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Why firms implement risk governance – Stepping beyond traditional risk management to enterprise risk management



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A B S T R A C T

Stakeholders of firms have pushed for enterprise risk management (ERM) as a response to flawed risk management and corporate governance systems (Kirkpatrick, 2009). Previous studies explaining why ERM is implemented have been informative but overly simplified. The basic argument presented in this study is that ERM should be seen as a composition of traditional risk management and risk governance, each with their own determining factors. Implementation of risk governance is the active step beyond traditional risk management to ERM. This study addresses the complexity of ERM by dividing it into its traditional risk management and risk governance components and investigating the determinants of these components separately but simultaneously. Based on a survey of 145 firms, empirical evidence suggests that the level of risk governance in a firm is related to the size of the firm, leverage and dividend payments and the chief executive officer's influence on the board; this may suggest that corporate governance motives, like the need for governance, existing governance and the control a CEO has over governance decisions, determine the decision to take the step toward implementing ERM. This study is a step toward clarifying the existing ad hoc theoretical foundations of ERM and implies that firms are implementing ERM in accordance with stakeholder desires for better governance of the risk management system.

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1. Introduction

The recent financial crisis can partially be attributed to failures and weaknesses in corporate governance in firms; specifically, risk management systems failed in many cases due to these corporate governance flaws rather than technical risk estimation models and other traditional risk management techniques (Kirkpatrick, 2009). As a response, regulators, auditors, Boards and risk assessment agencies have pushed for more structured and integrated risk management as a way to increase control of the risk management system. The result is a push from many directions for the implementation of enterprise risk management (ERM).¹ However, it is not clear if firms are implementing ERM on a superficial basis simply to appease stakeholders or if it is a thoughtful attempt to enhance the governance of the risk management system.

In previous research the motives for ERM implementation are based on an ad hoc collection of theories. There is no consistency or agreement regarding the underlying theoretical foundation for ERM. Some focus on the relationship between corporate governance and ERM (Desender, 2011). Others refer to traditional capital market imperfections motivating traditional risk management activities such as hedging and corporate insurance demand (Liebenberg and Hoyt, 2003; Pagach and Warr, 2011) or a mixture of motives for risk management, motives for corporate governance, and practical motives (Beasley et al., 2005; Gordon et al., 2009). Pulling from existing literature, there are however two general overarching theoretical motives that are applied when motivating ERM implementation: motives for traditional risk management activities and motives for corporate governance. When empirically testing for determinants, ERM studies use all-encompassing proxies of ERM like the hiring of a CRO or similar risk management position (Liebenberg and Hoyt, 2003; Pagach and Warr, 2011), a survey response on the firm's level of implementation (Beasley et al., 2005), or an aggregated ERM score made up of a number of dimensions (Desender, 2011; Gordon et al., 2009). While these studies have been an informative first step, they fail to take into account the complex nature of ERM, and the motivations are practical and theoretically unorganized.

The basic argument of this study is that motives for ERM implementation can be better studied by more thoroughly addressing the complexity of ERM; the way to do this is by breaking ERM into its essential parts and identifying determinants of each part. ERM is principally synonymous with integration – taking a portfolio view of firm risks (Bromiley et al., 2015). Holistically managing a variety of risks requires a well governed system. ERM can fundamentally be seen as traditional risk management with the addition of risk governance.² A traditional risk management process entails individually or in a silo identifying risk, measuring risk, monitoring, and perhaps reporting on risk but with little formality, structure, or centralization; simple examples being an isolated group of individuals in the finance department hedging currency risk or a factory floor manager tracking incidents of injury on the job.

Risk governance as used in this study refers to the direction and control of the risk management system. Risk governance provides the structure of the risk management system and specifies responsibilities, authority, and accountability in the risk management system as well as the rules and procedures for making decisions in risk management. Risk governance is the marriage of corporate governance and risk management, and it is the identifying component of an enterprise risk management system. Aebi et al. (2012) also define the risk management-related corporate governance mechanisms of ERM as risk governance, and they refer to the hiring of a chief risk officer (CRO) and the line of reporting of that CRO. Risk governance is about encouraging a culture of risk-awareness throughout the firm, having an organizational structure to support the risk management system, and having in place governance mechanisms to oversee the system in a formal manner. ERM is a step beyond traditional risk management where additional efforts are made by the firm to unite the risk management process organizationally across internal systems, processes and people (Culp, 2001). Essentially, firms supplement the traditional risk management process with risk governance to achieve an integrated approach to risk management – ERM.

¹ Also referred to as integrated risk management, holistic risk management, strategic risk management, and consolidated risk management.

² Risk governance and holistic organization of risk management are interchangeable concepts.

Given that ERM is a composition of traditional risk management and risk governance, it would be expected that each component has its own determinants and therefore different theoretical explanations. The distinctive set of determinants for risk governance is of particular interest because they address a previously unasked question in the ERM literature: why do firms take the step beyond traditional risk management to ERM implementation by choosing to implement risk governance. Are firms implementing risk governance exclusively because of outside pressure and a desire to window-dress, because of additional capital market imperfection expenses that cannot be mitigated solely with traditional risk management, or because of a need for better governance?

In order to investigate this, public Nordic firms (145 in the final sample) are surveyed in order to get inside the firms and obtain extensive and detailed information on the implementation of risk management. Firms respond with information regarding their degree of implementation of 59 dimensions of ERM, 24 that are directly related to risk management and ERM; few other ERM studies have wide-ranging information like this. Underlying relationships in the implementation of these dimensions are investigated with exploratory factor analysis resulting in a breakdown of ERM into components; in fact, the survey data supports the separation into the two components: traditional risk management and risk governance. Distinct determinants of these two components are estimated simultaneously using structural equation modeling (SEM).

By breaking ERM down into its two fundamental components and using detailed survey data to measure the implementation of those components, the study acknowledges and takes into account the complexity of ERM which is overlooked in previous studies. Motives for traditional risk management and motives for corporate governance, which are referred to in an inconsistent and ad hoc manner in current literature, fall into place as determinants for the respective components. This brings a certain level of clarity to the theoretical foundation for ERM. It is then possible to investigate the motives for the step of implementing ERM distinct from the motives of simply managing risk.

The results of the study indicate that the two components of ERM do in fact have different determinants and that firms exhibit lower levels of risk governance when they are smaller in size, have higher levels of leverage and dividend payments, and have chief executive officers (CEOs) on the board. The study argues that these findings may be evidence that firms are taking the step of implementing ERM in order to address governance needs in the risk management system, specifically to monitor managers.

The article is organized as follows. In the next section, the two theoretical explanations for enterprise risk management implementation, traditional capital market imperfections and motives for corporate governance, are presented with some of their empirical support. The purpose of the discussion is to build the model tested in the study. In the following section, the methodology is presented with a brief discussion regarding the survey method and developed ERM component structure, followed by an overview of the variables used and the structural equation modeling estimation. Results and analysis follow with final conclusions in the end.

2. Background and conceptual framework

Though there are a number of working definitions of enterprise risk management, there does exist some consensus regarding what the purpose of ERM is: firm's take a portfolio view of risk instead of managing in silos, they take into account strategic and more qualitative risks, and the focus is not solely on the downside of risk but also opportunity (Bromiley et al., 2015). The move from silo organized risk management to more integrated risk management is one of the characteristic features of ERM. And while strategic and qualitative risks were always managed by someone, as Douglas Barlow said "all management is risk management", ERM prescribes that these risks be managed with all other firm risks holistically.

Occurring at the same time as the emphasis of the benefits of starting an ERM system in order to take a portfolio approach to risk management was the advancement in corporate governance standards to also take into account the risk management system (Kleffner et al., 2003). In order to support the complex integration of risks across the firm, more structure, organization, accountability, and communication in the risk management system was necessary. Risk governance (risk

management-related corporate governance mechanisms), like the chief risk officer position, is a structural tool used in order to integrate risks into a single message to senior executives (Aebi et al., 2012); essentially, risk governance supports the process of integrating risks. These structural aspects made ERM a natural solution to the pressures for better governance of the risk management system. ERM began growing in importance because of the increased attention to risk management in the context of corporate governance (Altuntas et al., 2011) creating a sort of shift in the focus of ERM from risk integration to risk governance.

This shift is reflected in announcements of CRO hirings; early announcements of positions of chief risk officer (CRO) focused on the positions role to identify, assess, report and support the management of risks, and recognize and evaluate total corporate risk. However, the perceived responsibility of the CRO changed in post-Enron corporate America into a role intended to put the accountability of risk management in place (Liebenberg and Hoyt, 2003). Risk governance has also become a central focus in ERM studies. For example, Aebi et al. (2012) investigate risk governance's relationship with bank performance and find evidence that firms with risk governance in place perform better than other banks. Many studies use the hiring of a CRO as a proxy of ERM (Beasley et al., 2008; Liebenberg and Hoyt, 2003; Pagach and Warr, 2011) which emphasizes the central importance of risk governance in ERM implementation. These studies make an implicit assumption that risk governance facilitates risk integration; nevertheless, it puts the governance aspect in central focus. In addition, a number of studies have identified that firms with ERM have better governance (Altuntas et al., 2011; Baxter et al., 2013; Gates, 2006). Baxter et al. (2013) argue that increased operating performance and earnings of ERM firms is attributed to investor perceptions of the credibility and persistence of earnings as a result of corporate governance.

While ERM's purpose of achieving risk integration is not under question here, the importance and centrality of risk governance is evident. Adding the risk governance element to more traditional risk management systems is the essential step to ERM implementation and aids the integration of risk management across the firm. The combination of managing all types of firm risk and a well governed system yields an integrated approach to risk management or ERM.

