Enterprise Risk Management and Accounting Quality

Abstract

In this study we examine the role of enterprise risk management (ERM) in financial reporting quality. ERM expands internal control to form a solid conceptualization focusing more on risk. Using information regarding ERM from financial report and related disclosure, we find positive associations between ERM adoption and accounting quality. Firms employing ERM framework tend to have lower magnitude of discretionary accruals, lower probability to avoid loss, and lower probability to beat or meet analysts' earnings forecast. These associations are more significant in insurance companies than those in other financial industries. In addition, we find effects of ERM on analyst behavior. ERM adoption is associated with more accurate, less optimistic and lower dispersion of analysts' earnings forecast.

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1. Introduction

The concept and framework of enterprise risk management (ERM) developed during the period marked by a series of high-profile business scandals and failures from Enron to WorldCom. As a result, the US Government passed the Sarbanes-Oxley Act of 2002, also known as the "Public Company Accounting Reform and Investor Protection Act" and "Corporate and Auditing Accountability and Responsibility Act", that calls for enhanced improved accuracy of corporate disclosures. Overshadowed by the requirement of stronger risk management, reliable financial statements, and enhanced corporate governance from regulatory body and investors, the need for an enterprise-wide, top-down framework that can provide firms a clear direction and guidance with key principles and concepts communicated in a common language became even more compelling.

By definition, ERM is a process that is "effected by an entity's board of directors, management and other personnel, applied in strategy setting and across the enterprise, designed to identify potential events that may affect the entity, and manage risk to be within its risk appetite, to provide reasonable assurance regarding the achievement of entity objectives" (COSO 2004). Unlike the traditional "silo" based approach risk management that does not address the interrelationship of risk, ERM takes risk management up to an enterprise-level, to assess, quantify, finance, and manage risk with a holistic, integrated approach. Although ERM is not required for most firms, it facilitates compliance with the reporting and disclosure requirement of various regulatory frameworks. For example, Sarbanes-Oxley (2002) requires a certification of internal controls; NYSE listing requirement (2004) expects audit committees to provide input on risk-related activities; SEC (2009) stipulates that companies discuss in the proxy statements the board's role in the oversight of risk; Dodd–Frank Wall Street Reform and Consumer Protection Act (2010) requires large publicly traded financial firms to have a separate board risk committee composed of independent directors; and Basel (2003) expands risk management requirements to include oversight of operational risks in addition to credit and market risks as part of financial institutions capital adequacy determinations. Adams et al. (2011) suggested ERM will play a more significant role regarding reporting and disclosure requirement in the future. Frequently used ERM frameworks include COSO (2004) Enterprise Risk Management-Integrated

Framework, RIMS (2006) Risk Maturity Model, ISO 31000:2009 Risk Management – Principles and guidelines, and CAS (2003) Enterprise Risk Management framework.

Although there is no universal framework, existing ERM model all emphasize (1) comprehensive risk management; (2) stronger internal control; and (3) higher transparency and accountability that lead to better informed strategic decision-making and higher firm value. A strong system of internal control supports the achievement of the organization's business objectives and therefore good internal control is a way of managing risk. However, ERM is much broader than internal control. It serves as a link between value, risk, strategy, objective setting, performance measurement, risk response and control processes. Compared to the COSO – The Internal Control – Integrated Framework, ERM is a broader and more robust conceptualization framework that incorporates the internal control framework within it. In addition to supporting management's efforts to achieve business objectives, ERM operates at a strategic level that is higher than internal control. At the strategic level, it aligns firm's operation and risk management with strategy setting fully aware that risk appetite and risk tolerance are unique for each entity. Specifically, the reporting in the internal control framework emphasizes the reliability of published financial statement whereas ERM calls for better communication channel and is significantly expanded to cover all reports developed by an entity, disseminated both internally and externally. Beyond financial information, ERM also covers non-financial information. In addition, ERM calls for greater board independence. For the purpose of internal control, normally there needs to be at least two independent directors. For ERM, at least a majority of independent outside directors is required.

Previous research approaches ERM in three different ways. One spectrum discusses the contribution of ERM on firm performance. Some of them found no evidence that ERM increase firm value (Pagach and Warr 2010, Beasley et al. 2008, McShane et al. 2011) whereas others found ERM contributes to better firm performance (Hoyt and Liebenberg 2011, Baxter et al. 2013, Farrell and Gallagher 2015, etc.). The second spectrum studies firm characteristics that influence ERM adoption or outcome (Beasley et al. 2005, Liebenberg and Hoyt 2003, Pagach and Warr 2011, etc.). The third spectrum explores the specific function areas that benefit from ERM adoption, such as better strategic and capital structure decision making (Chapman 2006, Rosenburg and Schuermann 2006, Nocco and Stulz 2006, etc.). ERM, as an extension of internal control incorporating the goal of producing reliable financial statements, expands and elaborates internal control to form a more robust conceptulization focusing more fully on risk (COSO 2004). We therefore expect that the

adoption of ERM should influence financial reporting and accounting quality.

Prior accounting literature develops various proxies to measure accounting quality and links it to different areas. Typical meaasures of accounting quality include discretionary accruals and specific events, such as loss avoidance, meet or beat analyst forecast, or small changes in earnings, etc. Driven by the incentive of earnings management (Rangan 1998, Teoh et al. 1998, Francis et al. 2008), discretionary accruals is used to measure accounting quality (Healy 1985, DeAngelo 1986, Jones 1991). Later studies modified the models of discretionary accruals (Dechow et al. 1995, Dechow and Dichev 2002, Hribar and Collins 2002, and Kothari et al. 2005, etc.) using various firm-level characteristics. Other studies use alternate proxies, such as auditor's going concern opinion (Lim and Tan 2008), restatement (Dechow et al. 2010), loss avoidance (Matsumoto 2002), and small earnings surprise and changes (Frankel et al. 2002, Nelson et al. 2002, Ahmed et al. 2013, etc.) to measure financial reporting quality. In this work we therefore utilize alternate measures of accounting quality to examine their association with ERM adoption.

Previous literature explore the effects of ERM over financial reporting and related issues. Some researches investigate the associations between auditing process or quality and ERM process. They found that generally auditing process and financial reporting process both benefit from the adoption of ERM through the information effect (Bell et al. 1997, Kochetova-Kozloski and Messier 2011) and the internal control effect (Bell et al. 2002, Bell et al. 1997). A semi-structure interview conducted by Cohen et al. (2014) shed some light on the relationship between ERM and accounting quality. Their survey suggests that the adoption of ERM allows CFOs and auditors to more effectively assess the appropriateness of estimates, which leads to the improvement of the quality of the financial reporting process and the strength of internal control.

Motivated by these works, we conduct an empirical research with long sample period to examine the effect of ERM framework adoption on firm's accounting quality. Prior studies document that weak internal control is associated with poor accruals quality (Doyle et al. 2007). ERM, expanding internal control to form a solid conceptualization focusing more on risk (COSO 2004), may affect firms' operations as well as reporting incentives. Researchers have found the relations between ERM quality and firm value as well as firm performance (Hoyt and Liebenberg 2011, Baxter et al. 2013) to address the effects of ERM on firm operations. However, the role of ERM on reporting incentives or financial reporting quality is not specifically addressed. Our study investigates the roles of ERM as an extension

of internal control on accounting quality fills in this research gap. If adopting ERM can further improve internal control and accountability, we should observe its relation with higher accounting quality. In addition, since firms in financial industry are subject to more stringent internal control regulation and encouraged to adopt ERM, we should find stronger associations among these firms. Therefore, we first hypothesize that in general, there should be positive relations between ERM adoption and accounting quality measured by discretionary accruals, small positive earnings (loss avoidance), and meeting or beating analyst forecast (earnings surprise). Secondly, we focus on financial firms to develop our next hypothesis and expect stronger association between the adoption of ERM and accounting quality. In addition, since insurance companies, on average, are more specialized and have more experience in risk management, the frequency or quality of ERM adoption in these companies may be different from other financial firms. We also expect the relation between ERM and accounting quality in insurance firms to be more significant than other firms in the following hypothesis.

