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Enterprise Risk Management: Adoption, Performance Benefits, and Disclosure Effects

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ENTERPRISE RISK MANAGEMENT: ADOPTION, PERFORMANCE BENEFITS, AND DISCLOSURE EFFECTS

by

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Dedication

This dissertation is dedicated to my wife Laura. You have provided me all the kindness, love, support, and encouragement that I could have ever asked from the decision to pursue a Ph.D. through the final days of the dissertation. I look forward our next steps and adventures in our life together.

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ABSTRACT

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Enterprise Risk Management (ERM) includes the methods and processes used by organizations to manage risks and seize opportunities that maximize firm performance. Thus, the ERM framework can mitigate the occurrence of financial crisis while enhancing firms 'operating performance and potentially providing capital market benefits. This study uses a unique set of data obtained via survey of Internal Audit Function management and publicly disclosed financial information to empirically examine corporate governance factors associated with adoption of ERM, potential operational and market performance benefits associated with adoption, and the impact of the risk factors disclosures on the firm's cost of equity and debt. Specifically, this three (3) paper dissertation contributes to the existing academic literature by considering factors and benefits associated with Enterprise Risk Management (ERM). The first paper of the dissertation considers the audit committee and IAF as potential determinants of ERM adoption. The second paper of the dissertation provides evidence of operational and market performance benefits associated with firms adopting ERM. The third paper of the dissertation examines the potential cost of capital impacts associated with non-financial information, specifically, ERM related risk disclosures. Results of the study provide support for the hypothesized association between adoption and maturity of ERM processes and audit committee financial expertise as well as the internal audit function reporting independence. In addition, the results provide some evidence of a positive relationship between the assessed ERM process maturity and operational performance.

Finally, results indicate that increased disclosure of risk factors associated with ERM process is associated with reduced cost of capital. Prior literature has relied primarily on surrogates to estimate ERM impacts. While the reported results are based on a limited sample of firms, it provides direct evidence on the factors related to adoption of ERM processes as well as the potential benefits of adoption. Given the magnitude of the investment in ERM, this dissertation provides empirical evidence that there are potential firm benefits realized on the investment.

PREFACE

This dissertation study was designed as three separate and distinct studies which considers the factors influencing Enterprise Risk Management Adoption, whether and the extent to which the adoption and maturity of Enterprise Risk Management is associated better operating and market performance than the associated industry class, and whether a greater number of risk factor disclosures is associated with decreased cost of capital or cost of equity. As of the time of the completion of this dissertation, none of these three studies has been submitted to journals for publication.

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CHAPTER 1

INTRODUCTION

Enterprise Risk Management (ERM) provides a framework to mange organizational risk within levels considered to be tolerable by the board of directors and/or the management of an organization. Prior research (Beasley et al. 2005, Pagach and Warr 2007,) indicates that companies in the banking and finance industry were the most likely to implement ERM processes. Despite being more likely to implement ERM processes, organizational failures within the banking and finance industry in the wake of the recent sub-prime mortgage crisis has been considered a primary factor contributing to the meltdown of the U.S. economy and financial markets. The combination of increased likelihood of adoption and the lack of adequately addressing risk raise several questions related to ERM processes that this dissertation empirically investigates. Specifically, this dissertation explores risk management by considering adoption, operational and market performance benefits, and incentives for increased disclosure of organizational risk factors using a unique data set of ERM adoption obtained via survey of Internal Audit Function management.

The first paper of this dissertation explores whether quality characteristics of two corporate governance components, Audit Committees and Internal Audit Functions, are associated with adoption of ERM. The oversight roles fulfilled by Audit Committees and risk assessment activities undertaken by Internal Audit Functions would suggest a direct interest in organizational risk management processes. Based on this consideration, I hypothesize that characteristics of Audit Committees and Internal Audit Functions are positively associated with the adoption and maturity of ERM processes. The results of

paper 1 finds evidence to support a positive association between audit committee financial expertise, and number of audit committee meetings, reporting independence and extent of quality assurance reviews of Internal Audit Functions with the adoption of ERM processes.

Another question resulting from the risk management failure in the banking and financing industry is whether performance benefits exist for organizations adopting ERM. I hypothesize that organizations invest in ERM with the expectation of a benefit, specifically enhanced operating and market performance. Combining the assessed ERM maturity rating obtained via survey of Internal Audit Function Management with financial reporting (Compustat) and market performance (CRSP) data, I use a panel data regression model to test the association between ERM maturity and operating and performance benefits.

Prior disclosure literature (Botosan 1997; Sengupta 1998; Botosan and Plumlee 2002; and Ashbaugh-Skaife et al. 2009), provides evidence that that increased disclosure are associated with reduced cost of debt and equity. Consistent with this set of literature I hypothesize a negative association between the number of risk factors disclosed and the cost of capital. Using a the set survey respondents and disclosed risk factors during the fiscal years between 2006 and 2008, results provide support of a negative association between risk factor disclosure and proxies of cost of debt and cost of equity.

Together these three studies contribute to the literature in several areas. Using a survey to specifically identify whether a company has adopted ERM and the maturity of those processes, reduces the potential noise included in prior adoption and market event studies. In addition, the use of panel data to test examine operating and performance

benefits provides considers the use of both a new method as well as test of a benefit of ERM suggested by the COSO ERM Framework which has not been supported by empirical evidence. Finally, the method of capturing risk factor disclosure and testing its association with cost of capital may provide for additional considerations and opportunities.

CHAPTER 2

ASSOCIATION BETWEEN AUDIT COMMITTEE AND INTERNAL AUDIT FUNCTION EFFECTIVENESS CHARACTERISTICS AND ENTERPRISE RISK MANAGEMENT ADOPTION

Abstract: Enterprise Risk Management (ERM) provides a framework to mange organizational risk within the tolerable levels of the organization. The financial sector was considered to be one of the leading industries in the adoption of ERM processes, yet failures within the industry in the wake of the recent sub-prime mortgage crisis and subsequent meltdown of the U.S. economy and financial markets raise the questions about the quality of ERM processes. One of the most readily identified contributing factors of the recent sub-prime mortgage crisis and the resulting meltdown of the U.S. economy and financial markets was inadequate and ineffective organizational risk assessment and management processes. Enterprise Risk Management (ERM) provides a framework to manage organizational risk which should mitigate the occurrence of organizational financial crises while potentially enhancing company financial, operational, and market performance. This study considers the association between characteristics of two corporate governance components, Audit Committee and Internal Audit Function characteristics and the likelihood of ERM adoption. As opposed to using a proxy for ERM adoption, this study uses survey responses from Internal Audit Function management to identify whether ERM has been adopted by an organization. Results of the study provide evidence that certain characteristics of audit committees (the number of audit committee meetings and percentage of audit committee members disclosed as financial experts) and internal audit functions (reporting independence and quality assurance review procedures) are associated with a firm's likelihood of adopting and

implementing governance mechanisms such as ERM processes. These findings provide additional evidence of the value and importance of effective audit committees and internal audit functions in providing risk oversight and monitoring within organizations.

2.1 INTRODUCTION

Inadequate and ineffective risk assessment has been identified as one of many contributing factors to the recent financial crisis and the resulting meltdown of the U.S. economy and financial markets. In addition to inadequate risk assessment, implementation of ineffective strategies and controls to mitigate identified risks can also be considered factors contributing to the financial scandals of the new millennium (Enron, WorldCom, etc.), losses sustained from natural disasters and terrorism, as well as poor management judgments. These aforementioned issues have created major obstacles for the U.S. economy and tremendous losses throughout the financial investment community.

To mitigate financial scandals and other firm detrimental events, regulators have implemented regulation designed to address investor concerns, such as the Sarbanes-Oxley Act of 2002 (SOX). SOX and enhanced investor monitoring have increased scrutiny of executives and board members (more specifically the audit committee) in fulfillment of their management and oversight functions respectively. In response, executives and board members are likely increasing the emphasis placed on the implementation of firm-wide Enterprise Risk Management (ERM) to reduce the organizations' risks of failing to meet established goals and objectives, thereby making the area fruitful for research.

The Enterprise Risk Management – Integrated Framework published by the Committee of Sponsoring Organizations (COSO) of the Treadway Commission (COSO-ERM 2004) defines ERM as:

> … 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.

The COSO-ERM Integrated Framework (2004) indicates that in order for management to maximize firm value, it must develop the organization's "strategy and objectives to strike an optimal balance between growth and return goals and related risks, and efficiently and effectively deploy resources in pursuit of the entity's objectives."

In addition, The Institute of Internal Auditor's (IIA) International Professional Practices Framework (IPPF) defines internal auditing as:

> …an independent, objective assurance and consulting activity designed to add value and improve an organization's operations. It helps an organization accomplish its objectives by bringing a systematic, disciplined approach to evaluate and improve the effectiveness of risk management, control, and governance processes.

This definition explicitly indicates that the Internal Audit Function (IAF) has a professional responsibility to not only the corporate governance process, but also the risk management and control processes within the organization.[1]

[1] While the definition of internal audit states that that internal audit functions have a responsibility to "evaluate and improve the effectiveness of risk management", the IIA's definition of internal auditing and the International Professional Practices Framework standards explicitly indicate that internal audit functions must be independent. As a result, some components of ERM, including management of risk and setting of risk tolerances, would impair the internal audit function independence if performed. Although risk management would present a conflict of independence for the internal audit function, one of the primary responsibilities of internal audit functions includes performing risk assessment for both the macro-level annual audit plan and on the micro-level for each audit, thereby not presenting a conflict to independence. This study does not specifically consider the extent of internal audit functions ERM

This study posits that characteristics of two corporate governance factors (Audit Committee and Internal Audit Function) are associated with companies adopting ERM. This study uses a survey of Internal Audit Function management to gather information regarding the status of ERM processes and characteristics of the Internal Audit Function and match this data to audit committee data obtained from proxy statements (DEF 14A) filed with the Securities and Exchange Commission (SEC) and financial statement data obtained from Compustat. The results of this study contributes to existing literature by providing a deeper understanding of the association between enhanced corporate governance factors and the adoption and maturity of ERM processes. Specifically, the results of the study indicate a significant positive association between the number of audit committee meetings, percentage of audit committee members disclosed as financial experts, reporting independence and quality assurance review practices of the Internal Audit Function and measures of ERM adoption and process maturity.

This paper is structured as follows: The next section (II) provides an overview of prior literature. Section III provides the development of hypotheses followed by a discussion of the sample selection and research design. The results of the study are provided in Section V followed by concluding remarks in the last section.

2.2 PRIOR RESEARCH

Prior related ERM studies include factors associated with ERM implementation including board independence, but have not included considerations of the characteristics of Audit Committees and Internal Audit Functions and the adoption and maturity of ERM processes. In addition, many prior studies related to ERM adoption are limited as a result

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responsibilities, but only the association between internal audit function characteristics and ERM adoption and maturity of ERM processes.

of the use of a potentially noisy proxy of ERM adoption. An overview of the prior literature related to ERM adoption, Audit Committee Oversight, and Internal Audit Functions is detailed below.

Factors Associated with ERM implementation

Prior to the recent SEC requirement for companies to disclose "the extent of the board's role in the risk oversight" (SEC 2009), only limited information was publicly available to identify companies which have implemented ERM, and even the newly mandated disclosures may not specifically indicate whether ERM has been implemented. As a result, many prior ERM studies utilize the public disclosure of the appointment or hiring of a Chief Risk Officer (CRO) or Risk Manager as a proxy of whether an organization implemented ERM. Using announcements of Chief Risk Officer appointments as a proxy for ERM implementation, Liebenberg and Hoyt (2003) and Pagach and Warr (2007) find evidence that there is a greater likelihood that larger and more highly leveraged firms will implement ERM. Additionally, Pagach and Warr (2007) find that firms encountering greater earnings volatility, higher research and development expenses, with more business segments, and poorer stock market performance are more likely to implement ERM. Pagach and Warr (2007) further document that firms in the financial or utilities industries are more likely to adopt ERM.

Using an ordered logit model and survey responses from Chief Audit Executives, Beasley et al. (2005) find that the stage of ERM implementation is positively associated with entity size, the use of a Big-4 audit firm, and industry (banking, education, and insurance). Beasley et al. (2005) also find a significant relationship between the stage of ERM implementation and the independence of the board of directors, CEO and CFO

request for increased Internal Audit Function risk management efforts, and the existence of a Chief Risk Officer. In this same study, the authors find that Chief Audit Executives fulfill the role of the Chief Risk Officer in 92.6 percent (25 of 27) of companies which are in the process of implementing ERM without a formally dedicated Chief Risk Officer.

Although Beasley et al. (2005) find that the existence of a Chief Risk Officer is significantly associated with the stage (maturity) of ERM processes in place; the use of external announcements of Chief Risk Officers as a proxy is a poor instrument for measuring ERM adoption. Specifically, provided that a firm does not publicly disclose the appointment of a Chief Risk Officer when one exists or when ERM has been implemented without a Chief Risk Officer, companies would incorrectly be identified as not having implemented ERM. Alternatively, companies which have publicly announced the appointment of a Chief Risk Officer may not plan to implement ERM, but instead the Chief Risk Officers primary focus may only be related to financial or insurable risk as opposed to risk management throughout the organization. As a result, these considerations present concerns that the Liebenberg and Hoyt (2003) and Pagach and Warr (2007) studies which utilize Chief Risk Officer appointment announcements as a proxy for ERM implementation can be extended by clearly identifying ERM adoption or non-adoption, a contribution of this study.

Other related studies in this area include Desender (2007) and Tonello (2007). Desender (2007) measures ERM adoption within the Pharmaceutical Preparations industry (SIC code – 2834) based on firm disclosure of a list of seventy items indicated within the COSO-ERM framework to evaluate the influence of two other corporate governance considerations, CEO duality and board of director independence, on the

extent of ERM processes. Desender (2007) finds the separation of CEO and Chairman of the Board responsibilities (duality), interaction of board independence and lack of duality of the CEO and Chairman of the Board, firm size, financial risk (leverage), market risk (beta), and clients of KPMG to be positively associated with higher ERM adoption scores. The results of Desender (2007) suggest that CEOs in general do not favor ERM implementation and are frequently able to limit the extent of ERM effectiveness when also fulfilling the role of the Chairman of the Board. Tonello (2007) indicates that management incentives may be disproportionally tied to risk resulting in avoidance of considerations of certain risks within the ERM risk inventory and assessment phase. Consistent with Tonello's (2007) concerns, Pagach and Warr (2007) study the impact of the value of the CEOs stock options to stock equity in the company on ERM implementation efforts. Pagach and Warr (2007) find that ERM is less likely to be implemented when the CEO has a higher ratio of stock option to equity holdings. These findings suggest that CEO's personal portfolio may increase their preference for stock price volatility when they can exert enough power by holding the dual role of CEO and Chairman of the Board. As a result, effective Audit Committees and Internal Audit Functions (through their interactions with the Audit Committee) are likely to insist on the adoption of ERM processes.

Finally, using separate measures to proxy for ERM adoption (identification of a Chief Risk Officer and an aggregate risk disclosure score) within the Pharmaceutical Preparations industry (SIC code 2834), Desender and Lafuente Gonzalez (2009) find positive and consistent associations between their proxies of ERM adoption and firm

size, board of director independence, and concentration of ownership measures.[2] In addition, Desender and Lafuente Gonzalez (2009) also find that audit fees (negative) and the use of a Big-4 auditor (positive) are associated with their measure of ERM risk disclosure but not with identification of a Chief Risk Officer. Hoyt and Liebenberg (2009) find firm size and one-year change in market value to have a positive, and leverage and opacity to have a negative significant association with their measure of ERM adoption, for publically traded insurance companies (SIC codes 6311–6399).[3]

Audit Committee Oversight

Recent financial scandals at Enron, WorldCom, Adelphia, and Tyco were primarily perpetrated at the executive level. As a result, the oversight responsibilities of the board of directors, more specifically the Audit Committee, have received increased attention. Consistent with these concerns, Jensen and Meckling's (1976) seminal discussion on agency theory and moral hazard suggests that agents provide advantages to organizations as a result of their greater willingness to accept risk in order to enhance the value of the firm. However, Jensen and Meckling (1976) also suggest that as a result of the principal-agent contract, the principal will need to monitor the activities of the agent to ensure that the agent is not shirking their management responsibilities or taking excessive risk. Consistent with this concern, Rezaee (2006) indicates that the Audit Committee has oversight responsibility for corporate governance, financial reporting, internal control,

[2] Measures of ownership concentration used are: the percentage of ownership of largest shareholder and the largest three shareholders, and a dummy variable in the event the largest shareholder owns more than a 20 percent share.

[3] Hoyt and Liebenberg (2009) also find additional variables specifically related to insurance companies to be associated with ERM adoption.

and risk management. Rezaee (2006) states that, the Chief Audit Executive, the highest ranking employee of the Internal Audit Function:

> …can assume responsibility for the proper design of the ERM concept and obtain a firm commitment from the board of directors, audit committee, and top executives for effective implementation of ERM in addressing the organization's risk profiles, appetite, exposure and controls. (A-419)

Rezaee (2006) further states:

> Effective design and implementation of the ERM concept requires commitment and oversight responsibility by the full board of directors and audit committee, and proactive participation by top executives and internal auditors in implementing ERM. (A-419)

Finally, Rezaee (2006) indicates that the Audit Committee should rely on the IAF to provide feedback on the design, implementation and operation of ERM. These comments help provide a better understanding and additional support of the involvement and importance of the roles of effective Audit Committees and Internal Audit Functions related to ERM adoption and processes. As a result, studies have noted the increased responsibilities assumed by Audit Committees in review of organizational risk.

Audit Committee research has recently received significant attention with a large portion of studies focusing on member independence from operations management duties. These prior studies find Audit Committee independence to be significantly associated with higher external audit fees and more extensive audit procedures (Abbott et al. 2003) and negatively associated with auditor dismissals following going concern opinions (Carcello and Neal 2000), fraudulent financial reporting (Beasley et al. 2000), earnings management (Klein 2002), and restatements (Abbott et al. 2004; Agrawal and Chadha 2005). Section 301 of SOX requires Audit Committees of companies traded on

national exchanges to be comprised completely of independent board members. Despite this requirement, all independent Audit Committees are not of the same effectiveness.

Brancato et al. (2006) finds that the Audit Committee has been delegated either complete (sixty-six percent of respondents) or shared responsibility for risk oversight (twenty-three percent of respondents) for eighty-nine percent of companies surveyed. Scarbrough et al. (1998) find that independent Audit Committees are more likely to frequently meet with Chief Audit Executives and review the results of internal audits; thereby likely increasing their awareness of organizational risk. These considerations lend additional evidence regarding the role of the Audit Committee in the risk assessment and management process and potential adoption of ERM processes.

Internal Audit Function

The Institute of Internal Auditors (IIA) International Professional Practices Framework (IPPF) standards specify that management is responsible for setting the organization's risk appetite, imposing risk management processes, and making decisions about risk responses and that the Internal Audit Function must maintain independence and objectivity in order to fulfill its responsibilities by remaining independent of such management responsibilities. However, the IAF could manage the risk assessment process without assuming the previously identified management responsibilities, while maintaining its objectivity. Consistent with the Institute of Internal Auditors definition of internal auditing, the standards[4] state that the Internal Audit Function "must evaluate the effectiveness and contribute to the improvement of risk management processes."

[4] IIA IPPF Standard 2120 - Risk Management

Anderson and Leandri (2006) suggest that Internal Audit Functions are one of the few functions within an organization which have an "enterprise-wide view and scope" which is highly valuable. The Institute of Internal Auditors (IIA) International Professional Practices Framework (IPPF) standards[5] also require Internal Audit Functions to perform a periodic risk assessment (at least annually) to develop a risk-based audit plan. Although risk assessments can be quantitative, qualitative, or a combination of the two (hybrid), it should be a continuous process and include the organization's entire risk universe. Therefore, the involvement of the Internal Audit Function with ERM processes potentially reduces duplication of efforts and associated costs of an additional member of senior management while providing a broader risk assessment based on the in-depth understanding of business processes and risks obtained from providing assurance and consulting services throughout the entire organization. Prawitt et al. (2008) find abnormal accruals to be significantly lower for companies with more experienced and independent Internal Audit Functions (as measured by Chief Audit Executives reporting to the Audit Committee).

2.3 HYPOTHESES DEVELOPMENT

The primary goal of implementing ERM is to manage the overall financial risk as well as risks related to strategy, operations, reporting, and regulatory compliance. Managing such risks on an integrated organization-wide perspective is expected to reduce organizational risk and enhance the likelihood of achieving organizational goals and objectives which frequently include financial performance, market returns, customer satisfaction, new products and services development, and stockholder satisfaction. As discussed in the previous literature section, there are many reasons which may be

[5] IIA IPPF Standard 2010 – Planning

attributable to companies implementing ERM, all of which are not currently known. Despite the overwhelming risk management oversight responsibility entrusted to Audit Committees and Internal Audit Functions, to my knowledge, the influence of these components of corporate governance have not received much consideration in relation to ERM adoption, although an inherent relationship exists between these governance structures and ERM.

Audit Committee Association with ERM Adoption

Regulatory change imposed by SOX requires publically traded companies to have an Audit Committee whose members are independent of firm management, with at least one member who is identified as a financial expert[6] (or the disclosure of reasons for the lack of identification of a financial expert). SOX also requires Audit Committee involvement in hiring and firing decisions of the external auditor and discussion with external auditors of any audit issues which management and the external auditors are not able to agree upon. These requirements provide additional opportunity to ensure that the Audit Committee and the Board of Directors are aware of organizational risks while also implicitly suggesting an increase in fiduciary responsibilities of committee members.[7]

While Audit Committees are becoming over extended as a result of their extensive and continually expanding oversight responsibilities, Audit Committees exhibiting greater effectiveness (as measured by the number of members, meetings, percentage of

[6] The identification of Audit Committee Financial Expert is based on the number of Audit Committee members disclosed as a financial expert within the fiscal year 2008 SEC proxy statement filing.

[7] While many disclosures indicate that identification as a financial expert does not increase the liability of the director, disclosure of directors as an Audit Committee financial expert does implicitly represent enhanced awareness and skills related to financial risks as well as understanding of financial reporting.

members that are identified as financial experts, presence of the Chairman of the Board on the audit committee, CEO attendance of audit committee meetings, and the Audit Committees review of IAF risk assessment) are more likely to ensure that risks are brought to the attention of the full Board of Directors and management and are properly addressed. As a result, in addition to receiving feedback from internal and external auditors, Audit Committees with such characteristics would be more inclined to require ERM adoption:

> *Hypothesis 1* – Companies that exhibit more effective Audit Committee characteristics are more likely to adopt ERM processes.

IAF Association with ERM Adoption

The New York Stock Exchange (NYSE) revised its listing standards in the wake of the collapse of Enron and WorldCom and now requires all listing companies to maintain an internal audit activity (NYSE Corporate Governance Rules—Section 303A). Although the listing standards do not provide specific considerations for such internal audit activities, companies which merely intend to comply with the requirement are more likely to create small Internal Audit Functions with limited scope, while organizations investing in an effective Internal Audit Function do so as a result of potential benefits in the form of risk assessment, control evaluation, consulting, and other value-added activities which effective Internal Audit Functions can provide. Such an investment in an organizational oversight function is indicative of the Board of Directors, the Audit Committees', or executive managements' desire to evaluate and manage risk and controls. Internal Audit Functions of greater effectiveness are in turn more likely to be more experienced in risk assessment while also having greater exposure with the Audit Committee thereby highlighting potential benefits and the need for ERM adoption.

Provided that an organization has invested in a more effective Internal Audit Function, as measured by the Internal Audit Function's independence, and staff competency, it is also likely that such organizations would also invest in the adoption an ERM program:

> *Hypothesis 2* – Companies with more effective Internal Audit Function characteristics are more likely to adopt ERM processes.

2.4 METHODOLOGY

Sample Selection

This study uses data obtained from a web-based survey emailed to Internal Audit Function management[8] of U.S.-based publicly traded firms.[9] Survey responses are matched to financial statement data obtained from Compustat and Audit Committee characteristics obtained manually from proxy statements (DEF 14) filed with the SEC. The survey, included in the appendix (Table 1), asked respondents to indicate whether their organization has implemented ERM (formal implementation, informal implementation, or no implementation) as well as the maturity of implementation based on a six point scale for each of the three fiscal years of the period between 2006 and 2008. Each of these measures is modeled in separate regressions to increase the significance of statistical tests and evaluate the consistency of statistical tests based on alternative measurements of the dependent variable.

[8] Surveys were sent to Internal Audit Function management in order to obtain characteristics of the internal audit function. In addition, Internal Audit Functions have been noted in prior studies (Beasley et al. 2005; Institute of Internal Auditors 2006 Common Body of Knowledge survey) to be involved or familiar with the ERM activities, thereby having appropriate knowledge of ERM adoption and ability to assess ERM process maturity.

[9] Survey link and follow-up requests were emailed to Internal Audit Function Management between July 15, 2009 and October 21, 2009. A copy of the survey email request and the survey are included in the appendix.

The lack of publically available information regarding ERM implementation, has led most prior ERM adoption studies (Liebenberg and Hoyt 2003; Pagach and Warr 2007 - SSRN; Beasley et al. 2007) to use formal announcement of Chief Risk Officer appointments identified in press releases and SEC Filings as a proxy for ERM adoption. Despite the Beasley et al. (2005) finding that Chief Risk Officer appointment is associated with ERM implementation stage, the use of Chief Risk Officer appointment as a proxy variable for ERM adoption is likely to be a noisy as such a proxy fails to provide positive assurance of ERM adoption or lack thereof. The possible noise of such proxies is also identified by the results of the IIA's 2006 Common Body of Knowledge (CBOK) survey which finds that Internal Audit Functions perform a substantial portion of ERM processes (37.6 percent) and the Beasley et al. (2005) finding that the Chief Audit Executive fulfills the role of the Chief Risk Officer either formally or informally for more than 40 percent[10] of responding firms which have implemented ERM. To reduce the potential noise of the dependent variable (ERM Adoption and Stage of ERM Adoption), I use survey responses obtained from Internal Audit Function management of U.S. based companies[11] to specifically identify whether and to what extent (stage of implementation) their organization has adopted and implemented ERM processes for fiscal years between 2006 and 2009. The survey gathered information regarding Internal Audit Function

[10] Provided that announcements of Chief Audit Executive's formal (10.7 percent) or informal (29.8 percent) acceptance of Chief Risk Officer responsibilities are not publicly disclosed, the results presented by Beasley et al. (2005) provide additional evidence of the possibility that studies using Chief Risk Officer appointment as a proxy for ERM may consist of a high level of noise.