Fig. 1 depicts this conceptual breakdown of ERM into the components proposed; the relative size of each component is firm specific. Some firms may excel in risk governance and be considered exemplary ERM implementers; other firms may not have ERM implementation in which case they would have no risk governance and may have ad hoc, "small", traditional risk management.

The question is: why do some firms implement the additional component of risk governance instead of sticking with more ad hoc risk management practices. The use of theories in empirical studies of ERM determinants is inconsistent and ad hoc and often relies on practical motivations. However, there are two general overarching theoretical explanations for the implementation of ERM which can be pulled from the literature: traditional capital market imperfections and motives for corporate governance. These also fit nicely with the conceptualization of ERM proposed above. Traditional corporate finance theories motivate risk management implementation because of its ability to reduce costs resulting from capital market imperfections and increase firm value. These theoretical arguments do not distinguish between a firm's choice to implement traditional risk management or enterprise risk management; both decisions would likely be influenced by such benefits. ERM also has a strong connection to internal corporate governance controls (Beasley et al., 2005; COSO, 2004; Gordon et al.,

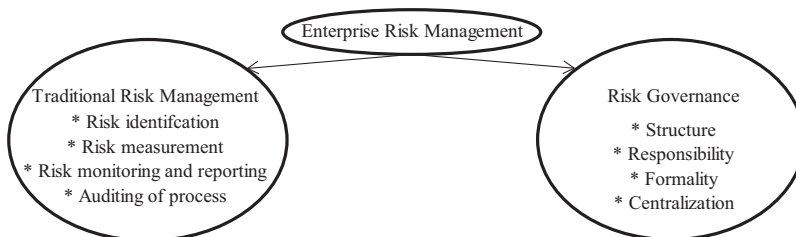


Fig. 1. Proposed conceptualization of enterprise risk management.

2009; Leadbetter et al., 2008; Pang and Shi, 2009). While mitigating costs resulting from managerial incentive problems are incorporated in the traditional capital market imperfection theories for risk management, agency problems of this kind are much more central and prevalent in the motives for corporate governance. Therefore, motives for corporate governance also play a role in the implementation of ERM. Any conclusions one can come to on the unique motives for risk governance are related to general incentives for corporate governance.

2.1. Motives for traditional risk management as motives for enterprise risk management

Traditional theories motivating risk management are one of the predominant explanations for implementing ERM. Liebenberg and Hoyt (2003) refer to theories that motivate traditional risk management activities such as hedging and corporate insurance demand because at the time documented evidence regarding various aspects of ERM was limited to the trade press and industry surveys and there was a lack of academic literature regarding the determinants of ERM. However, Pagach and Warr (2011) refer to the same theories in their study published eight years later. This also reflects the stagnant nature of the development of a theoretical foundation for ERM.

Studied fervently in the late 1990s, evidence on determinants of a firm's decision to use derivatives supports to varying degrees traditional corporate finance theories motivating hedging. This study pulls from a plethora of risk management derivative and hedging studies (Gay and Nam, 1998; Géczy et al., 1997; Howton and Perfect, 1998; Mian, 1996; Nance et al., 1993; Samant, 1996; Tufano, 1996) and a recent study with similarities to this one as regards to the geographic area covered by Brunzell et al. (2011), to select some of the most prominent theoretical motivations for risk management. Traditional theories motivating risk management generally pertain to transaction costs, agency costs and other policy decisions which may substitute for risk management. Many of these studies employ derivative use of one form or another as the focus variable. Of course, not all derivative use is motivated by hedging and risk management. However, Géczy et al. (1997) find that on average the firms in their sample are not speculating, Mian (1996) finds that their results are robust regardless of how firms are treated if it is unclear if they hedge or speculate, and Brunzell et al. (2011) find that a hedging motive dominates derivative use in their sample of Nordic firms.

Transaction costs, in terms of costs of financial distress, are often found to be a significant determinant of hedging (Gay and Nam, 1998; Howton and Perfect, 1998; Samant, 1996; Tufano, 1996). There are also transaction costs associated with corporate risk management in terms of information services, employees, and know-how (Bartram, 2000); empirical support for a positive and significant relationship between firm size and the use of derivatives is fairly robust (Brunzell et al., 2011; Géczy et al., 1997; Mian, 1996; Nance et al., 1993).

From an agency cost theory perspective, risk management can mitigate the underinvestment problem (Myers, 1977) by reducing the volatility of firm value; these costs are most significant for high growth firms. Gay and Nam (1998) find that each of their five growth proxies (R&D expenses, market-to-book ratio, Tobin's Q , price-to-earnings ratio, and market-adjusted cumulative abnormal return) is positively and significantly related to derivative usage. Additional support can be found in Brunzell et al. (2011) and Samant (1996). Additional agency costs of debt come in the form of debtholders' demands for costly compensation and/or debt covenants in order to block risk shifting from shareholders to debtholders (Smith and Warner, 1979). Risk management can mitigate these agency costs of debt by lowering the riskiness of projects which satisfies both shareholders, who like risk because of the call option nature of their equity holding, and debtholders. Géczy et al. (1997) find those firms with tighter financial restraints and a higher risk of breaking a covenant use currency derivatives to a greater degree.

Theoretically speaking, firms with high levels of debt face greater agency costs resulting from underinvestment problems and/or risk shifting. In addition, they face higher transaction costs of financial distress and more difficulty when coordinating financing and investment strategies. Therefore, one can confidently hypothesize that firms with higher debt levels would implement risk management in order to mitigate these problems. On the other hand, with risk management in place, firms theoretically should be able to hold more debt due to decreased probabilities of financial distress.

Therefore, leverage is a determinant, but there is also an important feedback effect that stands out between risk management and debt capacity.

An additional motive of risk management is related to agency costs resulting from the manager and shareholder relationship. Some evidence supports the [Smith and Stulz \(1985\)](#) hypothesis that managers with stock ownership will be more likely to implement risk management due to increased risk aversion ([Tufano, 1996](#)), and that managers with option holdings will be less likely to implement risk management given that the value of their options increase with increased risk ([Gay and Nam, 1998](#); [Géczy et al., 1997](#); [Tufano, 1996](#)).

There are also a number of corporate policies that can be viewed as substitutes for risk management; this study focuses on two: operative diversification and dividend restriction. [Brunzell et al. \(2011\)](#) suggest that operative diversification decreases the incentive for firms to use derivatives for hedging purposes. They find that firm-level diversification is negatively related to hedging, but that it is positively related to the use of derivatives for speculation. Dividend restriction can also be seen as a policy decision which is substitute to risk management implementation; support can be found for the argument that dividends restrain liquidity and thus imply an incentive to hedge ([Géczy et al., 1997](#); [Mian, 1996](#)). However, if you take into account the relationship between growth options and dividend payments, mature firms generally give dividends, and therefore, dividend paying firms generally have less growth options; the relationship between dividends and risk management is then likely to be negative ([Bartram, 2000](#)).

The motives for traditional risk management discussed above, transaction costs, agency costs of debt, agency costs of managerial incentives, and policy substitutes, should influence a firm's decision to implement ERM since a purpose of ERM is to manage risk. However, the main identifying feature of ERM is not that the firm manages risk but that it does so in an integrated way. In order to integrate and take the step beyond traditional risk management firms implement risk governance. The risk governance component of ERM may be better explained by the other general overarching motive for ERM – motives related to corporate governance.

2.2. Motives for governance as motives for enterprise risk management

[Nocco and Stulz \(2006\)](#) argue that ERM can create a long-run competitive advantage for a firm by creating value both on the macro level, by helping the firm maintain access to the capital markets and other resources, and the micro level, by creating a “way of life” for managers and employees at all levels of the company. The macro level benefits are arguably related to the traditional risk management theories in the previous section. The micro level benefits, resulting from the “way of life”, are a result of the governance mechanisms in place within the risk management setting.

Integration of risk management and internal control has existed prior to the current emphasis on enterprise risk management and this integration is essential to the perfection of both ([Pang and Shi, 2009](#)). A key aspect that separates enterprise risk management from traditional risk management practices is in fact its relation to internal control. The Committee of the Sponsoring Organizations of the Treadway Commission's (COSO) ERM framework from 2004, one of the most popular ERM frameworks, has strong roots in COSO's 1992 internal control framework. After events like Enron, a heightened concern and a call for risk management prompted COSO to revisit its original framework and update it, leading to the ERM framework ([Pang and Shi, 2009](#)). The monitoring, information and communication, and control aspects of ERM are in many ways similar to the original internal control framework. ERM's connection to internal control and the governance imposed on the risk management system by implementing ERM is a central theme in the motivations given for ERM implementation.

Many of the external drivers for ERM implementation are related to a push for firms to have better governance of the risk management system. The Sarbanes-Oxley Act of 2002 placed greater responsibility on the board to understand and monitor firm risks which increased the importance of ERM ([Fraser and Simkins, 2010](#)). New York Stock Exchange Listing Standards have mandated the Audit Committee of the board to explicitly oversee risk management and risk management policies, and the U.S. Securities and Exchange Commission (SEC) proxy disclosure rules also require the Board to describe aspects of the oversight of risk management.

Regulatory frameworks have had a significant impact on the increasing popularity of ERM, and in particular financial firms have been greatly influenced by the Basel requirements (Pagach and Warr, 2011). In order to strengthen the supervisory guidance and address flaws in risk management practices which were symptoms of fundamental shortcomings in governance, the [Basel Committee on Banking Supervision \(2009\)](#) provides guidance for firm-wide governance and risk management in their proposal for enhancements of Basel II. Holistic risk management has a longer history in the financial industry, and results from [Beasley et al. \(2005\)](#) show that firms in the banking³ industry are more likely to implement ERM than other firms. This could be evidence that financial firms are implementing ERM in order to respond to the regulatory push for better governance in the risk management system.

