Market Reactions to Enterprise Risk Management Adoption*

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Abstract

Enterprise Risk Management (ERM) is a process that integrates all of a firm's risks in a holistic way. Prior literature has provided mixed results as to whether ERM adds value. To reconcile the contrary strands of literature, we study stock market reactions to first public announcements of firms adopting ERM and find support for ERM value creation in years following 2005, when Standard & Poor's (S&P) declared their ERM-related rating criteria and firm stakeholders gained greater understanding of ERM. Prior to 2005, firms experienced negative abnormal returns when announcing ERM adoptions. Additionally, we study whether insurers experienced abnormal stock market reactions to ERM-related ratings announcements from S&P and A.M. Best. We find some evidence of abnormal reactions for S&P's announcement, but none for A.M. Best. We also find that the market rewarded ERM adopters and penalized non-adopters after November 2011 on key dates leading to the passage of the Own Risk Solvency Assessment (ORSA) Act when there was less uncertainty about it.

JEL classification: G22; G24; G28; G32
Keywords: Enterprise Risk Management (ERM), Insurance, Abnormal Returns

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Abstract

Enterprise Risk Management (ERM) is a process that integrates all of a firm's risks in a holistic way. Prior literature has provided mixed results as to whether ERM adds value. To reconcile the contrary strands of literature, we study stock market reactions to first public announcements of firms adopting ERM and find support for ERM value creation in years following 2005, when Standard & Poor's (S&P) declared their ERM-related rating criteria and firm stakeholders gained greater understanding of ERM. Prior to 2005, firms experienced negative abnormal returns when announcing ERM adoptions. Additionally, we study whether insurers experienced abnormal stock market reactions to ERM-related ratings announcements from S&P and A.M. Best. We find some evidence of abnormal reactions for S&P's announcement, but none for A.M. Best. We also find that the market rewarded ERM adopters and penalized non-adopters after November 2011 on key dates leading to the passage of the Own Risk Solvency Assessment (ORSA) Act when there was less uncertainty about it.

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1. Introduction

Enterprise Risk Management (ERM) takes a holistic, integrated approach to managing risk. Firms with ERM programs make an enterprise-wide assessment of risks, as opposed to the traditional "silo" based approach to risk management. The bulk of literature documents that ERM creates value (see, e.g., Hoyt and Liebenberg, 2011; Baxter et al., 2013; Farrell and Gallagher, 2014) and explores the channels through which value could be created (see, e.g., Grace et al., 2014; Berry-Stölzle and Xu, 2014; Eckles, Hoyt, and Miller, 2014). On the other hand, a small stream of literature either argues that ERM does not have value implication (see, e.g., Beasley, Pagach, and Warr, 2008; McShane, Nair, and Rustambekov, 2011) or claims that it even destroys value (see, e.g., Lin, Wen, and Yu, 2012). The reasons provided include the demanding and time-consuming learning process, ambiguous procedure and mechanisms, and substantial expenses of ERM implementation. While ERM is designed to be superior to traditional risk management, it does involve significant costs from various aspects.

The goal of this study is to bridge the gap between these two strands of literature and investigate the reasons why discrepancies in empirical evidences exist. We investigate the value implication of ERM by testing for abnormal market reactions surrounding ERM adoption dates for U.S. insurance firms. The insurance industry provides an excellent laboratory in which to test for market reactions to ERM adoption as insurance firms are in the business of managing risks and are have taken the lead in implementation of ERM.[1] The first year that a firm ever adopted an ERM program in our study was 1996. In the following years relatively few firms followed suit until 2005. In late 2005, Standard & Poor's (S&P) announced that it would incorporate an ERM evaluation as a "separate,

[1] Hoyt and Liebenberg (2011), Grace et al. (2014), and Berry-Stölzle and Xu (2014) are three recent studies on ERM that focus exclusively on the U.S. insurance industry. Pagach and Warr (2011) and Baxter et al. (2013) do not exclusively examine insurers, but large portions of their sample are comprised of firms from financial services industries.

major category" in their rating services to insurers, which was later expanded to non-financial firms.[2] Following S&P, other parties including alternative rating agency, regulatory authority, and mass media have emphasized the importance of ERM as well. Hence, we hypothesize that investors view ERM differently prior and after 2005. Consistent with this view, we find that ERM adoption is associated with a negative market reaction for firms that adopted prior to 2005, but that firms adopting following 2005 experienced a positive market reaction. We provide several explanations for the result. First of all, investors gain a greater understanding of ERM over time. In addition, firms that adopted ERM may rely on experiential learning and collect expertise via trials and errors in the early years when not many firms had adopted it. Outstanding models of ERM adopters can be shared at industry conferences and learned by following adopters. Further, S&P and other agency's focus on ERM around that period conveyed a positive signal of the value of ERM implementation.

As a secondary analysis, we examine market reactions surrounding ratings agency and regulatory announcements related to ERM. On October 17, 2005, S&P announced that it would begin to provide a ratings service that assessed ERM quality for insurers. On February 6, 2006 A.M. Best, the major firm that specializes in providing analysis and ratings of insurance firms, announced that it would start to incorporate an analysis of ERM quality in its insurer financial strength ratings. Since credit ratings are important to firms, we examine stock returns surrounding these announcements to determine whether the market reacted to these events. The Own Risk Solvency Assessment (ORSA) Model Act was passed by the National Association of Insurance Commissioners (NAIC) in September 2012, and requires that insurers adopt ERM by January 1, 2015. The eventual passage of the Act was the result of a series of proposing, drafting, discussing, commenting, and revising. The

[2] Baxter et al. (2013) find that firms experience positive abnormal returns when they receive an initial Standard & Poor's (S&P) ERM quality rating and also when S&P upgrades a firm's ERM rating. It indicates that the market value the positive information S&P conveys regarding a firm' ERM program, and opinions of S&P on firm's ERM matter to the investors. Hence, investors' view may change prior and after S&P's new rating criteria incorporating ERM in 2005.

whole process lasted for more than one-and-half years. We expect that this series of regulatory events will have implications for firms that have already adopted and also for firms that have not yet adopted at the time of each of the key event dates. We therefore test for market reactions surrounding these events.