With a set of long-term panel data covering the period between 2002 and 2014, we contribute to research in this area by expanding the analysis from financial firms to firms in other industries and examine the long-term effects of ERM to produce generalized findings summarized as follows. ERM adoption is negatively related to the magnitude of discretionary accruals and income-increasing (positive) discretionary accruals. At the same time, ERM adoption is negatively associated with the likelihood to report small positive earnings and to meet or beat analyst forecast. However, we do not find significant relations between ERM adoption and income-decreasing (negative) discretionary accruals. When focusing on firms in financial services, we find that ERM adopted by these firms has weaker incremental effects on lowering the magnitude of discretionary accruals, income-increasing discretionary accruals, and the probability to avoid losses. However, by separating financial firms to insurance companies and other financial firms, we find that ERM adoption in insurance companies is more significantly and negatively related to the magnitude of discretionary accruals, the income-increasing and income-decreasing discretionary accruals, and the probability to avoid losses than in other financial or non-financial firms. In addition, we examine whether accounting information, through the effects of ERM, is more useful or relevant to the market or financial reporting users by using analysts' forecast error, analysts' forecast dispersion, and constructed Tobin's Q as alternative dependent variables. We find that ERM adoption is related to more accurate analyst forecast (lower forecast error), less

forecast optimism, less forecast dispersion, and higher Tobin's Q. These results support our hypothesis that when a firm adopts ERM, its financial reporting is improved and become more useful for analysts to improve earnings forecast accuracy and form forecast consensus. Overall, we find ERM adoption is positively related to accounting quality as well as the usefulness of accounting information.

This paper should be of interest to financial reporting users, developers of ERM framework, designers of internal control mechanism, and related legislators. Financial reporting users benefit from ERM with high-quality accounting information so that they are able to make better forecast of firm performance in the future accordingly. The supportive findings in this study can also foster developers of ERM and internal control to evaluate and improve the synergy of these mechanisms. In addition to current requirements of internal control from Section 404 of Sarbanes-Oxley Act of 2002, the benefits of ERM found in this work can remind legislator or authoritative bodies to consider whether ERM, which is not mandatory currently, should be introduced and required similar to internal control mechanism. The remainder of this paper includes following sections. In Section 2 we incorporate literature both in ERM and accounting quality to develop our main two hypotheses. Section 3 presents the main research design, sample construction and descriptive statistics. Section 4 reports empirical results, including main analyses and further discussions in related perspectives. The main conclusions and contributions are summarized in Section 5.

2. Literature Review and Hypotheses Development

Prior ERM Literature

Prior ERM literature falls in three spectrums. The first spectrum discusses the contribution of ERM on firm performance. Mixed result has been found in this area. For example, Pagach and Warr (2010) and Beasley et al. (2008) found no significant evidence that overall average market will act positively once a firm adopts ERM. Beasley et al. (2011) survey of 450 companies shows ERM oversight is not considered as a formal responsibility by respondents. McShane et al. (2011) used Standard and Poor's (S&P) risk management rating and showed that higher ERM rating does not contribute to the increase of firm value. However, others find that ERM contributes to better firm performance in terms of market value (Baxter et al. 2013) through cost saving (Hoyt and Liebenberg, 2011). In addition, more

mature ERM relates to higher firm value (Farrell and Gallagher, 2015), which will then result into improved ratings from credit rating agencies (Samanta and Martinez, 2004).

The second spectrum of previous literature studies firm characteristics that influence ERM adoption or outcome. For example, Mikes and Kaplan (2012) used survey data of 250 interviews to differentiate "ERM mix" adopted by various organizations. They find the success of ERM depends on the organization's particular context. In particular, other research find that ERM is likely to be adopted by larger firms (Beasley et al., 2005) that are more-leveraged (Liebenberg and Hoyt, 2003), or has higher earnings volatility, poorer stock performance, or a CEO whose compensation increases with stock volatility (Pagach and Warr, 2011). In terms of firm performance, previous literature indicated that firms are more likely to benefit from ERM when they adopt ERM in post-crisis period, have matching firm-specific factors including size, industry, cash flow, volatility, and economic capital model. For example, Baxter et al. (2013) find that market reacts positively with initial ERM quality rating or revision and this impact is stronger among firms with earnings surprises and higher ERM quality. However, they point out that this relation does not exist in the pre-crisis period and during the crisis period, although firms with superior ERM programs rebounded faster after crisis. Gordon et al. (2009) find that the impact of ERM depends on how well ERM implementation matches firm-specific factors. ERM has higher perceived value for shareholders of larger, non-financial firms with little financial slack and low volatility (Beasley, Pagach and Warr 2008). Evidence also shows simple economic capital model together with a dedicated risk manager and reporting requirement is the combination of ERM initiatives that contributes the most to firm value (Grace et al. 2015).

The third spectrum of previous literature explores the specific function areas within a firm that benefit from ERM adoption, such as better strategic and capital structure decision making (Chapman 2006), improved board's and senior management's ability (Beasley et al. 2005), alignment and integration of risk management (Rosenburg and Schuermann, 2006), reduction in the probability of large detrimental cash flow shortfalls (Nocco and Stulz, 2006), and more transparent information in terms of informing regulators and investors (Hoyt and Liebenberg, 2011).

Prior Accounting Quality Literature

While accounting quality is not specifically defined and unanimously agreed, the concept that accounting quality measure should reflect faithful representation of the

underlying economics is broadly accepted by standard-setters, regulators, practitioners and academics (SEC 2000, Schipper and Vincent 2003, Ball 2006, FASB 2008, Dechow et al. 2010). Prior literature develops various proxies for accounting quality and associates this measure with factors in different perspectives for the most important question of how to improve accounting quality and make high-quality accounting standards.

Earnings management is an important incentive to affect accounting quality and drives the variation of earnings quality (Rangan 1998, Teoh et al. 1998, Francis et al. 2008). Prior studies base on this incentive to measure accounting quality by discretionary accruals (Healy 1985, DeAngelo 1986, Jones 1991). Other research modifies the model (Dechow et al. 1995), estimate accrual errors from working capital and cash flows (Dechow and Dichev 2002, Hribar and Collins 2002), adjusts the accruals measure by performance (Kothari et al. 2005) and documents the relations among accruals, earnings quality and firm characteristics. These firm-level characteristics, including length of operating cycle, loss incidence, standard deviation of sales, cash flows, firm size, book-to-market ratio, industry affiliation and accounting choices are widely used as controls in later studies in this stream (Healy and Palepu 2001, Dechow and Dichev 2002, Dechow and Schrand 2004, Francis et al. 2005, Dechow et al. 2010, etc.).

Discretionary accruals as a measure of accounting quality are also linked to other events, which are employed as signals or alternative proxies for accounting quality. For example, Becker et al. (1998) and DeFond and Subramanyam (1998) find that auditor type and auditor change are both associated with accruals quality. Frankel et al. (2002) document that non-audit fees are positively related to the magnitude of discretionary accruals. Doyle et al. (2007) find relations between internal control weakness and lower accruals quality. Financial reporting users also react to accounting quality. Francis et al. (1999) show the relations between auditor type and the credibility of accruals reporting. Francis et al. (2005) find positive associations between accrual quality and cost of equity.

Prior literature also uses measures other than discretionary accruals to examine accounting quality. Specific events are often used as a signal of fail to maintain financial reporting quality *ex ante*, such as issuance of auditor's going concern opinion (Lim and Tan 2008), restatement (Dechow et al. 2010), loss avoidance (Matsumoto 2002), small earnings surprise and changes (Frankel et al. 2002, Nelson et al. 2002, Ahmed et al. 2013, etc.). These measures are employed and regressed on issues in various settings, such as firm characteristics, managerial incentives, or auditing environment in different institutions.

Prior Literature on ERM and Financial Reporting

The implementation and effectiveness of ERM has raised research interest in the accounting research community recently. IIA's definition of internal auditing specifically mentioned that "risk management, control, and governance processes" are important elements of internal auditor's responsibilities. In light of this definition, extensive research has been performed on the relation between the auditing process or quality and the ERM process. Previous literature indicates that auditing process and financial reporting process generally benefit from the adoption of ERM through the information effect and the internal control effect. On one hand, the ERM process promotes better communication since it has the opportunity to provide insight of business and strategic risk and generate more accurate information of the internal control and inherent risk assessment across the board of the firm. Taking advantage of the information gathered in the ERM process, auditors would have better opportunity to establish an appropriate audit strategy (Bell et al. 1997), which then improves auditor's judgment accuracy, the nature and extent of audit testing, and auditor's evaluation of disclosure (Kochetova-Kozloski and Messier, 2011). On the other hand, ERM's emphasis on strategic risk management improves the monitoring and controls of risks, which affects auditor risk assessment and program planning (Bell et al. 2002), and increases the effectiveness of an auditor through the examination of client's business strategic risks (Bell et al. 1997).

