Enterprise Risk Management and Diversification Effects for Property and Casualty Insurance Companies

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Abstract

In a well-designed enterprise risk management (ERM) program, the firm integrates risk management into the strategic planning process, addressing strategic risk, financial risk, operational risk, and hazard risk under a single overarching process. This is particularly important to large financial firms, such as property and casualty (P&C) insurers, which face a diverse set of risks. We find that ERM quality, as measured by S&P ERM ratings from 2006 - 2012, has a strong positive affect on ROA and Tobin's Q for P&C insurers. In contrast to previous studies that have found that diversified firms suffer a value discount relative to their more focused peers, the results of this study suggest that, after controlling for ERM quality, business line diversification is associated with a performance premium whereas geographic diversification is not a significant factor.

Keywords: Enterprise Risk Management (ERM), Diversification Effect, Property and Casualty, Insurance Company Performance

1 Introduction

Following the industrial trend of conglomeration, modern companies have grown larger and more diverse in practice. The trend toward greater diversification generates new challenges and opportunities for risk management at the enterprise level. Theoretically, positive effects of diversification include scope economies, access to larger and less expensive internal capital markets, and risk reduction. However, the finance and insurance literature documents the existence of a diversification discount whereby firms with significant product line and/or geographic diversification tend to generate lower returns on equity and assets than their more focused peers, all else equal (Berger, et al., 2000; Liebenberg and Sommer, 2008). Possible explanations for

the diversification discount include agency costs and inefficiencies, such as the additional cost of duplicative efforts in various aspects of firm management, including risk management.

In the last decade, large firms have increasingly adopted enterprise-wide approaches for dealing with the wide variety of risks they face (Beasley et al. 2012). In a well-designed enterprise risk management (ERM) program, the firm integrates risk management into the strategic planning process, addressing strategic, financial, operational, and hazard risks under a single overarching process (for example, see Hoyt and Liebenberg, 2011; Ai, et al., 2012; Grace et al., 2014). This is in contrast to more traditional silo approaches to risk management in which each type of risk is managed separately. Industry and rating agencies report anecdotal evidence that ERM softened the effect of the economic recession, increasing adopting firms' identification of and preparation for complex and interrelated risks (S&P, 2009). It is our hypothesis that implementation of ERM should reduce or eliminate the negative factors that result in a diversification value discount. In fact, our analysis of the P&C insurance industry suggests that firms with effective ERM programs enjoy a performance premium. Using the S&P ERM ratings from 2006 to 2012, we find that product line diversification has a significant positive effect on value for more diversified firms with well-implemented ERM programs, as compared to those with weak ERM.

Although the academic literature has generally found ERM to have positive effects on firms,[1] these conclusions have been hampered by short time series and inadequate specification of the ERM implementation variables, as will be discussed in the next section. Nevertheless, rating agencies, such as S&P and A.M. Best, are clearly convinced of the beneficial effects of ERM. Recent inclusion of ERM quality scores in credit rating assessment has increased the rate of adoption, particularly among financial firms. In addition, the NAIC's new regulatory standard *Own Risk and Solvency Assessment* (ORSA) is expected to provide a major push toward advancing the commitment to ERM as a value-enhancing strategy for U.S.

[1]For two recent reviews of the empirical literature on the determinants and value impact of ERM in the insurance industry, see Kraus and Lehner (2012) and Gatzert and Martin (2013).

insurers at all levels. The Dodd Frank Act (2010) created the Federal Insurance Office which is charged with studying systemic risks posed by insurance products and firms. The state-based system of insurance regulation is under pressure to adopt uniform national standards, which would require centralized risk management to be implemented effectively (Brown, 2013). In response to these changes, insurers and other financial firms are being proactive in adopting and implementing ERM. Based on a survey of 131 large financial institutions, Deloitte (2011) reports that 79 percent had ERM or equivalent centralized risk management programs in place in 2010, up from 59 percent in 2008. Similar rates of adoption were found in a survey of executives from other industries in 2011 (Deloitte, 2012). The 2013 RIMS Enterprise Risk Management Survey found that 21 percent of respondents had fully integrated ERM across the organization and 42 percent had partially integrated ERM (RIMS, 2013). Whether the trend in ERM adoption is due to perceived value-enhancing effects by firm management or is merely a response to regulatory and rating agency pressures is still a matter of debate.

Coincident with the trend toward ERM implementation, the property and casualty (P&C) insurance industry has been in a phase of industry consolidation and reduced product line diversification. Given decreasing returns to scale for large insurers (Cummins and Xie, 2008) and the negative value effect for acquirers (Shim, 2011), observed consolidation and focus trends are more likely motivated by risk management objectives such as increased liquidity and improved efficiency. For example, Powell et al. (2008) report on the prevalence of capital transfers by means of reinsurance transfers among affiliated P&C insurers.

