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An analysis of the maturity and strategic impact of investments in ERM

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A B S T R A C T

Over the past decade, expectations for more effective oversight of risks by boards of directors have significantly increased. These expectations emanate from stock exchanges, regulators, credit rating agencies and other key stakeholders. Proponents of enhanced risk oversight argue that an increased understanding of enterprise-wide risks provides strategic benefit by helping the board and management identify and manage risks that may impact the achievement of strategic objectives while at the same time helping the board monitor the extent of risk-taking on the part of management in their desire to meet these objectives. In response to these growing expectations, some boards have asked management to explore implementation of a more holistic, top-down approach to risk oversight widely known as enterprise risk management (ERM) while others have not. Institutional theory would suggest that a number of organizations implement minimal elements of ERM for symbolic reasons, lacking substance in risk oversight. In contrast, agency theory would suggest that boards embrace explicit and robust risk oversight activities to monitor management's risk-taking actions, and resource dependence theory would suggest that they also do so to help the organization achieve strategic objectives. Little is known about the way in which boards and management organize their processes and the impact of those processes on the level of ERM adoption. More importantly, little is known about the extent to which ERM is perceived to provide strategic benefit to those organizations that have invested in developing a robust ERM process. Based on data gathered from 645 survey responses from executives of organizations spanning

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a number of industries and sizes, we find that organizations with greater ERM maturity are significantly more likely to have taken steps to formally engage the board and senior management in specific risk oversight tasks (consistent with agency theory), and certain board and management risk practices are associated with perceptions that ERM provides strategic advantage (consistent with resource dependence theory).

1. Introduction

In response to significant risk events triggering business and corporate governance failures and the recent financial crisis, a number of corporate governance-focused entities have issued calls for enhanced risk oversight processes within organizations. Many of these calls have centered on the role of the board of directors, placing increased expectations for more robust risk oversight as part of the board's overall corporate governance responsibilities.

The New York Stock Exchange's (NYSE's) revised corporate governance rules issued in 2004 place explicit risk oversight responsibilities on audit committees, and the Securities and Exchange Commission's (SEC's) expanded proxy disclosure rules effective in 2010 require greater transparency about the board's role in risk oversight (NYSE, 2004; SEC, 2010). Furthermore, a number of credit rating agencies now evaluate the effectiveness of the organization's risk management processes, including assessments of the board's governance role, as part of the credit rating evaluation process, while the Dodd-Frank legislation requires the creation of board risk committees for large financial institutions (Standard and Poor's, 2012; U.S. Congress, 2010). In 2015, U.S.-based insurance companies will file the insurer's Own Risk and Solvency Assessment (known as "ORSA") Report with its regulator that will focus on the insurer's enterprise risk management effectiveness, including an assessment of risk culture and governance. Collectively, these developments have placed greater expectations on the role of the board in overseeing management's processes for identifying, assessing, and managing risks that might impact the achievement of the organization's overall strategic objectives.

In response to these increasing expectations, a number of boards of directors have turned to executive management of the enterprises they serve challenging them to articulate the organization's overall approach to risk management and to strengthen those processes to enhance management's ability to identify, assess, and manage risks affecting the enterprise. Beasley et al. (2005) found that the stage of ERM implementation is increasing as the independence of the board of directors is greater, and Beasley et al. (2012) find that out of 618 organizations surveyed (mostly U.S.), boards of directors are cited as the most common factor increasing senior executive focus on risk oversight, with the largest organizations especially emphasizing the board's influence. Kleffner et al. (2003) found similar results highlighting the influence of boards over risk oversight for Canadian organizations. A number of organizations have responded by embracing the business paradigm of enterprise risk management (ERM) as a technique to help the organization develop a more holistic, top-down view of those risks most likely to impact the organization's success.

A number of principles-based frameworks have been issued to assist management in their design and implementation of ERM processes. Most of these frameworks, such as COSO's 2004 *Enterprise Risk Management – Integrated Framework* and ISO's 31000 – *Risk Management*, emphasize the important role that the overall culture and leadership from the board and senior management play in driving the maturity and strategic effectiveness of the ERM process (COSO, 2004; ISO, 2009).

From a theoretical perspective, there are a number of corporate governance-related theories that may help provide insight on the robustness of ERM implementations. Institutional theory suggests that the presence of external requirements, such as the NYSE, SEC, Dodd-Frank, and ORSA provisions, and the existence of conceptual frameworks and other best practices may cause some boards and management teams to merely implement only the basic elements of ERM processes to mirror

generally accepted practice so that their organizations resemble others around them, with ERM ultimately exhibiting minimal levels of maturity and providing little risk oversight strategic value (Powell, 1991; Cohen et al., 2008). In those situations, organizations may claim to have implemented ERM to satisfy calls for greater oversight, but those implementations lack evidence of any consistent or active risk oversight structure and are comprised of differing components, if any.

In contrast, agency theory would argue that organizations explicitly engage in robust and explicit ERM processes both at the board and senior management levels to aid the board in advancing the maturity of its oversight of risk-taking on the part of management. Greater engagement by the board and senior executives in specific and robust ERM-related activities commonly associated with more robust or mature programs would provide some evidence that ERM is a tool that boards and senior management are using to monitor risks associated with the agency relationship.

Finally, while ERM processes may help boards oversee risk-taking actions on the part of management as part of their governance role, most of the ERM conceptual frameworks and best practices suggest that ERM should ultimately provide strategic value by helping boards and management proactively identify, assess, and manage risks affecting the organization's achievement of strategic objectives. Thus, agency theory may only present a partial view of board governance (Cohen et al., 2008). Resource dependence theory, developed in the strategy management literature, suggests that boards and management may also implement ERM processes as a means to access and manage scarce resources and help set the strategy of the firm (Cohen et al., 2008). Perceptions that ERM provides strategic value would suggest that boards are not only using ERM to oversee management's risk-taking behavior (consistent with agency theory) but also using ERM to help guide the strategic direction of the organization (consistent with resource dependence theory).

Because the concept of ERM is relatively new, the extent of academic research on the topic is somewhat limited, but emerging. Our study contributes to this growing body of research in two primary ways. First, we provide evidence of best-practice elements of robust and explicit board and senior executive engagement in risk oversight that suggests boards are moving beyond an institutional theory perspective of ERM. This evidence shows that boards are engaging in processes to advance the maturity of the organization's oversight of risk-taking by management, consistent with agency theory. Second, we provide evidence about those key elements of board and senior-management engagement in ERM that are associated with perceptions that ERM is providing strategic value to the organizations surveyed. Our findings suggest that certain board and senior management levels of engagement in risk oversight activities are associated with ERM processes that are perceived to be providing important strategic value, consistent with resource dependence theory.

Our analysis is based on 645 survey responses from executives of organizations spanning a number of industries and sizes. We find that organizations with greater ERM maturity are significantly more likely to be associated with boards that engage in activities that exhibit more formal and explicit board engagement in risk oversight. Boards of organizations with more mature ERM processes are significantly more likely to have formally assigned risk management responsibilities to one of its committees, and they are significantly more likely to receive a formal report from management describing the entity's top risk exposures at least annually. Finally, they are significantly more likely to have articulated the organization's appetite for risks in the context of strategic planning. These findings that boards explicitly engage in ERM-related processes to oversee risk-taking by management is consistent with an agency theory view that ERM assists the board in its oversight duties on behalf of key stakeholders.

In regards to management's internal risk management processes, we find that those organizations with greater ERM maturity are associated with management teams that have designed and implemented a number of explicit internal risk management processes. Specifically, we find that organizations with more mature ERM programs are significantly more likely to have a formal risk management policy in place and they are significantly more likely to have provided risk management training for senior executives and key business unit leaders. More mature ERM programs are also significantly more likely to have a management-level risk committee consisting of the entity's senior executives and they are significantly more likely to provide explicit guidance to business unit leaders to help them assess the impact of a risk event. They also engage in more frequent processes to update inventories of key risks.

These findings suggest that explicit processes that engage the board and management in risk oversight leadership contribute to the overall maturity of the organization's ERM process. Interestingly, in supplemental analysis we divide our sample firms into two subsamples consisting of financial services firms exclusively (218 of the 645 sample firms) and the remaining 427 firms in all other industries. Given the unique regulatory focus on risk oversight in the financial services industry, we separated financial services firms from the remaining firms in our sample to determine if the results differ between the more heavily regulated and less heavily regulated firms. In this analysis, we observe a marked difference in the number of board and management level engagement variables that are significantly related to ERM program maturity, with more board and management processes significantly associated with ERM maturity for the non-financial services firms than for financial services firms. In a separate analysis we also split the sample between public and non-public firms, and find no substantive difference between the two subsamples. These results are discussed more fully in section seven of the paper.

Consistent with prior research, we also find that larger firms are significantly more likely to have more mature ERM processes. We also observe that U.S.-based firms in our sample are significantly more likely to have more mature ERM processes than non-U.S. firms. Collectively, these findings suggest that boards, especially those in non-financial services firms, are moving beyond implementing key elements of ERM merely for the sake of aligning with external expectations, as argued by institutional theory, and implementing ERM related processes to actively engage in the oversight of risk-taking by management, consistent with agency theory.

We also sought to examine factors that might affect the perception that ERM is an important strategic tool for the organization and found a number of ERM elements to be associated with organizations that have this perception. These results suggest that certain components of ERM increase the likelihood that ERM is value-adding, consistent with resource dependence theory expectations.

We find that perceptions of ERM as an important strategic tool are increasing for organizations that have articulated its appetite for risks in the context of strategic planning and whose boards of directors receive a formal report from management at least annually that describes the entity's top risk exposures. As for management level risk management processes, we find that perceptions of ERM as an important strategic tool are increasing for organizations that have established a management-level risk committee, that have provided executives formal training on risk management, and that frequently update their key risk inventories. Interestingly, we find explicit linkage between risk management and executive compensation yields a strong association with the view that ERM provides an important strategic competitive advantage.