While previous literature indicates ERM benefits firms in their overall firm value, little is found about the link between ERM and firm's accounting quality. Cohen et al. (2014) conducted semi-structured interviews to capture the experiences of 32 experienced individuals from 11 public companies. Using the COSO ERM framework, their survey suggested that the adoption of ERM allows CFOs and auditors to more effectively assess the appropriateness of estimates such as obsolescence in inventory, which leads to the improvement of the quality of the financial reporting process and the strength of internal control. Therefore, we predict that the adoption of ERM improves the accounting quality:

H1: *The adoption of enterprise risk management program is associated with higher accounting quality.*

Many prior studies in ERM focus on insurance companies and find strong evidence that ERM increases firm value (Hoyt and Liebenburg, 2011, Grace et at. 2012, etc.). However,

Beasley et al. (2006) showed no significant market response on ERM adoption from univariate analysis. Although their multivariate analysis provides empirical evidence that market responses positively with ERM, such result holds only for non-financial firms. Apparently prior literature shows a mixed finding of the impact of ERM on firm value among financial firms. Therefore, we predict that there is a different impact of ERM among financial firms or insurance industry:

H2(a): *The adoption of enterprise risk management program in financial firms is more positively associated with higher accounting quality than in other firms.*

H2(b): *The adoption of enterprise risk management program in insurance companies is more positively associated with higher accounting quality than in other firms.*

3. Data and Methodology

Research Method

Drawing upon prior studies in accounting quality, we use the following model to examine the association between ERM and accounting quality:

$$AQ = \alpha_0 + \alpha_1 ERM + \alpha_2 SIZE + \alpha_3 \text{ROA} + \alpha_4 \text{MTB} + \alpha_5 \text{LOSS} + \alpha_6 VOL_E + \alpha_7 VOL_S + \alpha_8 VOL_C + \alpha_9 \Delta SALES + \alpha_{10} CYCLE + \alpha_{11} LEV + \alpha_{12} REST + \alpha_{13} AGE + \alpha_{14} HHI + \varepsilon_{it} \quad (1)$$

where:

AQ = Measure of accounting quality, including magnitude of discretionary accruals (*ADACC*), signed discretionary accruals (*DACC_P* and *DACC_N*), small positive income (*SMALL*), and earnings surprise (*SURPRISE*).
ERM = An indicator equal to 1 if the firm-year adopts enterprise risk management and 0 otherwise.
SIZE = The logarithm of market capitalization at the beginning of the year.
LEV = Leverage calculated as total debts deflated by averaged total assets.
ROA = Return on total assets.
MTB = Market-to-book ratio.
LOSS = An indicator equals to 1 if the firm has net loss in previous year and 0 otherwise.
VOL_E = The standard deviation of earnings before extraordinary items in the past three years deflated by averaged total assets.
VOL_S = The standard deviation of sales in the past three years deflated by averaged total assets.
VOL_C = The standard deviation of net cash flows from operation in the past three years deflated by averaged total assets.

ΔSALES = The percentage change in sales from the previous year.
CYCLE = The logarithm of the average of [(Net Sales/360)/Average Accounts Receivable] + [(Cost of Goods Sold/360)/Average Inventory], calculated from 2002 to 2014.
REST = Restructuring charge scaled by the beginning total assets.
AGE = The logarithm of the number of years the firm has *CRSP* data as of 2014.
HHI = Herfindahl index measured as the sum of squared market shares (i.e., percentage of total industry sales for all firms available in *Compustat North America* based on the firm's primary two-digit SIC code.

We use multiple measures as proxies of accounting quality. Our first measure, *ADACC*, is the magnitude of discretionary accruals representing a company's reporting aggressiveness. We follow prior literature (Sloan and Sweeney 1995, Ahmed et al. 2013) to compute accruals scaled by average total assets (*ACC*) as below:

$$ACC = (\Delta Current\ Assets - \Delta Cash - \Delta Current\ Liabilities + \Delta Short\text{-}term\ debt\ in\ current\ liabilities + \Delta Taxes\ Payable - Depreciation) / Average\ Total\ Assets \quad (2)$$

where *Δ* represents the change of the value in a year. We then use modified Jones model to estimate discretionary accruals by two-digit SIC code following prior literature (Becker et al. 1998, Kothari et al. 2005, Doyle et al. 2007, etc.):

$$ACC_{it} = \beta_0 + \beta_1 \Delta Revenue + \beta_2 PPE + \gamma_{it} \quad (3)$$

where *PPE* is property, plant and equipment and *ΔRevenue* is the change of net sales. Both measures are scaled by average total assets. We require at least 30 observations in each two-digit SIC group, explain the firm-year residuals estimated from above model as discretionary accruals, and use its absolute value as *ADACC*. In addition, we partition the sample to examine income-increasing (*DACC_P*) and income-decreasing (*DACC_N*) discretionary accruals. In the test *DACC_N* is presented as positive number.

We employ two indicators (*SMALL* and *SURPRISE*) as alternative measures of accounting quality and revise model (1) accordingly. *SMALL* is an indicator for small positive earnings equals to one if net income scaled by average total assets is between 0.00 and 0.01 and zero otherwise. *SURPRISE* equals one if actual annual earnings per share (EPS) is greater or equal to the last consensus (median) of analyst annual EPS forecast prior to the announcement date. Our main interest variable is an indicator of *ERM*, which equals one for firm-year implementing enterprise risk management through development of risk management strategy, setting specific chief risk officer (CRO) position, including risk committee in board of director, etc., and equals zero otherwise. Other control variables are

defined above. We include year and industry fixed effects in the model and cluster sample at firm level.

Sample Construction and Descriptive Statistics

Since there is neither universal definition nor regulatory requirement of ERM, the qualification of firm's ERM adoption could be difficult. Previous research used three approaches to capture firm's ERM adoption. Altuntas, Berry-Stölzle and Hoyt (2011) and Grace et al. (2015) use survey data whereas other studies, including McShane et al. (2011), Baxter et al. (2013), and Ai et al. (2014), have used S&P's ERM ratings to measure the quality of ERM. Survey data is a good source of information. However, it is not available to the public since it needs to be obtained either directly from firms or consulting firm that conducts the survey. S&P ERM rating provides an independent and in-depth rating that also evaluates the quality of ERM. However, it only shows ERM adoption status at the rating year, making panel data analysis difficult. Other research (Hoyt and Liebenberg 2011, Pagach and Warr 2011, Eckles et al. 2014, Berry-Stölzle and Xu 2014) suggested keyword search from newswire and financial reports.

Our sample covers the period of 2002 through 2014. As ERM is employed to oversee enterprise-wide risks and manage activities from strategic to operational levels, we expect the establishment of ERM is time consuming and should bring widespread and long-term effects in various perspectives. Accordingly, we start from firms with available data in each sample year in *Compustat North America* to retrieve necessary long-term financial information and combine them with *CRSP* database for stock price and market capitalization. We then combine the dataset with *I*/*B*/*E*/*S* database for analyst forecast in annual EPS. After further elimination of missing data in control variables, we obtain an initial sample with 1,055 firms and 11,761 firm-year observations between 2002 and 2014. We base on this sample to gather information about ERM. Most prior literature use survey data (Altuntas et al. 2011, Grace et al. 2015) to collect ERM information. Some studies use S&P ERM ratings to measure the quality of ERM (McShane et al. 2011, Baxter et al. 2013, Ai et al. 2014) while this measure is only available for firms in financial industry. Other research (Hoyt and Liebenberg 2011, Eckles et al. 2014, Berry-Stölzle and Xu 2014, etc.) suggest keyword and text search from newswire and financial reports. We retrieve information regarding whether a firm discloses its holistic approach, techniques or strategies for risk management, whether a firm specifically set chief risk officer (CRO) in top management team, whether there is an

independent risk committee in board of directors to oversee a firm's risk management policies and framework, or other related disclosure from SEC 10-K filing and related reporting. However, there are no specific format or context requirements about this information and the quality of ERM cannot be measured directly. Therefore we use an indicator *ERM* to identify firms using any of these strategies, policies, or approaches as those implementing ERM and do not assume intensity or effectiveness of specific or multiple ERM techniques. In the end we construct our final sample with 786 firms and 7,333 firm-year observations. The sample selection procedure in detail is presented in Table 1.