[11] Survey link was emailed to Internal Audit Function management identified via Internet searches using various internal audit titles. In addition, three local IIA chapter officers distributed the survey link to their listing of Chief Audit Executive's at each organization within their local chapter membership.

effectiveness characteristics (reporting independence, staff size, percentage of staff holding certification (CIA, CPA, CISA, etc.), risk assessment type, quality assurance review processes, and Internal Audit Function budget information) and Audit Committee effectiveness characteristics (CEO attendance of Audit Committee meetings, Audit Committee review and approval of the Internal Audit Functions annual risk assessment and audit plan). Additional publically available Audit Committee effectiveness measures (number of Audit Committee members, number of Audit Committee meetings, number of Audit Committee financial experts) were gathered from SEC Filings (obtained from SECs Interactive Data Electronic Applications (IDEA)).

Consistent with the findings of prior ERM adoption literature, I control for firm size and leverage (Pagach and Warr 2007; Desender, 2007; Desender and Lafuente Gonzalez 2009; Liebenberg and Hoyt 2003; Hoyt and Liebenberg 2009). In addition, consistent with findings of Desender (2007) and Desender and Lafuente Gonzalez (2009), I include variables to control for other corporate governance mechanisms including board independence and duality of the CEO and Chairman of the Board roles and the use of external auditor type in the models. Following Pagach and Warr (2008) and Hoyt and Liebenberg (2009), I also include opacity and slack as measures of financial risk based on consideration of liquidation of intangible assets and availability of cash on hand respectively.

The two previously stated hypotheses are tested using two models differing in the measurement of the dependent variable (ERMADPT2, ERMADPT3, and ERMMTRY) and type of regression model; a logit model (Lienberg and Hoyt 2003; Pagach and Warr 2007) is used for the binary ERM adoption dependent variable (ERMADPT2) and an

ordered logit model (Beasley et al. 2005) is used for the ERM adoption variable which includes an informal adoption measure (ERMADPT3) and ERM maturity stage measure (ERMMTRY) dependent variables.

This study uses several measures of corporate governance components of effective Audit Committees and Internal Audit Function effectiveness to evaluate the potential association with whether firms adopt ERM and the maturity of ERM processes. Prior literature considers the number of Audit Committee members, number of Audit Committee meetings, and the disclosure of the existence of a financial expert on the Audit Committee as characteristics that are positively associated with more effective Audit Committees.[12] The number of Audit Committee members (ACMem) is frequently considered to be associated with increased responsibility and importance. The number of Audit Committee meetings (ACMeet) is considered to be associated with the level of oversight and has been found to be associated with increased audit quality (Abbott et al. 2003) and inversely related to the occurrence of fraud (Beasley et al. 2000). SOX (Section 407) mandated disclosure of at least one Audit Committee Financial Expert (ACFE) or the reason for the lack of an Audit Committee Financial Expert to ensure that boards have appropriate oversight of potential audit, financial, risk, and control concerns of the organization. I use the percentage of the number of disclosed Audit Committee Financial Experts to Audit Committee members (%ACFE), as opposed to the existence of a single financial expert as a measure of Audit Committee competence and effectiveness.

[12] Prior studies (Bédard et al. 2004; Klein 2002) have also used Audit Committee member independence as an additional measure of Audit Committee effectiveness. SOX requires all members of the Audit Committee to be independent: therefore this item is not included in the study as the item should not have any variance during the post-SOX adoption period considered by this study (fiscal years 2006 to 2008).

In addition to these factors, three additional measures of Audit Committee effectiveness this study considers are the membership of the Chairman of the Board on the Audit Committee (COBMemAC) and the Audit Committee's review of the Internal Audit Functions' risk assessment (ACRskAssmt) and the attendance of Audit Committee meetings by the CEO (ACMtgCEO) which is expected to be inverse (negative) measure as a result of a potential filtering effect that the CEO's attendance of Audit Committee meetings may have. The role of the Chairman of the Board has an increased ability to set the agenda for board meetings and ensure that noteworthy items, including consideration of organizational risk and opportunity, and resource considerations are brought to the attention of the full board to ensure appropriate action is considered. The Audit Committee's review and approval of the risk assessment suggests evidence that the Audit Committee provides an active oversight role as both a recipient and source of potential risk factors. The last proposed measure of Audit Committee effectiveness, CEO attendance of Audit Committee meetings, is expected to reduce the effectiveness of the Audit Committee by mitigating benefits achieved by requiring Audit Committee's to be independent.

The independence of the Internal Audit Function reporting has received extensive consideration as one of the primary factors associated with Internal Audit Function effectiveness. Best practices have long suggested benefits associated with Chief Audit Executive's reporting to Audit Committees to ensure independence (IAFRptInd) of the audit function due to less filtered information resulting from scope limitations, budget constraints, or concerns of job security. The annual budget of the Internal Audit Function (lnIAFBgt) provides a measure of both organizational and financial support which should

be associated with expected performance in evaluating risk, controls, and consulting efforts. While the number of Internal Audit Function staff full-time equivalents (lnIAFTE) provides a measure of the Internal Audit Functions ability to provide audit coverage, this variable is likely to be highly correlated with other variables including organization size, number of locations and business segments, and industry risk. The percentage of Internal Audit Function staff members who are certified (CPA, CIA, CISA, CFE, etc.) provides a measure of staff competency (%IAFCert). The performance of both internal and external quality assurance reviews of Internal Audit Function processes (IAFQAR) is conducted to ensure not only compliance with audit standards and processes, but also to identify potential opportunities for improvement to processes. Finally, I use the type (rotational, hybrid, or risk based approach) of audit plan (IAFPlan) used as a measure of the effectiveness of audit plan coverage. Each of these measures is expected to represent specific measures of Audit Committee and Internal Audit Function effectiveness and be associated with an organization's decision to adopt and maturity of ERM processes.

Although one of the anticipated contributions of this study was the development of consolidated measures of Audit Committee and Internal Audit Function effectiveness, an attempt to perform factor analysis did not provide reliable measures which demonstrated convergent and discriminate validity.[13] As a result, the study individually evaluates the six individual measures of Audit Committee and Internal Audit Function characteristics.

[13] Factor analysis was conducted on six proposed measures of Audit Committee effectiveness (ACMem, ACMeet, %ACFE, COBMemAC, ACRskAsmt, ACMtgCEO) and six proposed measures of Internal Audit Function effectiveness (IAFRptInd, lnIAFBgt, lnIAFTE, %IAFCert, IAFQAR, IAFPlan). The results of the factor analysis provided a six factors solution with Eigen values greater than 1. In addition, factor loadings were low for most factors as well as multiple

I use the following general model to perform both logit and ordered logit regressions to evaluate the likelihood of an association between ERM adoption or maturity of ERM adoption and the effectiveness of the Audit Committee and Internal Audit Function characteristics:

$$ERMMSR = f\{ SIZE, LEV, stdNI, OPACITY, SLACK, GROWTH, \Delta MVE, \%BODInd, CEOCOB, BIG4, FIN, UTIL, ACCharacteristics, IAFCharacteristics \} \quad (1)$$

With the three alternative dependent variable measures are defined as:

ERMMSR – one of three measures of the ERM implementation:

- ERMADPT2 – binary variable equal to 1 if company indicated formal adoption of ERM, and 0 for companies indicating they have not adopted ERM.[14]
- ERMADPT3 – ordinal variable taking on one of three values based on survey response equal to 2 if company indicated formal adoption of ERM, and 1 for companies indicating informal ERM adoption, and 0 for companies indicating they have not adopted ERM.[15]
- ERMMTRY – ordinal variable assuming one of six values based on process maturity levels defined by CoBIT obtained via survey respondents assessed rating of ERM process maturity assuming the value of 5, for "Optimized"; 4, for "Managed and Measurable"; 3, for "Defined Process"; 2, for "Repeatable but Intuitive"; 1, for "Initial/Adhoc"; and 0, for "Non-Existent" ERM processes for fiscal years between 2006 and 2008.[16]

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occurrences of cross loadings and low reliability scores. Appendix 2 provides additional information as well as the factor loading table results.

[14] Although the survey also allowed a response indicating informal adoption, these observations are excluded when using the ERMADPT2 binary variable measure.

[15] In order to consider organizations which consider their adoption of ERM to be informal but existent, I use an ordered logit model to evaluate results for consistency and robustness. Responses indicating informal adoption were excluded from the logit regression model using the ERMADPT2 dependent variable, thereby reducing sample size (from 245 to 148).

[16] Expanded definitions of the stage of ERM process activities are included in the survey as a measure of the maturity of the ERM adoption (ERMMTRY). The descriptions used in the survey for these six classifications (adopted from CoBIT) are as follows: 5 - Optimized – Good processes are followed and automated 4 - Managed and Measureable – Processes are monitored and measured; 3 - Defined Process – Processes are documented and communicated; 2 - Repeatable but Intuitive – Processes follow a regular pattern; 1 - Initial/Adhoc – Processes are ad hoc and disorganized; 0 - Non-existent – Management processes are not applied at all.

The variables of primary interest in the evaluation of the stated hypotheses are defined as:

Audit Committee (AC) Characteristics:

- ACMem – the number on the audit committee members obtained from proxy statements filed with the SEC for the 2008 fiscal year.
- ACMeet – the number of audit committee meetings reported in the proxy statement for the company's 2008 fiscal year.
- %ACFE – percentage of audit committee members identified as "financial experts" within the fiscal 2008 proxy statement to the total number of audit committee members.
- COBMemAC – binary variable coded as "1" if the chairman of the board was a member of the audit committee; and "0" otherwise.
- ACRskAssmt – provides a measure of the extent to which the audit committee is involved in the review and approval of the IAF's risk assessment and audit plan. It is computed as the proportion of scored responses based on a 5 point scale (strongly disagree to strongly agree) to the question "The [CEO, CFO, Audit Committee] reviews and approves the IAF's annual Risk assessment plan". The ratio of the audit committee score to the sum of the score for CEO, CFO, and Audit Committee review and approval of the IAF risk assessment plan.
- ACMeetCEO – measure of the frequency of attendance of the CEO at the audit committee meetings based on a 4-point scale (never, infrequently, frequently, and always).

IAF Characteristics:

- IAFRptInd – measure of the independence of the IAF based survey questions regarding the extent of IAF reporting, ability to be terminated by, and budgetary review and approval by the CEO, CFO, and Audit Committee.[17]
- lnIAFBgt – Natural log of the budget of the Internal Audit Function reported in survey responses.
- lnIAFTE – Natural log of the full-time equivalent employed by the internal audit function.
- IAFQAR – ordinal measure of the extent of quality assurance reviews of the IAF conducted. Assumes the value of "0" for organizations not conducting either internal or external QAR, "1" for organizations participating in either internal or external QAR, but not both, and "2" for companies which have both internal and external QAR's conducted.

[17] The composite measure follows the method used by Abbott et. al. (2010). The level of agreement is measured on a five point scale from Strongly Disagree (0) to Strongly agree (5) and summing and dividing the values of the responses associated with the values of the three Audit Committee measures (numerator) by the sum of responses from all nine responses which include the CEO and CFO as well as the Audit Committee measure (denominator).

- %IAFCERT – is a measure of the percentage of IAF employees having at least one professional certification (CPA, CIA, CISA, etc.).
- IAFPlan – ordinal measure of the consideration of risk as the basis for the development of the IAF's audit plan coded as "0" for a rotational, "1" hybrid (rotational and risk based), and "2" for risk based audit plan.

I also include variables noted as significant in prior studies to as a control for additional differences in firms which may be associated with ERM adoption or maturity. These control variables are defined as follows:

SIZE – natural log of total assets for the 2008 year end (Compustat item A6).[18]
LEV – leverage is calculated as Total liabilities/Total Assets for the 2008 year end (Compustat item A181/A6).[19]
stdNI – standard deviation of the previous 5 year span of net income (fiscal years 2004 through fiscal year 2008).
OPACITY – computed as the ratio of intangible assets to total assets (Compustat item A33/A6).
SLACK – calculated as the ratio of cash and marketable securities to total assets for 2008 (Compustat item A1/A6)
GROWTH – computed as the change in revenues between fiscal year 2008 and 2007 scaled by 2007 revenues (Compustat item A12).[20]
ΔMVE – Measure of the change in the market value of equity (MVE) of the firm between 2008 and 2007 scaled by the 2007 MVE (Compustat items A199*A25).

[18] There has been a lack of a consistent proxy of firm size in prior ERM studies. Lienberg and Hoyt (2003) define size as the natural logarithm of the three-year average of total assets; Pagah and Warr (2007) use a one period measure of the natural logarithm of the market value of equity (MVE) corresponding to the year of CRO appointment announcement. Desender (2007) uses a one period (corresponding to the year of disclosure) measure of the natural log of revenues as a proxy for firm size. For the purpose of this study I define size as the natural log of total assets for fiscal year 2008 (period of the survey).

[19] Lienberg and Hoyt (2003) define leverage as the three-year average of total liabilities/total assets; Pagah and Warr (2007) use a one period measure of leverage (total liabilities/total assets) corresponding to the year of CRO appointment announcement, Desender (2007) uses a one period measure of long-term debt scaled by total assets as the leverage measure. Following the methods of Pagach and Warr, I use a one year measure (2008) of total liabilities scaled by total assets.

[20] Pagach and Warr (2007) use Research and Development costs as a measure for growth. Due to the limited availability of Research and Development costs for certain industries and companies contained within the sample, I use yearly change in revenue as on alternative proxy for growth.

CEOCOB – Binary indicator variable equal to 1 for organizations in which the CEO and chairman of the board positions are held by the same individual (duality) during fiscal year 2008; 0 otherwise (Desender 2007; Desender and Lafuente Gonzalez 2009).[21]

%BODINDEP – Percentage of board of director members who are reported within the proxy statement to be independent board members in accordance with securities listings standards (independent members/total board members) during fiscal year 2008 (Desender 2007; Desender and Lafuente Gonzalez 2009).[22]

BIG4 – binary variable labeled 1 if the company has a big 4 auditor, 0 otherwise for the 2008 fiscal year end (Beasley et al. 2005; Desender 2007; Desender and Lafuente Gonzalez 2009[23]).

Following the study of Beasley et al. (2005), I also evaluate the model using an ordered logit regression with alternative ordinal measures of ERM adoption and process maturity (ERMADPT3 and ERMMTRY) as defined above. The results provide additional consideration for support and potentially a better understanding of Audit Committee and Internal Audit Function characteristics which are associated with adoption of and the maturity.

2.5 RESULTS

An on-line survey link was emailed[24] to 1,631 IAF management level employees throughout the U.S. and other countries identified via web-based keyword searches for

[21] Proxy statements were reviewed to identify whether duality existed in the position of CEO and Board Chair (CEOCOB).

[22] Board independence was based upon the board member independence disclosure included in proxy statements (DEF 14A) filed with the SEC.

[23] Desender (2007) uses four dummy variables to individually indentify whether any specific Big-Four accounting firm (Ernst & Young, Deloitte and Touche LLP, KPMG, PwC) was associated with a higher ERM score. Based on an ERM disclosure measure, Desender (2007) finds that KPMG clients were significantly more likely to adopt ERM processes. Consistent with Beasley et al. (2005), I use a single dummy variable to identify whether a firm is audited by one of the Big-Four.

IAF management titles.[25] As presented in the Table 2.1 (Panel A) - Sample Description, despite receiving 496 survey responses (30.4 percent response rate), only 249 were U.S. based publicly traded companies with complete responses regarding Internal Audit Function characteristics and ERM based information necessary for this study and able to be matched to Compustat and SEC Proxy filings.[26] Panel B of Table 2.1 provides an overview of the number of sample responses by industry classification. Industries with the highest percentage of response include banking, insurance, utility, retail, and business services.

TABLE 2.1 (Panel A) - Sample Selection	
Total Companies Surveyed[27]	1631
Survey Respondents	496
Non-Public Company Responses	(164)
Public Companies lacking IAF or ERM response	(56)
Foreign Companies	(23)
Proxy Data not available in SEC Edgar	(4)
Final Sample[28]	249

[24] Survey link and follow-up requests were emailed to Internal Audit Function Management between July 15, 2009 and October 21, 2009. A copy of the survey email request and the survey are included in the appendix.

[25] Keyword searches focused on IAF titles including "Chief Audit Executive", "CAE", "Vice President of Internal Audit", "VP Internal Audit", "Internal Audit Vice President", "Director of Internal Audit", and "Internal Audit Director" using Google and Lexis/Nexus.

[26] Survey reliability analysis will be conducted after the expansion of the sample obtained via second distribution of the survey.

[27] Companies surveyed were selected based on identification of the internal audit function management level employees which an email address could be identified as well as companies included in survey distribution list emailed by local Institute of internal audit chapters.

[28] The survey captures multiple measures of ERM adoption (not adopted, informal adoption, and formal adoption) and maturity values (ranging from 0 to 5). Therefore, although the final sample in table 1 indicates 249 sample observations, the total number of observations may be lower depending on the type of regression used (i.e. when using the logit model, observations indicating informal implementation are blank, thereby reducing the sample size to 149).

Panel C of Table 2.1 provides a summary of the leadership of ERM processes based on the categorized response of ERM adoption; Formal, Informal, or No Adoption (ERMADPT3). The results indicate that for companies which reported formal adoption, ERM leadership is more frequently provided by the Chief Audit Executive (30%) than by the Chief Risk Officer (23 percent). This result is also consistent for responses indicating informal adoption as well, with the ERM leader being identified as the Chief Audit Executive (24 percent) more frequently than the Chief Risk Officer (13 percent). The results also suggest that ERM leadership is also frequently provided by the Finance function (CFO and Finance Organization) as well as committees (ERM Committees) for both formal and informal ERM adopters. As a result, this brings into question the extent of noise in the dependent variables which primarily focus on the appointment of Chief Risk Officers as a proxy for ERM adoption. The descriptive statistics of the samples are included in Table 2.3 (Panels A – D) provides an overview of the mean and median values of variables included in the study as well as the results of univariate t-tests (Panel A) of means between survey response firms which have not adopted ERM and those which have formally adopted ERM (ERMADPT2). The results of tests of mean differences support prior findings that larger (SIZE) more highly leveraged (LEV) firms with more independent boards (%BODInd) are more likely to adopt ERM. As indicated by prior studies, respondents of more highly regulated industries, financial services (FIN) and utilities (UTIL), were more likely to report they had formally adopted ERM than had not. In addition, these results provide initial evidence that firms which formally adopt ERM have larger Audit Committees (ACMem), which have more meetings (ACMeet), a

TABLE 2.1 (Panel B) – ERM Adoption and Maturity Mean Averages by Industry Categorization

		ERMADPT2			ERMADPT3			ERMMTRY		
Industry	**2 digit SIC Codes**	**Count**	**Mean**	**% Sample**	**Count**	**Mean**	**% Sample**	**Count**	**Mean**	**% Sample**
Construction	15-17	3	1.00	2%	6	1.50	2%	6	3.50	3%
Consumer Products & Food	20-33	17	0.71	11%	46	1.15	18%	40	2.35	19%
Energy	10-14,46,49	17	0.94	11%	31	1.48	12%	27	2.70	13%
Financial Services	60-64,67	27	0.82	18%	44	1.39	18%	35	2.26	17%
Information & Communication	48,73,78-79,84	19	0.63	13%	26	1.19	10%	21	2.10	10%
Manufacturing	34-39	31	0.58	21%	43	1.12	17%	37	2.24	18%
Personal Services, Health & Dependent Care	72,80,83	5	0.60	3%	5	1.20	2%	4	2.50	2%
Professional & Commercial Service, & Education	75,76,82, 87,89	5	0.40	3%	5	0.80	2%	5	2.00	2%
Retail & Wholesale	50-59	20	0.55	13%	29	1.07	12%	20	2.35	10%
Transportation	40-42,44-45,47	6	0.83	4%	14	1.29	6%	14	2.86	7%
Totals		150		100%	249		100%	209		100%

TABLE 2.1 (Panel C) - ERM Leader by Adoption Response

	Formal			Informal			None		
	Count	ERM MTRY	%	Count	ERM MTRY	%	Count	ERM MTRY	%
Chief Audit Executive (CAE)	31	2.9	30%	24	2.45	24%	2	1.5	5%
Chief Executive Officer (CEO)	2	2.0	2%	6	3.5	6%	2	2.0	5%
Chief Financial Officer (CFO)	10	2.9	10%	16	2.1	16%	4	1.5	9%
Chief Risk Officer (CRO)	24	3.0	23%	13	1.8	13%	2	2.0	5%
Dir. ERM	3	3.0	3%	1	2.0	1%			
ERM Committee	16	3.0	15%	17	2.6	17%			
Finance Organization	10	3.2	10%	1	2.0	1%			
Legal Counsel	6	3.2	6%	7	1.7	7%			
Other	2	3.0	2%	7	2.3	7%	15	0.6	35%
Blank	1		1%	8	2.5	8%	18	0.6	42%
Totals	105	2.98	100%	100	2.29	100%	43	1.0	100%

TABLE 2.2 - Variable Definitions

ERMADPT2	Binary variable equal to 1 if company indicated formal adoption of ERM, and 0 for companies indicating they have not adopted ERM.
ERMADPT3	Ordinal variable taking on one of three values based on survey response equal to 2 if company indicated formal adoption of ERM, and 1 for companies indicating informal ERM adoption, and 0 for companies indicating they have not adopted ERM.
ERMMTRY	Ordinal variable assuming one of six values based on process maturity levels defined by CoBIT obtained via survey respondents assessed rating of ERM process maturity assuming the value of 5, for "Optimized"; 4, for "Managed and Measurable"; 3, for "Defined Process"; 2, for "Repeatable but Intuitive"; 1, for "Initial/Adhoc"; and 0, for "Non-Existent" ERM processes.
SIZE	Natural log of total assets for the 2007 year end (Compustat item A6).
LEV	Leverage is calculated as Total liabilities/Total Assets for the 2007 year end (Compustat item A181/A6).
stdNI	Calculated as the standard deviation of the net income for fiscal years 2004 – 2008.
OPACITY	Computed as the ratio of intangible assets to total assets (Compustat item A33/A6).
SLACK	Calculated as the ratio of cash and marketable securities to total assets for 2008 (Compustat item A1/A6).
GROWTH	Computed as the change in revenues between fiscal year 2008 and 2007 scaled by 2007 revenues (Compustat item A12).
ΔMVE	Measure of the change in the market value of equity (MVE) of the firm between 2008 and 2007 scaled by the 2007 MVE (Compustat items A199*A25).
CEOCOB	Binary indicator variable equal to 1 for organizations in which the CEO and chairman of the board positions are held by the same individual (duality); 0 otherwise.
%BODInd	Percentage of board of director members who are reported within the proxy statement to be independent board members in accordance with securities listings standards.
BIG4	Binary variable labeled 1 if the company has a big 4 auditor, 0 otherwise during the most recent fiscal year end.
FIN	Dummy variable used to classify companies in the financial, banking, and insurance industries. Coded as "1" for companies with a 6XXX level SIC code, otherwise coded as "0".
UTIL	Dummy variable used to classify companies in the utilities industry. Assumes a value of "1" for companies with a 49XX level SIC code, otherwise coded as "0".
ACMem	Number on the audit committee obtained from proxy statements filed with the Securities and Exchange Commission for the 2008 fiscal year.

TABLE 2.2 - Variable Definitions (continued)

ACMeet	Number of audit committee meetings reported in the proxy statement for the company's 2008 fiscal year.
%ACFE	Percentage of audit committee members identified as "financial experts" within the fiscal 2008 proxy statement to the total number of audit committee members.
COBMemAC	Dummy variable taking a value of "1" where the chairman of the board of directors is a member of the audit committee, otherwise coded as "0".
ACRskAsmt	Measure of the extent to which the audit committee is involved in the review and approval of the IAF's risk assessment and audit plan. It is computed as the proportion of scored responses based on a 5 point scale (strongly disagree to strongly agree) to the question "The [CEO, CFO, Audit Committee] reviews and approves the IAF's annual Risk assessment plan". The ratio of the audit committee score to the sum of the score for CEO, CFO, and Audit Committee review and approval of the IAF risk assessment plan.
ACMtgCEO	Measure of the frequency of attendance of the CEO at the audit committee meetings based on a 4-point scale (never, infrequently, frequently, and always).
IAFRptInd	Measure of the independence of the IAF based survey questions regarding the extent of IAF reporting, ability to be terminated by, and budgetary review and approval by the CEO, CFO, and Audit Committee.
lnIAFBgt	Natural log of the budget of the Internal Audit Function reported in survey responses.
lnIAFTE	Natural log of the full-time equivalent employed by the internal audit function.
%IAFCert	Measure of the percentage of IAF employees having at least one professional certification (CPA, CIA, CISA, etc.). This variable is obtained from survey responses.
IAFQAR	Ordinal measure of the extent of quality assurance reviews of the IAF conducted. Assumes the value of "0" for organizations not conducting either internal or external QAR, "1" for organizations participating in either internal or external QAR, but not both, and "2" for companies which have both internal and external QAR's conducted.
IAFPlan	Ordinal measure of the consideration of risk as the basis for the development of the IAF's audit plan coded as "0" for a rotational, "1" hybrid (rotational and risk based), and "2" for risk based audit plan.