Increasingly centralized management of risk provides an alternative explanation for the trends in consolidation and diversification in the P&C industry. The purpose of this paper is therefore to investigate the interrelated effects of ERM and diversification on P&C insurer performance and value. If implemented effectively, ERM should alleviate many of the inefficiencies inherent in large diversified organizations and thus mitigate the negative effects of diversification. However, ERM adoption and implementation activities are both costly and time consuming, and the quality of implementation will differ by firm. Therefore, the net effect on firm performance is

theoretically uncertain. Although the P&C industry fared better than most during and after the financial crisis (FIO, 2013), it is still subject to increased oversight and regulation of risk management activities. Better understanding of the impact of ERM will inform the development of rating criteria, reporting requirements, and managerial decision-making.

In the next section, we review the relevant literature that documents both a diversification discount for insurance companies and the benefits of enterprise risk management. We then describe our data and methodology and present the empirical results. This study makes several contributions to the insurance literature. In addition to providing important background on the cross-sectional characteristics of the S&P ERM rating and documenting a significant decline in P&C insurer product line diversification, we show that well-implemented ERM programs have a significant positive effect on P&C insurers. We also find that the previously-documented diversification discount is actually a diversification premium after controlling for ERM quality. The synergistic benefits of ERM are particularly important for more diversified firms. This is important because the financial crisis generated considerable structural and regulatory change in the insurance marketplace, warranting a fresh look at an issue that has important strategic implications for the industry. Our results add to the growing literature on the value of enterprise risk management.

2 Previous Literature

2.1 Literature on Enterprise Risk Management

Changes in the internal and external environment of business have heightened interest in centralized risk management. A holistic approach to risk management is believed to be more effective than traditional silo approaches, particularly for firms faced with increasingly complex and interrelated risks. A variety of factors have contributed to the widespread adoption of ERM, including enhanced understanding of systemic risks after the global financial crisis and improvements in technology re-

lated to risk quantification and tracking. ERM is uniquely different from traditional risk management approaches which have usually been reactive rather than proactive. Placement of risk management at higher levels of managerial responsibility, often the C-suite level, allows integration of risk decisions into fundamental corporate strategies. Ultimately, the objectives of ERM are to protect and enhance stakeholder value (Hoyt and Liebenberg, 2011).

The empirical literature on ERM has been hampered by lack of reliable data on corporate risk management activities. Earlier studies focused on the incidence of adoption, characteristics of firms with ERM programs, and the value and/or efficiency effects for these firms. Proxies for adoption, such as announcements of CRO appointments and other self-reported adoption activities have been commonly employed. More recently, external data on ERM quality has become available from rating agencies. However, few studies have incorporated these measures thus far due to the relatively limited firm-years available. In this section, we briefly review the ERM-related literature. For a more complete discussion and comparison of previous studies, see Gatzert and Martin (2013).

There is an extensive literature on the value of risk management more generally. Possible benefits include reduced volatility for earnings and stock prices, reduced external capital costs, increased capital efficiency, operating flexibility, and cost reductions achieved through more efficient capture of synergies in risk management activities (See e.g. MacMinn, 1987; Meulbroek, 2002; Smithson and Simkins, 2005; Eckles et al., 2012; Gamba and Triantis, 2013; Berry-Stölzlea and Xu, 2013).Whether ERM implementation achieves any or all of these goals and whether it adds value to shareholders are empirical questions that have been addressed in a variety of ways.

Earlier studies primarily focus on the determinants of ERM adoption (see e.g. Liebenberg and Hoyt, 2003; Kleffner et al., 2003; Beasley et al., 2005; Grace et al., 2014). Several studies investigate whether the creation of a specialized managerial position, such as a Chief Risk Officer (CRO), is related to ERM adoption (Liebenberg and Hoyt, 2003; Beasley et al., 2008; Pagach and Warr, 2011; RIMS, 2011). However, as regulatory pressure to report and document risk practices increases in the last decade, ERM has quickly become a mainstream business practice (RIMS 2013). In

fact, nearly all insurers at least claim to have adopted enterprise risk management to some extent. For this reason, more recent ERM research has attempted to assess the financial consequences and value effects of ERM adoption.

An essential factor in the success of ERM program implementation is that it must be championed at a high level of management. Although the appointment of a CRO may be a strong signal of firm commitment to ERM, Grace et al. (2014) point out that it may be only loosely correlated with implementation or effectiveness of an ERM program. The risk manager may have insufficient authority to implement necessary changes at an organizational level or may not be using ERM. Grace et al. (2014) find that an important element is that there exists a primary reporting relationship from the risk managers to the C-Suite level of management (CEO or CFO).

A problem with this literature has been that ERM adoption is not equivalent to ERM quality, making it difficult to assess value effects. Previous studies have taken different approaches to this problem. Some consider announcements of CRO appointments or ERM adoption as proxies for ERM implementation without being able to distinguish firms based on quality of ERM (Liebenberg and Hoyt, 2003; Pagach and Warr, 2011; Berry-Stölzlea and Xu, 2013). Others use survey data to assess quality (Kleffner et al., 2003; Beasley et al., 2005) or infer quality from observable outcomes or calculated efficiency measures (Gordon et al. 2009; Grace et al. 2014).