Panel A of Table 3 presents the descriptive statistics and breakdown by ERM. There are more firm-year observations (69.5%) adopting ERM in our sample. We first note that firms adopting ERM have generally weaker discretionary accruals (*ADACC*), especially in income-increasing discretion (*DACC_P*), implying better quality in financial reporting compared with firms without ERM. The probabilities to report small positive income (*SMALL*) and to meet or beat earnings forecast (*SURPRISE*) are also lower for ERM firms. In addition, firms with ERM, on average, have higher firm value (*Q* and *MTB*), larger size (*SIZE*), lower variation in past performance (*VOL_E, VOL_S* and *VOL_C*), and longer operating cycle (*CYCLE*) and history (*AGE*). Most features are consistent with the findings in prior literature (Hoyt and Liebenberg 2011, Baxter et al. 2013, etc.) while these studies mainly focus on financial firms. Table 3, Panel B, reports Pearson correlation among main variables. ERM is significantly correlated with most control variables, especially *SIZE* and *AGE*. This result suggests that firms with larger size and longer history have more resources and are more willing to invest in ERM.

4. Results and discussions

Main Empirical Results

Our main test investigates the association between the adoption of ERM as an indicator and alternative measures of accounting quality as the dependent variable. The first column of Table 4 contains the regression results of the magnitude of discretionary accruals (*ADACC*) on ERM adoption (*ERM*) and controls for firm characteristics related to accruals quality and determinants of ERM. The coefficient estimate on *ERM* is -0.005 with a t-value of -3.23 when all other control variables and fix effects are included. The negative relation between *ERM* and *ADACC* supports our first hypothesis that adoption of ERM is associated

with better accounting quality (lower discretionary accruals). The coefficients on most control variables are significant and their directions are consistent with our prediction and prior literature in accruals quality (Doyle et al. 2007). Firms with larger size, net loss, higher volatility in performance measures, higher sales growth, and longer operating cycle, are more positively associated with greater discretionary accruals. When a firm has better operating performance (*ROA*) and longer history (*AGE*), the incentives to increase income or manipulate earnings through discretionary accruals should be weaker. The second and third column presents the regression results with alternative dependent variables. We separate discretionary accruals to income-increasing (*DACC_P*) and income-decreasing discretionary accruals (*DACC_N*) and test their relations with *ERM* to examine specific reporting behavior. The results show that ERM adoption is negatively associated with both variables, but the relation is only significant for income-increasing discretionary accruals. The estimated coefficient of *ERM* is -0.003 with t-value of -2.04 in this regression. Coefficients of all control variables are significant except *CYCLE* while its direction is consistent with our predictions. *HHI* representing Herfindahl index in this test is negatively and significantly related to *DACC_P*. As Herfindahl index is a proxy for competition intensity in an industry, higher *HHI* implies more market share is taken by few companies. Hence, the results here suggest firms facing more competitors in the market and pressure from investors tend to increase income through discretionary accruals.

In addition to accruals quality, we use two indicators of earnings benchmark, *SMALL* and *SURPRISE*, as alternate proxies of accounting quality and examine their relations with ERM adoption. *SMALL* is an indicator for small positive income. Prior studies (Burgstahler and Dichev 1997, Roychowdhury 2006, Gunny 2010) find that firms have incentives to use different techniques of earnings management, such as overproduction, reducing discretionary expenses, or other real activities manipulation to avoid net loss or negative earnings changes in annual reporting. Although the firms' performance in subsequent years is not necessarily deteriorating, the reporting quality in current year has decreased. Following prior literature we also use an indicator, *SURPRISE*, to identify firm-year meeting or beating analyst earnings forecast based on the premise that earnings management is more likely to occur in firms just meet or beat the benchmark than in firms just miss the benchmark (Frankel et al. 2002). Prior literature has confirmed managers' incentives to continuously meet or beat analysts' forecast of EPS as analyst forecast is another benchmark of market expectation to a firm's performance. These incentives include higher assignment of firm valuation (Kasznik

and McNichols 2002), higher equity return premium (Bartov 2002, Brown and Caylor 2005), increasing bond ratings (Jiang 2008), and lower cost of capital (Duarte et al. 2008, Brown et al. 2009). Prior studies also document that managers tend to employ three main methods to meet or exceed analysts' forecast, including accrual manipulation (Dechow et al. 2003), expectation management (Kasznik and Lev 1995), and real activities manipulation (Roychowdhury 2006) and accounting quality is therefore affected. Table 5 presents related results of logistic regression. The estimated coefficient of *ERM* is -0.106 with t-value of -2.90 in the first column, suggesting firms adopting ERM are less likely to report small positive income. In the second column, strong evidence shows that *ERM* is also negatively associated with *SURPRISE* (coefficient= -0.136, t-value= -12.86), indicating the probability of meeting or beating analyst annual EPS forecast is lower with the emphasis of ERM. We control factors that affect incentives to avoid loss or meet/beat earnings forecast with different sign predictions. Most controls are significant and consistent with our expectation.

Firms in Financial Industries

Many prior studies in ERM focus on insurance companies and found strong evidence that ERM increases firm value. Therefore we use three additional binary variables to identify firms in financial industry (*FIN*, SIC code 6000-6999), insurance companies (*INS,* SIC code 6311-6499), and other financial firms (*OTHER*, SIC code 6000-6299 and 6500-6999) separately based on SIC classification code. We then investigate incremental effects of ERM in these firms on all dependent variables used in main tests discussed above. The results are presented in Table 6. For parsimony, we report only coefficients with respect to *ERM* and related interaction terms while all control variables and fixed effects are included. Panel A of Table 6 presents OLS regression results regarding accrual quality. We do not include standalone variable for financial industries (*FIN, INS* and *OTHER*) since the related effects have been controlled through industry fixed effects. Consistent with the main results, ERM is negatively associated with the magnitude (*ADACC*) and income-increasing part (*DACC_P*) of discretionary accruals no matter financial firms or insurance companies are identified. For these two dependent variables, we note that ERM, on average, has negative but weak incremental effects. The coefficients for (*ERM***FIN*) for both models are one-sided significant at 10% level. This finding echoes with Beasley et al. (2006) that ERM contributes to firm value only for non-financial firms, but not for financial institution. However, when we further disaggregate financial firms to insurance companies and other financial firms, we find

that ERM adoption has a stronger impact among insurance companies with its value more negatively related to *ADACC* and *DACC_P*. This could be due to two reasons: first of all, insurance companies provide enterprise risk management solutions to their clients so they have expertise advantage; second, insurance companies are also subject to regulations such as Own Risk and Solvency Assessment (ORSA) that require the adoption of ERM. Our results support this argument and imply that ERM is more effective for insurance companies than other firms, at least from the perspective of improving financial reporting quality. The incremental effects of ERM and financial firms other than insurance companies are consistently insignificant. For *DACC_N*, the relations between ERM and income-decreasing discretionary accruals are consistently insignificant, including main and incremental effects for most industries. However, the interaction between *ERM* and *INS* is weakly and negatively associated with *DACC_N*. Overall, the results reflect two implications. First, the adoption of ERM is related to higher accounting quality in financial industry. Second, this effect is more significant in insurance companies than other financial or non-financial firms.

Table 6, Panel B, reports results of logistic regression adding financial firm indicators with regard to *SMALL* and *SURPRISE*. The coefficients of ERM adoption is consistently negative no matter what model combination is used. For financial firms, ERM has incremental effects on reducing the probability to report small positive earnings (avoid loss), but not on lowering the probability to meet or beat analyst earnings forecast. When further identifying insurance companies. We find the coefficient of *ERM*INS* is significantly negative to *SMALL* (coefficient= -0.521, t-value= 0.24), implying an important effects of ERM on insurance companies to improve accounting quality. However, the coefficient of *ERM*INS* is weakly positive to *SURPRISE*, which is not consistent with our prediction. While ERM can lower the probability for a firm to meet or beat analyst forecast, its effect is not particularly strong form insurance firms. The interaction terms related to other financial firms (*ERM*OTHER*) are consistently insignificant, suggesting the effects of ERM on financial reporting quality are not specifically different between these firms and others in general industries.