Increased implementation of ERM in firms is often argued to be a result of the increased focus on ERM by rating agencies. In 2008, Standard and Poor's announced its intention to incorporate an ERM analysis into their corporate ratings stating that "ERM will add an additional dimension to our analysis of management and corporate governance, creating a more systematic framework for an inherently subjective topic" ([Standard and Poor's, 2008](#)). Though this argument is made over and over again in ERM literature ([Pagach and Warr, 2011](#); [Beasley et al., 2008](#); [Hoyt and Liebenberg, 2011](#); [McShane et al., 2011](#)), a direct relationship between a firm having publically rated debt and ERM implementation has never been formally investigated. However, two studies do acknowledge this important relationship by analyzing the impact of Standard and Poor's ERM ratings on firm performance and value. [Baxter et al. \(2013\)](#) find that ERM, as measured by Standard and Poor's, is positively associated with operating performance and earnings response coefficients. They attribute this finding to increased investor perception of credibility and persistence of earnings as a result of governance factors. [McShane et al. \(2011\)](#) find that insurance firms show a positive relationship between Standard and Poor's ERM ratings and firm value but only as the rating increases over the first three levels.

Another external pressure is claimed to come from the larger auditing firms, namely the Big Four: PricewaterhouseCoopers, Deloitte Touche Tohmatsu, Ernst and Young, and KPMG. The auditing process can be considered part of the corporate governance system, and therefore having a Big Four auditor puts pressure on firms to exhibit better governance. [Beasley et al. \(2005\)](#) and [Desender \(2011\)](#) both find that having a Big Four auditor has a positive and significant impact on the level of ERM.

Firms may respond to pressure from regulators, rating agencies, and auditing firms by implementing ERM in a true attempt to adhere to the push for better governance of the risk management system. However, in response to purely external pressures, firms may implement ERM in a superficial manner in order to window-dress for these stakeholders. There is however evidence that there are also internal motives for ERM implementation related to corporate governance.

The view of corporate governance that is widely held in accounting and finance relies on agency theory, and key motives for corporate governance are grounded in agency costs of managerial incentives. According to [Jensen \(1986\)](#), conflicts of interest between management and shareholders often lead to value destruction; this can occur when managers act in their own interests by making poor decisions, for example investing in projects with zero net present value. Corporate governance is focused primarily on designing mechanisms that control this type of management behavior.

The risk governance aspects of enterprise risk management have a comparable purpose but in the context of the risk management system. It may not be in the interest of managers to have the additional layer of monitoring and restriction that ERM provides while independent members of the board may favor more comprehensive control, risk management, and internal audit ([Desender, 2011](#)). [Desender \(2011\)](#) finds evidence that board independence is significantly related to ERM when the position of CEO and chairman are held by two different individuals. He argues that CEOs who are also chairman of the board can better withstand pressure from the board to implement ERM.

Agency costs become exacerbated as more free cash flow is available to managers. Therefore, one way to curb management activity is to increase leverage in the firm in order to restrict the free cash flow available for managers' discretion. Managers of highly levered firms are constrained by the reduction of free cash flow, and therefore, agency costs of managerial incentives are mitigated to some degree. This would in turn mean that highly levered firms are in less need of corporate governance

³ The insurance and education industries were also included in their analysis.

mechanisms. Previous ERM studies have found leverage to be significantly and negatively related to ERM implementation (Beasley et al., 2008; Hoyt and Liebenberg, 2011). This is one of the most telling results that indicate that something is motivating ERM implementation besides the traditional motive of reducing financial distress costs. The existing explanation is that shareholders of highly leveraged firms may not want risk reduction since it reduces the value of their option written to them by debtholders, in which case the option value outweighs the deadweight costs of financial distress associated with high levels of leverage (Beasley et al., 2008). However, an explanation grounded in the agency theory of managerial incentives is in line with the findings in Desender (2011) and better matches the conceptualization that risk governance is the identifying component of ERM.

There is also robust evidence that there is a positive relationship between size and ERM (Beasley et al., 2005; Desender, 2011; Liebenberg and Hoyt, 2003; Pagach and Warr, 2011). Desender (2011) argues that larger size firms not only have a different scope of threats but also additional resources to implement ERM and therefore are more likely to have implemented ERM. Large firms may also face greater agency problems due to increased difficulty of monitoring or excess free cash flows and therefore need to compensate with stricter governance mechanisms (Klapper and Love, 2004).

The relation between manager interests and ERM are also touched upon in Pagach and Warr's (2011) study on factors associated with a CRO hire. They find that a CRO hire is positively and significantly related to the sensitivity of the manager's compensation to stock volatility (Vega). This suggests that as compensation becomes more sensitive to stock volatility the likelihood of implementing ERM increases.

The pressures to implement ERM are often referred to in a practical manner; ratings agencies, auditing firms, and regulators are pushing for ERM. This push however is directly related to the pressure for better governance of the risk management system. Firm characteristics related to corporate governance are also often associated with ERM implementation. Motives for corporate governance are generally not highlighted in empirical studies on the determinants of traditional risk management. It is therefore reasonable to assume that motives related to corporate governance are specific to ERM and the risk governance aspect of ERM implementation.

2.3. Determinants of risk governance

The purpose of this study is to determine why firms implement risk governance and take the step beyond traditional risk management to implement ERM. As presented in the previous sections, the two overarching theories also fit well with the conceptualization that ERM has two foundational components: traditional risk management and risk governance.

Theoretically one would expect the traditional risk management component of ERM to be best explained by traditional capital market imperfections and the risk governance component to be explained by motives related to corporate governance. Investigating this theoretical expectation is a step toward determining a theoretical foundation for ERM which has previously been ad hoc.

Fig. 2 depicts the conceptual framework tested in this study. The model depicts the expected relationship between traditional and corporate governance determinants on risk governance while controlling for the determinants' effects on the traditional risk management component of ERM. Traditional risk management and risk governance are correlated by construction. The two are not uncorrelated separate entities, but they are correlated components which together make up ERM.

In the next section the methodology used to test this conceptual framework is presented.

3. Methodology

A survey methodology is used to get inside firms risk management implementation and gain information about the implementation of a variety of dimensions of ERM. Questionnaire responses are analyzed with exploratory factor analysis in order to determine the underlying component structure of ERM. The final component structure gives a picture of what ERM is based on how its dimensions are actually implemented by firms. Two of the four components identified represent the risk-related components of ERM and support the argument that ERM is a composition of traditional

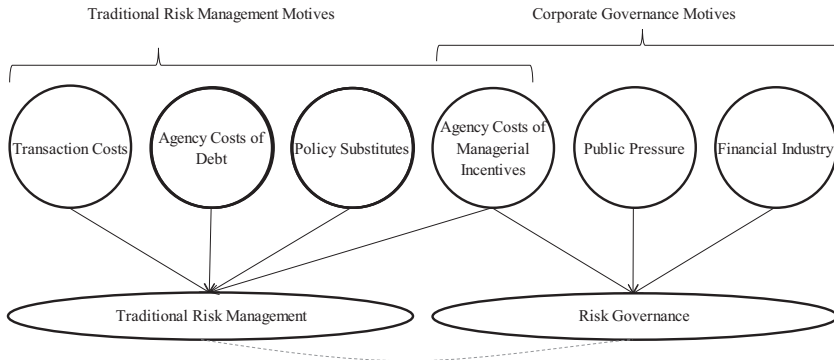


Fig. 2. Conceptual framework.

risk management and risk governance. A confirmatory factor analysis (CFA), which tests the fit of an a priori structure to the questionnaire responses, further confirms that the survey data supports the measurement of these two components using the developed structure.

Determinants of these two components are estimated simultaneously using structural equation modeling (SEM). This way the determinants of risk governance can be identified while controlling for the determinants of traditional risk management. The advantage of structural equation modeling is it allows us to indirectly measure complex and unobservable concepts, like risk governance, by making use of several imperfect but observable indicators, the questionnaire responses for dimensions of ERM; by modeling the unique variance of each imperfect indicator, SEM also accounts for measurement error of the concepts. With SEM, more valid and reliable conclusions can be made about the relationships in complex models which test a number of hypotheses simultaneously.

3.1. Questionnaire design, delivery, and response

The questionnaire used in the survey focused on identifying a firm's level of implementation of a number of dimensions of risk management. The questionnaire was based on a set of dimensions found in Desender (2011); additional input regarding necessary dimensions of proper ERM implementation was received from two members of the COSO board and from a thorough review of ERM frameworks and literature. The dimensions were then transformed into questionnaire questions designed to assess the degree of implementation of each dimension in the firm.

The questionnaire was sent to the Chairman of COSO, a consultant of ERM implementation, and a researcher with experience in questionnaire use for comments. The questionnaire was also pre-tested on two practitioners. The final version of the questionnaire included changes based on the comments from the aforementioned individuals. Minor changes were also made based on the recommendations of Sinitor,⁴ specialists in data collection, who helped distribute the questionnaire.⁵

The final version of the questionnaire is comprised of 59 dimensions. Firms were asked to give the degree of implementation of each dimension on a scale from zero to three. Zero being that the dimension is non-existent in the firm and three being that the dimension is robustly implemented in the firm. During the testing process a more standard five item Likert-like scale was deemed more difficult to answer. Therefore, more reliability in the scale was chosen over the potential for additional variation.

Included in the questionnaire are also two background questions, questions directed at the firm's perception of their implementation of ERM, and a number of questions addressing ERM specific concepts. The questionnaire did not draw attention to its focus on ERM in order to ensure that

⁴ Formally Anthill Stockholm.

⁵ The questionnaire is available on request.

respondents were not influenced by the mention of ERM but instead answered with a more general consideration to their risk management practices. Respondents were instructed to answer the questionnaire in relation to the firm's 2010 risk management practices.