We find some evidence of positive market reactions surrounding S&P's announcement for ERM firms, but not for non-ERM firms. We do not find evidence of any abnormal reactions surrounding A.M. Best's announcement. For market reactions around the passage of ORSA, we generally find that before the ORSA guidance manual was adopted for the first time by a NAIC group in November 2011, there was evidence of negative abnormal returns for both ERM adopters and non-adopters on some key dates leading to the final passage. Since state insurance Departments and NAIC committees involved were still debating on the articles and languages at the early stage of the Act, we interpret the results as evidence of the uncertainty and fear about the future direction of ORSA by the market. After November 2011 when the OSRA Act was more established and unambiguous and the terms were improved through debates, we find generally ERM adopters enjoyed positive abnormal returns on key dates leading to the final passage, while non-adopters suffered negative abnormal returns. Overall, our results support the theory that ERM adds value in general. The market rewards the adopters after 2005, but not the adopters prior to 2005 due to less understanding of ERM by various stakeholders, a lack of rating agency's validation, and absence of regulatory authority's encouragement. The market exhibited the similar pattern in passing the ORSA Act pre- and post- November 2011 with respect to rewarding ERM adopters.

There is a limited number of existing studies on market reactions to ERM adoption. While Beasley, Pagach, and Warr (2008) did not document abnormal market reactions, we expand upon their study in at least two important ways. For one, their study only analyzes CRO hiring announcements. Our study expands upon this to examine other signals of ERM implementation.

Second, their sample period ends in 2003, which is before important developments related to ERM. S&P and A.M. Best, two ratings agencies, both began considering ERM quality in their ratings after 2003, and the majority of ERM adoptions happened following 2003. We expect that if there were to be evidence of an abnormal reaction, it would be observed following 2005 instead of prior to 2003. The ability of these ratings agencies to validate ERM programs, as well as an overall increase in implementation, represents a change regarding the perceived importance of ERM programs.

Baxter et al. (2013) also test for abnormal market reactions related to ERM, but do so for announcements of an S&P ERM rating and also in changes in S&P's ERM rating. Since firms adopt ERM before S&P gives them a rating, their study only captures the secondary effect of ERM adoption. It measures the quality of ERM in opposed to the actual implementation of ERM programs. Therefore, our results complement the findings of Baxter et al. (2013) and, taken together, provide a more complete picture of how ERM impacts a firm's value.

The remainder of the paper proceeds as follows. Section 2 provides a review of prior literature and discusses our hypotheses related to ERM adoption. Section 3 provides an overview of the data and empirical methodology. In section 4 we present our empirical results and section 5 concludes.

2. Prior Literature & Hypothesis Development

Prior ERM Literature

Prior work on ERM has generally followed three main strands. The first strand is interested in how ERM is implemented (e.g., Colquitt, Hoyt, and Lee, 1999; Kleffner, Lee, and McGannon, 2003; Altuntas, Berry-Stölzle, and Hoyt, 2011). These studies tend to be descriptive in nature and based on corporate surveys. While they provide valuable descriptions of how ERM is implemented, they do not speak to its ability to create value.

The second area of ERM research has focused on the determinants of ERM adoption (e.g., Liebenberg and Hoyt, 2003; Pagach and Warr, 2011; Altuntas, Berry-Stölzle, and Hoyt, 2013). Descriptions of selected studies are presented in Table 1, Panel A. Liebenberg and Hoyt (2003) find that firms with higher leverage are more likely to hire a CRO, which the authors suggest provides evidence that ERM is used to reduce information asymmetry as this reduction will be more valuable for high leverage firms. Pagach and Warr (2011) find that size and cash flow volatility are positively associated with ERM implementation. These studies provide indirect evidence of value creation, in that firms that are more likely to adopt have issues that are likely to be lessened by ERM adoption, such as volatile cash flow. However, these studies do not provide direct evidence of value creation or address the channels through which ERM creates value, if it does at all.

The third strand of ERM research is focused on the value implications of ERM adoption (e.g., Hoyt and Liebenberg, 2011; Lin, Wen, and Yu, 2012; Grace et al., 2014). Selected prior studies in this area are presented in Table 1, Panel B. While prior studies have used a variety of different measures of firm value, there are mixed results as to the question of whether ERM creates value. For example, Hoyt and Liebenberg (2011), Baxter et al. (2013), and Farrell and Gallagher (2014) use Tobin's *Q* as a measure of firm value and find evidence that ERM improves firm value. However, also using Tobin's *Q*, McShane, Nair, and Rustambekov (2011) find that ERM does not provide an improvement in firm value above traditional risk management. Lin, Wen, and Yu (2012) find that ERM adoption is associated with a decrease in Tobin's *Q*.

The literature also has mixed results when using abnormal returns to measure the value of ERM adoption. Beasley, Pagach, and Warr (2008) find no evidence of abnormal returns surrounding CRO appointment, but Baxter et al. (2013) find evidence that S&P ERM ratings releases and changes are associated with market reactions.

Enterprise Risk Management Adoption

There are competing theoretical arguments for whether ERM adoption creates value for the firm. Managing risks holistically in opposed to the traditional "silo" approach allows firms to avoid inefficiency associated with communication between different departments, and also allows firms to exploit natural hedges and avoid duplicative risk management. More efficient identification of risk should give firms the opportunity to make better decisions in regard to the risk-return tradeoff in deciding how to manage risk (Muelbroek, 2002). ERM can also create value by improving firm transparency, so outsiders have a better idea about a firm's risk profile (Hoyt and Liebenberg, 2011). This transparency could also help to lessen potential agency conflicts within the firm (Jensen and Meckling, 1976).

However, there are also arguments that ERM should create no value or potentially negative value for the firm. In a frictionless capital market, capital structure should not affect firm value, as established by Modigliani and Miller (1958). This argument also holds for risk management, as individual investors are able to diversify their risk by investing in multiple firms. Risk management could, therefore, take away from firm value. Another possibility is that ERM adoption is motivated by managerial hubris (Roll, 1986). In this situation, managers would be motivated to implement in response to observing similar firms also adopting ERM, even in situations where it is not beneficial (Lin, Wen, and Yu, 2012). ERM is costly and difficult to implement, and managers could underestimate the difficulty of adopting, leading to a decrease in firm value.