TABLE 2.3 (Panel A) – Descriptive Statistics and Univariate t-test of mean differences

	Entire Sample						Formal Adopters		Non-Adopters		Adj. for Unequal Var.		
Variable	**N**	**Mean**	**Median**	**Std Dev**	**Min.**	**Max.**	**N**	**Mean**	**N**	**Mean**	**Diff**	**t-value**	**p-Value**
ERMADPT2	150	0.693	1.000	0.463	0.000	1.000							
ERMADPT3	249	1.233	1.000	0.742	0.000	2.000	104	2.000	46	0.000	2.000		0.000
ERMMTRY	209	2.397	2.000	1.197	0.000	5.000	93	2.989	33	0.939	2.050	10.51	0.000
SIZE	248	8.184	8.015	1.504	4.593	14.085	104	8.503	46	7.565	0.938	3.64	0.000
LEV	247	0.677	0.680	0.233	0.107	1.515	104	0.671	45	0.597	0.073	1.86	0.066
stdNI	249	348	69.000	1,224	0.549	15,664	104	431	46	284	147	0.62	0.538
OPACITY	248	0.156	0.076	0.181	0.000	0.767	104	0.159	46	0.199	-0.040	-1.18	0.240
SLACK	248	0.103	0.060	0.120	0.000	0.903	104	0.097	46	0.115	-0.019	-0.83	0.412
GROWTH	247	0.083	0.051	0.327	-0.619	3.556	104	0.075	45	0.143	-0.068	-0.79	0.432
ΔMVE	247	-0.277	-0.419	1.588	-0.976	24.058	104	-0.348	46	-0.417	0.069	1.11	0.271
%BODInd	249	0.799	0.833	0.119	0.333	0.929	104	0.828	46	0.763	0.065	3.21	0.002
CEOCOB	249	0.550	1.000	0.498	0.000	1.000	104	0.558	46	0.630	-0.073	-0.83	0.409
BIG4	249	0.892	1.000	0.312	0.000	1.000	104	0.913	46	0.891	0.022	0.43	0.670
FIN	249	0.177	0.000	0.382	0.000	1.000	104	0.212	46	0.109	0.103	1.67	0.097
UTIL	249	0.076	0.000	0.266	0.000	1.000	104	0.106	46	0.000	0.106	3.49	0.001
ACMem	249	4.060	4.000	1.074	3.000	8.000	104	4.125	46	3.826	0.299	1.76	0.080
ACMeet	249	8.281	8.000	2.867	1.000	20.000	104	8.740	46	7.696	1.045	2.18	0.031
%ACFE	249	0.515	0.400	0.297	0.000	1.000	104	0.549	46	0.442	0.107	2.11	0.036
COBMemAC	249	0.064	0.000	0.246	0.000	1.000	104	0.048	46	0.065	-0.017	-0.43	0.669
ACRskAsmt	249	0.489	0.429	0.191	0.000	1.000	104	0.483	46	0.465	0.019	0.59	0.558

TABLE 2.3 (Panel A) – Descriptive Statistics and Univariate t-test of mean differences (continued)

	Entire Sample						Formal Adopters		Non-Adopters		Adj. for Unequal Var.		
Variable	**N**	**Mean**	**Median**	**Std Dev**	**Min.**	**Max.**	**N**	**Mean**	**N**	**Mean**	**Diff**	**t-value**	**p-Value**
ACMtgCEO	249	2.225	3.000	1.003	0.000	3.000	104	2.212	46	2.152	0.059	0.33	0.741
IAFRptInd	249	0.542	0.524	0.178	0.000	1.000	104	0.574	46	0.505	0.069	2.38	0.019
lnIAFBgt	230	14.052	14.201	1.766	0.000	18.411	93	14.469	45	13.609	0.859	2.40	0.020
lnIAFTE	246	2.286	2.197	0.995	0.000	6.125	103	2.520	45	1.983	0.537	3.19	0.002
%IAFCert	249	0.666	0.670	0.249	0.000	1.000	104	0.704	46	0.647	0.057	1.31	0.193
IAFQAR	249	0.839	1.000	0.851	0.000	2.000	104	1.058	46	0.500	0.558	3.81	0.000
IAFPlan	249	1.430	1.000	0.550	0.000	2.000	104	1.500	46	1.435	0.065	0.67	0.507

TABLE 2.3 (Panel B) – Descriptive Statistics
ERMADPT2 Logit Model Variables (n=126)

Variable	Mean	Median	Minimum	Maximum	Std. Dev.
ERMADPT2	0.690	1.000	0.000	1.000	0.464
SIZE	8.260	8.076	4.593	12.019	1.436
LEV	0.655	0.659	0.107	1.391	0.199
stdNI	393.616	64.578	1.469	15,664.980	1,594.941
OPACITY	0.180	0.114	0.000	0.767	0.193
SLACK	0.097	0.063	0.001	0.504	0.104
GROWTH	0.109	0.063	-0.308	3.556	0.367
ΔMVE	-0.380	-0.417	-0.965	0.713	0.303
%BODInd	0.813	0.857	0.444	0.929	0.107
CEOCOB	0.579	1.000	0.000	1.000	0.496
ACRskAsmt	0.482	0.437	0.000	1.000	0.184
%ACFE	0.508	0.400	0.000	1.000	0.280
ACMem	4.040	4.000	3.000	6.000	0.916
ACMeet	8.365	8.000	4.000	20.000	2.779
ACMtgCEO	2.222	3.000	0.000	3.000	1.011
COBMemAC	0.056	0.000	0.000	1.000	0.230
lnIAFTE	2.372	2.303	0.693	5.011	0.936
IAFTEREV	0.006	0.003	0.001	0.050	0.008
IA-FTE	17.579	10.000	2.000	150.000	23.112
%IAFCert	66.460	72.500	0.000	100.000	26.986
IAFRptInd	0.562	0.524	0.000	1.000	0.196
IAFQAR	0.913	1.000	0.000	2.000	0.877
IAFPlan	1.516	2.000	0.000	2.000	0.547
lnIAFBud	14.226	14.221	0.000	17.148	1.670

TABLE 2.3 (Panel C) – Descriptive Statistics - ERMADPT3 Ordered Logit Model (n=202)

Variable	Mean	Median	Minimum	Maximum	Std. Dev.
ERMADPT3	1.238	1.000	0.000	2.000	0.755
SIZE	8.237	8.101	4.593	14.085	1.482
LEV	0.683	0.682	0.107	1.457	0.217
stdNI	346.777	67.781	0.549	15,664	1,308
OPACITY	0.165	0.091	0.000	0.767	0.184
SLACK	0.100	0.057	0.000	0.903	0.118
GROWTH	0.099	0.057	-0.538	3.556	0.345
ΔMVE	-0.370	-0.419	-0.976	0.713	0.318
%BODInd	0.806	0.846	0.333	0.929	0.112
CEOCOB	0.554	1.000	0.000	1.000	0.498
ACRskAsmt	0.490	0.429	0.000	1.000	0.193
%ACFE	0.510	0.400	0.000	1.000	0.290
ACMem	4.040	4.000	3.000	8.000	1.007
ACMeet	8.317	8.000	1.000	20.000	2.917
ACMtgCEO	2.252	3.000	0.000	3.000	1.008
COBMemAC	0.064	0.000	0.000	1.000	0.246
lnIAFTE	2.324	2.197	0.000	6.215	0.985
IAFTEREV	0.009	0.003	0.001	0.299	0.024
IA-FTE	19.203	9.000	1.000	500.000	41.644
%IAFCert	63.772	67.000	0.000	100.000	28.639
IAFRptInd	0.552	0.524	0.000	1.000	0.183
IAFQAR	0.901	1.000	0.000	2.000	0.858
IAFPlan	1.441	1.000	0.000	2.000	0.554
lnIAFBud	14.095	14.221	0.000	18.411	1.854

TABLE 2.3 (Panel D) – Descriptive Statistics
ERMMTRY Ordered Logit Model Variables (n=174)

Variable	Mean	Median	Minimum	Maximum	Std. Dev.
ERMMTRY	2.339	2.000	0.000	5.000	1.200
SIZE	8.270	8.166	4.593	14.085	1.444
LEV	0.685	0.692	0.107	1.457	0.223
stdNI	358.640	72.724	0.627	15,664	1,370
OPACITY	0.162	0.090	0.000	0.767	0.186
SLACK	0.103	0.056	0.000	0.903	0.124
GROWTH	0.106	0.060	-0.538	3.556	0.364
ΔMVE	-0.372	-0.421	-0.976	0.713	0.321
%BODInd	0.811	0.857	0.333	0.929	0.108
CEOCOB	0.557	1.000	0.000	1.000	0.498
ACRskAsmt	0.490	0.429	0.000	1.000	0.188
%ACFE	0.515	0.400	0.000	1.000	0.296
ACMem	4.040	4.000	3.000	8.000	1.005
ACMeet	8.328	8.000	1.000	20.000	2.891
ACMtgCEO	2.259	3.000	0.000	3.000	1.013
COBMemAC	0.063	0.000	0.000	1.000	0.244
lnIAFTE	2.307	2.197	0.000	6.215	0.949
IAFTEREV	0.009	0.003	0.001	0.299	0.025
IA-FTE	18.006	9.000	1.000	500.000	41.173
%IAFCert	63.724	67.000	0.000	100.000	28.860
IAFRptInd	0.548	0.524	0.000	1.000	0.177
IAFQAR	0.897	1.000	0.000	2.000	0.861
IAFPlan	1.466	1.000	0.000	2.000	0.545
lnIAFBud	14.125	14.221	1.946	18.411	1.592

higher percentage of members disclosed as financial experts (%ACFE). The results also provide limited evidence that the Internal Audit Functions at firms adopting ERM have greater reporting independence (IAFRptInd), higher budgets (lnIAFBgt), a greater number of staff (lnIAFTE), and were more likely to conduct quality assurance reviews of their functions (IAFQAR).

Table 2.4 (Panels A – D) provides the Pearson correlation matrices for the logit model and ordered logit model variables. Initial review of Table 2.4 (Panels A – D) provides additional initial evidence of the expected positive correlation between the three measures of ERM adoption (EMRADPT2, ERMADPT3) and maturity (ERMMTRY) and firm size and Board of Director independence as noted by prior studies. In addition, several of the corporate governance measures related to the Audit Committee (%ACFE and ACMeet) and Internal Audit Functions (lnIAFTE, IAFQAR, and lnIAFBgt) are also found to have consistent significant positive correlations with the three dependent variable measures of ERM adoption and maturity. Finally, both the utility (UTIL) and reporting independence of measure of Internal Audit Functions (IAFRptInd) were found to have significant positive correlations with the two measures of ERM adoption (ERMADPT2 and ERMADPT3).

Table 2.5 provides the results of the logistic regressions (logit (Panel A) and ordered logit (Panels B and C) models) noted in equation 1. Consistent with prior research, the results of the base model regressions provide evidence of a positive association between company size (SIZE) and the percentage of board independence (%BODInd) and the likelihood of formal adoption (ERMADPT2 and ERMADPT3) and maturity level (ERMMTRY) of ERM. Although the percentage of Board of Director independence

TABLE 2.4 - (Panel A) Correlation Table for ERMADPT2 Logit Model Variables (n=126)

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1)	ERMADPT2	1.000											
(2)	SIZE	0.293	1.000										
(3)	LEV	0.118	0.259	1.000									
(4)	stdNI	0.033	0.247	0.174	1.000								
(5)	OPACITY	-0.127	-0.126	-0.234	0.045	1.000							
(6)	SLACK	-0.046	-0.122	-0.372	0.012	0.041	1.000						
(7)	GROWTH	-0.078	-0.016	0.004	-0.031	0.187	-0.001	1.000					
(8)	ΔMVE	0.162	-0.014	-0.218	-0.138	0.119	-0.084	0.068	1.000				
(9)	%BODInd	0.281	0.128	-0.057	-0.035	-0.118	0.021	0.079	0.071	1.000			
(10)	CEOCOB	-0.084	0.169	0.014	0.028	-0.044	-0.091	0.074	0.022	-0.071	1.000		
(11)	ACRskAsmt	0.023	0.083	0.170	0.083	-0.041	-0.066	-0.013	0.087	-0.021	0.027	1.000	
(12)	%ACFE	0.161	0.098	0.005	-0.070	-0.056	0.035	-0.062	-0.019	-0.089	-0.032	-0.125	1.000
(13)	ACMem	0.104	0.261	0.085	0.201	-0.040	-0.139	-0.023	-0.045	0.289	0.055	0.130	-0.140
(14)	ACMeet	0.157	0.179	-0.067	-0.054	0.084	0.215	-0.143	0.086	0.008	-0.004	-0.078	-0.001
(15)	ACMtgCEO	0.028	-0.057	-0.108	-0.064	0.077	-0.130	0.054	0.070	0.054	-0.035	-0.071	0.067
(16)	COBMemAC	-0.062	-0.153	0.020	-0.025	-0.100	-0.045	-0.016	0.116	0.102	-0.285	0.049	-0.017
(17)	lnIAFTE	0.243	0.786	0.208	0.194	-0.131	0.019	-0.106	-0.037	0.088	0.151	0.082	0.048
(17)	IAFTEREV	-0.014	-0.197	0.204	-0.111	-0.108	-0.070	-0.103	0.105	-0.196	-0.046	0.172	-0.141
(19)	IA-FTE	0.141	0.653	0.117	0.103	-0.164	-0.004	-0.114	-0.018	0.111	0.214	0.059	-0.032
(20)	%IAFCert	0.150	-0.009	-0.112	0.128	0.098	0.032	0.037	0.112	0.226	-0.131	0.013	0.000
(21)	IAFRptInd	0.203	0.182	0.246	0.178	-0.031	-0.055	-0.023	0.014	-0.046	-0.036	0.363	-0.086
(22)	IAFQAR	0.287	0.382	0.087	0.053	-0.150	0.023	-0.059	0.119	0.150	0.025	-0.091	0.016
(23)	IAFPlan	0.004	0.008	-0.098	0.128	-0.016	0.186	0.003	-0.144	0.101	-0.049	0.034	-0.107
(24)	lnIAFBud	0.229	0.495	0.085	0.158	-0.029	0.023	0.029	0.041	0.040	-0.016	0.070	0.099

TABLE 2.4 - (Panel A (continued)) Correlation Table for ERMADPT2 Logit Model Variables (n=126)

		(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)
(1)	ERMADPT2												
(2)	SIZE												
(3)	LEV												
(4)	stdNI												
(5)	OPACITY												
(6)	SLACK												
(7)	GROWTH												
(8)	ΔMVE												
(9)	%BODInd												
(10)	CEOCOB												
(11)	ACRskAsmt												
(12)	%ACFE												
(13)	ACMem	1.000											
(14)	ACMeet	-0.059	1.000										
(15)	ACMtgCEO	0.129	-0.146	1.000									
(16)	COBMemAC	-0.201	-0.019	-0.260	1.000								
(17)	lnIAFTE	0.251	0.187	-0.019	-0.152	1.000							
(17)	IAFTEREV	-0.061	-0.123	-0.020	0.008	-0.068	1.000						
(19)	IA-FTE	0.172	0.154	-0.031	-0.090	0.841	-0.002	1.000					
(20)	%IAFCert	-0.016	0.089	-0.074	0.107	-0.097	-0.110	-0.111	1.000				
(21)	IAFRptInd	0.150	0.000	0.093	-0.081	0.122	0.203	0.074	0.018	1.000			
(22)	IAFQAR	0.084	0.010	-0.023	-0.055	0.429	0.016	0.333	-0.031	0.037	1.000		
(23)	IAFPlan	0.023	0.133	0.051	-0.039	0.091	0.024	-0.017	0.031	-0.042	0.045	1.000	
(24)	lnIAFBud	0.132	0.084	0.114	-0.017	0.607	-0.084	0.493	0.167	0.125	0.291	0.044	1.000

TABLE 2.4 - (Panel B) Correlation Table for ERMADPT3 Ordered Logit Model Variables (n=202)

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1)	ERMADPT3	1.000											
(2)	SIZE	0.222	1.000										
(3)	LEV	0.042	0.134	1.000									
(4)	stdNI	0.042	0.275	0.097	1.000								
(5)	OPACITY	-0.077	-0.118	-0.127	0.025	1.000							
(6)	SLACK	-0.039	-0.176	-0.285	0.011	-0.043	1.000						
(7)	GROWTH	-0.054	-0.063	0.010	-0.034	0.149	0.028	1.000					
(8)	ΔMVE	0.108	-0.029	-0.229	-0.115	0.091	0.002	0.046	1.000				
(9)	%BODInd	0.224	0.200	-0.079	0.015	-0.081	-0.019	0.048	-0.001	1.000			
(10)	CEOCOB	-0.048	0.207	-0.026	0.057	-0.077	-0.079	0.050	-0.088	-0.068	1.000		
(11)	ACRskAsmt	0.004	0.110	0.096	0.088	-0.021	-0.116	-0.018	0.160	0.046	-0.037	1.000	
(12)	%ACFE	0.116	0.137	0.008	-0.017	-0.055	-0.001	-0.008	-0.104	0.029	0.016	-0.190	1.000
(13)	ACMem	0.073	0.397	0.048	0.180	-0.059	-0.178	-0.057	0.029	0.350	0.035	0.167	-0.052
(14)	ACMeet	0.119	0.159	-0.149	-0.023	0.034	0.134	-0.006	0.029	0.096	-0.012	-0.084	0.189
(15)	ACMtgCEO	0.012	-0.049	0.051	-0.068	0.052	-0.070	-0.007	0.069	0.057	-0.023	-0.047	0.015
(16)	COBMemAC	-0.056	-0.119	-0.051	-0.033	-0.133	-0.030	-0.029	0.001	0.008	-0.293	0.082	-0.056
(17)	lnIAFTE	0.192	0.817	0.108	0.240	-0.088	-0.094	-0.140	-0.017	0.172	0.200	0.085	0.116
(17)	IAFTEREV	-0.039	-0.224	0.164	-0.069	-0.148	0.030	-0.038	0.100	-0.330	-0.144	0.054	-0.126
(19)	IA-FTE	0.048	0.581	0.077	0.151	-0.103	-0.047	-0.066	0.098	0.130	0.058	0.086	0.133
(20)	%IAFCert	0.138	0.065	-0.037	0.109	0.090	-0.039	-0.108	0.046	0.247	-0.138	0.099	0.056
(21)	IAFRptInd	0.184	0.042	0.201	0.091	-0.005	-0.006	-0.023	0.044	-0.096	-0.069	0.224	-0.064
(22)	IAFQAR	0.228	0.433	0.070	0.095	-0.145	-0.013	-0.136	0.063	0.223	0.071	-0.090	0.095
(23)	IAFPlan	0.046	-0.009	-0.110	0.118	0.012	0.209	0.053	-0.133	0.095	0.030	0.008	-0.051
(24)	lnIAFBud	0.180	0.457	0.022	0.170	0.034	-0.013	-0.001	0.013	0.100	0.021	0.062	0.040

TABLE 2.4 - (Panel B (continued)) Correlation Table for ERMADPT3 Ordered Logit Model Variables (n=202)

		(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)
(1)	ERMADPT3												
(2)	SIZE												
(3)	LEV												
(4)	stdNI												
(5)	OPACITY												
(6)	SLACK												
(7)	GROWTH												
(8)	ΔMVE												
(9)	%BODInd												
(10)	CEOCOB												
(11)	ACRskAsmt												
(12)	%ACFE												
(13)	ACMem	1.000											
(14)	ACMeet	-0.050	1.000										
(15)	ACMtgCEO	0.127	-0.185	1.000									
(16)	COBMemAC	-0.051	-0.001	-0.206	1.000								
(17)	lnIAFTE	0.403	0.135	0.056	-0.109	1.000							
(17)	IAFTEREV	-0.094	-0.185	0.033	0.196	-0.117	1.000						
(19)	IA-FTE	0.364	0.099	-0.004	-0.061	0.675	-0.040	1.000					
(20)	%IAFCert	0.058	0.101	-0.022	0.095	-0.002	-0.203	0.015	1.000				
(21)	IAFRptInd	-0.046	0.030	0.094	-0.071	-0.008	0.079	-0.050	0.051	1.000			
(22)	IAFQAR	0.195	0.080	0.041	-0.040	0.447	-0.113	0.261	0.075	0.044	1.000		
(23)	IAFPlan	0.004	0.150	0.067	0.010	0.014	-0.048	-0.047	-0.046	-0.061	0.029	1.000	
(24)	lnIAFBud	0.214	-0.004	0.085	0.005	0.537	-0.092	0.363	0.164	0.091	0.261	-0.008	1.000

TABLE 2.4 - (Panel C) Correlation Table for ERMMTRY Ordered Logit Model Variables (n=174)

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1)	ERMMTRY	1.000											
(2)	SIZE	0.245	1.000										
(3)	LEV	-0.011	0.106	1.000									
(4)	stdNI	0.032	0.245	0.118	1.000								
(5)	OPACITY	-0.069	-0.114	-0.119	0.043	1.000							
(6)	SLACK	-0.068	-0.185	-0.282	0.011	-0.041	1.000						
(7)	GROWTH	-0.161	-0.092	0.035	-0.048	0.153	0.015	1.000					
(8)	ΔMVE	0.134	-0.034	-0.207	-0.132	0.104	0.016	0.032	1.000				
(9)	%BODInd	0.229	0.122	-0.120	-0.020	-0.065	-0.023	0.023	0.020	1.000			
(10)	CEOCOB	0.020	0.202	-0.049	0.046	-0.020	-0.104	0.079	-0.063	-0.081	1.000		
(11)	ACRskAsmt	0.005	0.064	0.108	0.049	-0.003	-0.135	-0.055	0.175	0.058	0.002	1.000	
(12)	%ACFE	0.132	0.111	-0.022	-0.041	-0.063	0.005	-0.010	-0.095	0.012	-0.001	-0.204	1.000
(13)	ACMem	0.104	0.370	0.009	0.173	-0.077	-0.173	-0.067	0.054	0.348	0.036	0.162	-0.062
(14)	ACMeet	0.081	0.124	-0.162	-0.040	0.025	0.154	0.002	0.016	0.113	-0.015	-0.138	0.235
(15)	ACMtgCEO	0.065	-0.073	0.064	-0.075	0.029	-0.087	-0.016	0.072	0.088	-0.012	-0.051	0.011
(16)	COBMemAC	0.025	-0.095	-0.028	-0.029	-0.143	-0.032	-0.034	-0.002	0.013	-0.292	0.099	-0.041
(17)	lnIAFTE	0.294	0.815	0.085	0.207	-0.090	-0.103	-0.160	-0.012	0.159	0.193	0.031	0.074
(17)	IAFTEREV	-0.006	-0.218	0.151	-0.061	-0.128	0.049	-0.017	0.093	-0.341	-0.148	0.025	-0.119
(19)	IA-FTE	0.133	0.541	0.085	0.086	-0.095	-0.042	-0.077	0.103	0.100	0.027	0.029	0.120
(20)	%IAFCert	0.041	0.059	-0.007	0.109	0.071	-0.024	-0.141	0.008	0.255	-0.138	0.138	0.078
(21)	IAFRptInd	0.095	0.092	0.185	0.167	-0.032	0.024	-0.016	0.027	-0.061	-0.014	0.242	-0.048
(22)	IAFQAR	0.269	0.441	0.046	0.077	-0.136	-0.011	-0.177	0.064	0.189	0.095	-0.142	0.057
(23)	IAFPlan	0.040	0.016	-0.109	0.112	0.008	0.214	0.067	-0.112	0.117	0.039	0.002	-0.067
(24)	lnIAFBud	0.124	0.470	0.006	0.164	0.045	0.005	-0.045	-0.049	0.146	0.050	0.014	-0.029

TABLE 2.4 - (Panel C (continued)) Correlation Table for ERMMTRY Ordered Logit Model Variables (n=174)

		(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)
(1)	ERMMTRY												
(2)	SIZE												
(3)	LEV												
(4)	stdNI												
(5)	OPACITY												
(6)	SLACK												
(7)	GROWTH												
(8)	ΔMVE												
(9)	%BODInd												
(10)	CEOCOB												
(11)	ACRskAsmt												
(12)	%ACFE												
(13)	ACMem	1.000											
(14)	ACMeet	-0.088	1.000										
(15)	ACMtgCEO	0.171	-0.193	1.000									
(16)	COBMemAC	-0.010	0.011	-0.254	1.000								
(17)	lnIAFTE	0.403	0.103	0.036	-0.084	1.000							
(17)	IAFTEREV	-0.104	-0.177	0.049	0.230	-0.103	1.000						
(19)	IA-FTE	0.362	0.081	-0.028	-0.048	0.632	-0.028	1.000					
(20)	%IAFCert	0.073	0.078	-0.010	0.060	0.025	-0.182	0.021	1.000				
(21)	IAFRptInd	-0.029	0.017	0.088	-0.119	0.027	0.032	0.007	0.072	1.000			
(22)	IAFQAR	0.205	0.114	0.051	-0.024	0.459	-0.113	0.253	0.080	0.076	1.000		
(23)	IAFPlan	0.008	0.145	0.095	-0.005	0.045	-0.069	-0.038	-0.045	-0.025	0.042	1.000	
(24)	lnIAFBud	0.247	-0.022	0.016	0.010	0.568	-0.095	0.353	0.131	0.098	0.245	0.060	1.000

(%BODInd) remains consistently significant and positive for each of the regression models, firm size does not remain significant for all of the regressions. Each of the panels in Table 2.5 attempt to provide the results in a step-wise manner for by considering the base model, the base model and Audit Committee characteristics, the base model and Internal Audit Function characteristics, the full-model which includes the base model and both Audit Committee and Internal Audit Function Characteristics, and finally, the base model with select Audit Committee and Internal Audit Function characteristics.

While the percentage of Board of Director independence (%BODInd) remains positive and significant once Audit Committee and Internal Audit Function variables are added to the regression models, several control variables found to be significantly associated with ERM adoption in the base model, including size (SIZE), change in market value of equity (ΔMVE), and duality of the CEO and Chairman of the Board positions (CEOCOB) as well as others found in prior studies using proxies for ERM adoption, leverage (LEV), earnings volatility (stdNI), opacity (OPACITY), slack (SLACK), sales growth (GROWTH), auditor type (BIG4), and financial industry membership, are not supported by these results. Several potential explanations why such associations may not hold for this study exist. The first of which may be the potential noise in the dependent variable measures of prior studies which use Chief Risk Officer disclosure appointments or disclosure information as a proxy for ERM adoption. A second consideration may be the timing of measurement of the control variables. Prior studies used measures of control variables at points prior to the disclosure of their proxy, while tests in this study are based

at a similar point in time for each organization[29]. An alternative consideration includes the possibility that the announcement of Standard & Poor's to begin applying Enterprise Risk Analysis to corporate ratings and the expansion of Enterprise Risk Analysis to non-financial organizations may have influenced companies which differed from prior studies to adopt.