In our first supplemental analysis focusing on the two subsets of firms (financial services firms and non-financial services firms), we find that a greater number of board risk oversight processes are associated with the perception that ERM is an important strategic tool for non-financial services firms as compared to financial services firms. We do not observe a striking difference in the association of management processes and ERM as a strategic tool when we compare financial services and non-financial services firms. Section seven of the paper contains our discussion of these results. We also find organizations whose ERM processes are perceived to provide strategic value are larger, but surprisingly we find that private firms appear to view ERM as potentially value-adding more so than public firms.

Together the findings in this study collectively suggest that the overall level of tangible actions by the board and senior management to engage in leadership of ERM processes are significant factors that help explain greater ERM maturity, in line with an agency theory perspective that boards substantively use ERM to oversee management's risk taking actions. We also find that, not only does ERM help boards in their risk governance oversight responsibilities, but the implementation of those key board and senior executive risk management processes are also associated with increased perceptions that ERM is an important strategic tool, consistent with resource dependence theory. Leadership and culture are important factors that help explain overall ERM maturity and its connection to strategy, and the explicit engagement of the board and management in specific risk management tasks and responsibilities are important dimensions to consider for ERM success.

The next section builds upon the findings of prior research to motivate the need for an explicit focus on the role of the board. That section is followed by an overview of different governance-related

theories that we use to develop our two primary research questions. We then provide an overview of the research design and analysis of results. We conclude with a summary of the key findings.

2. Background regarding increasing calls for risk oversight

Over the past decade many organizations have faced major risk events that have significantly impacted them in their pursuit of strategic value for key stakeholders. Events such as the collapse of Enron, WorldCom, Lehman Brothers, and MF Global, the terrorist attacks of September 11th, Hurricane Katrina, the explosion of disruptive technologies, turmoil surrounding currencies such as the Euro, political uncertainty in the Middle East, growing concerns about cyber security risks and the need for greater transparency about cyber related risks, and the recent economic crisis, among numerous others, have all highlighted the importance of having effective processes to identify, assess, and respond to major risk events affecting enterprise success.

In response to risk events such as these and others, a number of organizations have begun to evaluate their approaches to risk management to identify opportunities for improvement. Many of them have embraced the business paradigm of ERM to strengthen the organization's risk management processes. To assist management in determining what might constitute an effective risk management process, the Committee of Sponsoring Organizations of the Treadway Commission (COSO) issued in 2004 its *Enterprise Risk Management – Integrated Framework* to provide guidance about the key elements of an effective, top-down, enterprise-wide approach to risk management. COSO's 2004 Framework defines ERM as follows:

> *ERM is a process, effected by an entity's board of directors, management and other personnel, applied in strategy setting and across the enterprise, designed to identify potential events that may affect the entity, and manage risk to be within its risk appetite, to provide reasonable assurance regarding the achievement of entity objectives* (COSO, 2004).

Other organizations have issued similar frameworks, such as ISO's 31000 – *Risk Management Framework*, the United Kingdom's *Corporate Governance Code*, and Australia/New Zealand's 4360 *Risk Management*[1] standard. All of these frameworks emphasize the important leadership role of the board of directors and senior management in successfully implementing a robust risk management process (ISO, 2009; UK, 2012; AS/NZS, 2009).

A number of governance organizations have issued calls throughout the past decade to strengthen the organization's risk management processes, with a particular emphasis on the role of the board in risk oversight. In 2004, the NYSE revised its corporate governance rules to include explicit requirements for the audit committee of the board to "discuss policies with respect to risk assessment and risk management" (NYSE, 2004). While those rules placed responsibility for the management of risks on the CEO and senior management, they assign specific responsibility to the audit committee to govern the process by which risk management is conducted by management. Those rules allow boards to assign this governance responsibility through other board mechanisms other than the audit committee. Despite that, the majority of public company boards, even for non-NYSE registrants, have assigned their risk oversight responsibilities to the audit committee (COSO, 2010a; Deloitte, 2011).

In 2008, credit rating agencies, such as Standard & Poor's, began to announce expanded considerations in credit rating evaluations of processes used by management and the board in the oversight of risks for the organization (Standard and Poor's, 2008). Based on the belief that the strategic competence, operational effectiveness, and the ability to manage risks shape an enterprise's competitiveness in the marketplace and its ultimate success, credit rating agencies are now using evaluations of an organization's "management and governance" as one of the components in the assessment of the enterprise's creditworthiness (Standard and Poor's, 2012). The comprehensiveness of the organization's enterprise-wide risk management techniques and the board's overall oversight effectiveness are sub-components of their ratings evaluation.

[1] Originally issued in 1995 and revised in 2004 by the Standards New Zealand, the joint Australian/New Zealand Committee decided to not revise it in 2009 and instead promote ISO's 31000 – *Risk Management* standard.

To enhance the transparency of information about the board's role in risk oversight and to encourage more effective board risk oversight, the Securities and Exchange Commission (SEC) expanded its proxy disclosure rules effective March 1, 2010 (SEC, 2010). Those rules now require all SEC registrants to include disclosures in their annual proxy statements to shareholders about the board's role in risk oversight. Those disclosure rules now require all SEC registrants to describe how the board administers its risk oversight function, such as through the whole board, or through a separate risk committee and how the board oversees individuals who supervise the organization's day-to-day risk management responsibilities. Furthermore, the SEC's focus on risk continues as it explores enhancements in disclosures related to how entities manage cyber security related risks (SEC, 2011).

Consistent with these expectations, other industry specific regulations now focus on the board's oversight of risk. The Dodd-Frank legislation requires the creation of board risk committees for large financial institutions (U.S. Congress, 2010). Insurance regulators have adopted the National Association of Insurance Commissioner's "Risk Management and Own Risk and Solvency Assessment Model Act," which requires U.S. insurers to file annually with their state regulator a report that includes a summary of the insurer's risk management framework that includes an assessment of the risk culture and governance (NAIC, 2012).

Collectively, these emerging expectations focus on the role of the board of directors and executive management in the design and implementation of risk management processes that identify, assess, manage, and monitor risks affecting the enterprise. Consistent with these expectations and the COSO definition of ERM, the board and executive management play a major leadership role at the enterprise level in influencing management of specific risks (i.e., operational, compliance, reporting risks, etc.) by other managers and employees at lower levels of the organization. This view is confirmed by recent research that finds the level of top-down executive engagement and the resultant cascade of ERM culture throughout the firm is the most important aspect explaining valuation premiums for firms with more mature ERM (Farrell and Gallagher, 2014). Thus, the focus on the role of the board of directors and executive management is an important component of recent developments in risk oversight and an important motivator for research about the role of boards and executive management in ERM as examined in this study.

3. Theoretical development of research questions

From a theoretical perspective, institutional theory, developed in the sociology of organizations and organizational behavior literatures, suggests that, in the presence of these emerging expectations, regulations, and conceptual frameworks, a number of organizations may feel pressure to state that they have embraced and implemented ERM processes so that their organizations are in line with basic external expectations (Powell, 1991; Cohen et al., 2008). This may be a particularly prevalent view at the onset of an ERM process implementation. In doing so, however, they may implement only minimal aspects of ERM so that the organization is in form compliant with those expectations, but the board and management fail to substantively embrace specific and robust key elements of what would be deemed as effective enterprise-wide risk oversight. Institutional theory would suggest that organizations embrace the basics of ERM as symbolic gestures to all relevant parties, with little substantive intent.

In contrast, agency theory would argue that the expectations placed on boards for robust oversight of the risk-taking by management are consistent with the view throughout the corporate governance literature that the board plays a significant role on behalf of stakeholders in the oversight of management. Agency theory argues that the board serves in an important governance role by monitoring and overseeing management's actions to ensure those actions are aligned with shareholder interests (Fama and Jensen, 1983). In the context of risk management, boards play a significant role in overseeing management's risk-taking actions in their pursuit of value to ensure risks assumed are in line with shareholder appetite for risk-taking. As a result, ERM serves as an important corporate governance mechanism that constrains and coordinates managers' behavior (Baxter et al., 2013).

Consistent with this agency theory view of the importance of the board's role in governance, a number of boards have been instrumental in the embrace of ERM. Beasley et al. (2005) found that

the stage of ERM implementation is increasing as the independence of the board of directors is greater, and Beasley et al. (2012) find that out of 618 organizations surveyed (mostly U.S.), boards of directors are cited as the most common factor increasing senior executive focus on risk oversight, with the largest organizations especially emphasizing the board's influence. Kleffner et al. (2003) found that many Canadian companies adopting ERM also cited encouragement from the board of directors as a main factor underlying their adoption of ERM. Gordon et al. (2009) found that board monitoring (measured as board size scaled by firm size) is an important factor contributing positively toward the relationship of ERM and firm performance and Baxter et al. (2013) found a positive association of board tenure with ERM quality. While these prior studies demonstrate a connection between the board and ERM maturity and impact, little is known about whether actions explicitly related to risk oversight on the part of the board are associated with the level of ERM adoption.

While the board's role in ERM is oversight of the process, it is management's responsibility to design and implement ERM-related processes to identify, assess, and manage key risks to the enterprise. Thus, the board generally delegates responsibility for development and day-to-day leadership of ERM to management. Consistent with this view, Beasley et al. (2005) found that the presence of a chief risk officer and CEO/CFO support for ERM are positively associated with the implementation of ERM. Other studies examine firm characteristics that explain the decision to appoint a chief risk officer, generally finding that firm size, the extent of financial risk (greater leverage or greater volatility in cash flows), and the extent of institutional ownership are important determinants to appointing a CRO (Liebenberg and Hoyt, 2003; Pagach and Warr, 2011).