The timing of ERM adoption could also play a role in the subsequent market reaction. S&P's 2005 announcement that they would begin to issue ratings of ERM quality could induce firms and investors to take more notice of ERM. Also, it provided the first external opinion on a firm's ERM activity. This was followed the next year by A.M. Best's announcement that ERM quality would be a component of its financial strength ratings. These announcements and the growing number of firms

adopting ERM programs could have increased awareness of the benefits associated with ERM. These factors could provide an explanation for why Beasley, Pagach, and Warr (2008) fail to find significant abnormal returns surrounding CRO hiring announcements, as their sample covers the period from 1992 to 2003.

Table 2 provides a summary of our hypotheses regarding market reactions to ERM adoption. The "ERM Value Hypothesis" predicts that the market should react positively to adoption, as this integrated risk management technique provides additional value to the firm. The "ERM Cost Hypothesis" predicts that the costs associated with ERM adoption result in a non-positive market reaction to adoption. We also propose that there will be differences in the market reaction to adoption before and after 2005. In this situation, we expect that even in situations where ERM should create value, there will be no positive market reaction to ERM adoption prior to 2005. Following 2005, however, we expect to observe positive market reactions to adoption under the value hypothesis. We expect non-positive returns for all time periods under the cost hypothesis.

Rating Agency and Regulatory Announcements

If ERM has value implications for firms, either positive or negative, external events related to ERM could also have an impact on firm value. We, therefore, examine the market reaction surrounding two ratings-agency events (S&P and A.M. Best) as well as one regulatory event (ORSA).

S&P's ERM ratings provide an assessment of how well a firm's ERM system is able to identify and monitor risks. They have ratings categories of "Excellent," "Strong," "Adequate," and "Weak." Baxter et al.'s (2013) finding of abnormal market reactions surrounding releases of new ERM ratings and changes in a company's existing ERM rating suggests that these ratings convey new information to the market.

A.M. Best financial strength ratings represent the ability of a firm to fulfill its obligations to policyholders going forward. These ratings are important to firms, policyholders, regulators, and investors. Firms with ratings below a certain level may not be able to sell to corporate clients (Pottier and Sommer, 1999). These ratings are a better predictor of insolvency compared to criteria used by regulators (Pottier and Sommer, 2002). Also, the market reacts to changes in financial strength ratings (Halek and Eckles, 2010). We, therefore, propose that the announcement of considering ERM in financial strength ratings is a significantly important even to insurance firms.

S&P's 2005 announcement of ERM-specific ratings and A.M. Best's 2006 announcement of considering ERM in financial strength ratings should have different effects on different groups of insurers. We, therefore, make no prediction for the reaction of all firms. However, groups of firms could have different market reactions depending upon their ERM adoption status. Firms that had already adopted at the time of either ratings announcement are hypothesized to see a positive market reaction, as they should theoretically benefit from this external validation of ERM quality. Firms that adopt at any time during the sample period could also experience positive reactions if they are a firm that has already taken steps to begin implementing or if they are a firm with a perceived high likelihood of adopting. On the other hand, they could also experience a significant negative reaction which, therefore, causes the firm to consider implementing. We also consider firms that do not have ERM at the time of the announcement. We expect this group of firms to have a non-positive reaction, as they are unlikely to benefit from having an ERM rating, and a poor rating could be interpreted as a poor signal. This would be consistent with the findings of Baxter et al. (2013), who find that negative S&P ERM ratings changes are associated with a negative market reaction. The final group we consider is firms that do not have ERM at any point during the sample period. We also predict these firms will have a non-positive market reaction for the same reasons as for firms that did not have an ERM program at the time of the announcement. We expect similar reactions

for each group of firms for A.M. Best's announcement, although the results are likely to be less strong as this consideration of ERM is bundled within A.M. Best's overall financial strength rating, whereas S&P's rating is specific to ERM quality.

The ORSA Model Act should also elicit different market reactions from different groups of firms. Since the process of passing the Act lasted more than one-and-a-half years, we investigate each of the key regulatory event dates leading to the eventual passage. Since each of the key dates carries important pieces of information regarding the Act, we expect the market to react on different stages of the Act instead of solely the passing date. Table 3 displays the key dates related to the ORSA Model Act. We consider firms that had ERM at the time of each of the key dates and those that did not. Firms with ERM at the time of the announcement are hypothesized to experience a non-negative market reaction, as they already comply with the legal requirement. Unlike the ratings announcements considered above, there is also the possibility this has no reaction, as there is not necessarily a benefit that is equivalent to a higher rating. Firms without ERM are hypothesized to have a negative reaction, as they must now bear the costs associated with implementing an ERM program. Since the process of passing the Act went through serious debates and fierce discussions, we also expect the understanding of the Act by the investors to improve over time. Hence, the market may show concerns about it before rewarding ERM adopters.

3. Data and Methodology

Data

A major consideration in ERM studies is how to quantify ERM. Altuntas, Berry-Stölzle, and Hoyt (2012), Grace et al. (2014), and Farrell and Gallagher (2014) rely on various surveys to determine whether a firm has adopted. While these data have an advantage in that they involve direct communication from firms, they are generally not publicly available. Other studies, including

McShane, Nair, and Rustambekov (2011), Baxter et al. (2013), and Ai, Bajtelsmit, and Wang (2014) have used S&P's ERM ratings to measure the quality of ERM. This has the advantage of providing an independent and informed determinant of ERM quality. However, this measure does not provide information on when a firm adopted, but instead its present quality, making it difficult to use in this study. Additionally, few firms have received these ratings so far and not all that have are publicly traded, which would also make this measure inappropriate for this study (Hoyt and Liebenberg, 2011).

Data on ERM adoption, therefore, come from a keyword search process as described in Hoyt and Liebenberg (2011) and used in, for example, Pagach and Warr (2011), Eckles, Hoyt, and Miller (2014), and Berry-Stölzle and Xu (2014). First, newswire mentions of each insurer are searched using Factiva, LexisNexis, Google, and other media for statements involving ERM. Second, financial reports are searched using Thomson One, Mergent Online, and SEC filings. Firm names are searched along with ERM-related key phrases, such as "enterprise risk management," "chief risk officer," "risk committee," and "integrated risk management." These searches are manually checked to ensure it is associated with a firm's adoption of risk management in opposed to, for example, ERM product sales to clients.