Panel A of Table 2.5 uses the binary adoption dependent variable (ERMADPT2). As a result of the lack of variation of respondents in the utility industry all reporting formal adoption, the dummy variable for utility firms (UTIL) is not included in the regression. I use a one-tailed significance test based on the consistency with the predicted sign of the coefficient to test the variables of interest. The regression of the base model with the Audit Committee variables, I find that the number of meetings (ACMeet) and the percentage of Audit Committee members that are financial experts to be both positive and significant within the model. In adding the Internal Audit Function characteristic variables to the base model, the assessed level of reporting independence is the only Internal Audit Function (IAFRptInd) characteristic that is significant. Using the full model which includes the base model and the twelve variables measuring Audit Committee and Internal Audit effectiveness, the number of Audit Committee meetings (ACMeet), percentage of disclosed financial experts (%ACFE), and independence is the only Internal Audit Function (IAFRptInd) remain significant with positive coefficients. As an additional robustness test, I regress the dependent variable on the two measures of Audit Committee and Internal Audit Function characteristics with the highest significance in the full model thereby adding the measure of the internal audit quality

[29] The ERMADPT2 and ERMADPT3 variables are measured at the time the survey was completed (July 2009 – October 2009). The ERMMTRY variable was measured for fiscal year 2008.

assurance review to the regression with the three test variables found to be significant in the full model. The results remain consistent with the exception of the quality assurance measure which is significant in the reduced form regression model. These results are consistent with the stated hypotheses, ERM adoption is associated with characteristics of the Audit Committee and Internal Audit Function, for several of the characteristics evaluated.

The results of the ordered logit regression model using the dependent variable measure of adoption which includes informal adoption, ERMADPT3, are similar to those using the binary dependent variable measure; however the coefficient of membership in the utility industry is positive and significant while the coefficients of the Audit Committee meeting (ACMeet)[30] and Internal Audit Function quality assurance review variables are not significant in the full or reduced form model regressions.

Finally, given that no two ERM processes are the same, I examine the prior set of regressions to determine if any variables of prior research or those hypothesized in this study are associated with the assessed stage of ERM process maturity (ERMMTRY). The coefficient of percentage of Board of Director independence continues to remain positive and significant; however membership in the utility industry is not consistent with that of the regression of the three value dependent variable regression (ERMADPT3). In addition, it is worth noting that the coefficient of the financial industry dummy variable is negative and significant which could potentially be as a result respondents low balling their organizations ERM process maturity based on recent failures in the financial

[30] Desender and Lafuente Gonzalez (2009) also failed to find evidence of a significant relationship between the number of Audit Committee members and their ERM proxy and adoption measures.

TABLE 2.5 – (Panel A) Logit Regression - Dependent Variable = ERMADPT2
ERMADPT2 = f{ SIZE, LEV, stdNI, OPACITY, SLACK, GROWTH, ΔMVE, %BODInd, CEOCOB, BIG4, FIN, UTIL, ACCharacteristics, IAFCharacteristics}

SIZE	*0.365*	0.267	0.228	0.398	0.153
	(0.031)	(0.334)	(0.213)	(0.160)	(0.437)
LEV	1.973	2.189	1.704	*2.521*	1.302
	(0.109)	(0.172)	(0.208)	*(0.085)*	(0.325)
stdNI	0.000	0.000	0.000	0.000	0.000
	(0.840)	(0.647)	(0.642)	(0.283)	(0.981)
OPACITY	-0.341	-0.715	-0.606	-0.452	-0.38
	(0.765)	(0.586)	(0.625)	(0.709)	(0.757)
SLACK	1.267	0.262	-0.588	1.612	-0.552
	(0.572)	(0.927)	(0.813)	(0.540)	(0.829)
GROWTH	-0.738	-0.46	-0.45	-0.701	-0.422
	(0.171)	(0.433)	(0.421)	(0.219)	(0.472)
ΔMVE	*1.629*	*1.701*	*1.544*	*1.827*	1.336
	(0.039)	*(0.071)*	*(0.066)*	*(0.043)*	(0.114)
%BODInd	*6.139*	*6.882*	*7.764*	*5.524*	*7.142*
	(0.003)	*(0.010)*	*(0.001)*	*(0.018)*	*(0.002)*
CEOCOB	-0.603	-0.612	-0.704	-0.581	-0.54
	(0.168)	(0.275)	(0.154)	(0.240)	(0.260)
BIG4	0.544	0.677	0.554	0.812	0.65
	(0.478)	(0.481)	(0.507)	(0.352)	(0.420)
FIN	0.467	0.461	0.926	0.040	0.517
	(0.506)	(0.622)	(0.240)	(0.962)	(0.537)
ACMem		0.050	-0.039		
		(0.859)	(0.877)		
ACMeet		0.166	**0.189**		**0.193**
		(0.126)	**(0.051)**		**(0.043)**

TABLE 2.5–(Panel A (continued)) Logit Regression-Dependent Variable=ERMADPT2					
%ACFE		**1.615**	**1.75**		**1.964**
		(0.079)	**(0.032)**		**(0.017)**
COBMemAC		-0.63	-0.969		
		(0.589)	(0.374)		
ACRskAsmt		-0.54	0.468		
		(0.696)	(0.704)		
ACMtgCEO		-0.009	0.03		
		(0.974)	(0.898)		
IAFRptInd		**3.062**		**2.667**	**2.916**
		(0.086)		**(0.083)**	**(0.060)**
lnIAFBud		0.181		0.147	
		(0.463)		(0.482)	
IA-FTE		-0.012			
		(0.467)			
%IAFCert		0.898		1.101	
		(0.381)		(0.272)	
IAFQAR		0.444		0.333	**0.493**
		(0.177)		(0.267)	**(0.090)**
IAFPlan		0.142		0.227	
		(0.776)		(0.619)	
lnIAFTE				-0.099	
				(0.827)	
Constant	-7.775	-14.904	-10.155	-12.651	-11.01
	(0.001)	(0.000)	(0.000)	(0.002)	(0.000)
Observations	148	135	148	135	148
Pseudo_R-squared	0.17	0.3	0.23	0.25	0.27
Chi2	31.475	50.087	41.729	42.136	48.042
Prob_>Chi2	0	0	0	0	0

Note: White Heteroskedastic Standard Errors used to calculate p- values in parentheses.
Significant coefficients and p-values of control variables noted in italics. **Significant coefficients and p-values of for hypothesized variables noted in bold.**

TABLE 2.5 - (Panel B) - Ordered Logit Regression - Dependent Variable = ERMADPT3

ERMADPT3 = f{ SIZE, LEV, stdNI, OPACITY, SLACK, GROWTH, ΔMVE, %BODInd, CEOCOB, BIG4, FIN, UTIL, ACCharacteristics, IAFCharacteristics}

SIZE	*0.207*	0.236	*0.188*	0.101	0.126
	(0.040)	(0.103)	*(0.085)*	(0.555)	(0.252)
LEV	0.335	0.267	0.413	0.085	0.119
	(0.574)	(0.695)	(0.497)	(0.898)	(0.847)
stdNI	0.000	0.000	0.000	0.000	0.000
	(0.716)	(0.949)	(0.590)	(0.739)	(0.766)
OPACITY	-0.066	-0.732	-0.145	-0.675	-0.164
	(0.928)	(0.388)	(0.849)	(0.402)	(0.827)
SLACK	0.656	-0.216	0.393	-0.113	0.337
	(0.554)	(0.862)	(0.730)	(0.925)	(0.766)
GROWTH	-0.328	-0.206	-0.379	-0.088	-0.269
	(0.400)	(0.641)	(0.327)	(0.846)	(0.491)
ΔMVE	0.64	*1.001*	0.717	0.736	0.566
	(0.134)	*(0.039)*	(0.103)	(0.110)	(0.197)
%BODInd	*3.207*	*3.116*	*3.359*	*2.758*	*2.921*
	(0.005)	*(0.024)*	*(0.006)*	*(0.035)*	*(0.014)*
CEOCOB	-0.204	-0.248	-0.213	-0.208	-0.147
	(0.435)	(0.412)	(0.445)	(0.464)	(0.581)
BIG4	0.117	0.201	0.028	0.282	-0.073
	(0.794)	(0.686)	(0.952)	(0.562)	(0.874)
FIN	0.456	0.436	0.469	0.359	0.281
	(0.244)	(0.331)	(0.239)	(0.415)	(0.492)
ACMem		0.000	-0.066		
		(0.999)	(0.634)		
ACMeet		0.034	0.061		0.055
		(0.501)	(0.188)		(0.236)

TABLE 2.5-(Panel B (continued))-Ordered Logit Regression Dependent Variable = ERMADPT3					
%ACFE		0.606	0.536		0.663
		(0.215)	(0.224)		(0.127)
COBMemAC		-0.238	-0.267		
		(0.666)	(0.609)		
ACRskAsmt		-0.721	-0.265		
		(0.350)	(0.692)		
ACMtgCEO		-0.078	-0.036		
		(0.587)	(0.783)		
IAFRptInd		**1.957**		**2.05**	**1.776**
		(0.022)		**(0.011)**	**(0.023)**
lnIAFBud		**0.151**		0.096	
		(0.073)		(0.240)	
IA-FTE		**-0.009**			
		(0.026)			
%IAFCert		0.571		0.621	
		(0.324)		(0.276)	
IAFQAR		0.142		0.169	0.268
		(0.448)		(0.360)	(0.124)
IAFPlan		0.331		0.336	
		(0.208)		(0.186)	
lnIAFTE				0.114	
				(0.656)	
Observations	244	223	244	223	244
Pseudo_R-squared	0.050	0.100	0.060	0.090	0.080
Chi2	24.801	48.461	30.664	39.866	38.233

Note: White Heteroskedastic Standard Errors used to calculate p- values in parentheses.
Significant coefficients and p-values of control variables noted in italics. **Significant coefficients and p-values of for hypothesized variables noted in bold.**

TABLE 2.5 - (Panel C) - Ordered Logit Regression- Dependent Variable = ERMMTRY

ERMMTRY = f{ SIZE, LEV, stdNI, OPACITY, SLACK, GROWTH, ΔMVE, %BODInd, CEOCOB, BIG4, FIN, UTIL, ACCharacteristics, IAFCharacteristics}

SIZE	*0.304*	*0.288*	*0.305*	*0.169*	0.07	*0.215*
	(0.002)	*(0.043)*	*(0.005)*	*(0.007)*	(0.687)	*(0.043)*
LEV	0.466	0.103	0.536	0.439	0.01	0.385
	(0.458)	(0.880)	(0.402)	(0.220)	(0.988)	(0.546)
stdNI	0.000	0.000	0.000	0.000	0.000	0.000
	(0.910)	(0.949)	(0.899)	(0.958)	(0.859)	(0.888)
OPACITY	-0.612	-0.322	-0.481	-0.284	-0.584	-0.523
	(0.409)	(0.694)	(0.532)	(0.519)	(0.462)	(0.484)
SLACK	0.249	-0.462	0.356	0.394	-0.758	-0.012
	(0.837)	(0.730)	(0.780)	(0.561)	(0.551)	(0.992)
GROWTH	*-0.966*	*-0.71*	*-0.994*	*-0.641*	*-0.614*	*-0.904*
	(0.017)	*(0.091)*	*(0.015)*	*(0.010)*	*(0.151)*	*(0.028)*
ΔMVE	*0.713*	*0.91*	*0.761*	*0.505*	*0.831*	*0.659*
	(0.100)	*(0.059)*	*(0.089)*	*(0.049)*	*(0.073)*	*(0.134)*
%BODInd	*2.61*	*3.11*	*2.605*	*1.511*	*2.87*	*2.296*
	(0.034)	*(0.040)*	*(0.047)*	*(0.046)*	*(0.044)*	*(0.068)*
CEOCOB	0.118	0.112	0.253	0.153	-0.058	0.141
	(0.657)	(0.709)	(0.371)	(0.346)	(0.837)	(0.602)
BIG4	-0.576	-0.448	-0.682	-0.389	-0.343	-0.764
	(0.250)	(0.410)	(0.182)	(0.166)	(0.523)	(0.131)
FIN	*-0.726*	*-0.729*	*-0.76*	*-0.497*	-0.67	*-0.874*
	(0.066)	*(0.092)*	*(0.060)*	*(0.037)*	(0.120)	*(0.032)*
ACMem		-0.078	-0.067	-0.017		
		(0.637)	(0.666)	(0.850)		
ACMeet		0.007	0.038	0.024		0.023
		(0.892)	(0.426)	(0.394)		(0.627)

Note: White Heteroskedastic Standard Errors used to calculate p- values in parentheses. *Significant coefficients and p-values of control variables noted in italics.* **Significant coefficients and p-values of for hypothesized variables noted in bold.**

TABLE 2.5 - (Panel C (continued)) - Ordered Logit Regression - Dependent Variable = ERMMTRY						
%ACFE		0.573	0.572	0.377		0.646
		(0.232)	(0.202)	(0.146)		(0.146)
COBMemAC		0.710	0.484	0.252		
		(0.218)	(0.383)	(0.432)		
ACRskAsmt		0.011	-0.068	-0.156		
		(0.989)	(0.927)	(0.713)		
ACMtgCEO		0.108	0.123	0.083		
		(0.479)	(0.385)	(0.303)		
IAFRptInd		1.129			1.276	0.904
		(0.173)			(0.105)	(0.234)
lnIAFBud		-0.041			-0.107	
		(0.692)			(0.313)	
IA-FTE		-0.001				
		(0.798)				
%IAFCert		-0.472			-0.396	
		(0.425)			(0.494)	
IAFQAR		0.309			0.245	**0.310**
		(0.108)			(0.193)	**(0.083)**
IAFPlan		0.135			0.163	
		(0.604)			(0.525)	
lnIAFTE					0.449	
					(0.104)	
Observations	206	191	206	206	191	206
Pseudo_R-squared	0.050	0.070	0.050	0.060	0.060	0.060
Chi2	30.302	38.766	34.394	38.289	37.725	37.785

Note: White Heteroskedastic Standard Errors used to calculate p- values in parentheses. *Significant coefficients and p-values of control variables noted in italics.* **Significant coefficients and p-values of for hypothesized variables noted in bold.**

industry segment. Only the coefficients of the Audit Committee (%ACFE) and Internal Audit Function (IAFRptInd and IAFQAR) characteristics are positive and significant, these results don't hold through for each of the regressions.

Consistent with preliminary univariate tests of mean difference between adopters and non-adopters (ERMADPT2), the coefficient of the percentage of financial experts on the audit committee (%ACFE) and the independence of the Internal Audit Function reporting (IAFRptInd) are significant in all three of the full regression models.

Taken together, these results provide support of the association between Audit Committee and Internal Audit Function corporate governance factors related and adoption and maturity of ERM processes.

2.6 CONCLUSIONS AND CONTRIBUTIONS

Although the study does have potential limitations as a result of sample size, potential for response bias, and a limited point in time view (fiscal year 2008), the use of a survey instrument should provide a more accurate measure of ERM adoption and process maturity measures. In addition, the study contributes to the literature by considering the association of several characteristics of corporate governance factors (more specifically Audit Committee and Internal Audit Function characteristics) with ERM adoption and assessed ERM process maturity. Although this study does identify significant positive associations between the number of audit committee meetings (ACMeet), percentage of audit committee members disclosed as financial experts (%ACFE), reporting independence of the Internal Audit Function (IAFRptInd) and Internal Audit Function quality assurance review practices (IAFQAR) and ERM adoption and process maturity, extended work in this area may be beneficial in providing additional information to be used by financial analyst, investors, creditors, suppliers, and regulators as a valuable signal for the consideration of investment, relationship, and compliance decisions by such critical stakeholders.

The COSO ERM Integrated Framework (2004) identifies four objectives, Strategy, Operations, Reporting, and Compliance. Provided that companies which adopt ERM focus on these four objectives, future research may consider several associated benefits of adoption including reduced occurrences of restatements, material weaknesses, and fraud

and the impact on audit fees. Other potential research in the area of ERM may include an examination of whether operating and market performance benefits exist for companies adopting ERM. A final area for future research should also consider whether the independence of the ERM reporting relationship is associated with differences of the results of the aforementioned future studies.

CHAPTER 3

AN EVALUATION OF POTENTIAL BENEFITS OF ENTERPRISE RISK MANAGEMENT

Abstract: The Committee of Sponsoring Organizations (COSO) of the Treadway Commission in 2004 released the COSO-Enterprise Risk Management (ERM) framework (COSO-ERM). COSO indicated that the development of an enterprise-wide risk assessment and management process is designed to "provide reasonable assurance regarding the achievement of entity objectives." Based on this, the companies which have implemented and mature Enterprise Risk Management processes in place should achieve greater operational and market based performance than those which have not. Using surveys of Internal Audit Function management, this study to my knowledge is the first to use a panel data approach to evaluate expected long-term benefits of ERM implementation based on assessed maturity of ERM processes. As opposed to using a proxy for ERM adoption or process maturity, this study uses survey responses from Internal Audit Function management to identity whether ERM has been adopted by an organization. Combining survey responses with archival data, this study provides a better understanding of operational and market performance benefits of ERM adoption. The results of the study do not find consistent support for the hypotheses that companies with higher assessed levels of ERM process maturity yield better operating or market performance. This lack of consistent support of the proposed hypotheses may be the result of limited sample size and power of tests, the length of lag between process maturity and identification of significant operational and market benefits, and limitations imposed as a result of multi-collinearity.

3.1 INTRODUCTION

The Committee of Sponsoring Organizations (COSO) of the Treadway Commission defines Enterprise Risk Management (ERM) as an enterprise-wide risk assessment and management process designed to "provide reasonable assurance regarding the achievement of entity objectives." Provided that one of the main objectives of most companies is to make a profit and provide value to shareholders, this definition of ERM suggests that companies implementing such processes should be more likely to achieve enhanced operational and market performance.

Previous studies have used CRO appointments as a proxy for ERM and have only considered limited benefits of ERM (stock price and earnings volatility). This study attempts to extend the current understanding of benefits associated with ERM implementation through the use of a more reliable measure of ERM adoption including the stage of implementation (Beasley et al. 2005). This study also attempts to evaluate additional potential operational (ROA and ROE) and market value (MVE) performance benefits which may be associated with ERM adoption and the maturity of the ERM processes.

Rather than rely on publicly available CRO appointment data which may not specifically indicate whether and to what extent an organization has implemented ERM, this study uses responses gathered from surveys of Internal Audit Function (IAF) management to more identify companies which have implemented ERM and the timeline of the maturity of ERM processes. Potential benefits of ERM implementation (operational and market performance) are evaluated using both cross-sectional and panel data models comprised of IAF survey-based data matched with financial and market performance information from the Compustat and the CRSP databases respectively. The

results of the study provide additional information and considerations to management and company boards regarding potential benefits associated with ERM adoption.

The next section contains a review of prior literature related to ERM benefits as well as studies associated with various operational and market performance measures, followed by development and formal identification of the research hypotheses. The research methodology and data are discussed in the forth section followed by the conclusions and contributions of the study.

3.2 PRIOR RESEARCH

Although various definitions of ERM exist, one of the most prevalent is published in the Enterprise Risk Management – Integrated Framework published by the Committee of Sponsoring Organizations (COSO) of the Treadway Commission (COSO-ERM) which defines ERM as:

> *… 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****.*

The COSO-ERM Integrated Framework indicates that in order for management to maximize firm value, it must develop the organizations "strategy and objectives to strike an optimal balance between growth and return goals and related risks, and efficiently and effectively deploy resources in pursuit of the entity's objectives." In fulfilling organizational objectives, the COSO-ERM Framework indentifies six capabilities which ERM encompasses: a) Aligning risk appetite and strategy, b) Enhancing risk response decisions, c) Reducing operational surprises and losses, d) Identifying and managing multiple and cross-enterprise risks, e) Seizing Opportunities, and f) Improving

deployment of capital. Each of these six capabilities can be mapped into the COSO-ERM Integrated Framework definition.

Despite being frequently used interchangeably with (Financial) Risk Management (insurance and hedging), ERM not only considers the impact of financial risk, but also takes into account strategic, operational, reporting, and compliance risks. As risks within each of these classifications could potentially impact other areas of risk, ERM considers the extent to which each risk is integrated into other objectives, thereby increasing or decreasing risk throughout subsidiaries, business units, divisions, or the entire entity. Detailed information relating to risks identified through the ERM process is used to evaluate the level of risk, identify appropriate risk responses, implement appropriate control procedures, and continuously monitor and communicate the updated likelihood and impact of the risk not only within departments or specific divisions, but throughout the entire organization.

Benefits of Implementing ERM

Implementing ERM requires a significant investment by organizations; however the benefits of operational effects including decreased costs and increased revenues are not always readily identifiable. Using the appointment of Chief Risk Officers (CRO) as a proxy for the implementation of an ERM process, Pagach and Warr (2008) find that companies adopting ERM experience a reduction in the volatility of stock price and earnings. Beasley et al. (2007) also find that the market response to ERM adoption, as proxied by CRO appointment, is firm specific.

Tonello (2007) contends that an effective ERM implementation considers the consequences of downside risk (negative consequences of events) and methods for

mitigating or avoiding such risk, as well as identification and analysis of upside risk frequently referred to as opportunities. As opposed to only using a traditional risk management process and focusing only on downside risk, Tonello (2007) suggests that ERM attempts to balance (optimize) the two risk sets which may lead to cost reductions through the increased integration of risk assessment and management, thereby leading to more profitable investment decisions resulting from a more objective basis for resource allocation. These cost reductions and improved investment decisions increase firm cash flows and can provide additional operational benefits. Consistent with Pagach and Warr (2008), Tonello (2007) suggests that benefits of balancing the combination of risk sets include less volatile earnings which are associated with less stock price volatility and reductions in the cost of capital. In addition, Lam (2001) suggests that organizations should be able to "reduce losses and earnings volatility" and improve return on capital and shareholder value by implementing ERM.

Rezaee indicates that the ability to quantify organizational risks provides management an opportunity to evaluate the six "premises and capabilities" of the COSO ERM Framework indicated above (Rezaee 2009, 183-4). By addressing these six COSO-ERM Integrated Framework premises, organizations should be more likely to achieve increased earnings by actively managing risk and improving planned responses to threats and opportunities. Provided that operational performance leads to increased market performance, I also expect ERM adoption and the stage of adoption to be positively associated with the market value of equity (MVE).

Operational Performance Measures

Prior studies have found differences or changes in organizational characteristics to be associated with changes in operational performance measures (e.g. ROA and ROE). Lie (2005) notes improvements in operational and market performance for firms which follow through on their announced intent to repurchase shares on the open market. Alternatively, Loughran and Ritter (1997) note that firms conducting seasoned equity offerings frequently outperform similar sized growth firms and industry adjusted average operating measures (ROA and ROE) leading up to the offering, only to underperform these two control groups following the seasoned offering. Core et al. (2006) find that firms with greater shareholder rights outperform (based on industry adjusted ROA) firms with lesser shareholder rights. More recently and more closely related to this study, Brown and Caylor (2008) find that enhanced governance, as proxied by their Governance-Score measure (Gov-Score), is positively associated with industry adjusted measures of ROA or ROE. This study attempts to build on these findings in considering the relationship between ERM and operational performance.

Market Performance Measures

Firm risk is a key component of both the demand for shares as well as the price of the firm's equity. The COSO-ERM framework identifies four broad risk categories which the framework attempts to provide focus; strategic, operations, reporting, and compliance risk. While not specific to COSO-ERM, prior research has considered variables associated with these four risk categories and their association with firms' market value of equity (MVE). Considering organizations compliance with the 1990 Clean Air Act Amendment, Hughes (2000) finds that firms in violation of the act suffer a 16 percent

share price decrease resulting from un-booked estimated liabilities for potential penalties. Consistent with Hughes (2000), Clarkson et al. (2004) find evidence that capital expenditures in excess of the cost of mere environmental compliance are value relevant in the paper and pulp industry. Consistent with this finding, Wang and Smith (2008) find that corporate reputation (proxied by listing on Fortunes "America's Most Admired Company" listing) is associated with higher market value of equity than those considered to have a less favorable corporate reputation. Amir and Lev (1996) find another nonfinancial growth measure (POPS – company's of population serviced in licensed area) in the wireless communications industry is value relevant. Consistent with these value relevant nonfinancial measures, this study evaluates the association of ERM adoption and process maturity as another potential nonfinancial measure that is of value relevance.

Reporting Independence

One of the key recommendations of the Blue Ribbon Committee (BRC) on Improving the Effectiveness of Corporate Audit Committees (1999) is the staffing of independent audit committees to help provide objective oversight of risk, control, and financial reporting. Due to the potential of conflicts of interest, functional reporting independence of the Internal Audit Function (IAF) to the Audit Committee has been recommended by the Institute of Internal Auditors (IIA) as a corporate governance best practice within the standards for the practice of internal auditing. The IIA's definition of internal auditing indicates that risk assessment is one of the primary responsibilities of the IAF. Pagach and Warr (2007) find that the adoption of ERM is sensitive to the CEO's equity at risk.

In contrast, Lam (2001) indicates that Chief Risk Officers (CROs) reporting to CEO's are more effective as a result of the direct reporting line.

3.3 HYPOTHESIS DEVELOPMENT

COSO-ERM, Lam (2001), Tonello (2005), and many others suggest that effective risk management should lead to enhanced operational and market performance. Despite these explicit predictions that effective ERM implementation should lead to improvements in return on capital, to my knowledge, prior research has not empirically considered the influence that ERM adoption may have on operational performance. In addition, while prior studies have considered market performance in the form of abnormal returns associated with the appointment of a CRO, and variability of stock price, I am not aware of any studies which consider the influence which the maturity of ERM processes may have on a firm's market value of equity.

Operational Performance Benefits

Improving the deployment of capital, the sixth premise of the COSO-ERM Framework, suggests that ERM adoption should increase the return on capital (assets and equity). Based on this consideration, companies implementing ERM should be associated with higher ROA and ROE than companies which have not implemented ERM. Furthermore, organizations which have more mature or advanced ERM activities should also experience higher returns (ROA and ROE) than those which are in earlier stages or have not adopted ERM practices. These considerations lead to the first hypothesis stated in the alternative form:

> *Hypothesis* 1 - Companies reporting greater ERM process maturity realize significantly higher Industry Adjusted ROA and ROE than firms not implementing ERM.