While prior research focuses on the role of the CRO in ERM leadership, we have little insight about other specific processes used by management to provide leadership of the entity's overall risk management process. Zimmerman (2001) notes that a key constraint on empirical research on management control systems is the lack of information on what corporations do internally. Part of that limitation is due to the fact that most of the prior work is based on external, publicly available data. We really do not know much about whether specific processes at the board of director and senior management level are associated with stronger perceptions of an overall ERM program level sophistication or robustness (which we refer to as ERM maturity) and whether certain board and management processes influence the strategic benefits of ERM.[2]

In the context of ERM, institutional theory would argue that few, if any, explicit and robust board and senior executive level processes would be in place in organizations claiming they have an effective or mature ERM program. In those situations, few elements of what regulators, conceptual frameworks, and best practices suggest should exist would be observed in organizations stating that they have embraced ERM. In essence, there would be little, if any, substance to their ERM.

In contrast, agency theory suggests that boards engage in ERM-related processes to aid them in the oversight of risk-taking on the part of management. Agency theory implies that boards will establish detailed and explicit oversight structures to oversee management's efforts to ensure the organization's ERM processes provide relevant information to assist the board in its oversight of risks taken by management. If boards are asking management to implement key elements of ERM processes to help the board increase its effectiveness in risk oversight on behalf of key stakeholders, we should be able to observe some evidence of active and robust board and senior-management levels of engagement in ERM activities. Thus, agency theory would argue that robust board and senior-management level engagement in ERM processes must be in place for effective risk oversight.

We are especially interested in exploring in greater depth whether the manner in which boards and management assign explicit risk management leadership responsibilities affects the level of ERM maturity within organizations. More robust level of engagement in explicit risk oversight activities would be consistent with agency theory and thereby help contribute to research on ERM by providing insights about internal processes organizations use to assign leadership responsibilities related to ERM maturity. Using data obtained from within organizations, we explore the following research question (RQ):

[2] Our use of ERM maturity in this context refers to the overall level of sophistication, robustness, stage of implementation, etc., of the ERM program as a whole.

RQ1: To what extent are explicit risk management processes at the board of director and/or senior management levels associated with varying levels of ERM maturity?

Consistent with COSO's definition of ERM as a process designed to increase the likelihood that organizational objectives are achieved, Nocco and Stulz (2006) argue that ERM can provide organizations competitive advantage and add value to shareholders by enabling management to quantify and manage the risk-return tradeoff that faces the entire firm. They argue that ERM helps the firm maintain access to the capital markets and other resources necessary to implement its strategy and business plan. As a result, there is growing support for the general argument that organizations will improve their performance by employing ERM (Gordon et al., 2009).

From a theoretical perspective, institutional theory would suggest that ERM is more form over substance and thus ERM would be viewed as providing little, if any strategic value. Thus, the lack of any association of explicit risk management processes at the board and senior executive levels with perceptions that ERM provides important strategic value would be consistent with an institutional theory view that the embrace of ERM is mostly symbolic.

In contrast, agency theory would argue that information generated by the ERM processes helps the board oversee risk-taking by management and that in turn provides important strategic value for the board in its governance role. However, because agency theory focuses more on activities that help the board monitor and control management, agency theory may only provide a partial view of how ERM intersects with the governance process.

Resource dependence theory, which is developed in the strategic management literature, focuses on the view that ERM as a governance mechanism provides a platform to help the organization achieve and further its strategic objectives (Pfeffer and Salancik, 1978; Boyd, 1990; Cohen et al., 2008). Resource dependence theory argues that shareholders rely on the board to implement explicit processes related to risk oversight to help set the strategy of the firm. Consistent with a resource dependence theory view of governance, ERM would also enhance an organization's long-term strategic success thereby adding value to the overall governance of the firm.

Prior research has examined the value proposition of ERM by examining a number of factors associated with market perceptions of ERM adoptions. For example, Beasley et al. (2008) find that significant equity market reactions to the announcements of the adoption of ERM for non-financial firms are associated positively with larger firms, firms with more volatile earnings, but negatively associated with the extent of leverage and cash on hand. In a subsequent study, Pagach and Warr (2011) find support for the hypothesis that firms adopt ERM for direct economic benefit rather than to merely comply with regulatory pressure.

Additional studies have examined the association of ERM maturity and firm performance. Hoyt and Liebenberg (2011) find a positive relation between firm value, as measured by Tobin's Q, and the use of ERM among insurance companies. Similarly, Farrell and Gallagher (2014) find that insurers that have reached more mature levels of ERM exhibit higher firm value, as measured by Tobin's Q. Others have demonstrated that the association is contingent on contextual factors surrounding the firm, including environmental uncertainty, industry competition, firm size, firm complexity, and board monitoring (Gordon et al., 2009; Grace et al., 2014). More recently, Baxter et al. (2013) find a significant positive market reaction to initial disclosures of credit rating agency assessments of ERM quality and they find a positive association of ERM quality and market performance during the market rebound following the recent financial crisis.

Collectively these studies document a positive association of external measures of ERM presence and firm performance and value creation, consistent with both agency theory and resource dependence theory. Unfortunately, these studies provide little insight as to what occurs internally within organizations at the board and management levels that might help explain how ERM might enhance firm performance and create value.

We know little about factors within organizations that might contribute to the perceptions of ERM as an important strategic tool. The absence of clear empirical evidence on the value of ERM programs continues to limit the growth of these programs (Hoyt and Liebenberg, 2011). Our study addresses this need by examining factors within organizations that are associated with stronger perceptions among boards and senior management about the strategic value provided by more robust risk oversight.

Implicit in the calls for greater board engagement in risk oversight is the expectation that more mature ERM processes and greater levels of board engagement in the oversight of top risk exposures should ultimately provide greater strategic value. Unfortunately, for some organizations ERM is perceived to be a compliance or bureaucratic activity with little strategic value, along the lines suggested by institutional theory. While prior research has demonstrated that ERM maturity is positively associated with firm performance and firm value, we know little about how firm characteristics, including the leadership responsibilities at the board and management levels, affect the perception of ERM as a strategic tool.

Using data obtained from within organizations, we also explore the following research question:

RQ2: To what extent are explicit risk management processes at the board of director and/or senior management levels associated with the perception that ERM is an important strategic tool?

4. Methodology

Data for this study was obtained through the administration of an identical online survey instrument during 2011 and again in 2012. The survey targeted members of the American Institute of Certified Public Accountants' (AICPA) Business, Industry, and Government Group and was directed to those individuals serving their organizations as the chief financial officer (CFO) or in other senior executive positions. Because audit committees of the board often assume responsibility for overseeing management's risk management process, they often turn to individuals on the management team who frequently interact with the audit committee to assume leadership of the risk management process at the management level. Thus, our focus on individuals in key finance positions within organizations is appropriate given that those individuals often provide risk management leadership in organizations (COSO, 2010b).

The range of positions held by the respondents across the two years of the survey is provided in Table 1, with individuals serving in CFO positions representing the majority of respondents. In total, we received 455 partially or fully completed surveys in 2011 and an additional 618 in 2012. We exclude 428 surveys because of incomplete responses, leaving 645 surveys with complete data for our work.

Survey respondents completed an online survey instrument consisting of over 40 questions that sought information about various aspects of risk oversight within their organizations.[3] Because the completion of the survey was voluntary, there is potential for bias if those choosing to respond differ significantly from those who did not respond.[4] Our study's results may be limited to the extent that such bias exists. Also, there is a high concentration of respondents representing financial reporting roles. There may be others leading the risk management effort within their organizations whose views are not captured in the responses we received. All survey responses were anonymous and all data used in this study, including demographic information such as firm size (revenues) and type of organization (public, private, not-for-profit), were self-reported by the survey participants and cannot be independently verified. Despite these limitations, we believe the responses we obtained provide a rich opportunity to explore information about internal processes at the board and management levels that are associated with more mature ERM programs and with ERM programs perceived to provide strategic advantage. We are not aware of any reason why a survey participant would willfully falsify their response(s) and we rely on the relatively large sample of observations we employ to minimize any such bias that may be introduced by such behavior.

[3] Survey respondents were asked to provide information about specific aspects of their organization's ERM process. To help respondents understand our use of the term "enterprise risk management (ERM)", the beginning of the survey instrument contained the COSO definition of ERM along with a notation that ERM in the context of the survey represents a formal process led by the organization's leaders, that is enterprise –wide and that addresses risks in a portfolio manner where risk interactions might be considered. The inclusion of this information helped reinforce that our survey was focused on ERM processes and not any specific type or definition of risk.

[4] We do not have data on how many survey requests were sent out. The Business, Industry and Government group of the AICPA managed the survey request process. Emailed requests for survey participation were sent by the AICPA to this membership group in both years.

Table 1
Profile of survey respondents.

	Number of respondents
Position held	
Chief Financial Officer	319
Treasurer	9
Chief Risk Officer (or equivalent)	24
Controller	103
Head of Internal Audit	74
Other/Did not respond	116
	645
Industries represented	
Finance, Insurance, Real Estate (SIC 60–67)	218
Manufacturing (SIC 20–39)	109
Not-for Profit (SIC N/A)	101
Services (SIC 70–89)	97
Construction (SIC 15–17)	35
Wholesale/Distribution (SIC 50–51)	32
Retail (SIC 52–59)	26
Transportation (SIC 40–49)	16
Mining (SIC 10–14)	11
	645
Fiscal year revenues	
\$0 < $x \leqslant$ \$5 million	60
\$5 million < $x \leqslant$ \$25 million	119
\$25 million < $x \leqslant$ \$100 million	97
\$100 million < $x \leqslant$ \$500 million	137
\$500 million < $x \leqslant$ \$1 billion	59
\$1 billion < $x \leqslant$ \$2 billion	48
\$2 billion < $x \leqslant$ \$5 billion	52
\$5 billion < $x \leqslant$ \$15 billion	31
$X >$ \$15 billion	42
	645

A broad range of industries and firm sizes (measured by fiscal year revenues) are represented by the respondents and are also provided in Table 1. Our greatest industry representation is finance, insurance and real estate, which comprise 33.8% of our sample, followed by manufacturing at 16.9%. Sixty-four percent of our sample organizations have revenues equal to or less than \$500 million. Six hundred ten (of 645) of the firms are U.S.-based and 145 of the 645 are public companies, with the remaining 500 privately held (untabulated). Because much of the prior research focuses exclusively on U.S. public companies, our study is able to provide unique insights about ERM in public and private organizations, including (to a limited extent) those based outside the U.S.