Additional Analyses: ERM and Analysts' Forecast

In addition to utilizing direct measures or proxies of accounting quality, we also address this issue from financial reporting users' perspective. Prior research documents that earnings attributes, such as accrual quality, persistence, and predictability, are important to users of

accounting information (Francis et al. 2004) When earnings quality is high, information asymmetry decreases (Bhattacharya et al. 2003, Francis et al. 2004) and analyst forecast is improved (Salerno 2013). Since ERM provides comprehensive risk management that addresses all aspects of risk in a firm and communicates the information in a more transparent fashion, one shall expect a reduction of performance variability among the firms that adopted ERM. Therefore, we investigate additionally whether ERM, through its effects on improved accounting quality, is associated with analysts' forecast behavior. We employ two related measures, forecast error (*FE*) and forecast dispersion (*DISP*), as alternate dependent variables to examine how ERM can affect the uncertainty of accounting information environment and analysts' consensus. Modified from Duru and Reeb (2002) we construct analyst forecast error as the absolute value of the difference between actual EPS and the median of final analyst forecasted EPS prior to the earnings announcement deflated by stock price at the forecast date. Hence, lower *FE* represents better forecast accuracy. We use forecast dispersion as a proxy for uncertainty among analysts about future events or credibility of accounting information and measure it as the standard deviation of final analyst forecasted EPS prior to the earnings announcement scaled by stock price at the forecast date. Higher *DISP* suggests analysts have fewer consensuses about a firm's future. This uncertainty may come from economic circumstances, a firm's operations, or accounting information quality provided analysts rely on financial report to make forecasts. ERM as a framework to control or reduce different types of risks may make a firm's operating activities more predictable and financial performance more persistent over a period of time.

The first two columns of Table 7 provide results of regressing ERM on *FE* and *DISP*. After controlling factors related to firm performance and uncertainty, we find that ERM is negatively related to analysts' forecast error and dispersion with coefficients of -0.101 (t-value= -3.12) and -0.004 (t-value= -2.61) respectively. Based on these results, adopting ERM can improve analysts' forecast accuracy as well as lower analysts' differences in their forecasts. We also follow Duru and Reeb (2002) to construct another alternate measure, forecast bias, as the proxy of optimism. Forecast bias is measured as the difference between analysts' forecasted EPS and actual EPS. Higher forecast bias suggests that analysts are more optimistic about a firm's future performance. The untabulated results show that ERM is negatively and significantly associated with forecast bias and further confirm the important effects of ERM on analysts' forecast behavior.

Additional Analyses: ERM and Firm Value

Prior literature addresses the relations between ERM and firm value or firm performance. Hoyt and Liebenburg (2011) find positive associations between ERM and constructed Tobin's Q proxied for firm value. Baxter et al. (2013) document ERM quality is positively associated with improved accounting performance, including market valuation and return on assets. ERM quality is also positively related to earnings response coefficients although the explanatory power is mainly from sample period after financial crisis in 2008. However, due to certain data limitations, these studies mainly focus on insurance companies and financial services firms. With a sample across different industries, we follow Hoyt and Liebenburg (2011) to examine the relations between ERM and firm value to understand whether the findings from financial industries can be generalized. The alternate dependent variable Q is constructed as the sum of market value of equity and book value of liabilities scaled by book value of total assets and used as a proxy of firm value. The third column of Table 7 reports the related regression results. The estimated coefficient of ERM in this model is 0.023 with the t-value of 4.10, indicating that ERM adoption is positively associated with firm value (Q). The adjusted R-square and F-value of the model is higher than other model combinations, suggesting strong relations between ERM and firm performance.

Another important measure of accounting quality employed by prior studies is timely loss recognition developed by Basu (1997), which captures whether bad news (loss) is recognized in a timely manner than good news (positive earnings). We utilize Basu model to examine whether ERM adoption provides incremental effects and fail to find significant results in general.

Additional Analyses: Robustness Checks

In our main tests we include known determinants of setting ERM as control variables, such as firm size or uncertainty from operations, and focus on ERM's effect on accounting quality. However, it is possible that a firm can choose its financial reporting quality and decide whether it should utilize ERM. Firms may employ certain ERM techniques at operational level but do not adequately report them since the related disclosure is not mandatory in general. These issues may create self-selection problems and we therefore employ Heckman two-stage test (1979) to control it following Baxter et al. (2013). In the first-stage model we use a logistic model to identify the probability for a firm to adopt ERM by regressing ERM on firm size, leverage, return on assets, uncertainty of earnings, operating

cycle, leverage, firm age and industry effects following Pagach and Warr (2011) to generate an inverse Mills ratio. We include this ratio in the second-stage OLS and logistic regressions and examine the effects of ERM similar to those reported in Table 4, 5 and 7. The first two columns of Table 8 present the results of first-stage logistic model and the second-stage OLS regression regarding *ADCC*. The (untabulated) results in general confirm positive associations between ERM adoption and the quality and usefulness of accounting information[1].

We also use propensity score matched (PSM) sample to control endogeneity problem and rerun our tests. Based on firm size, leverage, return on assets, and two-digit SIC code we estimate propensity score for each firm-year observation and identify firm-year which does not adopt ERM with the closest probability to make control group. After matching procedure we have a sample with 2,144 firm-year observations adopting ERM matched with 1,072 observations without ERM to construct a matched sample with 1,072 observations in total. We verify the main analyses based on matched sample and provide the test results of the relation between ERM adoption and *ADACC* in the third column of Table 8. The estimated coefficient is -0.006 with the t-value of -1.69, confirming our findings in Table 4. For parsimony we do not present tests with other dependent variables, but the results (untabulated) are consistent with our previous findings and support our main conclusion that ERM adoption is positively related to accounting quality.

Internal control is encompassed within and an integral part of ERM (if a firm adopts ERM) (COSO 2004). Prior literature (Doyle et al. 2007) also finds negative relations between internal control weakness and accruals quality. We therefore consider whether our findings are driven by the effectiveness of internal control and match our dataset with the indicator whether the firm-year has effective internal control from *AuditAnalytics*. As this information is not required or available for our whole sample period, we exclude observations without this information and decrease the pooled sample to 6,428 observations. In this dataset, only firm-year with ineffective internal control takes only 2.46% (158 observations). By adding the indicator for effective internal control, we still find consistent results as those in main tests, suggesting significant effects of ERM other than internal control on accounting quality. We also exclude firm-year without effective internal control to rerun our analyses and the results are not changed.

[1] After controlling inverse Mills ratio we use dependent variables tested above to rerun the second-stage OLS and logistic regressions depends on their properties. The results are similar to those reported in main tests except *DACC_P*, which is only one-sided significant at 10% level.

We include additional controls as further tests. We include an indicator for big four accounting firms to control the effects of external auditor on accruals quality[2]. The related coefficients are consistently significant and our main results are held. We further include an index for corporate governance, which is provided from Institutional Shareholder Services (ISS) and based on Gompers et al. (2003), as an additional variable in the main models to control sample firms' internal control mechanism. As ERM could be treated as an extension or alternative of internal control or corporate governance, we check variance inflation factors (VIF) of related tested variables and do not find multicollinearity problems. We employ number of segments, the ratio of foreign assets to total assets, and the ratio of foreign sales to total sales as proxies of firm complexity in addition to firm size. These tests decrease the sample size to 6,001 observations and do not change our main results and our conclusions. Finally we try different thresholds of data trimming and clustering as robustness checks. We trim and winsorize the pooled sample by top and down 1% for all continuous variables to have stronger results. We also cluster the sample by firm and year to have lower t-values. Both checks confirm our main findings and conclusions.

5. Conclusions

In this study we examine the role of ERM in financial reporting quality. ERM, as an extension of internal control incorporating the goal of producing reliable financial statements, expands and elaborates internal control to form a more robust conceptulization focusing more fully on risk (COSO 2004), and therefore should have integrated and broader effects on the whole company, including firms' operational deicisions and reporting incentives. While prior studies have documented the associations between ERM quality and firm value as well as firm performance (Hoyt and Liebenberg 2011, Baxter et al. 2013), they focus mainly on the effects of ERM on firm operations, rely on shorter sample period, and only base on firms in financial industry. The roles of ERM on reporting incentives or financial reporting quality are not fully addressed. Therefore our study fills in this gap and investigates the associations between ERM adoption and alternate measures of accounting quality.