Table 4 provides the sample selection process for the firms used to test for whether ERM adoption is associated with abnormal market returns. The initial sample is made up 371 insurance firms (SIC codes between 6311 and 6399) in the merged Compustat/CRSP database from 1996-2012.[3,4] For the current edition of the paper, we have yet to search for 174 firms, so we cannot determine if they are ERM adopters or not, so they are excluded from the analysis. We then exclude

[3] We require the Compustat database as future versions of this paper will perform analysis on determinants of abnormal returns, which requires firm characteristics.
[4] Hoyt and Liebenberg (2011) report the earliest ERM adoption as 1998. Lin, Wen, and Yu (2012) report that they are few ERM adopters prior to 2000, and only consider post-2000 firms in their analysis. Berry-Stölzle and Xu (2014) find the earliest adoption as 1996.

insurers without ERM, which reduces the sample by another 95 firms. Since we require an exact date to run the event study we further exclude 46 firms for which we cannot identify a precise date.[5] Finally, we exclude 13 firms without CRSP data during the period necessary to run the event study.[6] This results in 43 firms with exact dates and sufficient data to perform the event study.

Table 5 shows the number of ERM adopters by year. While there are few adopters early—less than 8 percent of all adopters implemented their program before 2000—the period with the highest frequency of adopters is 2005-2007. Of particular note is that 2006 was the year with the highest frequency of adoption as 17.70 percent of all adopters implemented their program in 2006. This lends some credibility to the idea that firms, and also possibly markets, were paying more attention to the rising popularity of ERM around 2005.

Table 6 provides summary statistics and univariate comparisons between firms that have adopted ERM and firms that have not. All variables are from Compustat from the time period from 1996 to 2012. Firms are designated as ERM firms in the first year the keyword search identifies them as ERM adopters and in all years following. *Assets* is a firm's total assets measured in billions. *Liabilities* is a firm's liabilities measured in billions. *MV Equity* is a firm's market value of equity measured in billions. *BV Equity* is a firm's book value of equity measured in billions. *M/B* is the market-to-book ratio, measured as *MV Equity* divided by *BV Equity*. *Leverage* is *Liabilities* divided by *MV Equity*. *Cash Ratio* is cash holdings divided by *Liabilities*. *Intangibles* is the book value of intangible assets divided by *Assets*. This represents 1,919 firm-year observations and 188 unique firms, with 639 ERM firm-years and 1,280 non-ERM firm-years.[7]

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[5] As an example, Arch Capital's 2009 proxy statement says "Mr. Singh, 47, joined Arch Insurance Europe in October 2005 as actuary and chief risk officer." Future versions of this paper will include an analysis of these more ambiguous cases to see whether they impact the results.

[6] We perform the ERM keyword search on all firms in the Compustat/CRSP database at any point, so for some firms they were not listed at the time of adoption, but were before or after adopting. That is why these 13 firms are excluded.

[7] Unlike the event study on ERM adoption, this analysis does not require the exact date of the news story, as firms are assigned as ERM adopters on a yearly basis. This is why there are a higher number of firms represented in the descriptive statistics.

The final three columns of Table 6 provide tests for differences in means and medians, as well as differences in standard deviations for the descriptive statistics. The *t*-tests for differences in means reveal that firms with ERM programs and firms without ERM programs are statistically significantly different in a number of dimensions. Notably, ERM firms tend to be larger and have a lower market-to-book ratio. The results are similar for nonparametric *k*-sample tests for differences in medians. These results suggest that ERM adopters and non-ERM adopters differ significantly in their characteristics. Future versions of this paper will incorporate these differences into the analysis to deal with potential problems associated with endogeneity.

Empirical Methodology

To test our hypotheses, we first perform an event study surrounding the date of the earliest found mention of a firm having implemented ERM. We calculate abnormal returns in various windows around the date the news report first mentioning ERM activity. Daily stock returns for each firm in the sample are regressed against the market return for the same day. The daily returns on the CRSP value-weighted index proxies for the market return. The estimation period begins 255 days before the event and ends 46 days before the event. Parameter estimates for equation (1) below are estimated using ordinary least squares (OLS):

$$AR_{i,t} = R_{i,t} - (\hat{\alpha}_i + \hat{\beta}_i R_{i,t}) \quad (1)$$

where $\hat{\alpha}$ and $\hat{\beta}$ are estimated from the standard capital asset pricing model (CAPM) over the estimation period. We test for significance using three alternative tests, including Patell Test, Standardized Cross-Sectional Test, and Generalized Sign Test. Test statistics based on different assumptions provide evidence of robustness of our results.

We next perform tests for abnormal returns surrounding S&P's announcement of ERM ratings and A.M. Best's announcement of incorporation of ERM into their financial strength ratings.

Clustering is likely to be an issue in this analysis, as we are examining events on a single industry for a single day. Since the event windows of the securities in this analysis overlap (they are exactly the same), it is difficult to make the assumption, as with event studies when events windows for different securities do not overlap, that the covariances between the abnormal returns are zero. In order to address this issue, we use the "crude dependence adjustment" (CDA) test. This test uses standard error of returns from the time series of portfolio mean abnormal returns during the estimation period to generate test statistics. We examine various windows around the announcements to test for abnormal reactions to these ratings from different groups of insurance firms. Specifically, for S&P and A.M. Best announcements, we examine all insurers, insurers who had ERM at the time of the announcement, all firms that adopt ERM at some point in our sample, firms that did not have ERM at the time of the announcement, and firms that have yet to implement ERM. For the series of key regulatory event dates leading to the passage of ORSA Model Act, we examine firms with ERM and those without at the time of each of the dates in order to compare the results of these two groups. Since this series of regulatory events happened on the same day for all the firms that are in the same industry, independently distributed residuals cannot be assumed and the cross-correlation problem is present. In order to address this issue, we employ joint generalized least squares approach or seemingly unrelated regression (SUR). The SUR approach explicitly includes correlation among firm returns in estimating variance. It provides consistent estimates and also retains firm-specific abnormal returns to be utilized in cross-sectional analysis (see, e.g., Binder 1985; Karafiath; 1988).

4. Results

ERM Adoption Results

Table 7 provides results from our event study analysis testing for abnormal returns surrounding dates identified as the earliest mention of ERM activity for each firm. These tests are performed on all firms, firms that adopted prior to S&P's announcement of ERM ratings, and firms that adopted following the S&P announcement. As in Beasley, Pagach, and Warr (2008) and Baxter et al. (2013), we examine returns in a five-day window (-2,+2) and a three-day windows (0,+2). In addition, we investigate four more windows, including (0, +1), (0, +3), (-3, +3), and (-5, +5). We use three alternative tests to test for significance of cumulative average abnormal returns in these event windows, namely, Patell Test, Standardized Cross-Sectional Test, and Generalized Sign Test. They provide evidence of robustness of our results.