Most of our survey questions required participants to select a response from a five-point scale. For example, we asked participants to indicate their organization's current stage of ERM development and provided them with the following response options:

5 = Complete formal enterprise-wide risk management process in place, or
4 = Partial enterprise-wide risk management process in place (i.e., some, but not all, risk areas addressed), or
3 = No formal enterprise-wide risk management process in place, but have plans to implement one, or
2 = Currently investigating concept of enterprise-wide risk management, but have made no decision yet, or
1 = No enterprise-wide risk management process in place and no plans to implement one.

Some of our questions simply required a yes/no response. For example, we asked participants whether the full board reviews and discusses in a specific meeting the top risk exposures facing the organization. The response options were yes or no. The complete set of variables used to explore our two research questions are defined in Table 2.

Table 3 contains descriptive statistics for each of these variables. To develop our measure of ERM maturity, we combined responses to three different questions that addressed aspects of ERM maturity.[5] We do provide separate descriptive statistics for these three measures in Table 3. Our combined measure ranges in value from three to fourteen (one of the three questions had a four-point response scale while the other two ranged from one to five). Higher scores of our ERM maturity variable correspond to more mature and robust ERM processes relative to lower scores. Just under half (45%) of the boards have assigned formal responsibility for risk oversight to a board level committee (*Formal_Resp*) and 46% of boards receive information from management at least annually about top risk exposures (*Formrep_BOD*). About one-third of the organizations have appointed an individual to serve in a chief risk officer role or equivalent position (*Formal_CRO*) while 42% report having a management-level risk committee (*Mgtlevel_Riskcomm*).

5. Research design

Research question one (RQ1) examines the extent to which ERM program maturity is associated with the formal assignment of risk management leadership at the board of director or senior management levels. We used the variable *ERM_Maturity* as discussed above as our dependent variable. Our primary variables of interest focus on formal assignments of risk oversight at the board of director and senior management levels. In general, agency theory would suggest that more extensive board and senior management engagement in risk oversight tasks will be positively associated with increasing levels of ERM maturity, while institutional theory would suggest a lack of association with ERM maturity given lack of investment in substantive processes.

Five of our variables capture the level of board engagement in risk oversight, which we would expect to be associated with ERM maturity if boards are using ERM to manage the agency relationship.[6] *Formal_Resp* captures whether the board has assigned to one of its committees responsibility for overseeing management's risk assessment and risk management processes. Our expectation is that such assignment to a board level committee will be positively associated with ERM maturity. We include *Formrep_BOD*, which indicates whether or not management provides a formal report describing the entity's top risk exposures to a committee of the board, or the full board, at least annually. We expect *Formrep_BOD* to be positively associated with ERM maturity based on the view that periodic dialog and exchange of risk information between management and the board create risk management expectations from boards for management that helps management move toward more ERM maturity. We also include *Specific_Mtg*, which simply asked whether the full board reviewed and discussed top risk exposures at a specific board meeting. We expect this variable to be positively associated with more mature ERM programs given the increased board focus on risk that this variable indicates. These three variables are all dichotomous (yes = 1, no = 0).

Our fourth variable, *BOD_Ask*, captures the extent to which the board of directors has asked for increased senior management involvement in risk oversight. We expect that ERM maturity will be increasing in *BOD_Ask*. Finally, we include *Risk_Appetite*, which asked to what extent the organization has articulated a risk appetite or tolerance within the context of strategic planning. The formal development of a risk appetite statement is often argued to be a feature of more robust ERM programs.

[5] The three individual variables are defined in Table 2. They are *Current_Develop*, *Current_Stage*, and *Level_Maturity*. We felt that each variable captured some aspect of overall ERM program maturity. Individual regressions using each of these proxies for ERM maturity separately yield (untabulated) results that are qualitatively identical to our reported findings.

[6] While some boards may delegate aspects of risk oversight to specific board committees (i.e., audit committees, compensation committees, risk committees), we focus on processes at the full board of director level, given ultimate responsibility for risk oversight resides with the full board, consistent with a number of regulatory expectations and other board governance best practices.

Table 2
Variable definitions.

Dependent variable – research question one (RQ1)	
ERM_Maturity	Equals the sum of the scores on the three measures below
Current_Develop	Please indicate your organization's current stage of ERM development 5 = Complete formal enterprise-wide risk management process in place 4 = Partial enterprise-wide risk management process in place (i.e., some, but not all, risk areas addressed) 3 = No formal enterprise-wide risk management process in place, but have plans to implement one 2 = Currently investigating concept of enterprise-wide risk management, but have made no decision yet 1 = No enterprise-wide risk management process in place and no plans to implement one
Current_Stage	Please indicate which of the following statements best describes your organization's current stage of ERM implementation 4 = Our process is systematic, robust, and repeatable with regular reporting of top risk exposures to the board 3 = Our process is mostly informal and unstructured, with ad hoc reporting of aggregate risk exposures to the board 2 = We mostly track risks by individual categories/silos of risks, with minimal reporting of aggregate top risk exposures to the board 1 = There is no structured process for identifying and reporting top risk exposures to the board
Level_Maturity	What is the level of maturity of your organization's risk management oversight 5 = Robust 4 = Mature 3 = Evolving 2 = Developing 1 = Very immature
Dependent variable – research question two (RQ2)	
Strategic_Tool	To what extent do you believe the organization's risk management process is a proprietary strategic tool that provides unique competitive advantage 5 = Extensively 4 = Mostly 3 = Somewhat 2 = Minimally 1 = Not at All
Independent variables – board engagement variables	
Formal_Resp	Has the board of directors assigned to one of its committees formal responsibility for overseeing management's risk assessment and risk management processes
Formrep_BOD	Does management provide a formal report describing the entity's top risk exposures to a committee of the board of directors or the full board at least annually
Specific_Mtg	Does the full board review and discuss in a specific meeting the top risk exposures facing the organization Each of these variables used the following response scale: 1 = Yes 0 = No
BOD_Ask	To what extent has the board of directors asked for increased senior executive involvement in risk oversight
Risk_Appetite	To what extent has your organization articulated its appetite for or tolerance of risks in the context of strategic planning Each of these variables used the following response scale: 5 = Extensively 4 = Mostly 3 = Somewhat 2 = Minimally 1 = Not at All

(*continued on next page*)

Table 2 (*continued*)

Independent variables – management engagement variables	
Formal_CRO	Has your organization formally designated an individual to serve as the chief risk officer (CRO) or senior risk executive equivalent
Mgtlevel_Riskcomm	Does your organization have a management-level risk committee (or equivalent committee consisting of (at least some of) the entity's senior executives) that formally discusses enterprise level risk
Formal_Policy	Does your organization have a formal policy statement regarding its enterprise-wide approach to risk management
Explicit_Guide	Has your organization provided explicit guidelines or measures to business unit leaders on how to assess the impact of a risk event (e.g., assigning specific dollar measures of loss or effect on revenues/profits to specific impact rankings) Each of these variables used the following response scale: 1 = Yes 0 = No
MGT_Compensation	To what extent are risk management activities an explicit component in determining management performance compensation
Training	To what extent have senior executives and key business unit leaders received formal training and guidance on risk management in the last 2 years Each of these variables used the following response scale: 5 = Extensively 4 = Mostly 3 = Somewhat 2 = Minimally 1 = Not at All
Key_Risk_Updates	How frequently does your organization go through a dedicated process to update its key risk inventories 6 = Daily 5 = Weekly 4 = Monthly 3 = Quarterly 2 = Semi-Annually 1 = Annually 0 = Not at all
Independent variables – risk environment variables	
Risk_Volume	To what extent has the volume and complexity of risks increased for your organization over the past five years
Ext_Press	To what extent are external parties (e.g., investors, rating agencies, emerging best practices, etc.) applying pressure on senior executives to provide more information about risks affecting your organization
Sig_Oprisk	To what extent has your organization faced a significant operational surprise in the last 5 years Each of these variables used the following response scale: 5 = Extensively 4 = Mostly 3 = Somewhat 2 = Minimally 1 = Not at All
Risk_Culture	How would you describe the risk management culture at your organization 5 = Strongly risk seeking 4 = Risk seeking 3 = Risk neutral 2 = Risk averse 1 = Strongly risk averse

(*continued on next page*)

Table 2 (*continued*)

Independent variables – firm characteristics variables	
Revenues	Please indicate your organization's annual revenues for the most recent fiscal year
Year	2012 survey = 1, 2011 survey = 0
US_nonUS	Please select from the following the option that best describes your organization's operations 4 = Non-U.S.-based, with no U.S. operations 3 = Non-U.S.-based, with U.S. operations 2 = U.S.-based, with foreign operations 1 = U.S.-based, operating domestically only
Public	Public = 1, privately held = 0
Industry	The following industry choices were provided. Each industry is a separate variable with yes = 1, no = 0. Agriculture, Forestry, Fishing (SIC 01–09) Mining (SIC 10–14) Construction (SIC 15–17) Manufacturing (SIC 20–39) Transportation (SIC 40–49) Wholesale/Distribution (SIC 50–51) Retail (SIC 52–59) Finance, Insurance, Real Estate (SIC 60–67) Services (SIC 70–89) Not-for-profit organization

These last two variables are measured on a one-to-five point scale where five indicates an extensive request for senior management involvement and/or risk appetite development.