Market Performance Benefits

Adoption of ERM has been found by prior studies to be associated with decreased earnings and stock price volatility (Tonello 2007; Pagach and Warr 2008). Affleck-Graves et al. (2002) has shown that decreased earnings volatility leads to lower transaction costs and therefore a lower cost of capital that translates to a potential higher market value. In addition, provided evidence is found to support the positive relationship between ERM adoption and return on capital as indicated by COSO-ERM and posited by the first hypothesis of this study; increased operational performance should be reflected in stock market performance. Consistent with Affleck-Graves et al. (2002), I expect that the decreased earnings volatility associated with ERM adoption to lead to higher MVE. This leads to the second hypothesis stated in the alternative form:

> *Hypothesis* 2 - Companies reporting greater ERM process maturity experience an increase in the market value of equity.

Differential Benefits of ERM Function Independence

While board influence may override the CEO's ability to resist ERM adoption, the reporting relationship of the ERM function may be influenced and yield differing operational and market performance benefits based on the ERM functions independence and reporting structure. This leads to the final hypothesis of this study stated in the alternative form:

> *Hypothesis* 3 - Operational and market performance benefits of companies reporting greater ERM process maturity are moderated based on the independence of the ERM reporting structure.

2.4 METHODOLOGY

This study uses a unique data set obtained via web-based survey of IAF management of U.S.-based publicly traded firms. Survey responses were then matched to financial statement data related to operational performance obtained from Compustat database and market valuation data obtained via the CRSP database. Benefits associated with ERM implementation (operational and market performance) are evaluated using panel data models for the three year period for fiscal years 2006 through 2008.[1]

Information related to the adoption and maturity of ERM processes is rarely publically disclosed.[2] Most prior studies use the announcement of CRO appointment as a proxy for ERM adoption. ERM processes take multiple years to implement and mature; therefore, the timing of ERM implementation creates difficulties matching ERM implementation with the expected period of operational and market performance benefits. These considerations lead to potential noise in the data of prior ERM studies which this study attempts to reduce and control for by obtaining survey responses from Internal Audit Function management regarding whether the company has specifically implemented ERM and if so the stage of maturity of the implementation for fiscal years 2006 through 2008.

[1] At the time of data gathering, Financial Statements data was not available for Companies with 2009 fiscal year ends occurring after August 30, 2009. Once this data becomes available, additional analysis could be performed by including fiscal year 2009 into the analysis.

[2] As of March 1, 2010, the SEC now requires organizations to discuss the Board of Directors oversight of risk within the organization. Although within this disclosure some organizations may or may not state that ERM has been implemented, there are no specific requirements to do so or provide any indication of when it was implemented or the maturity of the processes.

ERM Operational Performance Model

Following the model provided by Brown and Caylor (2008), I test the association between measures of the maturity of ERM processes (ERMMTRY) and two measures of industry adjusted operational performance; Return on Assets (IndAdjROA) and Return on Equity (IndAdjROE). While prior studies have considered some of the benefits of ERM adoption (EPS and the volatility of EPS (Lam 2001)), studies relying on the disclosure of CRO appointments do not take into account the lengthy and variable period of time which implementation of ERM processes occur.[3]

The COSO ERM Integrated Framework specifically references "Improving deployment of capital" as one of the potential benefits of ERM adoption. Applying the base model used by Brown and Caylor (2008), using separate models, I evaluate the association between operational performance measures (IndAdjROA and IndAdjROE) and test variables of interest which measures the assessed level of strategic, operational, and overall ERM processes maturity (ERMStrat, ERMOps, ERMOvr). A measure of the reporting independence for the ERM function (ERMInd[4]) is also included in regressions through interaction with the assessed level of maturity. The variables of interest include both firms that have and have not adopted ERM processes thereby providing a natural control of differing firms. In addition, control variables are included for growth (book to market), size (market value of equity), and the lag of the dependent variable measure

[3] A lag year analysis is conducted to test to for the potential lag of adoption with the hypothesized operational performance benefits.

[4] ERM reporting independence measure is measured at only one point in time. The lack of variance in the measure between years prevents it from being used as a stand-alone independent variable in a panel data regression model. As a result, only the interaction is included in the regression models.

(IndAdjROA or IndAdjROE). The following model includes these modifications to the Brown and Caylor (2005) base model to evaluate hypothesized benefits associated with ERM implementation:

$$\text{IndAdjROA (ROE)}_{i,t} = \alpha_{1} + \beta_1 \text{ROA (ROE)}_{i,t-1} + \beta_2 \text{lnBKMKT}_{i,t} + \beta_3 \text{BETA} + \beta_4 \text{ERMMSR}_{i,t} + \beta_5 \text{ERMMSR}_{i,t}*\text{ERMInd} + \varepsilon \quad (1)$$

where the dependent variables and hypothesized independent variables of primary interest are defined as:

$ROA_{i,t-1}$ - defined as income before extraordinary items (Compustat Annual Data Item 18) divided by total assets (Compustat Annual Data Item 6).

$IndAdjROA_{i,t}$ - Industry Adjusted ROA – defined as the difference between firm i's ROA and the mean average ROA of available firms (minimum of 5 firms) within the same Fama and French industry classification as firm *i*, at time *t*.

$ROE_{i,t-1}$ - defined as income before extraordinary items available for common equity (Compustat Annual Data Item 237) divided by the sum of the book value of equity (Compustat Annual Data Item 60) and deferred taxes (Compustat Annual Data Item 74).

$IndAdjROE_{i,t}$ - Industry Adjusted Return on Equity – defined as the difference between firm i's ROE and the mean average ROE of available firms (minimum of 5 firms) within the same Fama and French industry classification as firm *i*, at time *t*.

$ERMMSR_{i,t}$ - one of three measures (ERMOvr, ERMStrat, ERMOps) of the ERM process maturity level assessed on a six-point ordinal scale by survey respondents assuming one of the following six values defined by CoBIT: The value of 5, for "Optimized"; 4, for "Managed and Measurable"; 3, for "Defined Process"; 2, for "Repeatable but Intuitive"; 1, for "Initial/Adhoc"; and 0, for "Non-Existent" ERM processes.[5]

- $ERMOvr_{i,t}$ - ERM Overall is a measure of the survey respondents rating of the overall ERM maturity based on a six point scale provided above.

[5] Expanded definitions of the stage of ERM process activities were included in the survey as a measure of the maturity of the ERM adoption. The descriptions used in the survey for these six classifications (adopted from CoBIT) are as follows: 5 - Optimized – Good processes are followed and automated; 4 - Managed and Measureable – Processes are monitored and measured; 3 - Defined Process – Processes are documented and communicated; 2 - Repeatable but Intuitive – Processes follow a regular pattern; 1 - Initial/Adhoc – Processes are ad hoc and disorganized; 0 - Non-existent – Management processes are not applied at all.

- ERMStrat $_{i,t}$, - ERM Strategy is a measure of the survey respondents assessed rating of the maturity of ERM processes related to Strategic risk based on a six point scale provided above.
- ERMOps $_{i,t}$, - ERM Operations is a measure of the survey respondents assessed rating of the maturity of ERM processes related to Operational risk during year t based on a six point scale provided above.

ERMRPT - ERM function reporting structure based on survey question regarding to whom the ERM function reports. Computed as the ratio of score of the extent of reporting to the audit committee and board to the score of all reporting relationships identified (CEO, CFO, Legal, Audit Committee, Board of Directors).

with control variables defined as:

lnBKMKT $_{i,t}$ – natural logarithm of the book-to-market ratio – natural logarithm of the sum of the book value of equity (Compustat Annual Data Item 60) and deferred taxes (Compustat Annual Data Item 74) divided by the market value of equity (Compustat Annual Data Item 199* Compustat Annual Data Item 25).

lnMVE $_{i,t}$ – the natural logarithm of the market value of equity (Compustat Annual Data Item 199* Compustat Annual Data Item 25).

The model is also tested using the one-year lagged values of ERMMSR and the interaction of the ERMMSRs with ERMRPT. ERMInd was only measured at the point of the survey, therefore only one year of data (survey period) is available for this variable which remains constant for firms.

ERM Market Performance Model

The markets perceived value of a firm is captured by the firms market value of equity (MVE), calculated as the product of the number of outstanding shares of the firms' common stock and the stock price at a given point in time. Consistent with Matolcsy and Wyatt (2008), I calculate the MVE three months after the fiscal year close date of each firm. Using this calculation of MVE, I follow the basic Ohlson (1995) valuation model with the addition of the hypothesized variables of interest to test whether the maturity of

ERM processes (ERMMSR) or the interaction of ERM process maturity and the ERM reporting structure (ERMRPT) is associated with higher values of MVE:

$$MVE_{i,t} = \beta_1 BVE_{i,t-1} + \beta_2 EARN_{i,t} + \beta_3 BETA + \beta_4 ERMMSR_{i,t} + \beta_5 ERMMSR_{i,t} * ERMInd + \varepsilon \quad (2)$$

where the independent variables of primary interest to the proposed hypotheses are defined above, and the dependent variables and control variables are defined as:

$MVE_{i,t}$ – is the market value of equity for firm *i* three months after the fiscal year-end *t* (Matolcsy and Wyatt, 2008); calculated as the product of the stock price of firm i, and the number of common shares outstanding three months following the fiscal year close date (*t*) denoted in millions (obtained from CRSP database).

$BVE_{i,t-1}$ – Book value of equity for firm *i* at the prior year-end date (*t-1*; beginning of period book value) presented in millions (Compustat item 60).

$EARN_{i,t}$ – Earnings is defined as the net income before extraordinary items and discontinued operations presented in millions (Compustat Annual Data Item 18 + Compustat Annual Data Item 66).

3.5 RESULTS

An on-line survey was sent via email to 1,631 Internal Audit Function management level employees throughout the U.S. and other countries identified via web-based key word searches for IAF management titles.[6] The survey and follow-up requests were emailed between July and October 2010. As presented in the Table 3.1 (Panel A) - Sample Description, despite receiving 496 survey responses (30.4 percent response rate), only 146 were U.S.-based publicly traded companies with complete responses regarding ERM adoption and maturity of ERM related processes information necessary for this study which were able to be matched to Compustat and CRSP data. Panel B of Table 3.1 provides an overview of the number of sample responses classified according to the Fama

[6] Keyword searches focused on Internal Audit Function titles including "Chief Audit Executive", "CAE", "Vice President of Internal Audit", "Internal Audit Vice President", "Director of Internal Audit", and "Internal Audit Director" using Google and Lexis/Nexus search engines.

and French Industry Classification. Fama and French Industry classifications comprising the largest percentage of survey responses include transportation (9%), utilities (7%), retail (7%), business services (7%) and insurance (6%).

TABLE 3.1 (Panel A): Sample Selection	
Total Companies Surveyed	1,631
Total Survey Responses	496
Non-Public Company Responses	(164)
Foreign Companies	(23)
Companies without ERM Response (for all 3 fiscal years)	(52)
Public Company Survey Responses	257
Potential observations per Firm Year	3
Total Possible Firm Year Observations	771
Missing ERM Maturity Rating (for a single fiscal year)	(193)
Compustat Data not Available	(143)
CRSP Data Not Available	(12)
Firms with only 1 Firm Year Observation	(10)
Total Firm Years Remaining in Sample	413
Initial Public Company Responses	257
Companies removed due to missing information	111
Total Companies Remaining in Sample	146

TABLE 3.1 (Panel B) - Sample Observations By Industry By Year

	2006		2007		2008	
Ind. Description	Count	Mean	Count	Mean	Count	Mean
Food	2	3.00	2	3.00	2	3.00
Soda	1	3.00	1	3.00	1	3.00
Fun	4	1.00	5	1.40	5	2.60
Books	1	0.00	1	0.00	1	3.00
Household	1	2.00	1	2.00	1	2.00
Clothes	2	1.00	2	1.50	2	2.50
Medical Equipment	1	3.00	2	2.50	2	3.00
Drugs	4	0.75	4	0.75	4	2.25
Chemicals	5	1.40	5	1.80	5	2.20
Rubber	1	0.00	1	1.00	1	3.00
Textiles	2	0.50	1	1.00	2	1.00
Building Materials	5	1.80	5	2.00	5	2.20
Construction	4	2.25	4	3.00	3	4.00
Fabricated Products	1	0.00	1	0.00	1	2.00
Mach	5	1.40	5	1.80	5	2.00
Electrical Equipment	1	1.00	1	1.00	1	2.00
Miscellaneous	1	5.00	2	1.50	2	2.00
Autos	3	2.33	3	2.00	2	2.50
Aero	1	1.00	1	1.00	1	1.00
Mines	1	2.00	2	3.50	2	3.50
Energy	4	0.25	6	0.83	5	2.40
Utilities	8	1.88	10	2.10	10	2.90
Telecommunications	2	0.00	2	0.00	1	0.00
Personal Services	1	0.00	1	1.00	1	2.00
Business Services	7	1.00	11	1.27	11	1.82
Computers	7	1.14	7	1.43	7	2.00
Chips	4	2.00	4	2.50	3	3.00
Lab Equipment	1	1.00	1	3.00	1	4.00
Paper	4	1.75	4	2.25	3	2.67
Boxes	1	2.00	1	2.00	1	2.00
Transportation	12	2.00	13	2.31	12	2.83
Wholesale	6	1.50	6	1.50	4	2.00
Retail	9	1.44	10	2.30	10	2.70
Meals	2	0.50	2	0.50	2	3.00
Insurance	8	1.38	9	1.78	9	2.33
Fin	3	1.33	3	1.67	3	1.67
Health	2	0.50	2	1.50	2	2.00
Steel	2	0.50	2	0.50	2	2.00
Gold	1	2.00	1	2.00	1	3.00
Coal	1	0.00	1	0.00	1	1.00
Total	131		145		137	

Variable definitions of the study are provided in Table 3.2. The descriptive statistics for the sample, presented in Table 3.3, provide an overview of the variables included in the study

TABLE 3.2 - Variable Definitions

ROA_t	Return on Assets is measured as income before extraordinary items (Compustat #18) divided by total assets (Compustat #6) each measured at year t.
$IndAdjROA_t$	Industry Adjusted Average ROA is measured as the difference between the sample firms ROA in year t and the Fama and French Industry median ROA for year t.
ROE_t	Return on Equity is measured as income before extra ordinary items available for common equity (Compustat #237) divided by the sum of the book value of equity (Compustat #60) and deferred taxes (Compustat #74).
$IndAdjROE_t$	Industry Adjusted Average ROE is measured as the difference between the sample firms ROE in year t and the Fama and French Industry median ROE for year t.
lnMktCap	Market Capitalization three months after fiscal year end is computed as the product of shares outstanding (CRSP) and share price (CRSP) at the end of the third month following the fiscal year end.
$lnBKMKT_t$	Natural log of the Book to Market ratio, is computed as the natural log of the ratio of the sum of the book value of equity (Compustat #60) and deferred taxes (Compustat #74) divided by the market value of equity at fiscal year end (computed as the annual close price (Compustat #199) and common shares outstanding at year end (Compustat #25)).
$lnMVE_t$	Natural log of the market value of equity, is computed as the annual close price (#199) and common shares outstanding (Compustat #25) at year end.
$BETA_t$	Computed as the correlation of the monthly stock return (CRSP Returns) of the firm with the market return for up to 60 periods prior to the fiscal year end.
BVE_{t-1}	Book value of equity is measured as the book value of equity at the end of the prior fiscal year (Compustat #60).
$EARN_t$	Earnings is defined as the earnings before extraordinary items computed as the sum of the income before extraordinary items and discontinued operations (Compustat #18) and discontinued operations (Compustat #66).
$ERMOvr_t$	ERM Overall is a measure of the survey respondents rating of the overall ERM maturity based on a six point scale provided below.

In addition to an overall measure of ERM process maturity, the individual components of the COSO-ERM Framework, Strategy, and Operations were assessed by survey respondents. The following are the definitions of these for variables:

$ERMStrat_t$,	ERM Strategy is a measure of the survey respondents rating of the maturity of ERM processes related to Strategy based on a six point scale provided below.

TABLE 3.2 - Variable Definitions (continued)

$ERMOps_t$, ERM Operations is a measure of the survey respondents rating of the maturity of ERM processes related to Operations based on a six point scale provided below.

Survey respondents were requested to assess the level of maturity of their organizations Overall, Strategic, Operations, Reporting, and Compliance ERM process on a 6 point ordinal scale adopted from CoBIT. The following are the six ordinal levels used to assess ERM process maturity:

0 - Non-existent - Management processes are not applied at all;.

1 - Initial/Adhoc - Processes are ad hoc and disorganized;

2 - Repeatable but Intuitive - Processes follow a regular pattern;

3 - Defined Process - Processes are documented and communicated;

4 - Managed and Measurable - Processes are monitored and measured; and

5 – Optimized - Good processes are followed and automated.

TABLE 3.3 - Panel A - Descriptive Statistics IndAdjROA Model
(n=515)

Variable	Mean	Median	Min.	Max.	Std. Dev.
$IndAdjROA_t$	0.019	0.010	-0.448	0.501	0.092
ROA_{t-1}	0.052	0.048	-0.504	0.537	0.083
$lnBkMkt_{i,t}$	-0.648	-0.626	-6.602	1.993	0.798
$lnMVE_t$	7.664	7.696	2.269	12.125	1.644
$ERMOvr_t$	1.963	2.000	0.000	5.000	1.294
$ERMStrat_t$	1.821	2.000	0.000	5.000	1.321
$ERMOps_t$	1.915	2.000	0.000	5.000	1.385
ERMInd	0.316	0.000	0.000	1.000	0.384

TABLE 3.3 - Panel B - Descriptive Statistics IndAdjROE Model (n=388)

Variable	Mean	Median	Min.	Max.	Std. Dev.
$IndAdjROE_t$	0.014	0.016	-0.812	0.910	0.181
ROE_{t-1}	0.114	0.107	-0.693	0.987	0.160
$lnBkMkt_{i,t}$	-0.681	-0.670	-3.210	1.993	0.716
$lnMVE_t$	7.869	7.908	3.403	12.125	1.502
$BETA_t$	1.004	0.876	-0.475	4.660	0.629
$ERMOvr_t$	1.894	2.000	0.000	5.000	1.322
$ERMStrat_t$	1.809	2.000	0.000	5.000	1.371
$ERMOps_t$	1.853	2.000	0.000	5.000	1.433
ERMSPRIND	0.322	0.000	0.000	1.000	0.383

TABLE 3.3 - Panel C - Descriptive Statistics MVE Model (n=496)

Variable	Mean	Median	Min.	Max.	Std. Dev.
$MVE_{t+3mths}$	7,202,544	2,126,166	19,000	209,000,000	18,161,551
BVE_{t-1}	3,128	1,068	1.908	66,662	6,101
$EARN_t$	346	112	-5,911	11,706	1,186
$BETA_t$	0.981	0.862	-0.475	4.660	0.633
$ERMOvr_t$	1.948	2.000	0.000	5.000	1.302
$ERMStrat_t$	1.813	2.000	0.000	5.000	1.331
$ERMOps_t$	1.905	2.000	0.000	5.000	1.394
ERMInd	0.318	0.000	0.000	1.000	0.385

Operating Performance Models

Panels A and B of Table 3.4 provide the Pearson correlation matrices for variables included in the operational performance model (model 1).[7] Correlations between the Industry median adjusted average ROA and ROE, and the operational performance control model variables are both significant and consistent with expected directionality. Although not significantly correlated with industry median adjusted average ROA, the ERM maturity measures (ERMOvr, ERMStrat, and ERMOps) are in the direction hypothesized. However the correlation between ERMOvr and ERMStrat are unexpectedly negative though insignificant. Given the lack of control for other variables and consideration of linear relationships, the lack of results consistent with expectations does not provide sufficient evidence contrary evidence of the hypothesized association.

TABLE 3.4 – Panel A - Pearson Correlation Matrix - IndAdjROA$_t$ Model Variables (n=515)

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1)	IndAdjROA$_t$	1.000							
(2)	ROA$_{t-1}$	0.371	1.000						
(3)	lnBkMkt$_{i,t}$	-0.416	-0.163	1.000					
(4)	lnMVE$_t$	0.383	0.256	-0.413	1.000				
(5)	ERMOvr$_t$	0.027	0.110	0.129	0.138	1.000			
(6)	ERMStrat$_t$	0.018	0.092	0.141	0.124	0.786	1.000		
(7)	ERMOps$_t$	0.041	0.152	0.103	0.174	0.866	0.795	1.000	
(8)	ERMInd	0.126	0.055	-0.043	-0.066	0.099	0.035	0.081	1.000

[7] As a result of the number of variables included in the study Table 3.3 only provides a limited panel of variables included in the window.

TABLE 3.4 – Panel B - Pearson Correlation Matrix - IndAdjROE$_t$ Model Variables (n=388)

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1)	IndAdjROE$_t$	1.000								
(2)	ROE$_{t-1}$	0.456	1.000							
(3)	lnBkMkt$_{i,t}$	-0.535	-0.353	1.000						
(4)	lnMVE$_t$	0.358	0.243	-0.491	1.000					
(5)	BETA$_t$	-0.242	-0.105	0.191	-0.308	1.000				
(6)	ERMOvr$_t$	-0.027	0.056	0.160	0.157	-0.072	1.000			
(7)	ERMStrat$_t$	-0.023	0.071	0.157	0.163	-0.010	0.798	1.000		
(8)	ERMOps$_t$	0.041	0.122	0.104	0.217	-0.136	0.873	0.855	1.000	
(9)	ERMInd	-0.007	0.031	-0.016	-0.092	0.061	0.108	0.015	0.095	1.000

TABLE 3.4 – Panel C - Pearson Correlation Matrix - MVE Model Variables (n=496)

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1)	MVE$_{t+3mths}$	1.000							
(2)	BVE$_{t-1}$	0.798	1.000						
(3)	EARN$_t$	0.829	0.726	1.000					
(4)	BETA$_t$	-0.115	-0.184	-0.132	1.000				
(5)	ERMOvr$_t$	0.078	0.196	0.073	-0.033	1.000			
(6)	ERMStrat$_t$	0.036	0.155	0.056	0.021	0.789	1.000		
(7)	ERMOps$_t$	0.123	0.218	0.113	-0.102	0.872	0.817	1.000	
(8)	ERMInd	0.013	-0.008	-0.021	0.069	0.116	0.051	0.092	1.000

Industry Adjusted ROA

As presented in Table 3.5 (Panel A, B, C, and D), the natural log of book value to market value ($lnBKMK_t$), and the natural log of the market value of equity ($lnMVE_t$) have a positive and significant association with the industry median adjusted ROA. The coefficient of the ERMMTRY01 binary indicator, in Panel A of table 3.5 is both positive (coefficient = 0.017) and significant (p-value = 0.066). In addition, the coefficient of the ERMMTRY variable is also positive (0.010) and significant (p-value = 0.044) when the model also includes the interaction of ERMMTRY and ERMInd. However, the coefficient of the interaction term is negative (-0.014) and moderately significant (p-value=.081). Although the results of the regression do not find consistent significant associations between the different measures of ERMMTRY and the IndAdjROA, to fully support the hypothesized relationship, there is limited evidence to support of the hypothesis.

The lack of significant and consistent coefficient estimates do not provide support that either ERM process maturity or the independence of ERM function reporting is associated with positive operational performance benefits.