If adopting ERM can further improve internal control and accountability, we should observe its relation with higher accounting quality. This relation should be strengthened in financial firms since these firms are subject to more stringent internal control regulation and

[2] In our pooled sample, firm-year observations with big four accounting firm take 96.75%, so we do not include related indicator in main tests as most sample firms are treated as having similar and high level of external monitor.

encouraged to adopt ERM. With a set of long-term panel data covering the period between 2002 and 2014, we examine these associations with alternate proxies of accounting quality, including the magnitude of discretionary accruals, income-increasing (positive) and income-decreasing (negative) discretionary accruals, small positive earnings (loss avoidance), and meeting or beating analyst forecast (earnings surprise). We find that ERM adoption is negatively related to the magnitude of discretionary accruals, the income-increasing (positive) discretionary accruals, the likelihood to report small positive earnings and the likelihood to meet or beat analyst forecast. These associations, except the likelihood to meet or beat analyst forecast, are slightly strengthened in financial firms, but significantly improved in insurance companies. We explain this finding in a way that insurance companies should be more specialized in risk management, introduce ERM and utilize ERM's functions better than firms in other industries.

We also test whether accounting information under ERM framework is more useful and relevant to the market and financial reporting users. By using analysts' forecast error, analysts' forecast dispersion, and constructed Tobin's Q as alternative dependent variables we confirm the benefits of ERM adoption. We find ERM adoption is related to more accurate analyst forecast (lower forecast error), less forecast optimism, less forecast dispersion, and higher Tobin's Q. These results indicate that when a firm adopts ERM, its financial reporting becomes more high-quality and useful for analysts to improve earnings forecast accuracy and form forecast consensus. The positive and significant relation between ERM adoption and Tobin's Q also confirm the value of ERM in different industries and extend the findings in prior studies (Hoyt and Liebenberg 2011). In summary, we document that ERM adoption is positively related to accounting quality as well as the usefulness of accounting information.

We utilize a series of methods to confirm our findings. As a firm can choose its financial reporting quality and the method or timing to adopt ERM, it is possible that a firm employs certain ERM techniques but do not disclose them properly. This may raise self-selection problems and we therefore perform Heckman two-stage test (1979) following Baxter et al. (2013) to mitigate this concern. After generating inverse Mills ratio from the first-stage logistic model by regressing ERM on firm size, leverage, return on assets, uncertainty of earnings, operating cycle, leverage, firm age and industry effects following Pagach and Warr (2011), we include this ratio in the second stage regressions and find the results are consistent with our main analyses. In addition, as ERM adoption is not mandatory, firms may have different concerns to decide whether they should or should not introduce

ERM. We therefore employ propensity score matching (PSM) procedure to create treatment and control subsamples regarding ERM adoption to address potential endogenous problems. Based on firm size, leverage, return on assets, and two-digit SIC code, we estimate propensity score for each firm-year observation, obtain a sample with 1,072 firm-year adopting ERM to match 1,072 observations without ERM, and find consistent results to confirm our main conclusions.

We include additional control variables to examine the main research question with smaller subsamples. As internal control could be a factor other than ERM to drive accounting quality, we include a binary variable indicating whether the firm-year has effective internal control from *AuditAnalytics*. As external monitor could be an effective way to affect accounting quality, we include an indicator for big four (or five, depends on sample years) accounting firms while 96.75% of our sample observations are big accounting firms' clients. We also employ the index of corporate governance developed by Gompers et al. (2003) as additional controls. Prior studies use variables in addition to firm size to control firm complexity or internationalization for ERM and internal control issues. We utilize numbers of segment, the ratio of foreign assets to total assets, and the ratio of foreign sales to total sales as further control variables. Overall, we do not find significant change to our results and the main conclusions are held. Finally we use different thresholds of data trimming and clustering to examine the robustness of our results. We trim and winsorize the pooled sample by top and down 1% for all continuous variables and obtain stronger results. We also try two-way clustering by firm and year to have lower t-values. These checks confirm our solid findings and conclusions.

While the results and findings are informative, there are couples of caveats. First, we cannot provide direct evidence on how ERM framework, after adoption, affects a company in each aspect to have better accounting quality and improve the usefulness of accounting information. First, managers' operational decisions may be more risk averse after ERM adoption to naturally lower the uncertainty of reported amounts. Analysts therefore can easily rely on them to form earnings forecasts. Second, ERM adoption may mitigate managers' reporting incentives, such as earnings management or manipulation, and improve accounting quality. Both forces and their interactions, if any, will lead us to observe the associations between ERM adoption and measures of accounting quality. Furthermore, although we use multiple thresholds to determine whether a firm adopts ERM or not, we cannot measure the magnitude or specific quality of this adoption. Prior studies use data from S&P risk

management rating to measure ERM quality (Baxter et al. 2013), but this information is only available in financial industry.

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Table 1
Sample Selections

Panel A: Firms	Total
Firm observations across between 2002 and 2014 in *Compustat North America*	20,338
Less: Missing values in *CRSP* and *I/B/E/S* between 2002 and 2014	(18,821)
Firm observations available between 2002 and 2014	1,517
Less: Missing firm data in tested variables	(462)
	1,055
Less: Unable to match SEC 10-K filing for identifying enterprise risk management	(269)
Final sample firm observations	786

Panel B: Firm-year Observations	
Firm observations across between 2002 and 2014 in *Compustat North America*	161,575
Less: Missing values in *CRSP* and *I/B/E/S* between 2002 and 2014	(142,642)
Firm observations available between 2002 and 2014	18,933
Less: Missing firm-year data in tested variables	(7,262)
	11,761
Less: Unable to match SEC 10-K filing for identifying enterprise risk management	(4,338)
Final sample firm-year observations	7,333

Table 2
Variable Definition

Variables	Definitions
ADACC	= Absolute value of abnormal accruals estimated based on modified Jones model by two-digit SIC code and year.
DACC_P	= Income-increasing discretionary accruals, which equals to abnormal accruals estimated based on modified Jones model by two-digit SIC code and year if the value is positive and zero otherwise.
DACC_N	= Income-decreasing discretionary accruals, which equals to (-1) times abnormal accruals estimated based on modified Jones model by two-digit SIC code and year if the value is negative and zero otherwise.
FE	= Forecast error, which is equal to the absolute value of the difference between actual earnings per share (EPS) and the median of final analyst forecasted EPS from *I/B/E/S* prior to the earnings announcement scaled by stock price at the forecast date.
DISP	= Forecast dispersion; the standard deviation of final analyst forecasted EPS from *I/B/E/S* prior to the earnings announcement scaled by stock price at the forecast date.
Q	= *Q* is used as a proxy for firm value and is measured as the sum of market value of equity and book value of liabilities deflated by book value of total assets.
SMALL	= An indicator for small positive income, which is equal to one if net income deflated by average total assets is between 0.0 and 0.01 and equal to zero otherwise.
SURPRISE	= An indicator for meet or beat analyst forecasts, which is equal to one if actual EPS is greater or equal to the median of final analyst forecasts from *I/B/E/S* prior to the earnings announcement and zero otherwise.
ERM	= An indicator equal to one if the firm-year adopts enterprise risk management, and zero otherwise.
SIZE	= The logarithm of market capitalization at the beginning of the year.
LEV	= Leverage calculated as total debts deflated by averaged total assets.
ROA	= Return on total assets.
MTB	= Market-to-book ratio.
LOSS	= An indicator equal to one if the firm has net loss in previous year and zero otherwise.
VOL_E	= The standard deviation of earnings before extraordinary items in past three years deflated by averaged total assets.
VOL_S	= The standard deviation of sales in past three years deflated by averaged total assets.
VOL_C	= The standard deviation of net cash flows from operation in past three years deflated by averaged total assets.
⊿SALES	= The percentage change in sales from the previous year.
CYCLE	= The logarithm of the average of [(Net Sales/360)/Average Accounts Receivable]+[(Cost of Goods Sold/360)/Average Inventory], calculated from 2002 to 2014.
REST	= Restructuring charge scaled by the beginning total assets.
AGE	= The logarithm of the number of years the firm has *CRSP* data as of 2014.
HHI	= Herfindahl index measured as the sum of squared market shares (i.e., percentage of total industry sales for all firms available in *Compustat North America* based on the firm's primary two-digit SIC code.
FS	= An indicator for financial firms (SIC codes between 6000 and 6999).
INS	= An indicator for insurance companies (SIC codes between 6311 and 6499).
OTHER	= An indicator for financial firms other than insurance companies (SIC codes between 6000 and 6299 and between 6500 and 6999).