Seven additional variables of interest focus on the extent of formal assignment of responsibility for risk oversight at the senior management level. Our premise is that the maturity of ERM is contingent on the extent of leadership within management to help design and lead the implementation of ERM across the organization. Our focus on processes at the senior management level is supported by the finding by Farrell and Gallagher (2014) that top-level executive engagement is the most important determinant of valuation premiums for firms with more mature ERM. We are interested in understanding the nature of specific processes at the senior management level that might be associated with greater ERM maturity. If boards are using ERM to substantively oversee management's risk-taking actions, we would expect positive associations of these variables with ERM maturity.

Our first management engagement variable is *Formal_CRO* which asked if the respondent's organization has formally designated an individual to serve as CRO or senior risk executive equivalent. While a number of organizations have CROs who serve as internal risk management champions, some organizations assign risk management leadership responsibilities to a management-level risk committee. In some instances, risk committees exist as a substitute for a CRO while other organizations appoint CROs and also use management-level risk committees. As a result, we also include *Mgtlevel_Riskcomm* to capture whether the organization has a management-level risk committee that includes at least some of the entity's senior executives. Our third management engagement variable is *Formal_Policy*, which asked about the presence of a formal policy statement defining the entity's approach to enterprise-wide risk management. We also asked whether the organization provides explicit guidance in the form of risk assessment scales on how to assess the impact of a risk event—the variable *Explicit_Guide* captures this response. All four of these variables are dichotomous (yes = 1, no = 0) and we expect each of them to be positively associated with more mature ERM programs.

Three additional management engagement variables were also included in our analyses. *MGT_Compensation* asked about the extent to which risk management activities were an important element of determining management compensation. Linking compensation to risk management activities is often cited as a feature of more mature ERM programs. Because ERM is an evolving new business paradigm, there is not a consistent view on what it means (Kleffner et al., 2003). Based on the expectation that formal training in ERM at the management level should help management better understand the value proposition of more robust enterprise risk oversight, we use *Training* to capture the extent to which senior executives and key business unit leaders have received formal training and guidance on risk management in recent years. Our final management engagement variable is *Key_Risk_Updates*, which

Table 3
Descriptive statistics.

Variable	Mean	Std dev	Min	Qrtl1	Median	Qrtl3	Max
ERM_Maturity	8.00	3.18	3.0	5.0	8.0	10.0	14.0
Current_Develop	2.94	1.55	1.0	1.0	3.0	4.0	5.0
Current_Stage	2.53	1.09	1.0	2.0	3.0	3.0	4.0
Level_Maturity	2.53	1.03	1.0	2.0	3.0	3.0	5.0
Strategic_Tool	2.15	1.08	1.0	1.0	2.0	3.0	5.0
Formal_Resp	0.45	0.50	0.0	0.0	0.0	1.0	1.0
Formrep_BOD	0.46	0.50	0.0	0.0	0.0	1.0	1.0
Specific_Mtg	0.53	0.50	0.0	0.0	1.0	1.0	1.0
BOD_Ask	3.08	1.25	1.0	2.0	3.0	4.0	5.0
Risk_Appetite	2.96	1.06	1.0	2.0	3.0	4.0	5.0
Formal_CRO	0.32	0.47	0.0	0.0	0.0	1.0	1.0
Mgtlevel_Riskcomm	0.42	0.49	0.0	0.0	0.0	1.0	1.0
Formal_Policy	0.23	0.42	0.0	0.0	0.0	0.0	1.0
Explicit_Guide	0.25	0.43	0.0	0.0	0.0	0.0	1.0
MGT_Compensation	2.28	1.11	1.0	1.0	2.0	3.0	5.0
Training	2.08	1.01	1.0	1.0	2.0	3.0	5.0
Key_Risk_Updates	1.12	1.20	0.0	0.0	1.0	2.0	6.0
Risk_Volume	3.71	0.91	1.0	3.0	4.0	4.0	5.0
Ext_Press	2.98	1.18	1.0	2.0	3.0	4.0	5.0
Sig_Oprisk	3.15	1.08	1.0	2.0	3.0	4.0	5.0
Risk_Culture	3.47	0.87	1.0	3.0	4.0	4.0	5.0
Revenues	1497.5	4201	5.0	55	55	750	20,000
Year	0.57	0.50	0.0	0.0	1.0	1.0	1.0
US_nonUS	1.34	0.64	1.0	1.0	1.0	2.0	4.0
Public	0.24	0.42	0.0	0.0	0.0	0.0	1.0

$N = 645$ observations for all variables.
Variable definitions are in Table 2.
Revenues are in millions of USD.

captures the frequency by which the organization updates its key risk inventories. We expect all three of these additional variables to be positively associated with ERM maturity, if organizations engage in substantive ERM for risk oversight.

Four variables were included to control for the risk environment in which the organizations exist. A number of prior studies examining the extent of ERM adoption find that the overall risk environment surrounding the firm helps explain the level of ERM maturity (Beasley et al., 2008; Gordon et al., 2009; Pagach and Warr, 2011). Collectively they suggest that the risk context is associated with ERM adoption and its impact on firm performance. To capture information about the risk environment surrounding the organizations examined, we include *Risk_Volume* to control for the perceived volume and complexity of risks affecting the organization in the five years preceding the survey completion year. Similar to *Risk_Volume*, we include *Sig_Oprisk* which measures the extent to which the entity has experienced a significant operational surprise within the past five years (from the survey date).

We are uncertain about the expected relationship between *Risk_Volume*, *Sig_OpRisk* and ERM maturity. For some organizations, the perception that the volume and complexities of risks they face or operational surprises that have recently occurred may provide additional motivation to invest more in risk oversight. However, for others, greater volumes and complexity of risks or operational surprises may create significant implementation challenges that restrict ERM maturity.

In addition to the volume and complexities of risks or operational surprises affecting organizations, we also expect that the level of engagement in risk oversight is affected by the extent that the risk environment of the organization is influenced by external parties applying pressure on both boards and senior executives to provide more information about risks affecting the organization. We expect that increasing expectations by external parties affect the overall risk environment in which the board and management operate. As expectations increase, we expect more board and management

engagement in ERM and greater ERM maturity. As a result, we include *Ext_Press* to capture the extent of pressure for enhanced risk oversight from external parties (e.g., investors, rating agencies, emerging best practices) in the organization's overall risk environment. Our final risk environment variable, *Risk_Culture*, asked respondents to describe their organizations' risk culture and varied from "strongly risk seeking" (5) to "strongly risk averse" (1).

In addition to the risk environment, prior research consistently finds that firm size is an important factor associated with greater ERM maturity. In response, we include the variable *Revenues*, that represents the organization's most recent annual revenues.[7] We also included a dummy variable to control for the year in which the survey was completed (2012 = 1, 2011 = 0).[8]

Most of the prior research relies on external data about the organization to examine ERM adoption and the impact of ERM on firm value and performance. As a result, most of the firms included in the samples examined in those studies are U.S. publicly traded companies. Furthermore, a number of corporate governance expectations placed on the board of directors and management are explicitly tied to regulation of public companies. While many argue that a number of those expectations have been embraced as "best practices" for board risk oversight, the overall level of board and management engagement in risk oversight and the associated level of ERM maturity may differ across public and non-public organizations. Thus, we include *Public* in our models to control for whether the organization is a U.S. publicly traded company. Similarly we control for whether the organization is U.S.-based, given that the extent of ERM maturity and board and management engagement in risk oversight may differ between U.S. and non-U.S. based entities. *US_nonUS* controls for location.

Finally, a number of prior studies demonstrate that ERM adoption may be industry specific (Liebenberg and Hoyt, 2003; Beasley et al., 2005, 2008). As a result, we run each regression with and without industry dummy variables to ensure that our conclusions are not influenced by their omission (our primary results are discussed without these additional industry control variables—the results with and without the industry dummies are virtually identical). In tests of both RQ1 and RQ2, no industry dummy variables are found to be significant.

We provide in Table 4 Pearson correlation coefficients for the full set of independent variables we employ (except for the industry dummy variables). As might be expected, there is significant correlation among the full set of variables. Only two variables, *Sig_Oprisk* and *Risk_Culture*, display low levels of correlation with the others in a majority of the pairwise comparisons.

6. Results

6.1. Results related to RQ1

Table 5 contains the results of the multinomial probit regression of the following model:

$$\begin{aligned} ERM\_Maturity = {} & \beta_0 + \beta_1\ Formal\_Resp + \beta_2\ Formrep\_BOD + \beta_3\ Specific\_Mtg + \beta_4\ BOD\_Ask \\ & + \beta_5\ Risk\_Appetite + \beta_6\ Formal\_CRO + \beta_7\ Mgtlevel\_Riskcomm \\ & + \beta_8\ Formal\_Policy + \beta_9\ Explicit\_Guide + \beta_{10}\ MGT\_Compensation + \beta_{11}\ Training \\ & + \beta_{12}\ Key\_Risk\_Updates + \beta_{13}\ Risk\_Volume + \beta_{14}\ Ext\_Press + \beta_{15}\ Sig\_Oprisk \\ & + \beta_{16}\ Risk\_Culture + \beta_{17}\ Revenues + \beta_{18}\ Year + \beta_{19}\ US\_nonUS + \beta_{20}\ Public + \varepsilon \end{aligned}$$

We employ multinomial probit regression due to the categorical nature of the dependent variable, *ERM_Maturity*. Polychotomous dependent variables require specialized estimation given the limited outcomes available (for *ERM_Maturity* the values range from 3 to 14). While more computationally

[7] The survey asked respondents to choose the range of values that their organization's revenues fell within. Nine ranges were provided. The midpoint of the indicated range was used in our analyses.