The results in the Panel A of Table 7 provide no evidence of abnormal returns surrounding ERM adoption for all sample years. However, the results in the Panels B and C provide support for an increasing knowledge or appreciation of ERM in the market. Panel B shows that adopters in the 1998 to 2005 period experienced either no return or significantly negative returns. This is consistent with the ERM Cost Hypothesis. However, Panel C finds evidence of positive returns associated with firms that adopted an ERM program from 2006 to 2012. This is consistent with the ERM Value Hypothesis and provides evidence that ERM creates value for firms.

Rating Agency and Regulatory Results

Table 8 provides results from our event study analysis of abnormal returns surrounding S&P's October 17, 2005 announcement that they will begin releasing ERM ratings. These tests are on 5 different groups of firms: All insurers, insurers with ERM at the announcement, firms with ERM at any point in the sample period, firms without ERM at the time of the announcement, and firms without ERM at any point in the sample period. We perform this analysis on four different event

windows: a two-day window (-1,0), a three-day window (-1,+1), two seven-day windows (-1,+5) and (-3,+3), and an 11-day window (-5,+5).

The results in the first column of Table 8 provide some evidence that firms experienced a positive abnormal reaction surrounding S&P's announcement. Specifically, firms experienced a positive reaction of 1.52 percent in the (-1,+5) window. Also, firms that had ERM at any point during the sample period experienced positive abnormal returns of 1.68 percent in the (-1,+5) window. Firms with ERM at the time of the announcement experienced a positive CAR of 2.16 percent in the (-5,+5) window. Firms with no ERM at the time of the announcement, which includes some firms that would eventually implement an ERM program, experienced CARs not significantly different from zero for all event windows. Firms that have yet to implement ERM also experience no abnormal returns in any window. Overall, this provides some evidence that firms with ERM programs experienced positive returns following S&P's announcement of ERM-specific ratings. Firms without ERM do not experience abnormal returns around S&P's announcement. This complements the findings of Baxter et al. (2013), who find that the market reacts to *changes* in S&P's ERM ratings. Taken together, these results suggest that S&P's ratings convey information regarding ERM quality to the market.

Table 9 provides results from our event study on A.M. Best's February 6, 2006 announcement of incorporating ERM into its financial strength ratings. We test for abnormal returns using the same firm subsamples and event windows as with the S&P announcement in Table 8.

The results find no evidence of abnormal returns for any subsample of firms using any event window. One possible reason for this is that the effects of ratings on ERM adoption and quality had already been incorporated into the share price with the S&P announcement. Since this announcement follows relatively closely, there is less of an effect when looking at A.M. Best's announcement. Another potential explanation is that this announcement will result in a change that

is less easily observable, as it will be incorporated into the financial strength rating, which involves a multitude of other firm characteristics.

Table 10 provides results from our event study on the series of dates leading to the passage of ORSA in September 2012. For comparison purpose, we perform this test on subsamples of firms with ERM and without ERM. We use five event windows, including (0, 0), (-1, 0), (-1, +1), (-3, +3), and (-5, +5).

We generally find that before the ORSA guidance manual was adopted for the first time by a NAIC group, namely, the Group Solvency Issues Working Group (GSIWG) of the Solvency Modernization Initiatives (EX) Task Force in November 2011, there was evidence of negative abnormal returns for both ERM adopters and non-adopters on some key dates leading to the final passage. Since state insurance Departments and NAIC committees involved were still debating on the articles and languages at the early stage of the Act, we interpret the results as evidence of the uncertainty and fear about the future direction of ORSA by the market. After November 2011 when the OSRA Act was more established and unambiguous and the terms were improved through debates, we find generally ERM adopters enjoyed positive abnormal returns on key dates leading to the final passage, while non-adopters suffered negative abnormal returns. Overall, our results support the theory that ERM adds value in general. The market panelized firms that had not adopted ERM throughout the entire process of passing the ORSA Act. However, ERM adopters, as the Act was more disclosed and improved through serious debates and discussions, were rewarded by the market eventually.

5. Conclusion

Prior evidence had provided inconclusive results as to whether ERM creates firm value. In this study, we provide evidence to reconcile these two contrary strands of literature. Specifically, we test

for abnormal market reactions surrounding enterprise risk management program adoption, and find evidence that firms adopting prior to 2005 had either no market reaction or a negative market reaction to ERM adoption. Following 2005 we find evidence that firms experienced a positive market reaction when they implemented ERM. We attribute the results to S&P's announcement of ERM-related rating criteria in 2005 and a series of following events promoting ERM by other rating agency and regulatory authority, as well as a greater understanding of ERM over time by firm stakeholders through experimental learning and experience accumulation.

We also test for abnormal market reactions surrounding two ratings agency announcements, for S&P and A.M. Best, and a regulatory event, passage of the ORSA Act. We find that ERM firms experienced positive market reactions to S&P's announcement of ERM-specific ratings, while non-ERM firms experienced no market reaction. We do not find evidence for market reactions to A.M. Best's announcement. We find the market rewarded ERM adopters when better understanding about the ORSA Act was achieved, and the market penalized the ERM non-adopters in general.

We plan to improve upon this study in multiple ways moving forward. For one, the sample continues to expand as we identify the dates of more ERM adopters through the keyword search. Expanding the sample can help the power in some of the event studies with smaller sample sizes. We will also investigate different event windows to examine the robustness of our results. In addition, we plan to investigate alternative methodologies to better capture abnormal returns surrounding the ratings agency and regulatory events. As discussed above, clustering is particularly concerning in this analysis, so ensuring that the results are robust to alternative methodologies is particularly important in this case. Furthermore, we plan to run logistic regressions to investigate what firm characteristics make a firm likely to adopt ERM pre-2005 as opposed to post-2005. We will also run a regression analysis on the determinants of abnormal returns using data from Compustat and the statutory filings of each insurance firm. Moreover, we will provide empirical

evidence that S&P's ERM-related rating announcement made a difference on the signs of firm abnormal returns. Specifically we plan to run a treatment effects model similar to the one in Hoyt and Liebenberg (2011) with Tobin's Q as the proxy for firm value. We will add in the regression a dummy variable of *S&P* with a value of 0 for 1996-2005 and 1 for 2006-2012, and an interaction term of *S&P* and *ERM* dummy. We expect *ERM* to be negative, *S&P* positive, and the interaction term positive. We can also test whether uncertainty about ERM adopting firms reduces after 2005.