TABLE 3.5 (Panel A) - PANEL DATA – IndAdjROA Model - ERMMsr = $ERMOvr_{i,t}$

$IndAdjROA_{i,t} = \beta_1 ROA_{i,t-1} + \beta_2 lnBkMkt_{i,t} + \beta_3 lnMVE_{i,t} + \beta_4 ERMOvr_{i,t} + \beta_5 ERMOvr_{i,t}$*ERMInd + $\varepsilon_{i,t}$

ROA_{t-1}	-0.170	-0.169	-0.171	-0.172	-0.168	-0.171	-0.170
	(0.155)	(0.156)	(0.154)	(0.147)	(0.159)	(0.154)	(0.155)
$lnBkMkt_{i,t}$	*0.032*	*0.031*	*0.032*	*0.032*	*0.031*	*0.032*	*0.032*
	(0.017)	*(0.021)*	*(0.019)*	*(0.021)*	*(0.019)*	*(0.019)*	*(0.019)*
$lnMVE_{t\,t}$	*0.078*	*0.079*	*0.078*	*0.08*	*0.079*	*0.078*	*0.079*
	(0.000)	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*
$ERMMTRY_t$		0.004		**0.010**			
		(0.274)		**(0.044)**			
$ERMMTRY_t$*ERMIND			-0.002	**-0.014**			
			(0.683)	**(0.081)**			
$ERMMTRY01_t$					0.012		**0.017**
					(0.157)		**(0.066)**
$ERMMTRY01_t$*ERMIND						-0.002	-0.008
						(0.683)	(0.216)
Constant	-0.547	-0.562	-0.545	-0.573	-0.559	-0.545	-0.558
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Observations	515	515	515	515	515	515	515
Cross Sections	192	192	192	192	192	192	192
R-squared	0.828	0.829	0.828	0.83	0.829	0.828	0.83
Adj. R^2	0.723	0.723	0.723	0.725	0.724	0.723	0.724
F-stat	14.347	10.889	10.74	8.914	12.063	10.74	10.062

Note: White Heteroskedastic Standard Errors used to calculate p- values in parentheses. *Significant coefficients and p-values of control variables noted in italics.* **Significant coefficients and p-values of for hypothesized variables noted in bold.**

TABLE 3.5 (Panel B) - PANEL DATA – IndAdjROA Model ERMMsr = ERMMOvr$_{i,t-1}$

$IndAdjROA_{i,t} = \beta_1 ROA_{i,t-1} + \beta_2 lnBkMkt_{i,t} + \beta_3 lnMVE_{i,t} + \beta_4 ERMOvr_{i,t-1} + \beta_5 ERMOvr_{i,t-1}*ERMInd + \varepsilon_{i,t}$

ROA_{t-1}	-0.348	-0.345	-0.342	-0.342	-0.346	-0.348	-0.347
	(0.033)	(0.036)	(0.038)	(0.039)	(0.036)	(0.033)	(0.035)
$lnBkMkt_{i,t}$	0.063	0.062	0.06	0.06	0.063	0.063	0.063
	(0.001)	(0.001)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)
$lnMVE_t$	0.092	0.092	0.092	0.091	0.092	0.092	0.092
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
$ERMOvr_{t-1}$		0.004		-0.003			
		(0.568)		(0.644)			
$ERMOvr_{t-1}$*ERMInd			0.015	0.019			
			(0.347)	(0.288)			
$ERMOvr01_{t-1}$					-0.005		-0.014
					(0.767)		(0.344)
ERM $Ovr01_{t-1}$*ERMInd						0.008	0.027
						(0.830)	(0.489)
Constant	-0.626	-0.636	-0.632	-0.626	-0.623	-0.629	-0.627
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Observations	333	333	333	333	333	333	333
Cross Sections	175	175	175	175	175	175	175
R-squared	0.897	0.897	0.898	0.898	0.897	0.897	0.897
Adj. R^2	0.778	0.777	0.778	0.777	0.776	0.776	0.775
F-stat	7.057	5.544	6.177	5.095	5.733	6.715	5.474

Note: White Heteroskedastic Standard Errors used to calculate p- values in parentheses. *Significant coefficients and p-values of control variables noted in italics.* **Significant coefficients and p-values of for hypothesized variables noted in bold.**

TABLE 3.5 (Panel C) - PANEL DATA – IndAdjROA Model ERMMsr = $STRAT_{i,t}$

$IndAdjROA_{i,t} = \beta_1 ROA_{i,t-1} + \beta_2 lnBkMkt_{i,t} + \beta_3 lnMVE_{i,t} + \beta_4 ERMStrat_{i,t} + \beta_5 ERMStrat_{i,t} * ERMInd + \varepsilon_{i,t}$

ROA_{t-1}	-0.174	-0.169	-0.17	-0.172	*-0.348*	*-0.345*	*-0.346*	*-0.345*
	(0.128)	(0.156)	(0.156)	(0.149)	*(0.033)*	*(0.035)*	*(0.035)*	*(0.035)*
$lnBkMkt_{i,t}$	*0.033*	*0.03*	*0.032*	*0.031*	*0.063*	*0.062*	*0.062*	*0.062*
	(0.013)	*(0.024)*	*(0.019)*	*(0.026)*	*(0.001)*	*(0.001)*	*(0.001)*	*(0.001)*
$lnMVE_t$	*0.082*	*0.079*	*0.078*	*0.079*	*0.092*	*0.093*	*0.092*	*0.093*
	(0.000)	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*
$ERMStrat_t$		0.004		0.007				
		(0.306)		(0.184)				
$ERMStrat_t$*ERMInd			0.000	-0.008				
			(0.968)	(0.300)				
$ERMStrat_{t-1}$						0.003		0.005
						(0.595)		(0.562)
$ERMStrat_{t-1}$*ERMInd							0.002	-0.005
							(0.848)	(0.788)
Constant	-0.578	-0.562	-0.547	-0.567	-0.626	-0.638	-0.628	-0.639
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Observations	545	515	515	515	333	333	333	333
Cross Sections	203	192	192	192	175	175	175	175
R-squared	0.824	0.829	0.828	0.829	0.897	0.897	0.897	0.897
Adj. R^2	0.717	0.723	0.722	0.723	0.778	0.776	0.776	0.775
F-stat	16.443	10.575	10.884	8.665	7.057	5.329	5.252	4.303

Note: White Heteroskedastic Standard Errors used to calculate p- values in parentheses. *Significant coefficients and p-values of control variables noted in italics.* **Significant coefficients and p-values of for hypothesized variables noted in bold.**

TABLE 3.5 (Panel D) - PANEL DATA – IndAdjROA Model ERMMsr = $OPS_{i,t}$

$IndAdjROA_{i,t} = \beta_1 ROA_{i,t-1} + \beta_2 lnBkMkt_{i,t} + \beta_3 lnMVE_{i,t} + \beta_4 ERMOps_{i,t} + \beta_5 ERMOps_{i,t}*ERMInd + \varepsilon_{i,t}$

ROA_{t-1}	-0.170	-0.173	-0.170	-0.175	*-0.348*	*-0.348*	*-0.348*	*-0.348*
	(0.155)	(0.146)	(0.156)	(0.143)	*(0.033)*	*(0.034)*	*(0.034)*	*(0.034)*
$lnB2M_t$	*0.032*	*0.030*	*0.031*	*0.030*	*0.063*	*0.063*	*0.063*	*0.063*
	(0.017)	*(0.024)*	*(0.020)*	*(0.026)*	*(0.001)*	*(0.001)*	*(0.001)*	*(0.001)*
$lnMVE_t$	*0.078*	*0.079*	*0.078*	*0.079*	*0.092*	*0.092*	*0.092*	*0.092*
	(0.000)	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*
$ERMOps_t$		0.005		0.007				
		(0.117)		(0.114)				
$ERMOps_t$*ERMInd			0.003	-0.006				
			(0.568)	(0.465)				
$ERMOps_{t-1}$						0.000		0.000
						(0.949)		(0.954)
$ERMOps_{t-1}$*ERMInd							-0.002	-0.002
							(0.896)	(0.891)
Constant	-0.547	-0.567	-0.551	-0.570	-0.626	-0.625	-0.625	-0.626
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Observations	515	515	515	515	333	333	333	333
Cross Sections	192	192	192	192	175	175	175	175
R-squared	0.828	0.829	0.828	0.83	0.897	0.897	0.897	0.897
Adj. R^2	0.723	0.724	0.723	0.724	0.778	0.776	0.776	0.775
F-stat	14.347	11.149	10.844	8.853	7.057	5.534	5.28	4.577

Note: White Heteroskedastic Standard Errors used to calculate p- values in parentheses. *Significant coefficients and p-values of control variables noted in italics.* **Significant coefficients and p-values of for hypothesized variables noted in bold.**

Industry Adjusted ROE

As presented in Table 3.6 (Panels A, B, C, and D), the coefficients of the lagged value of the unadjusted dependent variable (ROE_{t-1}), the natural log of book value to market value ($lnBKMK_t$) are not significant in the model, while those of natural log of the market value of equity ($lnMVE_t$) and Beta are positive and significant in each of the the median industry adjusted averages models.. As a result of changes in the U.S. economic conditions during the period of the study, two dummy variables representing the fiscal year of observation are added into the overall ERM maturity model to attempt to control for these changes during the period and are presented in Panel B of Table 3.6. Although the coefficients of the measures of ERM process maturity (ERMOvr, ERMOvr01, ERMStrat, ERMOps) and the corresponding lags of these variables are positive for each model, with the exception of two models ($ERMMTRY_t$ (coef. = 0.030; p-value=0.043); $ERMStrat_t$ (coef. 0.027; p-value = 0.059); $ERMOps_t$ (coef. = 0.029; p-value=0.042), the coefficients are not statistically significant. Coefficients of the ERM maturity and ERM reporting independence interactions ($ERMOvr_t$*ERMInd, $ERMMTRY01_t$*ERMInd, $ERMStrat_t$*ERMInd, and $ERMOps_t$*ERMInd) are negative and significant for all non-lagged year models. in the current year models. Together, the results provide limited support of a positive association between ERM process maturity and operational performance. In addition, contrary to the hypothesized benefit of ERM reporting independence, tests results provide initial evidence of greater benefits when ERM leader reports to management as opposed to the board.[38]

[38] The ERM reporting independence variable is only captured for one point in time, fiscal year 2008, therefore the interaction terms are serially correlated across periods. An extension to the survey which captures the reporting relationship for each year would help to reduce such any concerns of the statistical results of the interactions based only on a single point in time measure.

TABLE 3.6 (Panel A) - PANEL DATA – IndAdjROE Model ERMMsr = $ERMOvr_{i,t-1}$

$IndAdjROE_{i,t} = \beta_1 ROE_{i,t-1} + \beta_2\ lnBkMkt_{i,t} + \beta_3 lnMVE_{i,t} + \beta_4 Beta_{i,t} + \beta_5 ERMOvr_{i,t} + \beta_6 ERMOvr_{i,t}*ERMInd + \varepsilon_{,t}$

ROE_{t-1}	-0.210	-0.212	-0.218	-0.240	-0.210	-0.218	-0.225
	(0.211)	(0.208)	(0.189)	(0.146)	(0.212)	(0.189)	(0.176)
$lnBkMkt_{i,t}$	0.029	0.024	0.040	0.032	0.029	0.040	0.039
	(0.517)	(0.609)	(0.413)	(0.515)	(0.534)	(0.413)	(0.427)
$lnMVE_t$	*0.176*	*0.175*	*0.181*	*0.183*	*0.176*	*0.181*	*0.184*
	(0.000)	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*
$BETA_t$	*0.046*	*0.044*	*0.049*	*0.049*	*0.046*	*0.049*	*0.052*
	(0.028)	*(0.039)*	*(0.022)*	*(0.022)*	*(0.026)*	*(0.022)*	*(0.014)*
$ERMOvr_t$		0.006		**0.030**			
		(0.558)		**(0.043)**			
$ERMOvr_t$*ERMInd			-0.025	**-0.062**			
			(0.102)	**(0.009)**			
$ERMOvr01_t$					0.002		0.025
					(0.935)		(0.368)
$ERMOvr01_t$*ERMInd						-0.025	**-0.034**
						(0.102)	**(0.059)**
Constant	-1.374	-1.379	-1.392	-1.441	-1.376	-1.392	-1.416
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Observations	388	388	388	388	388	388	388
R-squared	0.731	0.731	0.733	0.738	0.731	0.733	0.734
Adj. R^2	0.553	0.551	0.554	0.561	0.551	0.554	0.554
Cross Sections	150	150	150	150	150	150	150
F-stat	12.292	11.043	9.995	10.2	11.635	9.995	10.464

Note: White Heteroskedastic Standard Errors used to calculate p- values in parentheses. *Significant coefficients and p-values of control variables noted in italics.* **Significant coefficients and p-values of for hypothesized variables noted in bold.**

TABLE 3.6 (Panel B) - PANEL DATA – IndAdjROE Model ERMMsr = $ERMOvr_{i,t-1}$

$IndAdjROE_{i,t} = \beta_1 ROE_{i,t-1} + \beta_2 lnBkMkt_{i,t} + \beta_3 lnMVE_{i,t} + \beta_4 Beta_{i,t} + \beta_5 ERMOvr_{i,t} + \beta_6 ERMOvr_{i,t} * ERMInd + \varepsilon_{,t}$

ROE_{t-1}	-0.214	-0.214	-0.229	-0.241	-0.213	-0.229	-0.231
	(0.202)	(0.205)	(0.167)	(0.147)	(0.208)	(0.167)	(0.166)
$lnBkMkt_{i,t}$	0.019	0.019	0.028	0.029	0.019	0.028	0.028
	(0.719)	(0.714)	(0.615)	(0.596)	(0.717)	(0.615)	(0.611)
$lnMVE_t$	*0.193*	*0.194*	*0.202*	*0.201*	*0.193*	*0.202*	*0.202*
	(0.000)	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*
$BETA_t$	*0.043*	*0.044*	*0.048*	*0.048*	*0.043*	*0.048*	*0.049*
	(0.039)	*(0.042)*	*(0.026)*	*(0.024)*	*(0.044)*	*(0.026)*	*(0.022)*
FY2006	-0.026	-0.029	-0.040	-0.023	-0.031	-0.040	-0.038
	(0.264)	(0.323)	(0.104)	(0.428)	(0.240)	(0.104)	(0.150)
FY2007	*-0.047*	*-0.049*	*-0.057*	*-0.045*	*-0.050*	*-0.057*	*-0.055*
	(0.025)	*(0.049)*	*(0.008)*	*(0.071)*	*(0.030)*	*(0.008)*	*(0.016)*
$ERMOvr_t$		-0.002		0.022			
		(0.852)		(0.224)			
$ERMOvr_t$*ERMInd			**-0.038**	**-0.060**			
			(0.023)	**(0.014)**			
$ERMOvr01_t$					-0.015		0.009
					(0.599)		(0.767)
$ERMOvr01_t$*ERMInd						**-0.038**	**-0.040**
						(0.023)	**(0.026)**
Constant	-1.485	-1.485	-1.522	-1.545	-1.478	-1.522	-1.528
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Observations	388	388	388	388	388	388	388
Cross Sections	150	150	150	150	150	150	150
R-squared	0.738	0.738	0.742	0.744	0.738	0.742	0.742
Adj. R^2	0.560	0.558	0.566	0.568	0.559	0.566	0.564
F-stat	8.875	8.126	7.859	7.863	8.619	7.859	8.236

Note: White Heteroskedastic Standard Errors used to calculate p- values in parentheses. *Significant coefficients and p-values of control variables noted in italics.* **Significant coefficients and p-values of for hypothesized variables noted in bold.**

TABLE 3.6 (Panel C) - PANEL DATA – IndAdjROE Model ERMMsr = $ERMMOvr_{i,t-1}$

$IndAdjROE_{i,t} = \beta_1 ROE_{i,t-1} + \beta_2\ lnBkMkt_{i,t} + \beta_3 lnMVE_{i,t} + \beta_4 Beta_{i,t} + \beta_5 ERMOvr_{i,t} + \beta_6 ERMOvr_{i,t}*ERMInd + \varepsilon$

ROE_{t-1}	-0.161	-0.169	-0.163	-0.168	-0.171	-0.170	-0.172
	(0.440)	(0.423)	(0.437)	(0.428)	(0.419)	(0.420)	(0.419)
$lnBkMkt_{i,t}$	0.121	0.111	0.115	0.111	0.119	0.123	0.121
	(0.128)	(0.163)	(0.148)	(0.165)	(0.125)	(0.114)	(0.123)
$lnMVE_t$	*0.241*	*0.241*	*0.240*	*0.241*	*0.244*	*0.247*	*0.246*
	(0.002)	*(0.002)*	*(0.002)*	*(0.002)*	*(0.001)*	*(0.001)*	*(0.001)*
$BETA_t$	*0.075*	*0.073*	*0.072*	*0.073*	*0.074*	*0.070*	*0.071*
	(0.056)	*(0.060)*	*(0.067)*	*(0.061)*	*(0.055)*	*(0.080)*	*(0.077)*
$ERMMTRY_{t-1}$		0.021		0.019			
		(0.228)		(0.324)			
$ERMMOvr_{t-1}$*ERMInd			0.028	0.005			
			(0.413)	(0.895)			
$ERMMOvr01_{t-1}$					0.044		0.026
					(0.166)		(0.517)
$ERMOvr01_{t-1}$*ERMInd						0.094	0.053
						(0.210)	(0.574)
Constant	-1.867	-1.899	-1.872	-1.896	-1.900	-1.911	-1.912
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Observations	247	247	247	247	247	247	247
R-squared	0.83	0.832	0.831	0.832	0.832	0.831	0.832
Adj. R^2	0.610	0.609	0.608	0.605	0.609	0.609	0.606
Cross Sections	135	135	135	135	135	135	135
F-stat	6.531	5.385	5.238	4.658	5.556	5.429	4.699

Note: White Heteroskedastic Standard Errors used to calculate p- values in parentheses. *Significant coefficients and p-values of control variables noted in italics.* **Significant coefficients and p-values of for hypothesized variables noted in bold.**

TABLE 3.6 (Panel D) - PANEL DATA – IndAdjROE Model ERMMsr = $ERMStrat_{i,t-1}$

$IndAdjROE_{i,t} = \beta_1 ROE_{i,t-1} + \beta_2\ lnBkMkt_{i,t} + \beta_3 lnMVE_{i,t} + \beta_4 Beta_{i,t} + \beta_5 ERMStrat_{i,t} + \beta_6 ERMStrat_{i,t}*ERMInd + \varepsilon_{i,t}$

ROEt-1	-0.210	-0.211	-0.217	-0.240	-0.161	-0.160	-0.161	-0.168
	(0.211)	(0.212)	(0.189)	(0.147)	(0.440)	(0.441)	(0.437)	(0.423)
$lnBkMkt_{i,t}$	0.029	0.027	0.046	0.038	0.121	0.122	0.128	0.124
	(0.517)	(0.572)	(0.346)	(0.442)	(0.128)	(0.148)	(0.121)	(0.141)
$lnMVE_t$	*0.176*	*0.176*	*0.183*	*0.185*	*0.241*	*0.241*	*0.242*	*0.245*
	(0.000)	*(0.000)*	*(0.000)*	*(0.000)*	*(0.002)*	*(0.002)*	*(0.001)*	*(0.002)*
$BETA_t$	*0.046*	*0.045*	*0.050*	*0.049*	*0.075*	*0.075*	*0.076*	*0.076*
	(0.028)	*(0.034)*	*(0.018)*	*(0.021)*	*(0.056)*	*(0.061)*	*(0.057)*	*(0.059)*
$ERMStrat_t$		0.002		**0.027**				
		(0.834)		**(0.059)**				
$ERMStrat_t$*ERMInd			**-0.034**	**-0.067**				
			(0.075)	**(0.010)**				
$ERMStrat_{t-1}$						-0.002		0.023
						(0.927)		(0.308)
$ERMStrat_{t-1}$*ERMInd							-0.033	-0.067
							(0.485)	(0.132)
Constant	-1.374	-1.376	-1.397	-1.445	-1.867	-1.862	-1.855	-1.893
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)
Observations	388	388	388	388	247	247	247	247
Cross Sections	150	150	150	150	135	135	135	135
R-squared	0.731	0.731	0.735	0.74	0.83	0.83	0.832	0.832
Adj. R^2	0.553	0.551	0.558	0.564	0.61	0.606	0.609	0.607
F-stat	12.292	10.243	10.258	9.972	6.531	5.59	5.562	4.626

Note: White Heteroskedastic Standard Errors used to calculate p- values in parentheses. *Significant coefficients and p-values of control variables noted in italics.* **Significant coefficients and p-values of for hypothesized variables noted in bold.**

TABLE 3.6 (Panel E) - PANEL DATA – IndAdjROE Model ERMMsr = $ERMOps_{i,t-1}$

$IndAdjROE_{i,t} = \beta_1 ROE_{i,t-1} + \beta_2 lnBkMkt_{i,t} + \beta_3 lnMVE_{i,t} + \beta_4 Beta_{i,t} + \beta_5 ERMOps_{i,t} + \beta_6 ERMOps_{i,t}*ERMInd + \varepsilon$

ROE_{t-1}	-0.210	-0.217	-0.209	-0.232	-0.259	-0.256	-0.261	-0.268
	(0.211)	(0.198)	(0.211)	(0.166)	(0.241)	(0.248)	(0.238)	(0.237)
$lnBkMkt_i$	0.029	0.023	0.036	0.030	0.111	0.114	0.117	0.115
	(0.517)	(0.628)	(0.453)	(0.531)	(0.145)	(0.156)	(0.133)	(0.153)
$lnMVE_t$	*0.176*	*0.176*	*0.179*	*0.182*	*0.239*	*0.239*	*0.240*	*0.241*
	(0.000)	*(0.000)*	*(0.000)*	*(0.000)*	*(0.002)*	*(0.002)*	*(0.001)*	*(0.001)*
$BETA_t$	*0.046*	*0.044*	*0.048*	*0.048*	*0.067*	*0.066*	*0.068*	*0.070*
	(0.028)	*(0.036)*	*(0.022)*	*(0.019)*	*(0.091)*	*(0.091)*	*(0.092)*	*(0.081)*
$ERMOps_t$		0.009		**0.029**				
		(0.366)		**(0.042)**				
$ERMOps_t$ *ERMInd			-0.019	**-0.054**				
			(0.273)	**(0.022)**				
$ERMOps_{t-1}$						-0.006		0.013
						(0.772)		(0.540)
$ERMOps_{t-1}$*ERMInd							-0.038	-0.057
							(0.422)	(0.251)
Constant	-1.374	-1.390	-1.379	-1.435	-1.841	-1.828	-1.822	-1.839
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)
Observations	388	388	388	388	256	256	256	256
Cross Sections	150	150	150	150	140	140	140	140
R-squared	0.731	0.732	0.732	0.737	0.819	0.819	0.82	0.82
Adj. R^2	0.553	0.552	0.552	0.559	0.583	0.58	0.582	0.579
F-stat	12.292	10.943	9.923	10.086	6.817	5.504	5.572	4.585

Note: White Heteroskedastic Standard Errors used to calculate p- values in parentheses. *Significant coefficients and p-values of control variables noted in italics.* **Significant coefficients and p-values of for hypothesized variables noted in bold.**

Market Valuation Model

The correlation matrix for the Market Valuation model presented in Table 3.7 indicates significant, though low, positive correlations between the variables of interest (ERMOvr, and ERMOps) and the market value of equity (MVE). In addition, the correlations between the control variables included in equation 2 and the market value of equity are significant and consistent with the expected directions, though the correlation of Beta is low. Additional analysis of the correlation table indicates a highly significant correlation (coef. = 0.726; p-value = 0.000) between the two control variables, book value of equity (BVE_{t-1}) and earnings ($EARN_t$) which is likely introduce concerns of multi-coliniarity within the model.

The results of the Market Capitalization (90 days from fiscal year end ($MVE_{i,t+3mths}$) panel data regression are provided in Table 3.8 (Panels A, B, C, D). Each model and several of the control variables (BVE and EARN) are significant in each model. Contrary to the predicated hypothesis that ERM maturity would be associated with a market value of equity premium, the coefficients of the ERM process maturity measures (ERMOvr, ERMStrat, ERMOps) are consistently negative and significant for the both the current year and lagged year models. These results hold when the interaction variable, which measures ERM reporting independence, are added to the model. , but is not significant in any of the models. Despite these results, the adjusted R^2 values, greater than .87 for each model, provide additional evidence of concerns of multi-colliniarity.[1] Although the

[1] Additional analysis of the issue of multi-colliniarity will be further evaluated with more detailed statistical analysis in order to develop a model not restricted the limitation.

TABLE 3.7 (Panel A) - MKTVAL - ERMMsr = $ERMMOvr_{i,t}$ & $ERMOvr01_{i,t}$

$MktCap_{i,t} = \beta_1 BVE_{i,t-1} + \beta_2 EARN_{i,t} + \beta_3 BETA_{i,t} + \beta_4 ERMOvr_{i,t} + \beta_5 ERMOvr_{i,t} * ERMInd + \varepsilon$

$BVE_{i,t-1}$	*-2,212*	*-2,104*	*-2,168*	*-2,103*	*-2,169*	*-2,168*	*-2,154*	-4,465
	(0.058)	*(0.067)*	*(0.060)*	*(0.068)*	*(0.063)*	*(0.060)*	*(0.063)*	(0.136)
$EARN_t$	*2,549*	*2,451*	*2,532*	*2,450*	*2,413*	*2,532*	*2,446*	*1,776*
	(0.018)	*(0.024)*	*(0.018)*	*(0.024)*	*(0.025)*	*(0.018)*	*(0.022)*	*(0.048)*
$BETA_t$	*-1,674,552*	*-1,350,691*	*-1,493,316*	*-1,351,387*	*-1,589,994*	*-1,493,316*	*-1,500,786*	-1,446,780
	(0.018)	*(0.053)*	*(0.034)*	*(0.053)*	*(0.021)*	*(0.034)*	*(0.032)*	(0.155)
$ERMOvr_t$		**-1,041,587**		**-1,064,033**				
		(0.000)		**(0.004)**				
$ERMMOvr_t$*ERMInd			**-1,260,516**	53,388				
			(0.008)	(0.925)				
$ERMOvr01_t$					**-1,858,619**		-1,254,049	
					(0.024)		(0.186)	
$ERMOvr01_t$*ERMInd						**-1,260,516**	-811,749	
						(0.008)	(0.123)	
Constant	14,882,523	16,287,261	15,426,071	16,294,512	15,393,086	15,426,071	15,577,046	21,183,547
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.021)
Observations	496	496	496	496	496	496	496	321
Cross Sections	186	186	186	186	186	186	186	169
R-squared	0.953	0.954	0.954	0.954	0.954	0.954	0.954	0.941
Adj. R^2	0.924	0.926	0.925	0.926	0.925	0.925	0.925	0.872
F-stat	9.481	11.086	8.544	9.392	9.707	8.544	7.867	6.484

Note: White Heteroskedastic Standard Errors used to calculate p- values in parentheses. *Significant coefficients and p-values of control variables noted in italics.* **Significant coefficients and p-values of for hypothesized variables noted in bold.**

TABLE 3.7 (Panel B) - MKTVAL - ERMMsr = $ERMMTRY_{i,t}$

$MktCap_{i,t} = \beta_1 BVE_{i,t-1} + \beta_2 EARN_{i,t} + \beta_3 BETA_{i,t} + \beta_4 ERMOvr_{i,t} + \beta_5 ERMOvr_{i,t}$*ERMInd $+\varepsilon$

$BVE_{i,t-1}$	-4,446	-4,458	-4,446	-4,430	-4,430	-4,435
	(0.137)	(0.137)	(0.139)	(0.141)	(0.138)	(0.141)
$EARN_t$	*1,691*	*1,704*	*1,687*	*1,695*	*1,591*	*1,593*
	(0.055)	*(0.050)*	*(0.055)*	*(0.045)*	*(0.044)*	*(0.044)*
$BETA_t$	-1,073,656	-1,162,285	-1,062,353	-1,351,023	-1,099,940	-1,089,246
	(0.303)	(0.272)	(0.315)	(0.179)	(0.298)	(0.312)
$ERMOvr_{t-1}$	**-1,309,047**		**-1,207,725**			
	(0.009)		**(0.084)**			
$ERMOvr_{t-1}$*ERMIND		**-1,792,772**	-253,218			
		(0.046)	(0.840)			
$ERMOvr01_{t-1}$				-1,640,044		386,436
				(0.299)		(0.857)
$ERMOvr01_{t-1}$*ERMIND					-5,627,982	-6,167,623
					(0.158)	(0.254)
Constant	22,928,685	21,904,528	22,895,443	21,525,489	21,493,837	21,447,899
	(0.012)	(0.017)	(0.012)	(0.018)	(0.020)	(0.019)
Observations	321	321	321	321	320	320
Cross Sections	169	169	169	169	168	168
R-squared	0.942	0.941	0.942	0.941	0.941	0.941
Adj. R^2	0.873	0.872	0.872	0.871	0.873	0.872
F-stat	7.235	5.639	6.113	5.506	6.045	5.522

Note: White Heteroskedastic Standard Errors used to calculate p- values in parentheses. *Significant coefficients and p-values of control variables noted in italics.* **Significant coefficients and p-values of for hypothesized variables noted in bold.**

TABLE 3.7 (Panel C) - MKTVAL - ERMMsr = $ERMStrat_{i,t}$

$MktCap_{i,t} = \beta_1 BVE_{i,t-1} + \beta_2 EARN_{i,t} + \beta_3 BETA_{i,t} + \beta_4 ERMStrat_{i,t} + \beta_5 ERMStrat_{i,t}*ERMInd + \varepsilon$