The questionnaire was presented to all (676) firms listed at the start of 2011 on two major Nordic stock exchanges, either NASDAQ OMX or Oslo Børsen, with headquarters in a Nordic country (Sweden, Norway, Finland or Denmark). Iceland and associated territories are excluded due to their small number of companies. Sinitor attempted to contact the firms in the population directly by telephone and gave a brief introduction to the survey; the CEO, CFO, or an individual knowledgeable about risk management was targeted because of the important role they play in implementing enterprise risk management. Approximately 92% of respondents held the position of CFO, CEO, CRO or risk manager at the firm; the remaining respondents were for example part of the accounting function, treasury, or audit. Willing respondents were offered the questionnaire in Swedish, Norwegian, Danish, Finish, and English; they then received an e-mail with a link and filled out the questionnaire online.

See Table 1 for basic descriptive statistics of the surveyed firms (population) and respondent firms (sample). The final response rate for the survey was 22.6% with 153 responses. A similar survey by Brunzell et al. (2011) had an overall response rate of 18.92%. The distribution of respondent firms and the distribution of the original sample of firms are similar in respect to country representation, industry, and market capitalization; it can therefore be concluded that the respondent group is an adequate representation of the original sample and there is no expected non-response bias. Six firms were not listed in 2009 and two respondent firms have since delisted and are therefore eliminated from the study, leaving a final sample of 145 firms.

The Nordic countries have well developed and international capital markets which are highly integrated. Foreign ownership of listed companies is over one third for the region as a whole. The Nordic corporate governance structure lies somewhere between the Anglo-Saxon one-tier and the continental European two-tier model (Danish Corporate Governance Committee et al., 2009). Many firms have Anglo-American board members; as a result, there may be institutional contagion from the Anglo-American market system which in turn has an effect on important dimensions of corporate

Table 1
Descriptive statistics for the surveyed firms and the respondent firms.

		Surveyed		Respondent		Response rate (%)
		#	%	#	%	
Country	Denmark	173	26	32	21	18
	Finland	123	18	26	17	21
	Norway	147	22	37	25	25
	Sweden	233	34	58	38	25
	Total	676		153		22.6
Industry	Industrial	491	73	119	79	
	Utility	15	2	3	2	
	Transportation	44	7	8	5	
	Bank/save and loan	43	6	8	5	
	Insurance	7	1	4	3	
	Other financial	68	10	10	7	
	Other	8	1	1	1	
Market capitalization (thousands of U.S. \$)	Large	122	18	30	20	
	Mid	189	28	39	26	
	Small	365	54	84	56	
	Mean	2002		1848		
	Median	173		167		
	Std. dev.	6660		5403		
Total assets (thousands of U.S. \$)	Mean	6286		4771		
	Median	287		277		
	Std. dev.	44,742		26,974		

Notes: No statistically significant differences in mean values are found.

governance (Oxelheim and Randøy, 2005). Some of the other key features of Nordic governance systems are: strong general meeting powers, shares with multiple voting rights, strong minority protection, effective individual shareholder rights, non-executive boards, use of board committees, auditors appointed by and accountable to the shareholders, active governance role of major shareholders, and high levels of transparency. Also, in Denmark, Norway, and Sweden employees are given the right to appoint a limited number of board members (Danish Corporate Governance Committee et al., 2009). Fernandes et al., 2013 show that on average Swedish CEOs receive less pay for performance than CEOs in the United States; in 2006, the mean composition of CEO pay in stocks and options for Swedish CEOs was 2% and for U.S. CEOs it was 39%.

While many of the specific external pushes for ERM are specifically germane to the United States, the resulting push is a global one; this is especially the case for firms that are highly international, like Nordic firms. In the document “Nordic Corporate Governance” (Danish Corporate Governance Committee et al., 2009) produced through a co-operation of the self-regulatory corporate governance bodies of the five Nordic countries Denmark, Finland, Iceland, Norway and Sweden, the responsibility for oversight of risk management and internal control is assigned to the Board and disclosure of the company’s internal control and risk management principals is said to be generally required by the Nordic corporate governance rules.

3.2. Variables

This section discusses the variables used in the analysis, both the enterprise risk management components and its expected determinants.

3.2.1. Enterprise risk management components – exploratory factor analysis

The basic argument of this study is that dealing with the complexities of ERM is necessary to better understand its determinants. One way to address the complexity issue is to break ERM into its parts and separate it into its fundamental pieces. Responses to the questionnaire are analyzed using exploratory factor analysis in order to determine broader factors that are responsible for covariation in the responses.

The survey responses for the 59 ERM dimensions are first screened for evidence of multicollinearity; 48 dimensions of enterprise risk management are used in the exploratory factor analysis (EFA) after eliminating highly correlated dimensions. EFA identifies an underlying factor structure which explains covariation in the responses and is used when there is no a priori model. Robust weighted least squares estimation (WLSMV) with geomin oblique rotation is used for estimation, and missing data is assumed to be missing completely at random (MCAR).⁶

Four factors are retained based on parallel analysis, goodness of fit statistics (four factor model fit statistics: root mean square error of approximation (RMSEA) = 0.038, Prob. RMSEA \leq 0.05 = 0.998, the Bentler Comparative Fit Index (CFI) = 0.960, and the Standardized Root Mean Square Residual (SRMR) = 0.077) and interpretability. The resulting factor structure identifies the four underlying components of ERM implementation based on how dimensions are implemented in firms. See Fig. 3 for the components of ERM resulting from the factor analysis. Factor designation is based on the dimensions that load the highest on each factor. The resulting structure confirms the argument that ERM should be seen fundamentally as traditional risk management with the addition of risk governance.

Two of the components, related to the general internal environment and control activities of the firm, can be viewed as “prerequisites” of ERM implementation. These components are necessary to have well-functioning and well implemented ERM but are not connected directly to risk management activities nor are they specific to ERM. They are made up of indicators such as: having a code of conduct, compensation that aligns the interests of managers and shareholders, and having a mission statement. Since these dimensions are outside of the risk management system, firms with no effort toward holistic risk management, or risk management at all for that matter, can have implemented

⁶ Treating the variables as continuous, Little’s MCAR (missing completely at random) test supports the assumption that missing data is MCAR.

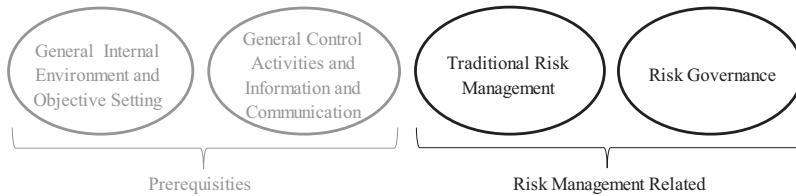


Fig. 3. Components of enterprise risk management resulting from exploratory factor analysis of survey responses.

these two prerequisite components robustly. These are not included in this study as the focus here is on the risk management specific activities of the firm. The other two components are the main variables of interest and are the focus of the remaining discussion.

Summary statistics for responses from the questionnaire regarding the risk-related dimensions (only the indicators of traditional risk management and risk governance) can be found in [Table 2](#). As expected, on average firms have more robustly implemented dimensions of traditional risk management than risk governance.

3.2.1.1. Traditional risk management measure. The first risk-related component identifies efforts of the firm to manage certain types of risk: financial, strategic, compliance, technology, economic, and reputation. This component reflects traditional risk management implementation because it says nothing

Table 2

Summary statistics for questionnaire responses of risk related dimensions of enterprise risk management.

	Indicator variable	Mean	Mode	SD	Min	Max	Count
Traditional risk management	Financial events	2.85	3	0.40	1	3	151
	Strategic events	2.57	3	0.60	0	3	150
	Likelihood strategic	2.57	3	0.57	1	3	149
	Compliance events	2.44	3	0.64	1	3	150
	Likelihood compliance	2.26	2	0.68	0	3	147
	Technology events	2.40	3	0.67	0	3	149
	Likelihood technology	2.27	3	0.79	0	3	147
	Economical events	2.77	3	0.48	1	3	151
	Reputation events	2.44	3	0.61	1	3	150
	Likelihood reputation	2.35	2	0.66	1	3	150
	Risk governance	Corr and portfolio	1.17	1	1.00	0	3
Quantitative		1.72	2	0.94	0	3	141
Board report		2.29	3	0.90	0	3	146
Risk indicators		1.77	2	1.00	0	3	144
Central technology		1.12	0	1.10	0	3	141
Verification		1.69	2	0.95	0	3	143
Policies		2.11	2	0.86	0	3	149
Response plan		1.72	2	0.96	0	3	146
Alternative response plan		1.53	1	0.94	0	3	142
Communication		1.79	2	0.97	0	3	143
Indp/external audit		1.23	0	1.12	0	3	149
Updates		1.70	2	0.96	0	3	147
Philosophy		1.78	2	1.01	0	3	148
Risk appetite		1.40	2	1.08	0	3	149
Board committee		1.46	0	1.27	0	3	145
Senior manager		1.61	3	1.22	0	3	150
Central department		1.08	0	1.25	0	3	151
Internal assessment group	1.21	0	1.14	0	3	150	
Risk owners	1.56	3	1.18	0	3	147	

Notes: Responses for each indicator can range from zero to three; zero being that the dimension is non-existent in the firm and three being that the dimension is robustly implemented in the firm.

about the organization of the management system. Traditional risk management activities are those related to the risk management process which Culp (2001) describes all firms having in some form or another. Therefore, firms that have robustly or well implemented traditional risk management may be implementing a formally structured ERM framework, but they may also be implementing more ad hoc forms of risk management or a silo-approach where risks are managed separately.