[8] The predictive value of leverage on the maturity of ERM is ambiguous (Hoyt and Liebenberg, 2011). While prior research (e.g., Beasley et al., 2008) suggests that the extent of leverage may impact ERM adoption, other studies (Pagach and Warr, 2011) do not find an association between leverage and ERM embrace. Our dataset does not allow us to include information about the extent of leverage for the sample firms and given the anonymity associated with survey participation, we are unable to subsequently capture measures of leverage in our analysis.

Table 4
Pearson correlation coefficients.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Formal_Resp (1)	1.00														
Formrep_BOD (2)	0.42	1.00													
Specific_Mtg (3)	0.21	0.46	1.00												
BOD_Ask (4)	0.40	0.38	0.36	1.00											
Risk_Appetite (5)	0.31	0.37	0.33	0.39	1.00										
Formal_CRO (6)	0.41	0.37	0.27	0.30	0.31	1.00									
Mgtlevel_Rskcom (7)	0.51	0.44	0.24	0.35	0.36	0.50	1.00								
Formal Policy (8)	0.38	0.47	0.28	0.34	0.35	0.46	0.46	1.00							
Explicit_Guide (9)	0.32	0.43	0.28	0.32	0.30	0.29	0.39	0.38	1.00						
MGT_Comp (10)	0.36	0.38	0.35	0.38	0.57	0.39	0.41	0.38	0.38	1.00					
Training (11)	0.40	0.47	0.34	0.40	0.41	0.37	0.43	0.48	0.44	0.52	1.00				
Key_Risk_Up (12)	0.30	0.42	0.28	0.31	0.30	0.28	0.34	0.29	0.31	0.30	0.36	1.00			
Risk_Volume (13)	0.17	0.15	0.18	0.38	0.18	0.20	0.24	0.17	0.13	0.19	0.23	0.21	1.00		
Ext_Press (14)	0.31	0.30	0.26	0.47	0.33	0.36	0.34	0.30	0.21	0.36	0.36	0.23	0.45	1.00	
Sig_Oprisk (15)	**0.05**	**0.00**	**0.06**	0.26	0.08	**0.07**	**0.07**	**0.01**	**0.04**	0.10	**0.02**	**0.01**	0.47	0.34	1.00
Risk_Culture (16)	0.12	0.14	**0.06**	0.09	0.15	0.12	0.12	0.16	**0.07**	0.15	0.16	**0.03**	**0.05**	**0.03**	**0.08**
Revenues (17)	0.24	0.26	0.21	0.22	0.12	0.24	0.23	0.19	0.19	0.21	0.19	0.16	**0.08**	0.15	**0.04**
Year (18)	0.17	0.10	0.10	0.11	**0.04**	0.14	0.14	0.13	0.14	0.10	0.12	0.12	0.10	**0.06**	**0.03**
US_NonUS (19)	0.10	0.20	**0.07**	0.14	**0.05**	**0.00**	**0.04**	**0.07**	0.16	**0.08**	**0.07**	0.15	**0.05**	**0.06**	0.10
Public (20)	0.35	0.35	0.27	0.28	0.14	0.25	0.27	0.28	0.22	0.20	0.25	0.26	0.13	0.18	0.09
	(16)	(17)	(18)	(19)	(20)										
Risk_Culture (16)	1.00														
Revenues (17)	**0.04**	1.00													
Year (18)	**0.04**	0.12	1.00												
US_NonUS (19)	**0.07**	0.28	0.11	1.00											
Public (20)	**0.03**	0.37	0.15	0.21	1.00										

Insignificant correlations (where $p > .05$) are bolded.

intensive than a multinomial logit model, multinomial probit is preferred in this setting because it allows for correlation of error terms across alternative values of the dependent variable (Kennedy, 1989). Overall, we find that our proxy for the level of maturity/rigor of ERM programs in place at respondent organizations is positively associated with the level of board of director and senior management engagement in risk oversight activities.[9] The likelihood ratio (LR) Chi Square test indicates an excellent model fit (Pr > ChiSq = 1.000).

We find that boards that formally assign risk oversight to a board committee are positively associated with increasing levels of ERM maturity, as evidenced by the significant coefficient ($p < .0001$) for *Formal_Resp* as reported in Table 5. Similarly, boards of organizations with greater ERM maturity are significantly more likely to be receiving formal reports from management describing the entity's top risk exposures at least annually, as evidenced by the significant coefficient ($p < .0001$) for *Formrep_BOD*. We also observe a significant relationship between ERM maturity and the presence of an articulated risk appetite as it relates to strategic planning. The variable *Risk_Appetite* is significantly associated ($p = .0005$) with ERM program maturity. Collectively, these findings suggest that the level of formal board responsibility and engagement in identifiable risk oversight activities at the board level is positively associated with ERM program maturity. That is, firms with more mature ERM processes are associated with boards of directors that assign responsibility for risk oversight to a board committee, that receive at least annually from management descriptions of the top risk exposures and that have articulated a risk appetite as they develop their organizations' strategic direction. These findings of explicit and robust board level risk oversight processes suggest that boards are

[9] Note that the SAS *PROC PROBIT* procedure models the probabilities of levels of the dependent variable having lower ordered values. Thus, a *negative* coefficient should be interpreted as a *positive* association. In our tabulated results we have reversed the signs of the coefficient estimates to allow for a clearer interpretation.

Table 5
Research question one – multinomial probit regression. $ERM\_Maturity = \beta_0 + \beta_1\ Formal\_Resp + \beta_2\ Formrep\_BOD + \beta_3\ Specific\_Mtg + \beta_4\ BOD\_Ask + \beta_5\ Risk\_Appetite + \beta_6\ Formal\_CRO + \beta_7\ Mgtlevel\_Riskcomm + \beta_8\ Formal\_Policy + \beta_9\ Explicit\_Guide + \beta_{10}\ MGT\_Compensation + \beta_{11}\ Training + \beta_{12}\ Key\_Risk\_Updates + \beta_{13}\ Risk\_Volume + \beta_{14}\ Ext\_Press + \beta_{15}\ Sig\_Oprisk + \beta_{16}\ Risk\_Culture + \beta_{17}\ Revenues + \beta_{18}\ Year + \beta_{19}\ US\_nonUS + \beta_{20}\ Public + \varepsilon$

	Est. coefficient	Std. error	Est. coefficient	Std. error
Board engagement variables				
Formal_Resp	0.5046	.1039***	0.5158	.1053***
Formrep_BOD	0.8537	.1140***	0.8504	.1158***
Specific_Mtg	0.1150	.0971	0.1292	.0986
BOD_Ask	0.0738	.0425*	0.0757	.0432*
Risk_Appetite	0.1735	.0500***	0.1835	.0505***
Management engagement variables				
Formal_CRO	0.0591	.1094	0.0667	.1106
Mgtlevel_Riskcomm	0.3780	.1098***	0.3915	.1117***
Formal_Policy	0.3832	.1257***	0.4046	.1278***
Explicit_Guide	0.3770	.1129***	0.3849	.1144***
MGT_Compensation	−0.0230	.0500	−0.0247	.0504
Training	0.2790	.0547***	0.2903	.0553***
Key_Risk_Updates	0.1261	.0394***	0.1420	.0398***
Risk environment variables				
Risk_Volume	0.0661	.0567	0.0518	.0573
Ext_Press	0.0233	.0443	0.0361	.0471
Sig_Oprisk	−0.0336	.0447	−0.0215	.0454
Risk_Culture	0.0018	.0494	−0.0025	.0498
Firm characteristics variables				
Revenues	0.0000	.0000***	0.0000	.0000***
Year	−0.0028	.0853	−0.0113	.0863
US_nonUS	−0.2375	.0694***	−0.1953	.0721***
Public	0.0328	.1113	0.0737	.1143
Industry indicator variables				
Agricultural			−0.3817	.6018
Mining			−0.2142	.3529
Construction			−0.1340	.2194
Manufacturing			−0.2304	.1516
Transportation			−0.1979	.2884
Wholesale			−0.2550	.2223
Retail			−0.0536	.2365
Finance, Insurance, RE			−0.1246	.1304
Services			−0.0246	.1519
Not-for-Profit			−0.4931	1.0330
N = 645				
Likelihood ratio chi square value:	2473.22 (Pr > ChiSq = 1.000)		2464.44 (Pr > ChiSq = 1.000)	

Variable definitions are in Table 2.
Note: The SAS *PROC PROBIT* procedure models the probabilities of levels of the dependent variable having lower ordered values. For clarity, we have reversed the signs to indicate positive associations.
* Significance at the 10%, level, based on Wald Chi-square tests.
** Significance at the 5%, level, based on Wald Chi-square tests.
*** Significance at the 1%, level, based on Wald Chi-square tests.

substantively engaging in ERM activities to oversee risk-taking on the part of management, which is more consistent with an agency theory versus institutional theory view of ERM.