$BVE_{i,t-1}$	-2,212	-2,113	-2,178	-2,111	-4,465	-4,391	-4,442	-4,396
	(0.058)	(0.070)	(0.061)	(0.072)	(0.136)	(0.147)	(0.141)	(0.146)
$EARN_t$	2,549	2,485	2,533	2,482	1,776	1,744	1,777	1,719
	(0.018)	(0.023)	(0.019)	(0.023)	(0.048)	(0.053)	(0.049)	(0.057)
$BETA_t$	-1,674,552	-1,429,641	-1,552,137	-1,430,606	-1,446,780	-1,131,704	-1,381,757	-1,070,784
	(0.018)	(0.042)	(0.029)	(0.042)	(0.155)	(0.252)	(0.165)	(0.285)
$ERMStrat_t$		**-722,987**		**-785,610**				
		(0.003)		**(0.034)**				
$ERMStrat_t$*ERMInd			**-842,088**	152,567				
			(0.019)	(0.771)				
$ERMStrat_{t-1}$						**-959,637**		**-1,649,713**
						(0.095)		**(0.032)**
$ERMStrat_{t-1}$*ERMInd							-664,400	1,692,615
							(0.522)	(0.228)
Constant	14,882,523	15,665,226	15,168,553	15,681,200	21,183,547	22,061,771	21,361,774	22,239,255
	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.021)	(0.015)	(0.021)	(0.014)
Observations	496	496	496	496	321	321	321	321
Cross Sections	186	186	186	186	169	169	169	169
R-squared	0.953	0.954	0.953	0.954	0.941	0.941	0.941	0.941
Adj. R^2	0.924	0.925	0.925	0.925	0.872	0.872	0.871	0.872
F-stat	9.481	11.328	9.201	9.024	6.484	5.953	4.838	6.842

Note: White Heteroskedastic Standard Errors used to calculate p- values in parentheses. *Significant coefficients and p-values of control variables noted in italics.* **Significant coefficients and p-values of for hypothesized variables noted in bold.**

TABLE 3.7 (Panel D) - MKTVAL - ERMMsr = $ERMOps_{i,t}$ & $ERMOps_{i,t-1}$

$MktCap_{i,t} = \beta_1 BVE_{i,t-1} + \beta_2 EARN_{i,t} + \beta_3 BETA_{i,t} + \beta_4 ERMOps_{i,t} + \beta_5 ERMOps_{i,t}$*ERMInd +ε

$BVE_{i,t-1}$	*-2,212*	*-2,086*	*-2,135*	*-2,085*	-4,465	-4,313	-4,354	-4,309
	(0.058)	*(0.068)*	*(0.063)*	*(0.069)*	(0.136)	(0.138)	(0.136)	(0.139)
$EARN_t$	*2,549*	*2,486*	*2,502*	*2,484*	*1,776*	*1,682*	*1,698*	*1,676*
	(0.018)	*(0.020)*	*(0.018)*	*(0.020)*	*(0.048)*	*(0.054)*	*(0.046)*	*(0.052)*
$BETA_t$	*-1,674,552*	*-1,355,361*	*-1,451,780*	*-1,347,553*	-1,446,780	-1,071,436	-1,180,747	-1,062,743
	(0.018)	*(0.054)*	*(0.041)*	*(0.057)*	(0.155)	(0.315)	(0.267)	(0.322)
OPS_t		**-1,000,251**		**-899,036**				
		(0.002)		**(0.017)**				
$ERMOps_t$*ERMIND			**-1,405,877**	-253,109				
			(0.022)	(0.713)				
$ERMOps_{t-1}$						**-2,135,761**		**-1,726,411**
						(0.008)		**(0.036)**
$ERMOps_{t-1}$*ERMInd							**-3,617,573**	**-1,096,478**
							(0.028)	**(0.528)**
Constant	14,882,523	16,102,604	15,362,227	16,065,509	21,183,547	23,759,444	22,548,500	23,679,449
	(0.000)	(0.000)	(0.000)	(0.000)	(0.021)	(0.009)	(0.013)	(0.009)
Observations	496	496	496	496	321	321	321	321
Cross Sections	186	186	186	186	169	169	169	169
R-squared	0.953	0.954	0.954	0.954	0.941	0.943	0.943	0.943
Adj. R^2	0.924	0.926	0.925	0.926	0.872	0.877	0.875	0.876
F-stat	9.481	10.849	8.684	9.524	6.484	8.719	7.165	8.018

Note: White Heteroskedastic Standard Errors used to calculate p- values in parentheses. *Significant coefficients and p-values of control variables noted in italics.* **Significant coefficients and p-values of for hypothesized variables noted in bold.**

results suggest evidence to contrary to expectations of hypotheses 2 or 3, the results are limited as a result of the presence of independent variables with are highly correlated with each other.

3.6 CONCLUSIONS AND CONTRIBUTIONS

Benefits of ERM adoption considered in this study (improved industry adjusted ROA and ROE, and MVE) are likely to be of considerable interest to stakeholders of any organization. However, executive management and board of directors (and their committees) may have the greatest interest of benefits associated with ERM adoption as a result of their respective fiduciary responsibilities for management and oversight of the organization. Like any investment in the business, management and the board are likely to be interested in the operational and market performance benefits associated with the cost to implement and maintain an effective ERM process.

This study contributes to the literature by providing an increased understanding of benefits of adopting ERM and maturity of ERM processes by using a unique data set obtained from survey responses provided by U.S. - based CAE's. Although the result of the study only provides limited evidence of support of proposed hypotheses, several limitations may have contributed to the lack of positive and consistent results. The small sample size, and lack of multi-year direct measure of ERM reporting independence, and multi-collinarity of data each create a limitation to adequately evaluating the results of the study. Despite these limitations, this study provides contributions to the literature through the use and development of direct longitudinal measures of ERM process maturity as well as identification of differences in reporting structures which may be associated with differing levels of benefits.

CHAPTER 4

INFLUENCE OF RISK FACTOR DISCLOSURE ON DEBT AND EQUITY FINANCING

Abstract: Prior disclosure related literature (Botosan 1997; Sengupta 1998; Botosan and Plumlee 2002; and Ashbaugh-Skaife et al. 2009) has noted benefits of reduced cost of debt and equity for companies with enhanced disclosure reporting. This study considers the specific association between the extent of risk factor disclosures in annual SEC filings (10-K) and the proxies for cost of debt and equity. Using a three year period (2006-2008) of panel data for a cross section of companies responding to a survey related to the ERM adoption survey used in the first two studies of this dissertation, I test whether a negative association exists between the number and level of risk disclosure factors per year with proxies for cost of debt (yearly change in S&P Long-term Credit Rating) and cost of equity (industry median adjusted average earnings to price ratio). Results of the panel data regression provide limited support of the hypotheses, that a higher level of risk factor disclosure is associated with lower cost of debt and equity. While additional proxies exist for both cost of debt and cost of equity, this provides support to the benefits of enhanced risk disclosure.

4.1 INTRODUCTION

The recent economic meltdown has focused attention on the risky business practices used by organizations to attempt to enhance operational and market performance. As the U.S. and other world economies have noticed such practices do not always result as planned. Risk is one of the prime determinants in assessing the cost of debt and equity financing. In establishing ERM initiatives, firms are encouraged to focus on the downside of risk, but the upside as well. The traditional approach to ERM initiatives was

to focus on the downside – the losses from currency or interest rate trades in financial markets, for instance, or financial losses that might be caused by a disruption in supply chain or cyber or terrorism attack that impairs a company's information technology. However, now firms are supposed to consider competitive opportunities and strategic advantages that might arise out of the efficient risk management (focusing on preventive measures that help a firm avoid potential future disasters. Organizations which are better able to manage and optimize risk throughout the organization by mitigating adverse events (downside risk) while taking advantage of opportunities (upside risk) are more likely to outperform organizations which are unable to adequately manage such risk. Lam (2001) indicates that firms implementing Enterprise Risk Management (ERM) as proxied for by the hiring of a Chief Risk Officer (CRO) are able to reduce losses and earnings volatility. Affleck-Graves et al. (2002) have also found reduced losses and variability of earnings to be associated with reductions in organizations cost of debt (higher credit rating) and equity.

Although the existence of ERM processes within banking and financial organizations has been used in Standard & Poor's and Moody's debt rating processes for some time, the companies have announced that they will begin to include factors related to ERM adoption in their procedures for rating other industries. As a result it is expected that future debt ratings will include a direct measure of ERM maturity which would likely be associated with lower debt ratings for organizations with less robust ERM processes. While the consideration of ERM activities is not currently directly included in debt ratings, it is likely to be indirectly incorporated as a result of risk assessment and management disclosures as well as decreased volatility of firm financial and market

performance benefits as indicated by Lam (2001). In addition to higher debt ratings (lower cost of debt), in the long run, the market is likely to respond favorably to higher and more consistent earnings per share (EPS) and lower earnings volatility through a reduction in the cost of equity to an organization.

The Committee of Sponsoring Organizations (COSO) Enterprise Risk Management (ERM) Integrated Framework (COSO-ERM) serves as guidance to considerations in the effective management of both down side and upside risk. This study uses two measures of risk disclosure (count of disclosed risk factors and count of key considerations of Enterprise Risk Management as noted by COSO and Desender (2007)) to evaluate the association with cost of debt and equity.

The next section contains a review of prior literature related to ERM benefits as well as studies associated with the cost of debt and equity. The development and formal identification of the research hypotheses is included in section three. Research methodology and data are discussed in the forth section followed by the conclusions and contributions of the study.

4.2 PRIOR RESEARCH

Increased levels of disclosure provide creditors (including credit rating agencies) and investors with additional information to evaluate investment decisions while also decreasing the level of asymmetric information thereby reducing the risk of investment. Arthur Levitt (1998), former chairman of the Securities and Exchange Commission (SEC) emphasized that disclosure was a component of high quality accounting standards which increase investor confidence resulting in lower cost of capital for firms. Consistent with Levitt, prior research in the area of cost of debt and cost of equity financing has

frequently found that both creditors and investors reduce their potential required return rate as a result of this decreased information asymmetry and risk achieved through greater disclosure. Healy and Palepu (2001) provide a review of disclosures literature and indicate that, disclosure is demanded by investors in order to make appropriate decisions, thereby reducing the cost of debt and equity.

Cost of Debt

Sengupta (1998) finds that a firms overall financial disclosure quality is inversely associated with its cost of debt. Using the quality of accruals as a proxy for information risk, Francis et al. (2005) find that lower accrual quality is associated with higher cost of debt and equity. Ahmed et al. (2002) find conservative accounting to be associated with lower cost of debt. Considering that increased disclosure of risk provides greater consideration of potential loss, a greater level of risk disclosure may also proxy for a higher level of accounting conservatism.

Cost of Equity

While sensitive to the level of analyst following, Botosan (1997) finds an inverse relationship between the level of disclosure and the cost of equity capital after controlling for market beta and firm size. Botosan and Plumlee (2002) find differential effects in the relationship of cost of equity based on whether the disclosure was included in the annual report (negative association between disclosure level and cost of equity) or disclosure in other publications (positive association between disclosure level and cost of equity). Ashbaugh-Skaife et al. (2009) find that firms disclosing internal control deficiencies experience an initial increase in cost of equity as a result of greater information risk. The increased cost of equity for such firms is found to decrease once identified control

deficiencies are remediated and an unqualified controls opinion is provided by the independent auditor (Ashbaugh-Skaife et al. 2009). Francis et al. (2005) find that lower accrual quality increases the information risk of investors, resulting in higher cost of equity for the firm.

4.3 HYPOTHESES DEVELOPMENT

Firms with more mature ERM processes are more likely to embed risk management processes throughout business processes. Such an increased awareness of risk throughout the organization increases the likelihood of risk identification and implementation of appropriate procedures to manage risk. Based on the identification of risk, management has the ability to determine whether to disclose the existence of such identified risk to creditors and shareholders. The additional disclosure of risk provides two potential benefits to creditors and investors: identification of risk to the organization and a signal of the effectiveness of the firms risk management process. As a result, consideration of risk is more likely to lead decreased risk of loan default and stock price volatility, resulting in a lower cost of debt and equity financing. Consistent with prior research (Sengupta 1998; and Botosan 1997), I expect increased disclosure of risk factors to be associated with reduced risk and cost of capital. This leads to the two hypotheses of this study stated in alternative form:

> *Hypothesis 1* - Companies which disclose more risk factors experience higher credit ratings (lower cost of debt).

> *Hypothesis 2* - Companies which implement more risk factors experience lower cost of equity.

4.4 METHODOLOGY

Cost of capital can be separated into two primary components (debt capital and equity capital) with certain benefits associated with the use of each in making to finance operations. The following section discusses the methodology and measures for each.

Cost of Debt

I use firm credit ratings (S&P Long-Term Credit Rating) as a proxy for a firm's cost of debt to investigate whether firms providing greater disclosure of risk factors have a lower cost of debt. While Jiang (2008) used both credit ratings and initial bond yield spreads as proxies for cost of debt and Francis et al. (2005) uses an estimate interest rate for outstanding interest bearing long-term debt, this study focuses on the use of the firm credit rating as a proxy for cost of debts.[1]

I use the following ordered logistic model and control variables, adapted from Jiang (2008), to include a risk disclosure measure (disclosed risk factors), to evaluate whether higher management disclosure of risk factors affects firm credit ratings:

$$\Delta Rating_{i,t+1} = f\{PROFIT_{i,t}, EPS_{i,t}, \Delta CFO_{i,t}, \Delta StdROA_{i,t}, \Delta TIMES_{i,t}, \Delta StdRet_{i,t}, \Delta BM_{i,t}, \Delta Size_{i,t}, \Delta LEV_{i,t}, DISCRISK_{i,t}\} \quad (1)$$

[1] As a result of the potential differences in the cost of debt proxies, additional sensitivity tests will be conducted prior to journal submission using alternative measures of cost of debt including the initial bond yield spread used by Jiang (2008) and estimated cost of debt proxy following Francis et al. (2005).

where:

$\Delta Rating_{i,t+1} = Rating_{i,t+1} - Rating_{i,t}$, where $Rating_{i,t}$ is a numeric value associated with firm i's Standard & Poor's Domestic Long-Term Issuer Credit Rating (senior debt rating) in year t. S&P uses a three alpha-character rating to identify the firm's ability to repay interest and principal with AAA indicating the highest likelihood of repayment, and D indicating default. Debt ratings are transformed from alpha characters to numeric characters with a smaller number indicating greater likelihood of repayment and larger numbers indicating greatest likelihood of default (AAA = 1; D = 23; Table 2 of the appendix provides a complete listing of the ratings). Based on this method, a negative change represents a ratings upgrade while a positive difference indicates a ratings downgrade;

$DISCRISK_{i,t}$ – Two separate values of risk disclosure are used within the model to capture a measure of total risk disclosure and more specifically an ERM risk disclosure method. Each measure was manually captured from the "Item 1a. Risk Factors" section of 10-K filings of companies responding to the survey.

- $DISCTOTAL_{i,t}$ – Count of the total number of risk factors disclosed by the company i's in year t's 10-K.
- $DISCERM_{i,t}$ - Count of the total number of risk factors disclosed by the company "i" in year "t's" 10-K that are related to key terms of the dimensions and factors of ERM included in Desender (2007). The listing of dimensions and factors considered by Desender (2007) is included in Table 1 of the Appendix);

with control variables defined as follows:

$PROFIT_{i,t}$ - takes on the value of 1 if the firms with basic EPS greater than 0 in year t, and 0 otherwise;

$EPS_{i,t}$ - Firms i's earnings per share before extraordinary items in year t scaled by its stock price at the end of year t-1;

$CFO_{i,t}$ = Firm i's cash flows from continuing operations for year t scaled by total assets at the beginning of the year (t-1);

$StdROA_{i,t}$ = Standard deviation of firm i's ROA calculated using five years of data from to t to t-4. ROA is computed as net income before extraordinary items scaled by total assets at the beginning of year t (ending of year t-1);

$TIMES_{i,t}$ = Natural log of (1+ times interest earned ratio), where times interest earned ratio is firm i's operating income before depreciation and interest expense divided by interest expense for year t;

$StdRet_{i,t}$ - Standard deviation of firm i's daily stock returns during year t;

$BM_{i,t}$ = Natural log of firm i's book value of equity divided by its market value of equity, each measured at the end of year t.

$Size_{i,t}$ = Natural log of firm i's total assets at the end of year t;

$LEV_{i,t}$ = Firm i's long-term debt divided by total assets at the end of year t.

Each change variable (variables in the model preceded by a Δ symbol) in the model is defined as the first difference of the above variables, following the example provide in the description of the Ratings variable.

Cost of Equity

Prior literature has identified multiple proxies of the cost of equity[2]. I follow the model used by Francis et al. (2005), the industry adjusted earnings-price ratio (inverse P/E ratio) as a proxy for the cost of equity. Thus, a higher (lower) earnings-price ratio (E/P ratio) is associated with a higher (lower) cost of equity capital. While controlling for firm growth, leverage, market risk, and size, I use the following model to test whether increased disclosure risk factors as described above is associated with cost of equity capital:

$$IndEP_{i,t} = \alpha_0 + \beta_1 GROWTH_{i,t} + \beta_2 LEVERAGE_{i,t} + \beta_3 BETA_{i,t} + \beta_4 SIZE_{i,t} + \beta_5 DISCRISK_{i,t} + \varepsilon_{it} \quad (2)$$

where:

$IndEP_{i,t}$ - The difference between firm i's earnings-price ratio and the firms industry median earnings-price ratio (higher earnings-price ratio indicates higher cost of equity capital);

with control variables defined as follows:

$GROWTH_{i,t}$ - Log of one plus the firm i's growth in book value of equity over the past 5 years (years t through t-4);
$LEVERAGE_{i,t}$ - Firm i's ratio of interest bearing debt to total assets in year t;
$BETA_{i,t}$ - Firm i's systemic volatility compared to the stock market (measured on a 5 year rolling average basis in CRSP);
$SIZE_{i,t}$ - Log of firm i's total assets in year t.

[2] Hail and Leuz (2006) summarize additional cost of equity models which include the Claus and Thomas (2001) model, the Gebhardt et al. (2001), Ohlson and Juettner-Nauroth (2005), and the Modified PEG ratio model (Easton, 2004). While access to I/B/E/S prevented calculation and use of these other proxies. The aforementioned models will be considered as proxy for cost of equity pending the availability of data and extension of the study.

4.5 RESULTS

The initial sample for this study was limited to the 259, companies which responded to an on-line survey related to Enterprise Risk Management and Internal Audit Function characteristics. Although the sample of this study is limited to companies that responded to the survey, all data used in this study was obtained from S&P Compustat, CRSP, and 10-K filings with the Securities and Exchange Commission. Panel A and Panel B of Table 4.1 provide reconciliations of observations used in this study. As a result of the use of the S&P Debt rating as a proxy for cost of debt, and the limited availability of S&P Long-Term Debt Ratings and other control variables, the cost of equity sample and cost of debt samples differ in size; descriptive statistics and correlation tables are presented separately within their respective sections. Using a cross-sectional fixed-effects model, I test for an association between risk disclosures (DISCTOTAL and DISCERM) with measures of cost of debt and cost of equity.[3]

Cost of Debt Models

Following the model used by Jiang (2008), this study uses a one year debt rating change as a proxy for cost of debt. Table 4.2 provides a summary of the descriptive statistics for the cost of debt sample which includes 383 firm year observations from 149 companies. The average total assets of companies in the survey is $15,959M of which over eighty-seven percent of companies in the sample had a profit during the three year period, 2006 through 2008. In addition, the average number of risk factors disclosed in was 19.1 with an average of 6.7 disclosures being related to key terms used by Desender (2007) as a proxy for the adoption of ERM. Table 4.3 provides the correlation matrix for

[3] Likelihood ratio of period fixed-effects and Hausman tests of random effects models were both rejected. A likelihood ratio test indicated significant cross-sectional fixed-effects.

the 383 observations of the study. While a high positive correlation exist between the disclosure measures (DISCTOTAL and DISCERM), these two variables are not included concurrently included in the same model. In addition, several of the independent variables are highly correlated (EPS_t and $PROFIT_t$, (0.594) and $\Delta StdROA_t$ and $PROFIT_t$ (-0.409) and EPS_t-0.469)) provides initial potential concerns regarding multi-collinarity within the model.

TABLE 4.1 - Panel A - Ratings Change Sample Reconciliation		
Companies Responding to Survey	259	
*3 Observations per company		777
Observations eliminated as a result of lack of:		
Ratings Information	(269)	
Earnings per Share Information	(9)	
Cash Flows from Operating Activities	(23)	
Times Interest Earned data	(32)	
Subtotal - Missing Compustat Data	(333)	
Daily Returns Data (CRSP)	(31)	
Risk Factor Disclosures (SEC Filing Data)	(7)	
Total Observations eliminated due to missing data	(371)	
Total Observations		406

TABLE 4.1 - Panel B - Industry Adjusted EPRatio Sample Reconciliation		
Companies Responding to Survey	259	
*3 Observations per company		777
Observations eliminated as a result of lack of:		
Earnings to Price Ratio	(17)	
Leverage information	(4)	
Growth	(86)	
Subtotal - Missing Compustat Data	(107)	
Market Returns to calculate Beta (CRSP)	(11)	
Risk Factor Disclosures (SEC Filing Data)	(23)	
Total Observations eliminated due to missing data	(141)	
Total Observations		636

TABLE 4.2 - Descriptive Statistics - S&P Credit Rating Change Model Variables (n=383)

Variable	Mean	Median	Minimum	Maximum	Std. Dev.
$\Delta RATING_t$	0.042	0.000	-3.000	4.000	0.733
$PROFIT_t$	0.875	1.000	0.000	1.000	0.332
EPS_t	0.038	0.058	-1.306	0.246	0.126
ΔCFO_t	-0.003	0.000	-0.378	0.847	0.078
$\Delta StdROA_t$	0.001	0.000	-0.167	0.109	0.022
$\Delta TIMES_t$	-0.037	0.003	-2.643	1.962	0.425
$\Delta StdRET_t$	0.008	0.003	-0.017	0.068	0.013
$\Delta LNB2M_t$	0.199	0.111	-4.696	3.812	0.603
$\Delta SIZE_t$	0.056	0.038	-1.234	1.449	0.222
$\Delta LEVERAGE_t$	0.005	-0.002	-0.362	0.480	0.075
$DiscTotal_t$	19.120	18.000	1.000	69.000	9.201
$DiscERM_t$	6.736	7.000	0.000	14.000	2.028

TABLE 4.3 – Correlation Matrix - S&P Credit Rating Change Model Variables (n=383)

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1)	$\Delta RATING_t$	1.000											
(2)	$PROFIT_t$	-0.312	1.000										
(3)	EPS_t	-0.239	0.594	1.000									
(4)	ΔCFO_t	-0.048	0.111	0.048	1.000								
(5)	$\Delta StdROA_t$	0.278	-0.409	-0.469	-0.048	1.000							
(6)	$ChgTIMES_t$	-0.286	0.289	0.232	0.042	-0.193	1.000						
(7)	$\Delta StdRET_t$	0.235	-0.411	-0.362	-0.102	0.255	-0.095	1.000					
(8)	$\Delta LNB2M_t$	0.110	-0.170	-0.041	-0.061	0.011	-0.054	0.469	1.000				
(9)	$\Delta SIZE_t$	0.004	0.220	0.227	0.069	-0.206	0.092	-0.182	0.129	1.000			
(10)	$\Delta LEVERAGE_t$	0.175	-0.134	-0.107	-0.073	0.058	-0.278	0.101	-0.106	0.088	1.000		
(11)	$DiscTotal_t$	-0.024	-0.130	-0.092	-0.018	-0.018	-0.072	0.211	0.168	0.092	-0.013	1.000	
(12)	$DiscERM_t$	-0.014	-0.100	-0.108	0.007	0.051	-0.113	0.227	0.147	-0.034	0.025	0.535	1.000

Table 4.4 provides the results of five regression models with $\Delta Rating_{i,t+1}$ as the dependent variable. The results indicate a consistently positive associations between the change in standard deviation of ROA and change in leverage and ratings changes. In addition, the coefficients of PROFIT, change in TIMES, are statistically significant and negative. The raw measure of disclosed ERM related risk factors is statistically significant and negative providing limited support for Hypothesis 1 for both the current year period and one year lagged period.

As an additional test to control for potential outliers and to evaluate whether potential differences exists between different levels of disclosure, the disclosure variable measures (DISCTOTAL and DISCERM) are divided into a high, medium, and low reporting categorical dummy variables. Table 4.4 (Panels A and B) provides the results of regressions including high (DISCTOTAL3 and DISCERM3) and low (DISCTOTAL1 and DISCERM1) disclosure level measures into the base regression model. The high/low total disclosure levels regression model results indicate that companies with a higher level of disclosures (DISCTOTAL3) is associated with lower cost of debt. This result provides additional evidence that in support of the first hypothesis, that increased disclosure is associated with decreased cost of capital.