3.2.1.2. Risk governance measure. The second component is truly the ERM identifier. The dimensions that make up this component are the typical characteristics of ERM addressing the organizational and holistic nature of risk management as ERM prescribes: formal written statement of risk appetite, having a senior manager assigned the responsibility of overseeing risk and risk management, and a formal risk management report submitted to board level regularly. This component sets up the structure of the risk management system, ensures centralization and integration, and formalizes the risk management process.

3.2.2. Determinants

Additional data regarding characteristics of the firms surveyed is collected from DataStream or directly from a firm's financial statements. Since the questionnaire addresses the risk management activities of the firm in 2010 and the focus is to identify determining factors of implementation, the data collected pertains to the 2009 year end or an average of three years prior to 2010. Tables 3 and 4 summarize the determinant variables, their definitions, expected relationships with traditional risk management and risk governance, and data sources.

3.2.2.1. Determinants of traditional risk management. In order to proxy transaction costs, this study follows Brunzell et al. (2011) and uses the book value of long-term debt over total assets as a measure of leverage (*Lev*) to proxy for financial distress costs. However, this study uses a three year average (2007, 2008 and 2009) as in traditional hedging literature (Gay and Nam, 1998; Howton and Perfect, 1998; Nance et al., 1993); this is in order to capture a more historic measure proxying the level of financial distress and risk of asset substitution and underinvestment problems and to decrease the likelihood of an endogeneity problem. Additionally, an attempt is made to analyze the feedback effect between risk

Table 3
Variable description for determinants of traditional risk management.

Determinants of traditional risk management			
Variable and expectation			Definition
<i>Transaction costs</i>			
Leverage	Lev	+	Long-term debt/total assets averaged over end of year 2007, 2008, and 2009
Size	Size	+	Natural logarithm of total assets in USD averaged over 2007, 2008, and 2009
<i>Agency costs of debt</i>			
Growth options: Market-to-book	MB	+	Book value of equity/market value of equity for end of year 2009
<i>Agency costs of managerial incentives</i>			
Managerial ownership	ManOwn	+	Percent of total shares owned by the management group end of year 2009
Managerial incentive compensation	ManOptD	–	Dummy variable = 1 if managers hold options, warrants, or convertibles end of year 2009
<i>Substitutes/complements</i>			
Diversification	Sic	?	Number of different SIC codes at the 2 digit level end of year 2009
Dividend	Div	?	Dividend per share/share price averaged over end of year 2007, 2008, and 2009

Notes: Financial statement data from DataStream. SIC codes from Worldscope. Data on corporate governance, public pressure, the largest shareholders, and management ownership from annual reports. For the leverage feedback effect, long-term debt/total assets for end of year 2010 (*Lev2010*) is included as a dependent variable of traditional risk management and risk governance.

Table 4

Variable description for determinants of risk governance.

Determinants of risk governance			
Variable and expectation	Definition		
<i>Agency costs of managerial incentives</i>			
Leverage	Lev	–	Long-term debt/total assets averaged over end of year 2007, 2008, and 2009
Size	Size	+	Natural logarithm of total assets in USD averaged over 2007, 2008, and 2009
Managerial ownership	ManOwn	–	Percent of total shares owned by the management group end of year 2009
Managerial incentive compensation	ManOptD	+	Dummy variable = 1 if managers hold options, warrants, or convertibles end of year 2009
Board independence	Bind	+	Percentage of board members considered independent of the company and major shareholders end of year 2009
CEO on board	CEOB	–	Dummy variable = 1 if the firm's CEO sits on the Board of Directors end of year 2009
<i>Public pressure</i>			
Publicly rated debt	Rate	+	Dummy variable = 1 if the firm has public debt rated by Standard and Poor's end of year 2009
(No) Big 4 auditor	Big4	–	Dummy variable = 1 if the firm DOES NOT use a Big Four auditor end of year 2009
<i>Financial industry</i>			
Financial industry	Fin	+	Dummy variable = 1 if the firm is in the financial industry end of year 2009

Notes: Financial statement data from DataStream. SIC codes from Worldscope. Data on corporate governance, public pressure, the largest shareholders, and management ownership from annual reports.

For the leverage feedback effect, long-term debt/total assets for end of year 2010 (*Lev2010*) is included as a dependent variable of traditional risk management and risk governance.

management and leverage; this feedback effect stands out in the theoretical discussion of motives from Section 2. Financial distress is hypothesized to increase the need for risk management, and risk management in turn decreases the risk of financial distress allowing the firm to carry more debt. The effect of ERM on leverage has not been investigated previously, but a positive relationship is expected between both traditional risk management and risk governance and “future” leverage. To capture the feedback effect of risk management implementation on the amount of leverage in a firm, long-term debt over total assets for 2010 (*Lev2010*) is included as a dependent variable of traditional risk management and risk governance; the relationship of traditional risk management and risk governance (measured in 2009) with leverage the following year (2010) is estimated. This feedback effect is estimated simultaneously with the determinants in the structural equation model. In order to capture the relationship between size and traditional risk management, this study follows [Liebenberg and Hoyt \(2003\)](#) and measures size (*Size*) as the prior three year average of the natural logarithm of total assets measured in USD.

To proxy for the firm's growth opportunities, this study uses market-to-book (*MB*) ([Gay and Nam, 1998](#); [Pagach and Warr, 2011](#); [Samant, 1996](#)) at year end 2009.

To capture management compensation or incentives in terms of stock ownership (*ManOwn*), this study uses the percent of total shares owned by the management group at the end of year 2009. To capture option compensation and shareholder/manager incentive alignment (*ManOptD*), a dummy variable which takes the value of one if managers hold options, warrants, or convertibles at the end of 2009 is used. Both of these management compensation variables are hand collected from annual reports and follow [Brunzell et al. \(2011\)](#). While the measures do not differentiate between ownership from compensation and ownership bought on the market, both variables should still capture the ownership incentives of having equity and options.

Policy decisions are incorporated by the inclusion of an operative diversification proxy; the diversification (*SIC*) variable follows [Brunzell et al. \(2011\)](#) and is the number of different SIC codes for a firm at the two digit level. SIC codes are retrieved from DataStream for 2009 where the maximum number of SIC codes per firm is eight. Dividend policy is incorporated into the model by using the prior three year average of the firm's dividend yield (*Div*) following [Mian \(1996\)](#).

See Table 3 for a summary of the variables used as determinants of traditional risk management, their definition, and the expected relationship.

3.2.2.2. *Determinants of risk governance.* Leverage (*Lev*) and size (*Size*), managerial stock ownership (*ManOwn*) and managerial incentive compensation (*ManOptD*) are included as determinants of risk governance as proxies of a firm's agency costs of managerial incentives.

Board independence (*Blnd*) is the percentage of board members who are independent of the company and its major shareholder in 2009. CEO on the board (*CEOB*) is a dummy variable equal to one if the firm's CEO (or equivalent) sits on the Board of Directors (or equivalent supervisory board) in 2009. This data is retrieved by hand from the annual reports.

Publicly rated debt (*Rate*) is a dummy variable equal to one if the firm has public debt rated by Standard and Poor's. This variable has not been tested in prior ERM studies. It is collected from DataStream and annual reports. Additionally, Big Four auditor (*Big4*) is a dummy variable equal to one if the firm does NOT use a Big Four auditor: PricewaterhouseCoopers, Deloitte Touche Tohmatsu, Ernst and Young or KPMG. The data is retrieved from the annual reports.

A financial industry dummy variable (*Fin*) is used to represent firms that are in the financial industry; the variable is equal to one if the firm is in the financial industry. General industry classifications given by DataStream are used where bank/savings and loan, insurance, and other financial are all considered financial firms.

Table 4 shows a summary of the variables used as determinants for risk governance, their definition and expectation. Table 5 presents the summary statistics for all variables in the study including factor scores for the traditional risk management implementation measure (TradRM) and the risk governance measure (RiskGov) calculated using the regression method for categorical outcomes with WLSMV.

3.3. Estimation of the model

The base model is a MIMIC model (Multiple Indicator Multiple Cause); that is, a model where traditional risk management and risk governance factors each are measured with multiple indicators (the questionnaire responses) and have multiple causes (determinants). The model also includes a feedback effect from traditional risk management and risk governance to leverage and a correlation between traditional risk management and risk governance. The base model does not include managerial compensation variables and board independence in order to preserve sample size. However, separate models are estimated with the addition of managerial compensation and board independence. The base model plus managerial compensation and board independence is depicted in Fig. 4.

Structural equation modeling is used to estimate the model and is used to explicitly consider the possible bias of measurement error on path estimates which is especially relevant given the nature of the underlying survey data. Additionally, it allows the creation of complex measures, like risk governance, from a number of imperfect underlying indicators and the simultaneous estimation of those measures' determinants. The model is estimated using Mplus Version 6. For structural equation estimation with at least one binary or ordered categorical dependent variable (factor indicators using survey data), the default estimator (WLSMV) represents weighted least square parameter estimates using a diagonal weight matrix with standard errors and mean- and variance-adjusted chi-square test statistic that uses a full weight matrix.

4. Results

4.1. Measurement model results

Although the measures of traditional risk management and risk governance are found through EFA and fit is indicated to be good, confirmatory factor analysis is used to test the validity of the measures of traditional risk management and risk governance without the two prerequisite components found in EFA. Fit of the measurement model must be tested before moving on to the structural equation

Table 5
Variable correlations.

