. A., D. S. Scharfstein, and J. C. Stein, 1993, Risk Management: Coordinating Corporate Investment and Financing Policies, *Journal of Finance*, 48: 1629-1658.

Haubenstock, M., 1999, Organizing a Financial Institution to Deliver Enterprise-Wide Risk Management, *Journal of Lending and Credit Risk Management*, February 1, 46-52

Hovey, J., 2000, Risky Business, *Industry Week*, May 15, 75-77.

Hoyt, R. E., and H. Khang, 2000, On the Demand for Corporate Property Insurance, *Journal of Risk and Insurance*, 67: 91-107.

Jablonowski, M., 2001, Thinking in Numbers, *Risk Management*, February: 30-35.

Jensen, M. C., and W. Meckling, 1976, Theory of the Firm, Managerial Behavior, Agency Costs and Ownership Structure, *Journal of Financial Economics*, 3: 305-360.

Lam, J., 2001, The CRO Is Here to Stay, *Risk Management*, April: 16-20.

Lam, J., and B. M. Kawamoto, 1997, Emergence of the Chief Risk Officer, *Risk Management*, September: 30-34.

MacMinn, R. D., 1987, Insurance and Corporate Risk Management, *Journal of Risk and Insurance*, 54: 658-677.

Mayers, D., and C. W. Smith, 1982, On the Corporate Demand for Insurance, *Journal of Business*, 55: 190-205.

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

Mayers, D., and C. W. Smith, 1990, On the Corporate Demand for Insurance: Evidence from the Reinsurance Market, *Journal of Business*, 63: 19-40.

Meulbroek, L. K., 2002, Integrated Risk Management for the Firm: A Senior Manager's Guide, *Journal of Applied Corporate Finance*, 14: 56-70.

Miccolis, J., and S. Shah, 2000, *Enterprise Risk Management: An Analytic Approach*, Tillinghast-Towers Perrin. World Wide Web: http://www.tillinghast.com/tillinghast/publications/reports/Enterprise_Risk_Management_An_Analytic_Approach/erm2000.pdf.

Miller, K., 1992, A Framework for Integrated Risk Management in International Business, *Journal of International Business Studies*, 23: 311-332.

Morgan, D. P., 2002, Rating Banks: Risk and Uncertainty in an Opaque Industry, *American Economic Review*, 92: 874-888.

Myers, S. C., 1977, The Determinants of Corporate Borrowing, *Journal of Financial Economics*, 4: 147-175.

PR Newswire, 2000, The St. Paul Companies Names Janet Nelson Corporate Chief Risk Officer, *PR Newswire*, December 14. World Wide Web: http://www.prnewswire.com.

PR Newswire, 2001, TXU Names Chief Risk Officer, *PR Newswire*, December 7. World Wide Web: http://www.prnewswire.com.

PR Newswire, 2002, AMS Names David Fontaine General Counsel and Chief Risk Officer, *PR Newswire*, July 16. World Wide Web: http://www.prnewswire.com.

Smith, C. W., and R. M. Stulz, 1985, The Determinants of Firms' Hedging Policies, *Journal of Financial and Quantitative Analysis*, 31: 419-439.

Thiessen, K., R. E. Hoyt, and B. M. Merkley, 2001, *A Composite Sketch of a Chief Risk Officer*, (Canada: The Conference Board of Canada).

Tillinghast-Towers Perrin, 2002, Enterprise Risk Management in the Insurance Industry—2002 Benchmarking Survey Report. World Wide Web: http://www.tillinghast.com/tillinghast/publications/reports/ERM_Insur_Ind_2002_benchmark_survey/ERM_2002_all.pdf.

Toronto Stock Exchange Committee on Corporate Governance in Canada, 1994, *Where Were the Directors*? (Toronto: Toronto Stock Exchange).