Cost of Equity Models

The cost of equity model used follows Francis et al. (2005) in using the industry median adjusted earning to price ratio as a proxy for cost of equity. Table 4.5 provides descriptive statistics for the sample comprised of 230 companies included in the panel

TABLE 4.4 (Panel A) – Credit Rating Change Models Regression Results (Ordered Logit)

$\Delta Rating_{i,t+1} = f\{PROFIT_{i,t}, EPS_{i,t}, \Delta CFO_{i,t}, \Delta StdROA_{i,t}, \Delta TIMES_{i,t}, \Delta StdRet_{i,t}, \Delta BM_{i,t}, \Delta Size_{i,t}, \Delta LEV_{i,t}, DISCRISK_{i,t}\}$

$PROFIT_t$	*-0.501*	*-0.520*	*-0.511*	*-0.497*	*-0.501*
	(0.081)	*(0.072)*	*(0.079)*	*(0.084)*	*(0.082)*
EPS_t	-0.040	-0.084	-0.200	-0.074	-0.067
	(0.940)	(0.874)	(0.720)	(0.884)	(0.899)
ΔCFO_t	0.133	0.123	0.093	0.168	0.130
	(0.877)	(0.885)	(0.913)	(0.844)	(0.878)
$\Delta StdROA_t$	*9.963*	*9.556*	*9.094*	*9.823*	*9.782*
	(0.001)	*(0.002)*	*(0.005)*	*(0.002)*	*(0.002)*
$\Delta TIMES_t$	*-0.542*	*-0.557*	*-0.549*	*-0.576*	*-0.552*
	(0.002)	*(0.001)*	*(0.001)*	*(0.001)*	*(0.002)*
$\Delta StdRET_t$	6.810	8.609	9.031	8.741	7.374
	(0.279)	(0.183)	(0.168)	(0.166)	(0.247)
$ChgLNB2M_t$	0.047	0.054	0.052	0.058	0.051
	(0.731)	(0.692)	(0.707)	(0.666)	(0.703)
$\Delta SIZE_t$	0.495	0.555	0.579	0.494	0.500
	(0.167)	(0.129)	(0.122)	(0.158)	(0.159)
$ChgLEVERAGE_t$	*1.867*	*1.738*	*1.650*	*1.814*	*1.831*
	(0.056)	*(0.071)*	*(0.092)*	*(0.057)*	*(0.058)*
$DiscTotal_t$		-0.011			
		(0.150)			
$DiscTotal1_t$			0.103		
			(0.484)		
$DiscTotal3_t$			**-0.288**		
			(0.089)		
$DiscERM_t$				**-0.065**	
				(0.045)	
$DiscERM1_t$					0.077
					(0.615)
$DiscERM3_t$					-0.038
					(0.806)
Pseudo R-squared	0.099	0.102	0.107	0.105	0.100
LR statistic	65.600	68.087	71.358	69.476	66.134
Prob(LR statistic)	0.000	0.000	0.000	0.000	0.000
Observations	383	383	383	383	383

Note: White Heteroskedastic Standard Errors used to calculate p- values in parentheses. *Significant coefficients and p-values of control variables noted in italics.* **Significant coefficients and p-values of for hypothesized variables noted in bold.**

TABLE 4.4 (Panel B) – Credit Rating Change Models Regression Results (Ordered Logit)

$\Delta Rating_{i,t+1} = f\{PROFIT_{i,t}, EPS_{i,t}, \Delta CFO_{i,t}, \Delta StdROA_{i,t}, \Delta TIMES_{i,t}, \Delta StdRet_{i,t}, \Delta BM_{i,t}, \Delta Size_{i,t}, \Delta LEV_{i,t}, DISCRISK_{i,t}\}$

$PROFIT_t$	-0.227	-0.241	-0.188	-0.178	-0.213
	(0.451)	(0.425)	(0.542)	(0.541)	(0.459)
EPS_t	-0.171	-0.237	-0.216	-0.213	-0.181
	(0.769)	(0.686)	(0.703)	(0.696)	(0.745)
ΔCFO_t	-0.403	-0.380	-0.310	-0.266	-0.278
	(0.647)	(0.677)	(0.748)	(0.777)	(0.769)
$\Delta StdMROA_t$	*8.573*	*7.972*	*8.274*	*8.234*	*8.140*
	(0.015)	*(0.028)*	*(0.028)*	*(0.024)*	*(0.025)*
$\Delta TIMES_t$	*-0.735*	*-0.765*	*-0.794*	*-0.798*	*-0.791*
	(0.000)	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*
$\Delta StdRET_t$	*16.123*	*17.998*	*18.436*	*18.139*	*17.653*
	(0.022)	*(0.013)*	*(0.012)*	*(0.008)*	*(0.010)*
$\Delta LNB2M_t$	0.094	0.111	0.109	0.089	0.099
	(0.586)	(0.518)	(0.535)	(0.594)	(0.559)
$\Delta SIZE_t$	0.453	0.555	0.543	0.496	0.533
	(0.253)	(0.174)	(0.176)	(0.217)	(0.191)
$\Delta LEVERAGE_t$	*2.919*	*2.734*	*2.643*	*2.674*	*2.618*
	(0.003)	*(0.006)*	*(0.008)*	*(0.007)*	*(0.009)*
$DiscTotal_{t-1}$		-0.019			
		(0.127)			
$DiscTotal1_{t-1}$			-0.044		
			(0.809)		
$DiscTotal3_{t-1}$			**-0.687**		
			(0.001)		
$DiscERM_{t-1}$				**-0.103**	
				(0.030)	
$DiscERM1_{t-1}$					**0.331**
					(0.062)
$DiscERM3_{t-1}$					-0.173
					(0.364)
Pseudo R-squared	0.136	0.145	0.164	0.150	0.152
LR statistic	63.317	67.302	76.042	69.509	70.429
Prob(LR statistic)	0.000	0.000	0.000	0.000	0.000
Observations	257	257	257	257	257

Note: White Heteroskedastic Standard Errors used to calculate p- values in parentheses.
Significant coefficients and p-values of control variables noted in italics. **Significant coefficients and p-values of for hypothesized variables noted in bold.**

data regression model. The average of the total company assets and leverage (LEVERAGE) for the 628 sample observations is $14,856M and 22.3 percent respectively. Average unlevered Beta of observations is 0.691. In addition, average number of risk factors disclosed in was 19.9 with an average of 6.6 disclosures being related to key terms used by Desender (2007) as a proxy for the adoption of ERM. Table 4.6 provides the correlation matrix for the 628 observations of the study. Consistent with the correlation matrix for the cost of debt models, a high positive correlation exist between the disclosure measures (DISCTOTAL and DISCERM). However, these two variables are not simultaneously included in the same regression model.

TABLE 4.5 –Descriptive Statistics – Cost of Equity Model (n=628)
Industry Adjusted EPRatio Model Variables

	Mean	Median	Min.	Max.	Std. Dev.
$IndAdjEPRatio_t$	-0.109	0.000	-7.493	0.478	0.578
GROWTH	0.399	0.390	-5.180	3.299	0.822
$LEVERAGE_t$	0.218	0.189	0.000	1.050	0.180
$BETA_tUnlev$	0.691	0.589	-0.098	4.538	0.488
$SIZE_t$	8.259	8.133	4.593	14.085	1.488
$DiscTotal_t$	19.939	19.000	1.000	69.000	9.519
$DiscERM_t$	6.557	7.000	0.000	14.000	2.090
$DiscTotal1_t$	0.357	0.000	0.000	1.000	0.479
$DiscTotal2_t$	0.328	0.000	0.000	1.000	0.470
$DiscTotal3_t$	0.315	0.000	0.000	1.000	0.465
$DiscERM1_t$	0.346	0.000	0.000	1.000	0.476
$DiscERM2_t$	0.330	0.000	0.000	1.000	0.470
$DiscERM3_t$	0.325	0.000	0.000	1.000	0.469

TABLE 4.6 – Correlation Table – Industry Adjusted EPRatio Model (n=628)

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
(1)	$IndAdjEPRatio_t$	1.000												
(2)	GROWTH	0.248	1.000											
(3)	$LEVERAGE_t$	-0.092	-0.205	1.000										
(4)	$BETA_tUnlev$	-0.059	0.062	-0.232	1.000									
(5)	$SIZE_t$	0.073	0.054	0.058	-0.354	1.000								
(6)	$DiscTotal_t$	-0.073	0.172	0.003	0.244	-0.088	1.000							
(7)	$DiscERM_t$	-0.084	0.006	0.095	0.065	0.169	0.518	1.000						
(8)	$DiscTotal1_t$	0.091	-0.055	-0.029	-0.192	0.166	-0.687	-0.364	1.000					
(9)	$DiscTotal2_t$	-0.022	-0.081	0.011	0.037	-0.167	-0.065	-0.026	-0.520	1.000				
(10)	$DiscTotal3_t$	-0.071	0.138	0.018	0.161	-0.003	0.775	0.401	-0.505	-0.474	1.000			
(11)	$DiscERM1_t$	0.117	-0.001	-0.104	-0.091	-0.069	-0.442	-0.763	0.424	-0.108	-0.327	1.000		
(12)	$DiscERM2_t$	-0.086	-0.014	0.025	0.075	-0.082	0.017	0.009	-0.161	0.232	-0.068	-0.510	1.000	
(13)	$DiscERM3_t$	-0.032	0.016	0.081	0.017	0.152	0.432	0.766	-0.268	-0.123	0.400	-0.504	-0.486	1.000

Table 4.7 provides the results of five cost of equity regression models. The results indicate a consistently significant positive association between the growth (GROWTH), unlevered Beta (BETAUnlev) with the median industry adjusted earnings to price ratio. In addition, a negative association is also noted between the natural log of total assets and the median industry adjusted earnings to price ratio. With the exception of the significant and positive coefficient on the low level of ERM disclosure variable (DiscERM1), the disclosure variables are not significant. The positive and significant value of the coefficient is consistent with Hypothesis 2, that a lower level of risk disclosure is associated with increased cost of equity.

TABLE 4.7 – IndAdjEPRatio Regression Results

$IndEPRatio_{i,t} = \alpha_0 + \beta_1 GROWTH_{i,t} + \beta_2 LEVERAGE_{i,t} + \beta_3 BETA_{i,t} + \beta_4 SIZE_{i,t} + \beta_5 DISCRISK_{i,t} + \varepsilon_{it}$

GROWTH	*0.017*	*0.017*	*0.017*	*0.016*	*0.016*
	(0.055)	*(0.051)*	*(0.054)*	*(0.057)*	*(0.059)*
LEVERAG	0.115	0.114	0.116	0.12	0.123
	(0.148)	(0.150)	(0.144)	(0.139)	(0.127)
$Beta_t$Unlev	*0.034*	*0.035*	*0.034*	*0.034*	*0.035*
	(0.001)	*(0.001)*	*(0.001)*	*(0.001)*	*(0.000)*
$SIZE_t$	-0.048	-0.049	-0.047	-0.048	-0.048
	(0.121)	(0.113)	(0.125)	(0.117)	(0.117)
FY2008	*0.008*	0.007	*0.009*	*0.01*	*0.011*
	(0.064)	(0.149)	*(0.060)*	*(0.042)*	*(0.025)*
FY2006	*-0.010*	*-0.010*	*-0.01*	*-0.011*	*-0.011*
	(0.052)	*(0.061)*	*(0.050)*	*(0.050)*	*(0.047)*
$DiscTotal_t$		0.001			
		(0.424)			
$DiscTotal1_t$			0.006		
			(0.491)		
$DiscTotal3_t$			0.000		
			(0.999)		
$DiscERM_t$				-0.002	
				(0.257)	
$DiscERM1_t$					**0.014**
					(0.027)
$DiscERM3_t$					0.002
					(0.858)
Constant	0.354	0.351	0.348	0.373	0.346
	(0.140)	(0.144)	(0.148)	(0.130)	(0.145)
Observatio	520	520	520	520	520
Cross	210	210	210	210	210
R-squared	0.700	0.701	0.701	0.702	0.705
Adj. R^2	0.487	0.487	0.484	0.487	0.491
F-stat	3.230	2.836	2.469	2.776	2.646

Note: White Heteroskedastic Standard Errors used to calculate p- values in parentheses. *Significant coefficients and p-values of control variables noted in italics.* **Significant coefficients and p-values of for hypothesized variables noted in bold.**

4.6 CONCLUSIONS AND CONTRIBUTIONS

This study hypothesizes an inverse relationship between the level of risk disclosure and cost of debt and cost of equity. The results provide limited evidence to support the hypothesized negative association between the level of risk disclosure and cost of debt, thereby providing support that additional disclosure of risk provides debt and equity financing benefits in the form of lower cost based on the proxies utilized in the study.

Consistent with the second hypothesis, the results of the test of association between the total number of disclosed risk factors and the measure of cost of equity is negative and significant. These results provide limited evidence that equity investors not only value transparency and disclosure of risk for their investments, but may also consider increased disclosure of risk as a signal of not only risk identification, but also enhanced management of risk.

Although the results of the study are potentially limited based on due to a small sample size which choose to respond to the survey. Combined, these results suggest that creditors and investors may evaluate risk factor disclosures with differing perspectives.

CHAPTER 5

CONCLUSION

The majority of prior literature related to ERM has focused on the characteristics of organizations which have adopted ERM. Although potential factors associated with ERM adoption is the focus of the first study of this dissertation, I add to the existing literature by extending the study of ERM adoption by evaluating whether potential operational and market performance benefits exist for firms which have implemented ERM and the association between risk factor disclosure and cost of capital. This study contributes to ERM research in several ways, the first of which is achieved by using a survey to obtain a more direct measure of ERM adoption as opposed to the relying on the appointment of a Chief Risk Officer as a noisy proxy for ERM adoption. Secondly, this dissertation extends existing literature by empirically testing for the existence of operating and market performance benefits of ERM process maturity. Finally, the collection, classification, and summarization of disclosed risk factors and its association with cost of capital provides not only a method for measuring risk disclosure but also extends disclosure literature.

Consistent with the hypotheses of the first paper, this study provides support that audit committee financial expertise and meeting frequency and Internal Audit Function reporting independence and whether an organizations Internal Audit Function has been evaluated externally and/or internally are associated with ERM adoption and the level ERM process maturity. Although the results of the second study do not provide consistent and positive significant coefficients for the association between ERM maturity and operational and market performance, several potential considerations for the lack of

significant results are discussed below. Consistent with the hypotheses stated in the third paper, the results of a regression of the disclosure panel data set provide support that greater risk factor disclosure and levels of disclosure are associated with lower cost of debt and equity.

The use of a direct measure of assessed ERM adoption and maturity is one of the contributions of this dissertation; this improvement does not come without limitations. Specifically, the sample size is limited to 249 companies or fewer depending on data requirements of the regression models. The use of panel data helps to minimize this concern by expanding the number of observations by as many as three annual observations per company. Although not specifically identified by simple review of correlation tables, regression results indicate that the issues of multi-colliniarity of independent variables within the model indicate additional concerns regarding the generalizeability of lack of support for the hypotheses evaluated in the performance benefit study. Despite these limitations, as previously indicated, this study has provided several contributions to the accounting literature.

Despite the noted limitations of this study, the ability to increase the sample size and period of time series observations could help further extend the literature related to ERM. In addition, recent disclosure requirements related to the role and activities of the organizations board for risk management oversight activities and the disclosure of the compensation committee evaluation of compensation risk evaluation process provides an area with great potential. Finally, consideration of other potential benefits as well as organizational or industry specific risk benefits provide opportunities not only to consider the benefits, but also the ability to identify possible reasons for lack of benefits within

certain industry sectors. These considerations should provide considerable opportunities for not only identifying ERM benefits, but also the opportunity to enhance the framework and study what makes one ERM process better than another. Finally, the using a field study to develop a clear understanding of ERM processes provide another area to expand the related literature.

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APPENDIX 1 – SURVEY INSTRUMENT

Survey Questionnaire Cover Letter:

School of Accountancy

200 Fogelman College Admin Bldg.
Memphis, Tennessee 38152-3120

Office: 901.678.4569
Fax: 901.678.4282

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RE: Dissertation Study Survey
The University of Memphis
Fogelman College of Business Administration & Economics

In fulfillment of the requirements of my doctorate dissertation studies at The University of Memphis, I am conducting a brief survey to obtain data regarding characteristics of your Internal Audit Function (IAF) and the extent of Enterprise Risk Management (ERM) processes within organizations. Your responses and additional feedback is critical to this dissertation study, therefore I ask you to please take a few minutes to complete the on-line survey at the following link. While the identity of your organization is necessary to gather additional organizational and financial data which are publicly available, please rest assured that your responses will be held in strict confidence, and neither the company nor individual respondents will be specifically publicly identified for the purpose of this study.

http://www.surveymonkey.com/s.aspx?sm=FJlceOfkxZELbYChx8pP5Q_3d_3d

Should you have any questions or concerns regarding the survey, please feel free to contact me at jssoilea@memphis.edu or by phone at (901)552-6955, or my Dissertation Chairperson at The University of Memphis, Dr. Carolyn Callahan, at cmcllhan@memphis.edu or by phone at (901)678-4569.

Thank you in advance for your participation.

Sincerely,

Jared S. Soileau, CIA, CPA, CISA, CCSA
Ph.D. Student – School of Accountancy
The University of Memphis

Survey Questionnaire

Enterprise Risk Management (ERM) is a very broad process which organizations for various different reasons may or may not choose to implement with no two implementations being identical. While Internal Audit Functions (IAFs) may or may not be directly involved in the implementation of ERM, it is likely that IAF management would be knowledgeable of ERM implementation, the structure of ERM reporting function, and ERM risk considerations. Therefore I am hopeful that you will assist me in my dissertation study of factors contributing to ERM adoption and potential organizational benefits which may potentially result from ERM adoption. While identification of your organization is necessary to match your responses to financial reporting and market data, your responses will be kept in strict confidence and will only be presented and discussed in aggregate. Your time in completing the following survey is greatly appreciated.

Organization Name: _____

How would you classify your organization?
___ Publically Traded ___ Privately Held ___ Not-for-profit
___ Government Agency ___ Other

INTERNAL AUDIT FUNCTION CHARACTERISTICS

How many full-time equivalents (FTEs) does your Internal Audit Function (IAF) employ? ___

Approximately what percentage of IAF staff members hold the following certifications (please do not enter a "%"):

%	CIA	%	CISA
%	CPA	%	Other (please specify) _____
%	At least one certification (CPA, CIA, CISA, etc.)		

Please indicate your level of agreement with the following statements regarding your organizations internal audit function(IAF):
(1= strongly disagree; 2 = disagree; 3 = neutral; 4 = agree; 5 = strongly agree)

Statement	**Level of Agreement (circle one number)**
Internal Audit Reports to the CEO	1 2 3 4 5
Internal Audit Reports to the CFO	1 2 3 4 5
Internal Audit Reports to the Audit Committee	1 2 3 4 5
The CFO has authority to terminate the Chief Audit Executive(CAE)	1 2 3 4 5
The CEO has authority to terminate the CAE	1 2 3 4 5
The Audit Committee has authority to terminate the CAE	1 2 3 4 5

Survey Questionnaire (continued)

Please indicate your level of agreement with the following statements regarding your organizations internal audit function(IAF):
(1= strongly disagree; 2 = disagree; 3 = neutral; 4 = agree; 5 = strongly agree)

Statement	**Level of Agreement (circle one number)**
The Audit Committee authorizes/approves the IAF Budget	1 2 3 4 5
The CFO authorizes/approves the IAF Budget	1 2 3 4 5
The CEO authorizes/approves the IAF Budget	1 2 3 4 5
The Audit Committee reviews and approves the IAF's annual risk assessment plan	1 2 3 4 5
The CEO reviews and approves the IAF's annual risk assessment plan	1 2 3 4 5
The CFO reviews and approves the IAF's annual risk assessment plan	1 2 3 4 5

How frequently do the following attend audit committee meetings?
(1= never; 2 = infrequently; 3 = frequently; 4 = always)

Chief Executive Officer (CEO)	1 2 3 4
Chief Financial Officer (CFO)	1 2 3 4
Chief Audit Executive(CAE)	1 2 3 4
Chairman of the Board	1 2 3 4

How much is the annual budget of the internal audit function? (please enter a whole number without any formatting decimals or commas) $_____

ORGANIZATIONAL Risk & RISK ASSESSMENT CHARACTERISTICS

How would you rate the overall level of inherent risk at your organization?
___ High ___ Moderate ___ Low ___ Unknown

How would you rate the overall level of residual risk at your organization?
___ High ___ Moderate ___ Low ___ Unknown

How frequently does Internal Audit conduct a Risk Assessment of the Audit Universe at your organization?
___ Monthly ___ Quarterly ___ Semi-Annually
___ Annually ___ Do Not Conduct Risk Assessment

What type of Risk Assessment do you conduct at your organization?

___	Qualitative	___	Hybrid (combination qualitative and Quantitative)
___	Quantitative	___	Other (please specify)_____

Survey Questionnaire (continued)

What are the key components (classification categories) of your organizations Internal Audit risk assessment and weighting of each (High, Medium, Low)?

	Not Considered	Low	Medium	High
Management Change	____	___	___	___
Technology Change	____	___	___	___
Process Change	____	___	___	___
Competition	____	___	___	___
Market Growth/Decline	____	___	___	___
Geographical	____	___	___	___
Unit Revenue	____	___	___	___
Unit Costs	____	___	___	___
Budget Variances	____	___	___	___
Prior Audit Opinion	____	___	___	___
Time Since Last Audit	____	___	___	___
Other 1: _____	____	___	___	___
Other 2: _____	____	___	___	___
Other 3: _____	____	___	___	___
Other 4: _____	____	___	___	___

What is the basis of your organizations Audit Plan? (please check one)

___	Risk Based	___	Hybrid (combination risk and rotational coverage)
___	Rotational Audit Coverage	___	Other (please specify) _____

Approximately what percentage of the audit time budget is spent conducting the following project types?

___%	Financial	___%	Consulting
___%	Operational	___%	Financial Audit Support
___%	Systems	___%	ERM Assessment
___%	Other (please specify) _____		

Has a Quality Assurance Review (QAR) of the Internal Audit Function (IAF) been conducted? If so, please indicate the year of the last review, frequency of reviews and the party who conducted the review?

Type	**Yes/No**	**Year Last Conducted**	**Frequency**	**Conducted by**
Internal				
External				

Survey Questionnaire (continued)

ERM CHARACTERISTICS

Has your organization implemented ERM?
___No; ___ Informally; ___Formally; ___ Other: _____

Using the following rating scale, please rate the maturity your organizations ERM Processes (strategic, operational, reporting, compliance, overall) for the given year (2008, 2007, 2006):

0 - Non-existent – Management processes are not applied at all
1 - Initial/Adhoc – Processes are ad hoc and disorganized
2 - Repeatable but Intuitive – Processes follow a regular pattern
3 - Defined Process – Processes are documented and communicated
4 - Managed and Measureable – Processes are monitored and measured
5 - Optimized – Good processes are followed and automated

	2008	2007	2006
Strategic			
Operational			
Reporting			
Compliance			
Overall			

Who is the sponsor of the ERM process? (Check all that apply)

___ Chief Executive Officer (CEO)	___ Chief Financial Officer (CFO)	___ Chief Audit Executive (CAE)
___ Board of Directors	__ Audit Committee	___ Other_____

Who is the leader of the ERM Process?

___ Chief Risk Officer (CRO)	___ Chief Financial Officer (CFO)	___ ERM Committee
___ Chief Audit Executive (CAE)	___ Chief Executive Officer (CEO)	___ Legal
___ Other _____		

Survey Questionnaire (continued)

If responsibility lies within an ERM committee; Indicate each business function represented on the committee? Please specify any additional business function members not listed.

___ Finance	___ Internal Audit	___ Operations
___ Information Technology	___ Legal	
___ Other _____		

If responsibility lies within an ERM committee; please identify the business function of those who chair the committee: _____

How much is the annual budget for organization-wide ERM activities?
$_____

Approximately how many FTE's are designated to the ERM function? _____ FTE's

CHIEF RISK OFFICER (CRO) CHARACTERISTICS

Does your organization have a Chief Risk Officer (CRO)?
___No CRO; ____ Informal CRO; ___ Formally Appointed CRO

Please specify any additional role (title) the CRO (formal or informal) fulfills at the organization: _____

If your organization has a formal or informal CRO, approximately when (MM/YYYY) was this role filled? _____

Who (title) appointed the CRO? _____

Who does the CRO report to?
Functionally (title) _____

Administratively (title) _____

Who (title) is responsible for reviewing the CRO's performance? _____

Survey Questionnaire (continued)

CONCLUSION

Please indicate if there was any ambiguity with the questions, if you have any hesitation in providing responses to any questions, or any other feedback which you may have.

Thank you for your participation in this study. If you wish to receive a copy of the results of this survey, please provide the following:

Name: _____

Title: _____

email address: _____

If you are willing to be contacted for any follow-up discussions to provide possible insight regarding the aggregated results of the study, please also provide your:

Phone Number: _____

APPENDIX 2 – FACTOR ANALYSIS RESULTS

Factor analysis of the twelve items (six Audit Committee Effectiveness Characteristics and six Internal Audit function Effectiveness Characteristics) resulted in 5 factors with Eigenvalues great than one which explained a cumulative total of 59.844 percent of the variance. In addition, three of the items cross-loaded on two factors with a loading greater than "0.3".

Table A2.1 Principal Component Analysis – Varimax Rotation

	1	2	3	4	5
lnIAFTE	0.877				
lnIAFBud	0.730				
IAFQAR	0.669				
ACMem	0.584	-0.398			
%ACFE		0.679			
ACMeet		0.639			0.375
ACRskAsmtScr		-0.423	0.649		
IAFRptIndp			0.826		
ACMTCEOScr				0.749	
COBMemAC				-0.692	
%IAFCert					0.583
IAFPlan					0.768

APPENDIX Table A3.1: Disclosure Checklist

Dimensions and Factors of Enterprise Risk Management (ERM) based on terms adapted from Desender (2007)

Key Term (Desender 2007)	Search Text String
Environmental	*environmental*
Ethics	*ethic*
Foreign Exchange Rate	*foreign*exchange*rate* or *currency*exchange*
Health & Safety Regulation	*health*regulation* or *safety*regulation*
Hotline	*hot*line*
Information Systems/Technology	*information system* or *information technology*
Interest Rate	*interest rate*
Internal Audit	*internal audit*
Liquidity	*liquidity*
Physical Controls	*physical*control*
Privacy	*data*priva* or *priva*data* or *information*privacy* or *privacy*information* or *privacy*data* or *confidentiality*
Segregation/Separation of Duties	*segregation*dut* or *separation*duties* or *segregation*responsibilit* or *separation* responsibilit"
Cost of Capital	*cost of capital* or *credit rat*
Capital Market	*access*capital market* or *capital market*access*
Litigation	*litigation*
Regulation	*regulation*
Industry Code	*industry*code*
Corporate Governance	*governance*
Data Management	*data*management*
Customer Data/Employee Data	*customer*data* or *employee*data*
Industry Competition	*competition*
Disaster Recovery	*disaster*recovery* or *business*continuity* or *business*contingency*

Appendix Table A3.2 – S&P Credit Rating Translation Table

S&P Credit Rating Letter	Numeric Rating Variable
AAA	1
AA+	2
AA	3
AA-	4
A+	5
A	6
A-	7
BBB+	8
BBB	9
BBB-	10
BB+	11
BB	12
BB-	13
B+	14
B	15
B-	16
CCC+	17

Note: Consistent with Jiang (2008), S&P credit rating for lower categories (higher credit risk firms) were grouped together in the "CCC+" Credit Rating.