Table 3
Descriptive Statistics

Panel A: Variables Distributions

	Pooled Sample			ERM=1			ERM=0			
Variable	N	Mean	SD	N	Mean	SD	N	Mean	SD	Difference
ADACC	7,333	0.047	0.070	5,107	0.046	0.068	2,226	0.051	0.074	-0.005 ***
DACC_P	7,333	0.021	0.048	5,107	0.020	0.045	2,226	0.025	0.053	-0.005 ***
DACC_N	7,333	0.024	0.059	5,107	0.024	0.058	2,226	0.024	0.061	0.000
SMALL	6,927	0.691	0.312	4,701	0.890	0.313	2,226	0.893	0.310	-0.003
SURPRISE	6,927	0.677	0.468	4,701	0.666	0.472	2,226	0.703	0.457	-0.037 ***
FE	7,188	0.061	0.964	5,027	0.037	0.222	2,161	0.117	1.725	-0.080 ***
DISP	7,086	0.018	0.050	4,956	0.015	0.047	2,130	0.024	0.058	-0.009 ***
Q	7,330	0.587	0.223	5,107	0.599	0.215	2,223	0.561	0.238	0.038 ***
ERM	7,333	0.694	0.460	5,107	1.000	0.000	2,226	0.000	0.000	1.000
SIZE	7,333	8.913	1.594	5,107	9.273	1.517	2,226	8.809	1.455	0.464 ***
LEV	7,333	0.243	0.181	5,107	0.241	0.169	2,226	0.246	0.206	-0.005
ROA	7,333	0.138	0.094	5,107	0.134	0.088	2,226	0.149	0.105	-0.015
MTB	7,333	1.824	7.151	5,107	1.889	7.983	2,226	1.677	4.716	0.212 ***
LOSS	7,333	0.109	0.312	5,107	0.110	0.313	2,226	0.107	0.310	0.003
VOL_E	7,333	0.324	0.597	5,107	0.311	0.560	2,226	0.352	0.673	-0.041 ***
VOL_S	7,333	1.098	1.338	5,107	0.982	1.274	2,226	1.365	1.439	-0.383 ***
VOL_C	7,333	0.304	0.326	5,107	0.281	0.294	2,226	0.357	0.385	-0.076 ***
ΔSALES	7,333	-0.005	0.023	5,107	-0.004	0.022	2,226	-0.010	0.024	0.006 ***
CYCLE	7,333	3.782	1.154	5,107	3.858	1.170	2,226	3.609	1.099	0.249 ***
REST	7,333	0.003	0.010	5,107	0.003	0.009	2,226	0.003	0.012	0.000 **
AGE	7,333	3.232	0.737	5,107	3.352	0.666	2,226	2.959	0.814	0.393 ***
HHI	7,333	0.091	0.011	5,107	0.089	0.010	2,226	0.094	0.011	-0.005 *

Table 3 (continued)
Descriptive Statistics

Panel B: Pearson Correlation Matrix

Variables	*ADACC*	*ERM*	*SIZE*	*LEV*	*ROA*	*MTB*	*LOSS*	*VOL_E*	*VOL_S*	*VOL_C*	*ΔSALES*	*CYCLE*	*REST*	*AGE*	*HHI*
ADACC	**1.000**														
ERM	**-0.038**	**1.000**													
SIZE	**-0.130**	**0.342**	**1.000**												
LEV	**-0.140**	**-0.013**	**0.123**	**1.000**											
ROA	**-0.102**	***-0.074***	***-0.280***	***-0.065***	**1.000**										
MTB	**0.199**	0.0137	**-0.051**	**-0.130**	*-0.022*	**1.000**									
LOSS	**0.127**	0.004	**-0.064**	**0.099**	**-0.367**	**0.077**	**1.000**								
VOL_E	**0.131**	**-0.031**	**-0.231**	-0.009	*-0.2222*	*0.022*	**0.260**	**1.000**							
VOL_S	**0.084**	**-0.132**	**-0.274**	**-0.091**	**0.232**	0.007	**0.000**	**0.205**	**1.000**						
VOL_C	**0.168**	**-0.106**	**-0.306**	**-0.080**	**0.213**	**0.046**	0.082	**0.397**	**0.404**	**1.000**					
ΔSALES	*0.021*	**0.122**	**0.141**	**0.047**	**-0.206**	-0.002	**0.159**	**-0.056**	**-0.193**	**-0.128**	**1.000**				
CYCLE	**0.151**	**0.099**	**0.225**	**-0.068**	**-0.262**	**0.118**	**0.031**	**-0.034**	**-0.195**	**-0.101**	**0.034**	**1.000**			
REST	*0.023*	*0.024*	**-0.076**	*0.022*	**-0.043**	*-0.022*	**0.213**	**0.085**	-0.002	0.018	**0.134**	0.012	**1.000**		
AGE	**-0.145**	**0.245**	**0.367**	**0.070**	**-0.045**	**-0.044**	**-0.058**	**-0.133**	**-0.162**	**-0.188**	**0.093**	**0.089**	**0.048**	**1.000**	
HHI	**-0.030**	*-0.022*	0.011	**0.047**	**0.058**	0.002	0.008	-0.017	**0.073**	0.004	0.018	**-0.151**	**-0.054**	**-0.074**	**1.000**

Numbers reported in **bold** and *italics* represent strong ($p<0.01$) or weak ($p<0.05$ or $p<0.1$) levels of significance respectively.

Table 4
Accruals Quality and Enterprise Risk Management

Variables	Expected Sign	Measures of Discretionary Accruals		
		ADACC	*DACC_P*	*DACC_N*
ERM	-	-0.005***	-0.003**	-0.001
		(-3.23)	(-2.04)	(-0.79)
SIZE	-	-0.087*	-0.025*	0.003
		(-1.66)	(-1.77)	(0.32)
ROA	-	-0.030***	-0.015**	-0.030***
		(-3.09)	(-2.26)	(-3.53)
MTB	?	0.001***	-0.001*	0.001***
		(8.75)	(-1.64)	(9.18)
LOSS	+	0.014***	-0.004**	0.021***
		(4.70)	(-2.18)	(8.22)
VOL_E	+	0.014***	0.005***	0.004
		(3.74)	(4.95)	(0.33)
VOL_S	+	0.003***	0.003***	0.006
		(4.42)	(6.74)	(0.01)
VOL_C	+	0.027***	0.016***	0.011***
		(10.15)	(8.42)	(4.73)
⊿SALES	+	0.106***	0.117***	-0.072**
		(1.59)	(4.81)	(-2.38)
CYCLE	+	0.019***	0.001	0.005***
		(7.86)	(1.11)	(6.71)
LEV	?	-0.035***	0.007**	-0.037***
		(-7.28)	(2.25)	(-9.89)
REST	?	0.163**	0.140**	-0.111
		(1.87)	(2.34)	(-1.52)
AGE	?	-0.011***	-0.006***	-0.004***
		(-9.55)	(-8.40)	(-4.03)
HHI	?	-1.134	-0.969**	-0.132
		(-1.60)	(-1.98)	(-0.21)
Fixed Effects		Industry Year	Industry Year	Industry Year
Obs		7,333	7,333	7,333
F value		45.88	19.19	35.76
Adjusted R^2		0.123	0.064	0.127

All variables are defined in Table 2. ***, **, and * indicate two-sided statistical significance at the 1, 5 and 10% levels, respectively. Robust t-statistics based on standard errors clustered at firm level are reported in parentheses.