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Table 1.

A. Selected Prior Studies on Determinants of ERM Adoption

Authors	Time Period	# Firms	ERM Data	Determinants of Adoption
Liebenberg and Hoyt (2003)	1997-2001	26	Keyword Search	Higher leverage
Pagach and Warr (2011)	1992-2005	138	Keyword Search	Larger, Higher Volatility, More Institutional Ownership
Altuntas, Berry-Stölzle, and Hoyt (2012)	2001-2009	53	Survey	Larger, Group Membership

B. Selected Prior Studies on ERM Value

Authors	Time Period	# Firms	ERM Data	Value Measure	Effect of ERM on Value
Beasley, Pagach, and Warr (2008)	1992-2003	120	Keyword Search	CAR	Two-day market response not significant
Hoyt and Liebenberg (2011)	1998-2005	275	Keyword Search	Tobin's *Q*	20% ERM premium
McShane, Nair, and Rustambekov (2011)	2006-2008	82	S&P Ratings	Tobin's *Q*	No value from TRM to ERM
Lin, Wen, and Yu (2012)	2000-2007	105	Keyword Search	Tobin's *Q*	5% ERM discount
Baxter et al. (2013)	2006-2008	165[a]	S&P Ratings	Tobin's *Q*/ROA/CAR	Positive response to ERM quality
Grace et al. (2014)	2004, 2006	586	Survey	Cost and Revenue Efficiency	ERM associated with more efficiency
Farrell and Gallagher (2014)	2006-2011	225	RIMS RMM Survey	Tobin's *Q*	Mature levels of ERM increase value
Eckles, Hoyt, and Miller (2014)	1992-2008	280	Keyword Search	Return Volatility	Reduction in stock return volatility
Berry-Stölzle and Xu (2014)	1996-2012	250	Keyword Search	Cost of Capital	2% decrease in cost of capital

[a]Firm-year observations, as authors only report firm-year observations in the paper.

Table 2.
Testable Hypotheses and Expected Effects for Adopting ERM

Firms	ERM Value Hypothesis	ERM Cost Hypothesis
All ERM Adopters	Positive	Non-Positive
ERM Adopters (pre-2005)	Non-Positive	Non-Positive
ERM Adopters (post-2005)	Positive	Non-Positive

Note: The above table details testable hypotheses related to firms adopting ERM. The ERM Value Hypothesis is that ERM increases shareholder value, resulting in a positive stock price reaction from firms that adopt. The ERM Cost Hypothesis is that ERM implementation is costly and since investors can diversify away their risk, ERM adoption will lower firm value. This would result in a negative stock price reaction to ERM adoption. There are also different predictions for different periods. The effects of the ERM Value Hypotheses are predicted to be stronger post-2005. Under the ERM Cost Hypothesis, ERM will provide non-positive reactions over all time periods.

Table 3.
Regulatory Event Dates Leading to the Passage of ORSA Model Act

Date	Event
February 11, 2011	The U.S. ORSA Proposal was presented by Solvency Modernization Initiative (EX) Task Force. It was later not adopted.
March 18, 2011	Comment letters to the NAIC were published on the Febuary 11, 2011 Proposal.
July 21, 2011	ERM Education Session was presented to state regulators in Jacksonville.
August 5, 2011	The ORSA Guidance Manual draft was created by the NAIC Group Solvency Issues Working Group (GSIWG) of the Solvency Modernization Initiatives (EX) Task Force.
August 25, 2011	Comment letters to the NAIC were published on the Auguest 5, 2011 Guidance Mannual draft.
October 14, 2011	The ORSA Guidance Manual second draft was created by the NAIC GSIWG of the Solvency Modernization Initiatives (EX) Task Force.
October 28, 2011	Comments were received on October 14, 2011 Draft ORSA Guidance Manual and Draft Form B Regulation Language for NAIC ORSA.
November 2, 2011	GSIWG adopted ORSA guidance manual at NAIC 2011 Fall National Meeting.
December 19, 2011	NAIC Financial Condition (E) Committee said that they are expecting an effective date of ORSA in 2014, or 2015 at the latest.
March 6, 2012	The NAIC ORSA Guidance Manual was adopted by the NAIC Executive (EX) Committee and Plenary. It provides information for insurers on performing its ORSA and documenting risk policies and procedures.
April 4, 2012	NAIC Group Solvency Issues (E) Working Group released ORSA Model Act for public comment.
September 6, 2012	NAIC Financial Condition (E) Committee adopted ORSA act
September 12, 2012	NAIC Executive (EX) Committee and Plenary adopted Model #505. Model #505 provides the requirements for completing an annual ORSA and provides guidance and instructions for filing an ORSA Summary Report.

Table 4.
Sample Selection: ERM Event Study

Sample Selection Criteria	Number of Firms
Initial Sample	371
Less	
Firms not searched for ERM	-174
Firms without ERM	-95
Firms without exact dates	-46
Firms without CRSP data	-13
Final Sample	43

Note: The initial sample consists of publicly traded insurers (SIC between 6300 and 6399) listed on the merged Compustat/CRSP database at any point. Firms are eliminated if we have not yet completed a keyword search, the firm does not have ERM, an exact date could not be identified to perform the event study, or returns were not available on CRSP for the adoption date for the firm. This table will be updated as more data are obtained.

Table 5.
ERM Adoption by Year

Year	Adopters	Percentage	Cumulative
1996	2	1.77%	1.77%
1997	1	0.88%	2.65%
1998	3	2.65%	5.31%
1999	3	2.65%	7.96%
2000	2	1.77%	9.73%
2001	3	2.65%	12.39%
2002	8	7.08%	19.47%
2003	6	5.31%	24.78%
2004	9	7.96%	32.74%
2005	10	8.85%	41.59%
2006	20	17.70%	59.29%
2007	15	13.27%	72.57%
2008	7	6.19%	78.76%
2009	7	6.19%	84.96%
2010	11	9.73%	94.69%
2011	4	3.54%	98.23%
2012	2	1.77%	100.00%

Note: This table provides data on ERM adopters by year, as determined by a keyword search. The third column provides the percentage of total ERM adopters in the sample per-year, and the final column is the cumulative percentage over time.