Consistent with the results related to the association of board engagement in risk oversight tasks, we also find that the extent of ERM maturity/rigor is positively associated with the level of risk management activities among management. We find that the level of ERM maturity is increasing for organizations that have established management-level risk committees that formally discuss enterprise level risks as evidenced by the statistically significant coefficient for *Mgtlevel_Riskcomm* ($p < .0006$). As well, we find that those organizations that have developed a formal policy statement regarding its enterprise-wide approach to risk management have more mature ERM programs in

Table 6
Research question two – multinomial probit regression. $Strategic\_Tool = \beta_0 + \beta_1\ Formal\_Resp + \beta_2\ Formrep\_BOD + \beta_3\ Specific\_Mtg + \beta_4\ BOD\_Ask + \beta_5\ Risk\_Appetite + \beta_6\ Formal\_CRO + \beta_7\ Mgtlevel\_Riskcomm + \beta_8\ Formal\_Policy + \beta_9\ Explicit\_Guide + \beta_{10}\ MGT\_Compensation + \beta_{11}\ Training + \beta_{12}\ Key\_Risk\_Updates + \beta_{13}\ Risk\_Volume + \beta_{14}\ Ext\_Press + \beta_{15}\ Sig\_Oprisk + \beta_{16}\ Risk\_Culture + \beta_{17}\ Revenues + \beta_{18}\ Year + \beta_{19}\ US\_nonUS + \beta_{20}\ Public + \varepsilon$

	Est. coefficient	Std. error	Est. coefficient	Std. error
Board engagement variables				
Formal_Resp	0.0782	.1113	0.0897	.1256
Formrep_BOD	0.3470	.1191***	0.3338	.1344***
Specific_Mtg	0.1623	.1047	0.1478	.1088
BOD_Ask	0.0463	.0461	0.0329	.0511
Risk_Appetite	0.1314	.0537**	0.1206	.0628**
Management engagement variables				
Formal_CRO	−0.0535	.1167	−0.0663	.1265
Mgtlevel_Riskcomm	0.2622	.1168**	0.2479	.1217**
Formal_Policy	−0.0888	.1297	−0.0659	.1378
Explicit_Guide	0.0711	.1170	0.0916	.1244
MGT_Compensation	0.1518	.0530***	0.1527	.0604***
Training	0.2627	.0580***	0.2638	.0627***
Key_Risk_Updates	0.0806	.0415*	0.0828	.0498*
Risk environment variables				
Risk_Volume	0.0445	.0616	0.0352	.0673
Ext_Press	−0.0208	.0479	−0.0042	.0521
Sig_Oprisk	−0.0536	.0485	−0.0567	.0574
Risk_Culture	−0.0827	.0527	−0.0779	.0569
Firm characteristics variables				
Revenues	0.0000	.0000***	0.0000	.0000***
Year	−0.0141	.0922	−0.0102	.1005
US_nonUS	−0.0090	.0748	−0.0021	.0821
Public	−0.2572	.1194**	−0.2587	.1255**
Industry indicator variables				
Agricultural			0.8759	.7026
Mining			0.5365	.3752
Construction			0.1305	.2456
Manufacturing			−0.2005	.1741
Transportation			−0.1681	.3362
Wholesale			−0.0468	.2536
Retail			0.2908	.2641
Finance, Insurance, RE			−0.0156	.1438
Services			0.1605	.1725
Not-for-Profit			−0.0823	1.1556
N = 645				
Likelihood ratio chi square value:	1508.13 (Pr > ChiSq = 1.000)		1524.48 (Pr > ChiSq = 1.000)	

Variable definitions are in Table 2.
Note: The SAS *PROC PROBIT* procedure models the probabilities of levels of the dependent variable having lower ordered values. For clarity, we have reversed the signs to indicate positive associations.
* Significance at the 10%, level, based on Wald Chi-square tests.
** Significance at the 5%, level, based on Wald Chi-square tests.
*** Significance at the 1%, level, based on Wald Chi-square tests.

place. Our variable, *Formal_Policy*, is significantly associated ($p = .0023$) with ERM maturity. We also find that ERM maturity is increasing for organizations that provide explicit guidance to business unit leaders when they assess the impact of a risk event. *Explicit_Guide* is found to be significantly associated ($p = .0008$) with our measure of ERM program maturity. Interestingly, we did not find a significant association between ERM maturity and the formal designation of an individual to serve as chief risk officer (CRO).

Two additional management engagement variables, *Training* and *Key_Risk_Updates*, are significantly associated with more advanced ERM programs. Organizations whose senior executives and key

business leaders have received formal training and guidance on risk management in the past two years have more mature ERM programs. We find a strong association ($p < .0001$) between *Training* and ERM maturity. Likewise, organizations that have developed a dedicated process to frequently update their inventory of key risks have more mature ERM programs. Specifically, we find that *Key_Risk_Updates* is significantly associated ($p = .0013$) with ERM maturity. Together, these results suggest that the engagement of senior management in important risk management activities such as the development of a formal policy statement on risk management and explicit guidance on how to measure the impact of a risk event, formal training activities, and updating of key risk inventories on a frequent basis help explain greater ERM program maturity.

We do not find any association of ERM maturity/rigor with the nature of the risk environment in which the organization operates. The extent of the volume and complexity of risks, the presence of significant operational surprises in preceding years, the extent of external pressures from investors, regulators, and others, as well as the identified risk culture of the organization are not significantly associated with the extent of ERM maturity, when examined in concert with the internal process variables previously discussed.

We also include control variables for specific firm characteristics such as firm size (*Revenues*), location (*US_nonUS*), available information (*Public*), and whether the data was collected in 2011 or 2012 (*Year*). As discussed previously, we also include a set of indicator variables for industry—these results are qualitatively identical to those results with these additional variables omitted, with no significant industry effects. In RQ1 we find no significant effects for *Public* or *Year*. We find that *Revenues* is positively significant ($p = .0002$), providing evidence that larger firms are more likely to be associated with more well-developed ERM processes, consistent with a number of prior studies. We also find evidence that U.S. based firms in our sample are more likely to have mature ERM programs (*US_NonUS* is significant at $p = .0006$).[10]

6.2. Results related to RQ2

As discussed previously, Nocco and Stulz (2006) argue that ERM helps the organization maintain access to the capital markets and other resources necessary to implement its strategy and business plan. While the results for RQ1 tell us that more engaged boards and senior executive teams in risk oversight activities are associated with more mature ERM, we are uncertain whether those actions actually contribute to strategic success of the organization. To get a sense for whether components of a mature ERM process actually contribute to strategic benefit as argued by resource dependence theory, we employ the same set of independent variables from RQ1 on a new dependent variable, *Strategic_Tool*. That variable captures the extent to which ERM is viewed as a proprietary tool which provides a unique competitive advantage for the organization.

Table 6 contains the regression results for the following multinomial probit model:

$$\begin{aligned} Strategic\_Tool = {} & \beta_0 + \beta_1\ Formal\_Resp + \beta_2\ Formrep\_BOD + \beta_3\ Specific\_Mtg + \beta_4\ BOD\_Ask \\ & + \beta_5\ Risk\_Appetite + \beta_6\ Formal\_CRO + \beta_7\ Mgtlevel\_Riskcomm \\ & + \beta_8\ Formal\_Policy + \beta_9\ Explicit\_Guide + \beta_{10}\ MGT\_Compensation + \beta_{11}\ Training \\ & + \beta_{12}\ Key\_Risk\_Updates + \beta_{13}\ Risk\_Volume + \beta_{14}\ Ext\_Press + \beta_{15}\ Sig\_Oprisk \\ & + \beta_{16}\ Risk\_Culture + \beta_{17}\ Revenues + \beta_{18}\ Year + \beta_{19}\ US\_nonUS + \beta_{20}\ Public + \varepsilon \end{aligned}$$

As in RQ1, we employ multinomial probit regression due to the polychotomous nature of the dependent variable.[11] Of particular note is our finding that tying management compensation to risk management activities seems to contribute to the perception of strategic benefit. This association was not observed in RQ1 with respect to ERM maturity. The likelihood ratio (LR) Chi Square test indicates an excellent model fit (Pr > ChiSq = 1.000).

[10] Note that a *smaller* value on this independent variable reflects a U.S. based entity. Hence, the negative association is consistent with more mature ERM within U.S. based respondents.

[11] *Strategic_Tool* ranges in value from 1 to 5, as discussed in Table 2.

For our panel of board engagement variables, only two (*Formrep_BOD* and *Risk_Appetite*) are found to have a significant association with perceptions of enhanced value from ERM (as proxied by the perception of competitive advantage). *Formrep_BOD* is significant at the $p = .0036$ level while *Risk_Appetite* has a slightly less strong association ($p = .0144$). Our remaining board engagement variables (*Formal_Resp*, *Specific_Mtg*, and *BOD_Ask*) do not reveal significant associations with the perception that ERM is an important strategic tool for the organization.

For our panel of management engagement variables, we find three to have no association with enhanced value via strategic advantage. These are *Formal_CRO*, *Formal_Policy*, and *Explicit_Guide*. The four remaining variables demonstrate varying levels of significance. The presence of a management-level risk committee (*MGTLevel_Riskcomm*) is associated ($p = .0247$) with perceptions of strategic benefit and the provision of recent training and guidance on risk management to senior executives (*Training*) is strongly associated ($p < .0001$) with such perceptions. We also find weak evidence that frequent updating of key risk inventories (*Key_Risk_Updates*) is associated ($p = .0520$) with enhanced ERM program value. Most interestingly, we find that an explicit linkage between risk management activities and executive compensation yields a strong association with the view that ERM provides an important strategic competitive edge. Specifically, we find that *MGT_Compensation* is strongly associated ($p = .0042$) with *Strategic_Tool*. Thus, ERM related training and linking risk management activities to compensation impact ERM's strategic value, in addition to more frequent updates of risk inventory information.

As in RQ1, we do not find any association of ERM maturity/rigor with the nature of the risk environment in which the organization operates. The extent of the volume and complexity of risks, the presence of significant operational surprises in preceding years, the extent of external pressures from investors, regulators, and others, and risk culture of the organization are not significantly associated with the perception that ERM adds value in the form of strategic advantage.

We also include control variables for the same set of firm specific characteristics as in RQ1. Also, as in RQ1, we included a set of indicator variables for industry—these results are qualitatively identical to those reported with these variables omitted, with no significant industry effects. In RQ2, we find no significant effects for *US_NonUs* or *Year*. We find that *Revenues* is positively significant ($p = .0083$), providing evidence that larger firms are more likely to identify ERM as a proprietary strategic tool vis-à-vis smaller firms. In an interesting finding, we observe that *private* firms appear to view ERM as potentially value-enhancing more so than public firms. The association is significant ($p = .0312$) and suggests that, after controlling for other characteristics, private firms that have invested in ERM development perceive those investments to be delivering on their promise—namely enhanced strategic benefit.