	Variables	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	Size	12.82	0.17	1.00														
2	Lev	0.17	0.01	0.42**	1.00													
3	Lev 2010	0.17	0.01	0.36**	0.76**	1.00												
4	MB	2.16	0.23	-0.28**	-0.18*	-0.08	1.00											
5	Rate	0.07	0.02	0.53**	0.02	0.03	-0.12	1.00										
6	Fin	0.15	0.03	0.32**	0.15	0.14	-0.15	0.17*	1.00									
7	Big4	0.06	0.02	-0.20*	-0.17*	-0.13	-0.08	-0.07	-0.03	1.00								
8	SIC	2.41	0.13	0.23**	-0.12	-0.04	-0.13	0.02	0.08	0.00	1.00							
9	Div	3.43	0.30	0.24**	0.06	-0.01	-0.06	0.07	0.05	-0.12	0.03	1.00						
10	CEOB	0.16	0.03	0.15	0.03	-0.01	0.10	0.16	0.02	-0.03	-0.02	0.09	1.00					
11	ManOwn	0.05	0.01	-0.24**	-0.06	-0.04	0.08	-0.11	0.04	0.35**	-0.12	0.05	0.20*	1.00				
12	ManOptD	0.56	0.04	0.08	0.03	-0.05	0.16	0.04	-0.17*	-0.06	0.00	-0.17*	0.04	-0.01	1.00			
13	Bind	0.59	0.02	-0.16	-0.21**	-0.21**	0.08	-0.03	-0.06	-0.17*	0.02	0.01	-0.23**	-0.13	0.04	1.00		
14	TradRM	0.00	0.05	0.48**	0.21**	0.24**	-0.05	0.30**	0.16*	-0.08	0.09	-0.01	0.08	-0.06	0.09	-0.11	1.00	
15	RiskGov	0.00	0.05	0.47**	0.04	0.16*	-0.18*	0.24**	0.24**	-0.15	0.18*	0.03	-0.11	-0.21*	0.00	-0.03	0.64**	1.00
		Min	Max	Mode														
	TradRM	-1.77	1.24	-0.03														
	RiskGov	-1.72	1.72	0.56														

Notes: TradRM and RiskGov are factors scores calculated using the regression method, also known as the modal posterior estimator, for categorical outcomes with WLSMV.

* $p < 0.05$.

** $p < 0.01$.

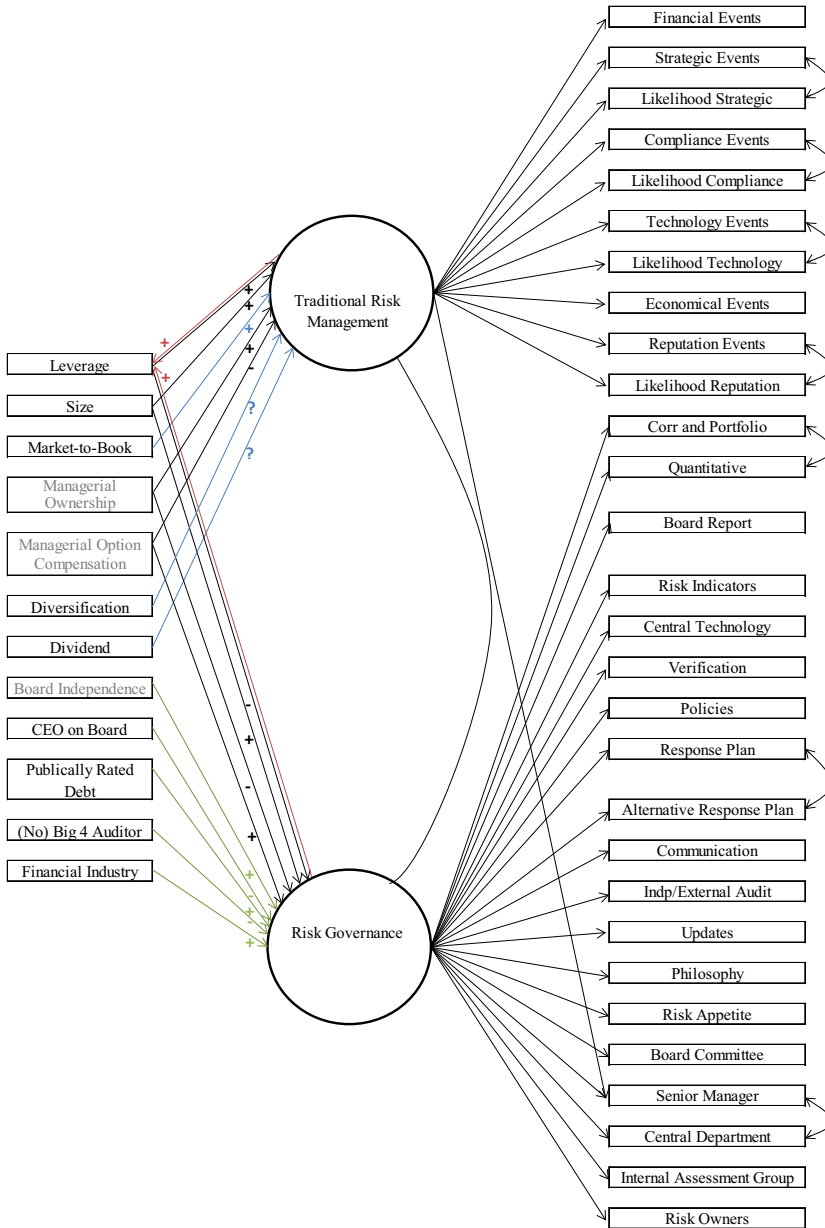


Fig. 4. Base model + managerial compensation + board independence.

modeling. Model statistics show that the chi-square ($\chi^2 = 436.42$, d.f. = 368, $p < 0.05$) may indicate poor fit of the measurement model. Chi-square values are not relied on for model fit in this case given that [Chau and Hocevar \(1995\)](#) found that the chi-square test statistic is strongly biased against models with a large number of measured variables. However, the comparative fit index (CFI), Tucker–Lewis index (TLI) and root mean square error of approximation (RMSEA) indicate good fit (0.99, 0.98 and 0.035, respectively). All estimated unstandardized loadings are significant. See [Table 6](#) for standardized loading estimates. Cronbach’s alpha, a commonly reported score reliability coefficient which

Table 6
Confirmatory factor analysis (CFA) measurement model results.

Indicators			Estimate	t-value	CR
TradRM				0.831*	
TradRM	→	Financial	0.623	5.557	
TradRM	→	Strategic	0.553	5.943	
TradRM	→	LStrategic	0.472	4.299	
TradRM	→	Compliance	0.714	9.424	
TradRM	→	LCompliance	0.723	10.501	
TradRM	→	Technology	0.549	6.585	
TradRM	→	LTechnology	0.564	7.066	
TradRM	→	Economical	0.550	6.192	
TradRM	→	Reputation	0.814	12.64	
TradRM	→	LReputation	0.785	12.01	
TradRM	→	Senior manager	-0.324	-2.867	
Strategic	↘	LStrategic	0.756	9.755	
Compliance	↘	LCompliance	0.396	2.722	
Technology	↘	LTechnology	0.727	12.93	
Reputation	↘	LReputation	0.528	3.681	
RiskGov				0.939	
RiskGov	→	Corr and portfolio	0.665	12.129	
RiskGov	→	Quantitative	0.754	18.159	
RiskGov	→	Board report	0.809	20.126	
RiskGov	→	Risk indicators	0.700	14.844	
RiskGov	→	Central tech	0.822	24.326	
RiskGov	→	Verification	0.723	17.134	
RiskGov	→	Policies	0.812	24.418	
RiskGov	→	Response plan	0.738	17.704	
RiskGov	→	Alternative response plan	0.797	23.654	
RiskGov	→	Communication	0.740	18.682	
RiskGov	→	Indp/external audit	0.637	11.871	
RiskGov	→	Updates	0.846	31.177	
RiskGov	→	Philosophy	0.827	27.316	
RiskGov	→	Risk appetite	0.759	21.418	
RiskGov	→	Board committee	0.557	8.564	
RiskGov	→	Senior manager	0.826	9.360	
RiskGov	→	Central department	0.734	14.399	
RiskGov	→	Internal assessment group	0.702	14.623	
RiskGov	→	Risk owners	0.712	16.452	
Corr and portfolio	↘	Quantitative	0.453	4.338	
Response plan	↘	Alternative response plan	0.605	11.270	
Senior manager	↘	Central department	0.625	6.476	
TradRM	↘	RiskGov	0.604	9.474	

Notes: Number of observations is 151. Estimates presented are standardized. All unstandardized estimates are significant ($p < 0.05$); chi-square = 436.421 (d.f. = 368, $p < 0.05$), CFI = 0.985, and RMSEA = 0.035 (prob. RMSEA \leq 0.05 = 0.979).

CR = construct reliability or Cronbach's alpha.

* Not including item senior manager.

measures internal consistency of the survey responses within a given measure, exceeds the suggested 0.7 threshold (Nunnally, 1978) for acceptable reliability.

Senior manager is allowed to load on both the traditional risk management and the risk governance component, but it loads negatively onto traditional risk management. This cross loading is suggested from the modification indices to provide better fit; it is incorporated into the model since it is theoretically accurate that a senior risk manager would be a prime identifier of risk governance and not a part of traditional or typical silo risk management.⁷ Additionally, it may be of interest to note that traditional risk management and risk governance are highly and significantly correlated with a value of 0.60 (see Table 6). This is reasonable given that having robust implementation of one would likely mean relatively more robust implementation of the other.

⁷ The results reported in the following sections are not significantly affected by this cross loading.

Table 7

Structural equation modeling (SEM) results: base model, adaptations, and all model.