Table 6.
Summary Statistics and Univariate Comparisons

Firm characteristics	*ERM (N=639)*			*No ERM (N=1,280)*			*Difference (ERM-No ERM)*		
	Mean	*Median*	*Std. Dev.*	*Mean*	*Median*	*Std. Dev.*	*Mean*	*Median*	*Std. Dev.*
Assets	871.1791	154.8433	1855.4587	182.6527	22.4281	650.8539	688.5264***	132.4152***	1204.6048
Liabilities	791.5325	113.6828	1754.6995	162.2964	15.7221	609.9446	629.2361***	97.9607***	1144.7549
MV Equity	102.2372	38.6085	160.9955	34.4001	8.4817	89.4811	67.8370***	30.1268***	71.5144
BV Equity	79.2600	35.9200	112.8643	19.9823	5.8122	45.2392	59.2776***	30.1078***	67.6251
M/B	1.2956	1.1362	0.7789	1.6375	1.3633	1.1192	-0.3419***	-0.2271***	-0.3403
Leverage	7.0994	2.9686	10.5516	3.9239	2.1870	5.7972	3.1754***	0.7816***	4.7544
Cash Ratio	0.0679	0.0243	0.1125	0.0897	0.0235	0.1642	-0.0218***	0.0008	-0.0517
Intangibles	0.0330	0.0083	0.0719	0.0425	0.0087	0.0808	-0.0095**	-0.0004	-0.0089

Note: Tests above for significant differences between firms with ERM programs and firms without ERM programs are *t*-tests for means and nonparametric *k*-sample test for medians. *Assets* is a firm's total assets in billions. *Liabilities* is a firm's liabilities in billions. *MV Equity* is the market value of equity in billions. *BV Equity* is the book value of equity in billions. *M/B* is a firm's market-to-book ratio. *Leverage* is total liabilities divided by market value of equity. *Cash Ratio* is cash holdings divided by total liabilities. *Intangibles* is the book value of intangible assets divided by total assets. The sample period is 1996 to 2012. In total, there are 1,919 firm-year observations and 188 unique firms. ***, **, and * represent significance at the 1, 5, and 10 percent levels, respectively.

Table 7.

Event Study: ERM Adoption

Panel A: All Years

Window	N	CAAR	Patell Test Z	Standardized Cross-Sectional Test Z	Generalized Sign Test Z
(0,+1)	43	-0.19%	-0.356	-0.295	-0.592
(0,+2)	43	-0.06%	0.238	0.208	0.629
(0,+3)	43	-0.54%	-1.031	-1.016	-1.507 *
(-2,+2)	43	0.58%	1.056	1.169	2.154 **
(-3,+3)	43	-0.15%	-0.551	-0.629	0.018
(-5,+5)	43	0.74%	0.124	0.115	0.934

Panel B: 1998-2005

Window	N	CAAR	Patell Test Z	Standardized Cross-Sectional Test Z	Generalized Sign Test Z
(0,+1)	15	-1.47%	-1.845 **	-1.692 **	-1.240
(0,+2)	15	-1.70%	-1.813 **	-2.116 **	-1.756 **
(0,+3)	15	-1.68%	-1.810 **	-2.149 **	-2.273 **
(-2,+2)	15	-0.30%	-0.445	-0.734	-0.207
(-3,+3)	15	-0.86%	-1.024	-1.563 *	-0.724
(-5,+5)	15	0.38%	-0.667	-0.576	-0.724

Panel C: 2006-2012

Window	N	CAAR	Patell Test Z	Standardized Cross-Sectional Test Z	Generalized Sign Test Z
(0,+1)	31	0.54%	1.014	0.875	0.359
(0,+2)	31	0.64%	1.410 *	1.223	1.797 **
(0,+3)	31	0.01%	-0.003	-0.003	-0.360
(-2,+2)	31	0.96%	1.554 *	1.613 *	2.515 ***
(-3,+3)	31	0.00%	-0.100	-0.107	0.000
(-5,+5)	31	0.49%	0.382	0.379	1.078

Note: This table presents results from event studies surrounding ERM adoption, as determined from a newswire search. Panel A reports the firms that adopted ERM in all sample years, Panel B reports the ones that adopted from 1998 to 2005, and Panel C reports the ones that adopted from 2006 to 2012. Z-statistics from three alternative tests are reported in the last three columns. *, **, and *** represent significance at the 10, 5, and 1 percent level, respectively.

Table 8.
Event Study Results for S&P Announcement

	All Firms	*ERM Ever*	*ERM at 0*	*No ERM at 0*	*No ERM Ever*
(-1,0)	0.07%	-0.27%	0.17%	-0.04%	0.60%
	0.13	-0.23	0.247	-0.07	0.848
(-1,+1)	0.50%	0.27%	0.53%	0.34%	0.83%
	0.794	0.601	0.642	0.546	0.959
(-1,+5)	1.52% *	1.68% **	1.51%	1.21%	0.30%
	1.593	1.873	1.187	1.25	0.226
(-3,+3)	0.72%	0.82%	1.24%	0.47%	0.23%
	0.748	0.816	0.978	0.483	0.176
(-5,+5)	1.09%	1.28%	2.16% *	0.89%	-0.09%
	0.911	1.145	1.357	0.735	-0.053
Firms	109	80	15	81	27

Note: This table presents the results of testing for abnormal market reactions to S&P's announcement of Enterprise Risk Management firm ratings on 10/17/2005. The first column contains results for all firms in the sample. The second column provides results for all firms that either had ERM at the time of the announcement or eventually adopted ERM. The third column provides results for firms that had already adopted ERM at the time of the announcement. The fourth column provides results for firms that did not have ERM at the time of the announcement. The fifth column provides results for firms that did not have ERM at the time of the announcement and have yet to adopt it. The time-series *t*-statistic is reported as the Crude Dependence Adjustment (CDA) is used and is presented beneath the cumulative abnormal returns. *, **, and *** represent significance at the 10, 5, and 1 percent level, respectively.