Table 5
Logistic Regressions of Small Positive Earnings and Earnings Surprise on Enterprise Risk Management

Variables	Exp. Sign	Small Earnings *SMALL*	Exp. Sign	Meet or Beat Forecast *SURPRISE*
ERM	-	-0.106*	-	-0.136***
		[-2.90]		[-12.86]
SIZE	?	-0.136***	?	0.074***
		[-37.80]		[29.59]
ROA	-	-12.609***	+	2.032***
		[-56.12]		[107.26]
MTB	-	-0.015***	+	0.007*
		[-14.12]		[3.70]
VOL_E	?	-0.385***	?	-0.046
		[-61.21]		[-2.63]
VOL_S	?	-0.007	?	0.019
		[-0.15]		[1.96]
VOL_C	?	-0.144	?	-0.105*
		[-2.52]		[-3.36]
⊿SALES	-	-8.672***	+	1.335*
		[-48.97]		[3.45]
CYCLE	+	0.097***	?	-0.035**
		[21.61]		[-5.48]
LEV	-	-1.292***	-	-0.245***
		[-85.95]		[-7.51]
REST	-	-35.58***	-	0.692
		[-115.85]		[0.14]
AGE	?	0.045	?	-0.046*
		[1.41]		[-3.80]
HHI	-	-47.97**	+	-24.24
		[-4.15]		[-2.67]
Fixed Effects		Country Industry		Country Industry
Obs		6,927		6,927
Max-rescaled R^2		0.480		0.048

All variables are defined in Table 2. ***, **, and * indicate two-sided statistical significance at the 1, 5 and 10% levels, respectively. Wald Chi-square values are reported in the brackets.

Table 6
Accruals Quality and Enterprise Risk Management in Financial Industry

Panel A:Accruals Quality and ERM in Financial Industry

	Exp.	Measures of Discretionary Accruals					
Variables	Sign	*ADACC*	*ADACC*	*DACC_P*	*DACC_P*	*DACC_N*	*DACC_N*
ERM	-	-0.004**	-0.004**	-0.002***	-0.002*	-0.001	-0.001
		(-2.02)	(-2.03)	(-4.39)	(-1.67)	(-0.68)	(-0.69)
*ERM*FIN*	-	-0.007#		-0.011#		-0.003	
		(-1.32)		(-1.46)		(-0.70)	
*ERM*INS*	-		-0.024*		-0.011***		-0.016#
			(-1.78)		(-4.35)		(-1.43)
*ERM*OTHER*	-		-0.004		-0.007		-0.001
			(-0.67)		(-0.88)		(-0.15)
Controls		Included	Included	Included	Included	Included	Included
Fixed Effects		Industry	Industry	Industry	Industry	Industry	Industry
		Year	Year	Year	Year	Year	Year
Obs		7,333	7,333	7,333	7,333	7,333	7,333
F value		44.36	42.85	19.34	18.65	34.45	33.28
Adjusted R^2		0.159	0.159	0.067	0.067	0.127	0.127

Panel B: ERM in financial industry

	Exp.	Small Earnings		Meet or Beat Forecast	
Variables	Sign	*SMALL*	*SMALL*	*SURPRISE*	*SURPRISE*
ERM	-	-0.152**	-0.155**	-0.141***	-0.141***
		[-6.19]	[-6.35]	[-15.05]	[-15.11]
*ERM*FIN*	-	-0.211#		0.059	
		[-2.17]		[0.54]	
*ERM*INS*	-		-0.521**		0.136#
			[-6.46]		[1.77]
*ERM*OTHER*	-		0.093		-0.01
			[0.24]		[0.00]
Controls		Included	Included	Included	Included
Fixed Effects		Industry	Industry	Industry	Industry
		Year	Year	Year	Year
Obs		6,927	6,927	6,927	6,927
Max-rescaled R^2		0.525	0.526	0.081	0.081

All variables are defined in Table 2. ***, **, and * indicate two-sided statistical significance at the 1, 5 and 10% levels, respectively. # represents one-sided statistical significance at 10% level. Robust t-statistics based on standard errors clustered at firm level are reported in parentheses. Wald Chi-square values are reported in the brackets.

Table 7
Regressions of Analysts' Forecast Error, Forecast Dispersion, and Firm Value on Enterprise Risk Management

Variables	Exp. Sign	Forecast Error *FE*	Forecast Dispersion *DISP*	Exp. Sign	Firm Value *Q*
ERM	-	-0.101***	-0.004***	+	0.023***
		(-3.12)	(-2.61)		(4.10)
SIZE	?	-0.035***	-0.007***	+	0.006***
		(-3.91)	(-15.27)		(3.39)
ROA	?	-0.332**	-0.023***	+	0.564***
		(-2.25)	(-3.20)		(23.04)
MTB	?	-0.001	0.012	+	0.001***
		(-0.93)	(1.60)		(3.15)
LOSS	+	-0.018	0.008***	-	-0.023***
		(-0.43)	(3.85)		(-3.11)
VOL_E	+	0.003	0.004***	?	-0.020***
		(0.13)	(4.14)		(-5.61)
VOL_S	+	0.015	0.003***	?	0.005***
		(1.57)	(5.38)		(2.90)
VOL_C	+	0.041	0.021***	?	-0.028***
		(0.99)	(10.04)		(-3.93)
ΔSALES	?	0.294	0.027	+	0.139
		(0.55)	(1.04)		(1.53)
CYCLE	+	0.020*	0.004***	+	0.008***
		(1.81)	(6.80)		(4.56)
LEV	?	-0.032	-0.007***	?	-0.731***
		(-0.48)	(-2.35)		(-6.25)
REST	?	-1.340	-0.132**	?	-0.015
		(-1.11)	(-2.07)		(-0.07)
AGE	?	0.002	0.002	?	0.031***
		(0.14)	(0.19)		(10.40)
HHI	?	-5.602	-0.470	+	7.221***
		(-0.52)	(-0.90)		(3.96)
Fixed Effects		Industry Year	Industry Year		Industry Year
Obs		7,188	7,086		7,330
F value		2.40	38.20		241.02
Adjusted R^2		0.015	0.125		0.474

All variables are defined in Table 2. ***, **, and * indicate two-sided statistical significance at the 1, 5 and 10% levels, respectively. Robust t-statistics based on standard errors clustered at firm level are reported in parentheses.

Table 8
Robustness Checks for the Magnitude of Discretionary Accruals

		Heckman Test		Propensity-Score
	Exp.	First-Stage Est.	Second-Stage Est.[3]	Matched Sample
Variables	Sign	Pr(ERM=1)	*ADACC*	*ADACC*
ERM	-		-0.004*	-0.006*
			(-1.83)	(-1.69)
SIZE	?	0.924***	-0.039*	0.058
		[57.94]	(-1.82)	(0.75)
ROA	?	-2.148***	-0.031***	-0.036**
		[20.23]	(-3.17)	(-2.16)
MTB	?		0.001***	0.002***
			(8.78)	(7.33)
LOSS	+		0.013***	0.018***
			(4.63)	(3.43)
VOL_E	+	0.128**	0.005***	0.006**
		[4.73]	(3.81)	(2.01)
VOL_S	+		0.003***	0.002*
			(4.31)	(1.77)
VOL_C	+		0.027***	0.034***
			(10.07)	(6.67)
⊿SALES	?		0.057	0.156***
			(1.63)	(2.58)
CYCLE	+	0.088***	0.006***	0.005***
		[4.33]	(7.91)	(3.27)
LEV	?	-0.642***	-0.031***	-0.022***
		[8.49]	(-7.32)	(-3.29)
REST	?		-0.011	0.137
			(-0.13)	(0.72)
AGE	?	0.258***	-0.010***	-0.009***
		[17.87]	(-7.62)	(-4.51)
HHI	?		-1.102	0.135
			(-1.55)	(1.51)
Inverse Mills Ratio			0.002*	
			(1.72)	
Fixed Effects		Industry	Industry	Industry
			Year	Year
Obs		7,333	7,333	2,144
F value		-	44.41	12.06
Max-rescaled R^2 /Adjusted R^2		0.421	0.159	0.137

All variables are defined in Table 2. ***, **, and * indicate two-sided statistical significance at the 1, 5 and 10% levels, respectively. Robust t-statistics based on standard errors clustered at firm level are reported in parentheses. Wald Chi-square values are reported in the brackets.

[3] For parsimony we report only the second-stage estimate regarding *ADACC*. The results with other alternate dependent variables are similar to the main tests except *DACC_P*, which is not significantly related to *ERM*.