Model specifications	χ^2	d.f.	p-Value	CFI	TLI	RMSEA	90% C.I.	Prob. \leq .05	Sample
Base model	740.471	653	0.0097	0.976	0.974	0.030	0.016 0.041	1.000	145 (full)
+ Compensation	799.300	709	0.0102	0.970	0.968	0.032	0.017 0.043	0.998	127
+ Board independence	815.730	738	0.0242	0.970	0.967	0.031	0.012 0.043	0.997	112
All	748.544	646	0.0031	0.972	0.969	0.033	0.020 0.043	0.998	145 (full)

	Base model	+ Compensation	+ Blind	All
Lev → TradRM	0.202	0.497	0.849	0.202
Size → TradRM	0.153***	0.139**	0.157**	0.153***
MB → TradRM	0.038**	0.023	0.022	0.038*
SIC → TradRM	0.004	0.018	0.028	0.003
Div → TradRM	-0.025*	-0.024	-0.029	-0.026*
ManOwn → TradRM		0.457	0.777	
ManOptD → TradRM		0.034	0.006	
CEOB → TradRM				0.034
Rate → TradRM				0.265
Big4 → TradRM				0.154
Fin → TradRM				-0.008
Lev → RiskGov	-1.030***	-0.802*	-0.431	-1.031***
Size → RiskGov	0.201***	0.186***	0.211***	0.202***
Rate → RiskGov	-0.192	-0.171	-0.191	-0.184
Big4 → RiskGov	-0.145	-0.316	-0.174	-0.142
CEOB → RiskGov	-0.314**	-0.386**	-0.408**	-0.313**
Fin → RiskGov	0.274*	0.102	-0.070	0.274*
ManOwn → RiskGov		-0.591	-0.486	
ManOptD → RiskGov		0.042	0.001	
Blnd → RiskGov			-0.044	
MB → RiskGov				-0.004
SIC → RiskGov				-0.005
Div → RiskGov				-0.022*
TradRM → Lev2010	0.000	-0.004	-0.016	0.000
RiskGov → Lev2010	0.037**	0.034**	0.032**	0.037**
Lev → Lev2010	0.882***	0.905***	0.919***	0.882***
R ² TradRM	0.241	0.286	0.329	0.283
R ² RiskGov	0.339	0.310	0.347	0.330

Notes: Unstandardized coefficients are reported.

* $p < 0.10$.** $p < 0.05$.*** $p < 0.01$.

4.2. Results for the base model and adaptations

Results for the base model and adaptations of the base model are shown in Table 7.

Overall, the Base Model shows good fit (CFI: 0.976, TLI: 0.974, RMSEA: 0.030). The chi-square test statistic indicates poor fit of the model; however, the normed chi-square (1.13) falls below the most modest suggested cutoff of two (Ullman, 2001). Models with small sample size and a large number of variables show upward bias in chi-square statistics (Kenny and McCoach, 2003); therefore, the indications of the other fit statistics are relied upon. Adaptations to the Base Model and the All model also show good fit; based on parsimony, the Base Model is considered the best fitting model and the best model to explain risk governance and traditional risk management implementation.

4.2.1. Determinants of traditional risk management

The expectation is that the determinants of traditional risk management implementation can be best explained using traditional corporate finance motives for risk management, and the findings show no evidence that this expectation is unrealistic, and the significant variables give reliable evidence for such an argument.

Starting with the results from the Base Model (see Table 7); size shows a significant and positive relationship with the implementation of traditional risk management. Large firms face lower transactions costs associated with corporate risk management based on economies of scale (Bartram, 2000), therefore making it value enhancing for the firm to do risk management instead of investors themselves through their own portfolios. This is in line with the previous finding of Géczy et al. (1997), Mian (1996) and Nance et al. (1993).

The proxy for *growth opportunities*, market-to-book, shows a weak (at the 10% level) positive relationship with traditional risk management implementation levels which is in line with Brunzell et al. (2011), Gay and Nam (1998) and Samant (1996), and the hypothesis that firms implement risk management in order to reduce agency costs of underinvestment.

The result for *dividend policy* is also consistent with the underinvestment argument. A firm's dividend yield has a weak negative relationship with traditional risk management implementation. This is not in line with the substitute policy hypothesis presented in an earlier section which suggests firms with dividends would be more likely to implement traditional risk management because of reduced liquidity resulting from the dividend payout. However, previous empirical studies of risk management have led to ambiguous results with regards to dividends, and the negative relationship found in this study may be explained, not by a liquidity restraint argument, but instead by the negative relationship between growth options and dividends (Bartram, 2000). More mature firms give dividends and therefore dividends are a sign of less growth options which would in turn suggest less of a need for risk management to reduce the underinvestment problem. Both the results for growth opportunities and dividend policy suggest that firms implement traditional risk management aspects to reduce agency costs of debt resulting from the underinvestment problem.

None of the other Base Model determinants of traditional risk management are significant. *Leverage* shows an insignificant relationship with traditional risk management implementation, similar to the finding of Brunzell et al. (2011); a number of other empirical studies have also found ambiguous results regarding leverage (Bartram, 2000). *Diversification* also shows an insignificant relationship with traditional risk management implementation.

In the second model, management compensation variables are added to the base model (+ Compensation in Table 7); these variables are not included in the main specification because of the loss of sample size when adding them. They are found to have an insignificant effect on traditional risk management implementation. Brunzell et al. (2011) find no evidence of a relationship between derivative use for hedging and managerial ownership variables in their Nordic sample. When management compensation is added, the effects of growth opportunities and dividend yield on traditional risk management implementation become insignificant. This could be a result of loss of sample size since there is no obvious correlation problem between compensation variables and market-to-book or dividend yield.

Because evidence does not suggest that traditional risk management is motivated by transaction costs of financial distress (no leverage effect), the traditional theoretical expectation that implementing risk management should create additional debt capacity through reduction of costs resulting from leverage would not be expected to hold in this case. In fact, the feedback effect between traditional risk management and leverage in 2010 is insignificant.

None of the evidence regarding determinants of the traditional risk management component of ERM suggests a need for alternative hypotheses outside of traditional corporate finance theories, and the findings are in line with the expectations and previous research. Therefore, one can conclude that part of ERM implementation, the traditional risk management activities associated with identifying and assessing risk, is due to traditional needs for risk management associated with capital market imperfections.

4.2.2. Determinants of risk governance

The determinants of risk governance and the motives for taking the active step past traditional risk management activities are expected to be related to motives for corporate governance. Because risk management and ERM is substantially an issue of accounting and finance, motives for corporate governance are rooted in agency theory and agency costs of managerial incentives; the findings can with consistency be interpreted from this perspective.

The results suggest that risk governance has a significant and positive relationship with size. This is in line with previous empirical ERM studies (Beasley et al., 2005; Desender, 2011; Liebenberg and Hoyt, 2003; Pagach and Warr, 2011) and with the hypothesis that large firms may also face greater agency problems due to increased difficulty of monitoring or excess free cash flows and therefore need to compensate with stricter governance mechanisms (Klapper and Love, 2004).

Leverage is highly significant and negatively related to risk governance implementation levels. This relationship suggests that higher levels of leverage negatively impact the level of risk governance which is not at all in line with the traditional corporate finance explanation for risk management based on transaction costs of financial distress. Therefore, there must be a motive for risk governance that is not part of traditional corporate finance theory for risk management. Evidence of this same relationship has been found in previous ERM empirical studies (Beasley et al., 2008; Hoyt and Liebenberg, 2011), and as mentioned previously, shareholders of highly leveraged firms may not want risk reduction since it reduces the value of their option written to them by debtholders (Beasley et al., 2008). However, one could also explain this relationship from an agency cost of managerial incentive perspective which would be in line with the overall hypothesis that the risk governance component of ERM is related to needs for corporate governance. As proposed earlier, managers of levered firms are constrained in their use of free cash flows for their own incentives; therefore, agency costs of managerial incentives are already mitigated to some degree and additional mitigation through added risk governance is less necessary. This would then explain the negative relationship between leverage and risk governance implementation. Additional evidence of this type of hypothesis is discussed in the next section in relation to the relationship between dividend yield and risk governance.

Because public pressure for ERM implementation is often cited as a motivator for implementing ERM, a surprising finding is that both having *publicly rated debt* and not having a *Big 4 auditor* have no effect on risk governance implementation in the sample of firms. Big Four auditor is a relatively standard variable used in ERM empirical studies (Beasley et al., 2005; Desender, 2011), but in this sample of Nordic firms, where most firms employ Big Four auditors (94%) and those that do not tend to be small,⁸ the size variable most likely accounts for any Big Four auditor effect which is essentially an indirect size effect. Publicly rated debt is similar in the sense that the firms that have publicly rated debt are few and are larger firms,⁹ and therefore size may be capturing any effect from this variable.¹⁰ The lack of significant relationship between public pressure variables and risk governance implementation may be evidence that firms are implementing risk governance for reasons other than to appease stakeholders which may set aside some fears that ERM is simply a window-dressing technique.

The corporate governance variable *CEO on board* is significant and negatively related to a firm's implementation of risk governance. This is in line with the hypothesis from Desender (2011) that managers, who generally like freedom and would be opposed to additional corporate governance and monitoring, would be more effective in stopping ERM implementation if they held a seat on the board. Without the support of the CEO and the executive management team, ERM implementation is more or less destined to fail. This makes evidence of an agency problem like this highly problematic.

Finally, being a *financial firm* shows a weakly significant and positive relationship with risk governance. This is in line with previous findings of Beasley et al. (2005) and arguments made by Pagach and Warr (2011). Given the importance of ERM for the Basel II framework, such a finding is not surprising.

When added, management compensation variables (+ Compensation in Table 7) have an insignificant effect on risk governance implementation. Also, the effect of financial firms becomes insignificant which again can be due to the loss of sample size.

Board independence is added to the model (+ BInd in Table 7) in order to further explain risk governance but found to have an insignificant relationship. For the sample of firms that report board independence clearly (approximately 77% of the full sample) most report that they follow corporate

⁸ A mean difference test reveals that the mean size of the non-audited firms is significantly smaller than that of the audited firms.