Table 9.
Event Study Results for A.M. Best Announcement

	All Firms	*ERM Ever*	*ERM at 0*	*No ERM at 0*	*No ERM Ever*
(-1,0)	0.05%	-0.07%	-0.50%	0.35%	0.46%
	0.110	-0.138	-0.845	0.668	0.668
(-1,+1)	0.67%	0.67%	0.35%	0.76%	0.67%
	1.119	1.085	0.478	1.21	0.793
(-1,+5)	0.19%	0.24%	-0.65%	0.48%	-0.10%
	0.208	0.259	-0.586	0.494	-0.079
(-3,+3)	0.10%	0.43%	-0.66%	0.26%	-1.00%
	0.107	0.456	-0.593	0.264	-0.776
(-5,+5)	0.35%	0.51%	-0.55%	0.64%	-0.20%
	0.303	0.435	-0.396	0.528	-0.121
Firms	108	82	31	65	26

Note: This table presents the results of testing for abnormal market reactions to A.M. Best's special report announcing an increased focus on ERM in rating analysis on 2/6/2006. The first column contains results for all insurance firms in the sample. The second column provides results for all firms that either had ERM at the time of the announcement or eventually adopted ERM. The third column provides results for firms that had already adopted ERM at the time of the announcement. The fourth column provides results for firms that did not have ERM at the time of the announcement. The fifth column provides results for firms that did not have ERM at the time of the announcement and have yet to adopt ERM. *P*-values are presented beneath the abnormal market returns. The time-series *t*-statistic is reported as the Crude Dependence Adjustment (CDA) is used and is presented beneath the cumulative abnormal returns. *, **, and *** represent significance at the 10, 5, and 1 percent level, respectively.

Table 10.
Abnormal Returns Surrounding Dates Leading to the Passage of ORSA

Panel A.

	2/11/2011		3/18/2011		7/21/2011		8/5/2011		8/25/2011	
	ERM	*No ERM*	*ERM*	*No ERM*	*ERM*	*No ERM*	*ERM*	*No ERM*	*ERM*	*No ERM*
(0,0)	0.690%	0.549%	0.357%	-0.464%	-0.641%	-0.639%	-2.504% ***	-0.149%	-0.026%	-0.663%
	0.207	0.374	0.497	0.448	0.208	0.284	0.000	0.805	0.959	0.261
(-1,0)	0.453%	0.320%	-0.431%	-0.748%	-0.532%	-0.613%	-2.681% ***	0.381%	0.928%	-1.419% *
	0.559	0.715	0.563	0.388	0.460	0.468	0.000	0.664	0.188	0.087
(-1,+1)	-0.348%	0.186%	-0.422%	-0.696%	-0.790%	-1.812% *	-1.643% *	-0.083%	0.682%	-1.445%
	0.714	0.863	0.645	0.515	0.372	0.080	0.084	0.942	0.430	0.156
(-3,+3)	-0.032%	1.766%	-0.575%	0.083%	-2.344% *	-2.836% *	0.877%	0.028%	-0.944%	-1.423%
	0.983	0.285	0.682	0.960	0.085	0.075	0.530	0.987	0.485	0.372
(-5,+5)	0.685%	0.731%	-3.117%	-1.362%	-2.818%	-4.272% **	-2.353%	-0.807%	-0.452%	-0.681%
	0.711	0.726	0.079	0.510	0.101	0.034	0.168	0.697	0.788	0.731
Firms	34	15	34	14	34	13	34	13	34	13

(continued)

Panel B.

	10/14/2011		10/28/2011		11/2/2011		12/19/2011	
	ERM	*No ERM*	*ERM*	*No ERM*	*ERM*	*No ERM*	*ERM*	*No ERM*
(0,0)	-0.994% *	-0.754%	-0.540%	-0.529%	1.454% ***	0.549%	-0.001%	0.547%
	0.055	0.205	0.314	0.363	0.009	0.374	0.999	0.335
(-1,0)	-2.082% ***	-0.865%	0.030%	-1.541% *	1.758% **	0.320%	-0.387%	-0.583%
	0.004	0.303	0.969	0.064	0.026	0.715	0.663	0.467
(-1,+1)	-2.917% ***	-1.570%	0.756%	0.140%	1.130%	0.186%	-0.664%	-0.687%
	0.001	0.127	0.418	0.890	0.243	0.863	0.542	0.486
(-3,+3)	-0.850%	-1.525%	3.020% **	4.732% ***	2.108%	1.766%	3.539% **	-0.207%
	0.537	0.336	0.035	0.002	0.157	0.285	0.035	0.891
(-5,+5)	-1.175%	-1.714%	4.482% **	11.191% ***	3.451% *	0.731%	3.831% *	-0.969%
	0.502	0.394	0.014	0.000	0.066	0.726	0.070	0.612
Firms	33	12	33	12	33	15	33	11

(continued)

Table 10.

Abnormal Returns Surrounding Dates Leading to the Passage of ORSA (continued)

Panel C.

	3/6/2012		4/4/2012		9/6/2012		9/12/2012	
	ERM	*No ERM*	*ERM*	*No ERM*	*ERM*	*No ERM*	*ERM*	*No ERM*
(0,0)	-0.191%	-0.696%	0.297%	0.320%	-0.272%	-0.642%	-0.400%	-0.624%
	0.780	0.254	0.657	0.605	0.699	0.421	0.572	0.455
(-1,0)	1.154%	-0.554%	0.215%	0.608%	-0.435%	-0.314%	-0.223%	-0.857%
	0.233	0.522	0.821	0.488	0.662	0.781	0.824	0.469
(-1,+1)	1.130%	-0.886%	0.004%	1.262%	-0.652%	-0.365%	-0.902%	-1.462%
	0.341	0.403	0.997	0.241	0.593	0.792	0.464	0.314
(-3,+3)	-0.086%	-1.758%	-1.079%	-3.353% **	0.617%	-0.437%	-0.332%	-2.371%
	0.963	0.281	0.547	0.043	0.742	0.838	0.861	0.289
(-5,+5)	-0.613%	-4.148% **	-0.103%	-1.778%	0.733%	-1.567%	-0.978%	-3.153%
	0.791	0.044	0.964	0.395	0.757	0.560	0.683	0.264
Firms	32	11	31	11	31	11	31	11

Note: This table provides cumulative abnormal average returns (CAARs) for the corresponding event window. Each date represents a key date leading to the NAIC's adoption of ORSA. Results are presented for ERM firms and non-ERM firms separately. *P*-values are presented beneath each CAAR estimate and are based on an unreported *F*-test of the null hypothesis that CAAR=0. *, **, and *** represent significance at the 10, 5, and 1 percent level, respectively.