Overall, the results in Table 6 related to RQ2 find evidence that some of the explicit board and senior management processes are associated with ERM programs that are providing strategic value, consistent with resource dependence theory. Thus, while our study, combined with some of the earlier research related to ERM, supports an agency theory perspective of ERM, our findings related to the strategic value of ERM finds some evidence that ERM is also providing some strategic value, as suggested by resource dependence theory.

7. Supplemental analysis

As discussed previously, a sizable subset of our sample firms (33.8%) comes from the financial services sector. This industry is differentiated by significant regulatory oversight vis-à-vis our remaining sample firms. Because previous research finds more notable market reactions to ERM announcements for non-financial services firms relative to financial services firms, we conducted our first supplemental analysis by dividing our sample into financial services (FS) firms (218 firms) and all others (427 firms) (Beasley et al., 2008). We reran RQ1 and RQ2 regressions on these two subsamples separately in order to highlight any differences that may result from this classification. Our findings suggest that there is a marked difference between the two subsamples with respect to RQ1 (but not RQ2). Specifically, for ERM program maturity (RQ1), we find that *all five* of the board engagement variables are significant for the non-FS subsample while *only two* of the five are significant for the FS subsample.

Table 7
Supplemental analysis of RQ1 and RQ2. *ERM_Maturity* = $\beta_0 + \beta_1$ *Formal_Resp* + β_2 *Formrep_BOD* + β_3 *Specific_Mtg* + β_4 *BOD_Ask* + β_5 *Risk_Appetite* + β_6 *Formal_CRO* + β_7 *Mgtlevel_Riskcomm* + β_8 *Formal_Policy* + β_9 *Explicit_Guide* + β_{10} *MGT_Compensation*-or-*Strategic_Tool* = $+\beta_{11}$ *Training* + β_{12} *Key_Risk_Updates* + β_{13} *Risk_Volume* + β_{14} *Ext_Press* + β_{15} *Sig_Oprisk* + β_{16} *Risk_Culture* + β_{17} *Revenues* + β_{18} *Year* + β_{19} *US_nonUS* + β_{20} *Public* + ε

	ERM_Maturity		*Strategic_Tool*	
	FS firms	Non-FS firms	FS firms	Non-FS firms
Board engagement variables				
Formal_Resp	0.4586*	0.5083***	0.1727	0.0105
Formrep_BOD	1.0122***	0.6815***	0.3022	0.3483**
Specific_Mtg	−0.0120	0.2214*	0.0319	0.2207*
BOD_Ask	0.0547	0.1035**	−0.0755	0.0961*
Risk_Appetite	0.1553	0.1702***	0.1749*	0.1123*
Management engagement variables				
Formal_CRO	−0.1704	0.2980**	−0.0730	−0.0089
Mgtlevel_Riskcomm	0.5669**	0.4004***	0.4399**	0.2153
Formal_Policy	0.5897**	0.3083*	−0.1249	0.0040
Explicit_Guide	0.3836	0.2892*	0.0047	0.1393
MGT_Compensation	0.0619	−0.0443	0.1573*	0.1689**
Training	0.2303*	0.2887***	0.4285***	0.1689**
Key_Risk_Updates	0.1345	0.0809*	0.0646	0.0815
Risk environment variables				
Risk_Volume	0.1374	0.0251	−0.0694	0.0851
Ext_Press	−0.0014	0.0510	0.0074	−0.0310
Sig_Oprisk	−0.1039	−0.0119	−0.0342	−0.0695
Risk_Culture	−0.0021	−0.0008	−0.0440	−0.1051
Firm characteristics variables				
Revenues	0.0001*	0.0000	0.0000	0.0000**
Year	0.1724	−0.0386	0.0726	−0.0614
US_nonUS	−0.3727**	−0.0345	0.0844	−0.0344
Public	0.0907	0.0421	−0.2371	−0.2578
	N = 218	*N* = 427	*N* = 218	*N* = 427
Likelihood ratio chi square value:	774.87#	1660.13#	514.97#	964.25#

FS firms consist of all sample firms with two-digit SIC codes of 60–67 (financial services).
Non-FS firms consist of all sample firms excluding those with two-digit SIC codes of 60–67.
Variable definitions are in Table 2.
Note: The SAS *PROC PROBIT* procedure models the probabilities of levels of the dependent variable having lower ordered values. For clarity, we have reversed the signs to indicate positive associations.
# Indicates a Pr > ChiSq = 1.0000.
* Significance at the 10%, level, based on Wald Chi-square tests.
** Significance at the 5%, level, based on Wald Chi-square tests.
*** Significance at the 1%, level, based on Wald Chi-square tests.

In addition, *six* of the seven management engagement variables are significant for the non-FS subsample while *only three* of the seven are significant for the FS subsample.

We attribute these findings to the possibility that for the heavily regulated financial services firms in our sample, institutional theory may explain many ERM adoptions (that is, ERM in name only). For non-FS firms, where regulatory scrutiny is likely to be less intense, ERM adoption and maturity may be better explained by agency theory. Here we would expect to observe the significant associations between the dependent variable and the collection of board and management engagement variables we include in our model. Table 7 contains the results for both RQ1 and RQ2 when we separately investigate FS firms and non-FS firms.

The results for RQ2 are not as striking. While we do observe more statistically significant board engagement variables for the non-FS firms relative to the financial services, three of the four variables are only weakly significant. In addition, for the set of management engagement variables we observe three significant variables for the FS firms while only two of these variables are significant for the non-FS subsample. As discussed at length earlier, whether investments in ERM translate to strategic

advantage (RQ2) is a separate issue versus the maturity of the ERM program (RQ1). Hence, these disparate results, which parallel in many ways our findings for the full sample, are not surprising.

In a second supplemental analysis (untabulated), we explored whether the results for public firms (145 of the 645 sample firms) versus private firms (the remaining 500 firms) would also yield differences across the two research questions. The motivation for this second supplemental analysis is similar to the first, namely that public firms in general receive significant regulatory scrutiny as compared to private firms. Here, we find little difference in the results across the two subsamples.

8. Conclusions

Over the past decade, a number of governance related organizations, such as the NYSE, the SEC, credit rating agencies, and Congress, have issued calls for organizations to strengthen their overall risk management processes. Many of these calls have centered on the board of directors' role in risk oversight. In response, a number of boards have turned to senior management to strengthen the organization's risk management processes so the board is in a stronger position to oversee management's risk-taking actions in the pursuit of stakeholder value. In response, a number of organizations have embraced a holistic, top-down process widely known as enterprise risk management (ERM).

Ultimately, responsibility for the oversight of management's risk-taking actions is at the board of director level, given they have responsibility for overseeing the agency relationship between stakeholders and management. While some of the emerging academic research provides limited evidence about the board's influence on the adoption of ERM, little is known about how the board's level of engagement in specific risk oversight tasks is associated with the overall maturity of ERM within the organization and whether the ERM processes ultimately provide important strategic value for the organization.

This study provides important insights about board of director and senior management internal processes that are associated with more mature ERM programs and the usefulness of ERM as a strategic tool for competitive advantage. Consistent more with an agency theory versus institutional theory perspective of the role of ERM in governance, we find that boards that formally designate responsibility for risk oversight to a board level committee and boards that receive from management a formal report describing the entity's top risk exposures at least annually are significantly associated with more mature ERM programs. We also find that ERM maturity is positively associated with boards that have developed a risk appetite statement that articulates how risk is to be considered in the formulation of the strategic plan.

At the management level, formal training of senior executives about ERM and the creation of management-level risk committees are found to be strongly associated with ERM maturity. In addition, we find that the formalization of the process as evidenced by a formal risk management policy statement and the provision of explicit guidance in the risk assessment process are significantly associated with more mature ERM programs. Finally, we note that frequent updating of key risk inventories appears to be an important element of ERM maturity. These results are strongest for the subsample of firms outside the financial services industry.

Finally our study provides unique insights about internal perceptions of the value of ERM to the organization. While a number of prior studies document an association between ERM implementation and firm value or firm performance, our study provides perspective about internal process-related factors affecting the usefulness of ERM as an important strategic tool. We find that the perception of ERM as an important strategic tool is positively associated with many factors that are also elements of mature ERM programs, consistent with a resource dependence theory of governance. In addition, we identified a linkage between risk management activities and management compensation that suggests that tying compensation to specific risk management goals helps lead to perceptions of enhanced value. In short, we believe the results indicate that greater investment in risk information gathering processes and dedicated discussion about the information at the board level enhances the strategic value of ERM. We did not find a notable difference on this dimension when we examined financial service firms separately from non-financial services firms.

While we believe this study provides important new insights about processes internal to organizations affecting the maturity and usefulness of ERM, our study does have a number of

important limitations. First, respondents completed an online survey consisting of over 40 questions that sought information about various aspects of risk oversight within their organizations. Because the completion of the survey was voluntary, there is some potential for bias if those choosing to respond differ significantly from those who did not respond. Our study's results may be limited to the extent that such bias exists. Second, there is a high concentration of respondents representing financial reporting roles. Possibly there are others leading the risk management effort within their organizations whose views are not captured in the responses we received. Third, our study focuses on explicit ERM-related processes at the board of director and senior executive levels, but we are not able to examine risk management processes at lower levels of the organization. We believe greater understanding of how risk management processes related to specific risks (i.e., operational risks, compliance risks, financial reporting risks) are performed and aggregated to create an enterprise view of risks is an important avenue for future research. Finally, we do not have information about the length of time our sample firms may have been engaged in ERM processes. It is possible that organizations recently implementing ERM may have fewer board and senior management specific processes in place, consistent with institutional theory. To the extent our survey respondents are in more ERM mature firms, our study may be biased against findings consistent with institutional theory. Future research that captures information about length of time of ERM embrace may be able to shed insights about how time and experience affects the maturity and strategic value of ERM. Despite these limitations, we believe the responses we obtained provide a rich opportunity to explore the key drivers to ERM maturity levels and the extent to which ERM programs are integrated with the strategic planning process to achieve competitive advantage.

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