⁹ A mean difference test reveals that the mean size of the rated firms is significantly larger than that of the audited firms.

¹⁰ If size is removed from the model, having publicly rated debt does in fact effect ERM specific implementation in a significant and positive way.

governance guidelines for board independence or are transparent about not complying¹¹; given that the guidelines are intended to mitigate governance problems solved by board dependence, following guidelines and reporting may imply enough mitigation of those governance problems deeming additional risk governance unnecessary to mitigate related issues.

Finally, there is evidence of a robust *feedback effect* between risk governance and future leverage holdings where higher levels of risk governance during 2010 are positively related to larger end of the year leverage holdings in 2011. This is the first evidence of ERM's relationship with leverage and debt capacity. One could argue at first glance that it is a result of the traditional transaction cost of financial distress argument for risk management; implementing risk management reduces the probability of financial distress and increases the debt capacity of the firm allowing the firm to take on more debt with less costs of future financial distress. However, the feedback only pertains to the risk governance component since traditional risk management implementation does not show any significant impact on leverage holdings, and there is no evidence that financial distress costs motivate either traditional risk management or risk governance in the sample. As shown by the determinants, the risk governance component is explainable using agency theory of managerial incentives, one of the main theoretical foundations for corporate governance. Therefore, it would be more likely that the relationship between risk governance and future leverage is grounded in the same theories. As mentioned previously, generally managers dislike leverage because of its restrictive qualities, it will therefore be in the managers' interests to have lower levels of leverage to increase their freedom to use free cash flows as they please. Therefore, one could argue that managers who are better monitored by risk governance will be less successful at curbing levels of leverage.

The estimated relationships between the variables are qualitatively unchanged if the feedback effect is removed; in fact, estimates generally change only slightly in the thousandths decimal place and all significance tests remain the same as the model with the feedback effect.

4.3. Exploratory robustness check – all model

In order to ensure that the conceptual model (Fig. 2) does not eliminate relationships that are significant, an “exploratory” model where all available variables for the full sample are determinants of both traditional risk management and risk governance is estimated (All in Table 7). Size is still robustly a significant and positive determinant of traditional risk management and risk governance. *CEO on board* is also significantly and negatively related to risk governance. There is weak evidence that *growth opportunities* increase the implementation of traditional risk management and that *dividend yields* decrease implementation, still supporting the motive that firms implement risk management in order to reduce agency costs of underinvestment.

However, this model also weakly suggests that *dividends* have a negative impact on risk governance.¹² Dividends have not been empirically studied as a determinate of ERM implementation in previous studies, and this is therefore the first evidence of this relationship. This may suggest, as mentioned previously, that firms that do not have growth options are less likely to implement ERM or risk governance. However, it could be instead interpreted from a corporate governance/managerial incentive perspective which is in line with the interpretation of the leverage relationship. Dividends reduce the free cash flow in the firm, this mitigates agency costs of managerial incentives because it decreases the available free cash flow that managers can use in their own interest, for example risk reduction through operative diversification which is generally associated with a loss in value for the owners (Bartram, 2000). Therefore, firms that give dividends require less monitoring and therefore are in less need of enterprise risk management's additional governance aspects.

Market-to-book is not a significant determinant for risk governance. This is consistent with the findings of Liebenberg and Hoyt (2003) and Pagach and Warr (2011). Growth opportunities then explain

¹¹ Codes in place year end 2009: The Swedish Code of Corporate Governance applicable July 1st, 2008; The Norwegian Code of Practice for Corporate Governance from October 21, 2009; Committee on Corporate Governance's Recommendations for corporate governance of August 15, 2005; Finnish Corporate Governance Code from October 20, 2008.

¹² This relationship holds when adding dividend yield as a determinant of ERM to the original base model; results for all other determinants are similar, and dividends are significantly (at the 10% level) and negatively related to ERM specific implementation.

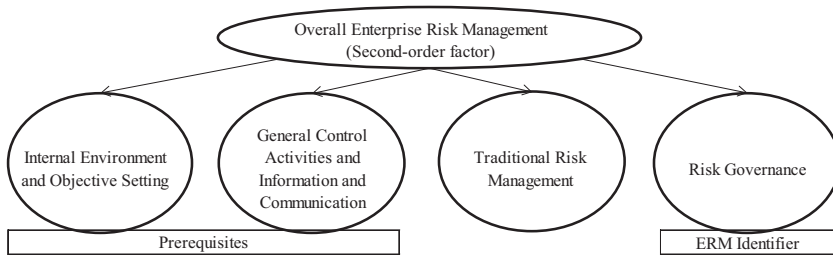


Fig. 5. Second-order enterprise risk management factor structure.

Table 8

Structural equation modeling (SEM) results: overall enterprise risk management (second-order) model.

	Estimate
Lev → ERM	−0.478**
Size → ERM	0.127***
MB → ERM	0.001
SIC → ERM	−0.014
Div → ERM	−0.016**
CEOB → ERM	−0.165*
Rate → ERM	−0.060
Big4 → ERM	−0.029
Fin → ERM	0.090
ERM → Lev2010	0.046**
Lev → Lev2010	0.866***
R ² ERM	0.355

Notes: 145 observations.

Unstandardized coefficients are reported.

Chi-square = 1810.979 (d.f. = 1541, $p = 0.000$), CFI = 0.943, TLI = 0.940, and RMSEA = 0.035 (prob. RMSEA $\leq 0.05 = 1.000$).

* $p < 0.10$.

** $p < 0.05$.

*** $p < 0.01$.

only the portion of overall ERM that is associated with traditional aspects of risk management but not the risk governance component. Therefore, one could potentially argue that firms facing very high agency costs of underinvestment gain sufficient advantages from traditional risk management and without other reason would not have an incentive to implement ERM. This also supports a different interpretation of the dividend and risk governance relationship from that of the dividend and traditional risk management relationship; the same consistency in dividend and growth option relationship does not exist for risk governance.

4.4. Results for an overall enterprise risk management model

Most existing determinants studies look at the relationship between firm characteristics and an overall measure or indicator of ERM like the hiring of a CRO or similar risk management position (Liebenberg and Hoyt, 2003; Pagach and Warr, 2011), a survey response on the firm's level of implementation (Beasley et al., 2005), or an aggregated ERM score made up of a number of dimensions (Desender, 2011; Gordon et al., 2009).

In order to compare to existing studies and show that the division of ERM into its underlying components provides more information about determinants than using an all-encompassing measure of ERM, the effects of base model variables on overall ERM implementation are estimated. Overall ERM is a second-order factor structure; all four factors identified in the EFA load onto a single ERM factor (see Fig. 5).

As can be seen in [Table 8](#), *leverage* and *dividend yield* have an overall negative and significant impact on overall ERM implementation and *size* maintains its positive effect. The weak effects found in some of the previous models of *market-to-book* and *financial industry* become insignificant and *CEO on board* becomes less significant (decreased to the 10% level). Therefore, results on determinants that are specific to risk governance or traditional risk management are altered when combining them to form an all-encompassing ERM measure. It also gives less clarity on how to interpret the remaining significant variables. The feedback effect of ERM on leverage is positive and significant. This suggests that the MIMIC model ([Table 7](#): Base Model) is a more informative way to approach the analysis than analyzing relationships between determinants and overall ERM levels.

5. Conclusions

Typically enterprise risk management implementation is explained either by corporate governance motivations or traditional corporate finance theories. Previous empirical studies of ERM determinants focus on all-encompassing proxies for ERM. However, ERM can include varying levels of very traditional risk management activities and risk governance, and taking this division into account is an important step in clarifying theoretical motives for ERM implementation. By doing so, this study is able to investigate determinants of the additional risk governance component of ERM – the step beyond traditional risk management.

Based on a survey of 145 firms, results support that the two components do in fact have their own determinants, and that the level of risk governance in a firm is related to the need for governance because of the size of the firm and the existing governance in terms of leverage and dividend payments. The level of control the chief executive officers have on the governance decisions in the firm also plays a role in risk governance implementation; given the importance of the support of the CEO and the executive management team for successful ERM implementation, evidence of an agency problem like this is highly problematic. These characteristics are consistent with motives for corporate governance, heavily grounded in agency theory of managerial incentives. Evidence does not seem to suggest that public pressure, from Big Four auditing firms and credit rating agencies, is motivating risk governance implementation. This may be evidence that risk governance and ERM implementation are not simply about firms' attempts to window-dress and appease stakeholders artificially. Traditional risk management seems to be best explained by the firms advantage in terms of transactions cost of risk management and the need to mitigate underinvestment costs. Therefore, the evolution of risk governance in the last few decades can arguably be in response to the growing concern about the lack of both corporate governance and risk management in firms.

As with most studies in corporate finance, there are limitations to this study. Structural equation modeling is intended for a priori testing of theoretical models, therefore, robustness is problematic in the sense that there is not a clear cut competing model to test. Sample size is also a crucial aspect of structural equation modeling. Based on [Comrey and Lee \(1992\)](#) the sample used in this study falls between poor and fair. Given several variables are loading strongly on each factor, a smaller sample, like the one in this study, can be argued as adequate. Further research should attempt to test this suggested model on another sample.

Given the limitations, the findings of this study should be taken as an exploratory step and not as absolute. Despite this, this study does contribute to sorting out motivations of ERM in a more theoretical manner; until now much of the argumentation has been intuitive and ad hoc and with little connection to corporate finance theory. It may also be evidence that firms are implementing ERM for the same reasons stakeholders have for pushing for its implementation. Future research should focus on the value of implementing risk governance while controlling for the value created by traditional risk management.

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