The evidence on whether ERM is positively associated with firm value is mixed. For example, Hoyt and Liebenberg (2011) simultaneously model the determinants of ERM adoption and the effect on firm value (Tobin's Q) and conclude that ERM adoption results in a 20 percent value premium. However, Pagach and Warr (2010) do not find a significant effect. Arguably, the inadequacies of the data on ERM adoption, risk management strategies, and quality are responsible for the inconsistencies in research conclusions.

The S&P ERM rating, which is described in more detail in a later section, is only recently available, but has been used in a few studies. Pooser (2012) uses insurer ERM ratings from 2009 and 2010 to examine the determinants of being a rated firm.

The Baxter et al (2012) study estimates the effect of various firm characteristics on ERM ratings of banks and insurers from 2008 to 2010. These studies conclude that size and complexity are associated both with being rated and with having a higher rating among the rated firms. McShane et al. (2011) finds a positive relationship between ERM quality and Tobin's Q for rated insurers in 2006-2007. Because S&P initially rated a smaller number of firms, these studies include only a small number of firms over a very short time series.

2.2 Literature on Diversification and Performance

A related literature examines the effect of diversification on firm performance. To the extent that product line and geographic diversification are key risk management strategies, it is interesting that many studies have found a diversification discount although the existence and the extent of the discount may be industry-specific (Santalo and Becerra 2008). Theoretically, the benefits of diversification should be related to economies of scope, potential for cross-selling of products, reduced costs of production, and more efficient governance structures. As in some other industries, however, more diversified insurers have been shown to underperform more focused firms. Diversification is hypothesized to result in increased agency costs and less efficient allocation of capital among divisions of the firm (Berry-Stölzle et al., 2012).

The finding of a diversification discount is relatively robust to various measures of diversification and value as well as to different empirical methodologies. Diversification has been measured in different ways in various studies, including: whether firms sell both P&C and Life and Health (L&H) products versus specializing (Hoyt and Trieschmann, 1991); a Herfindahl index across P&C and L&H (Tombs and Hoyt, 1994); a dummy measure for single line vs. multi-line insurers (Liebenberg and Sommer 2008); a Herfindahl index across all business lines (Berry-Stölzle et al., 2011); and a Herfindahl index across geographies (Elango et al., 2008).

Similarly, different measures of value and profitability have been examined. For other industries, the effects of diversification have commonly been measured by refer-

ence to the impact on stock price or return. One of the difficulties in estimating the diversification discount for insurers is that so few are publicly traded, which implies that researchers who are interested in market effects are limited to a subsample of firms, most of which are large and relatively diversified. If the sample is broadened to include the universe of firms, both public and private, accounting-based or statutory values must be used. Despite these issues, however, the diversification discount has been shown to be robust to the value measure choices, with effects seen on stock returns (Hoyt and Trieschman, 1991); Tobin's Q and various accounting measures, such as Return on Assets (ROA) and Return on Equity (ROE) (Liebenberg and Sommer, 2008). In a related study, Shim (2011) specifically looks at the value effects of diversification in mergers and acquisitions (M&As). He finds that acquirers suffer a diversification discount and experience greater earnings volatility during and after the M&As, perhaps as the result of increased frictions and agency problems.

Based on our review of the literature, the value effects of combined ERM and diversification strategies on P&C insurers are still indeterminant. Diversification is a strategic decision that should be based on careful evaluation of risks and rewards. Firms with high quality ERM programs might be able to better capture the value effects of this decision, whereas those with ineffective and/or decentralized risk management might not. As an example, ERM might lead a given firm's management to a more diversified strategy because its analysis suggests that the firm has a unique ability to manage in diverse geographies or product lines, leading to competitive advantage and value creation. Another firm's management might come to the conclusion that a more focused approach is preferable because diversification imposes too many agency costs. In addition to differences in methodologies, sample periods, control variables, and measures of ERM and diversification, the previous literature does not adequately consider these interacting effects. Furthermore, most ERM and diversification studies analyze data from years that precede the financial crisis, widespread adoption of ERM, and recent declines in P&C product line diversification. In the next section, we describe these trends in more detail.

3 Recent Trends in P&C Diversification and ERM

Two important trends in the property and casualty insurance industry that provide motivation for our research are declining product line diversification and widespread adoption of centralized risk management approaches.

3.1 Declining Diversification

Whereas other industries have continued the trend of the last decades toward diversification to achieve economies of scale and scope, but P&C insurers are becoming more focused by product line in recent years (see Shim, 2011). We define geographic and business line diversification using the standard approach in the insurance literature. Business line diversification ($BLHHI_{kt}$) and geographic diversification ($GEOHHI_{kt}$) for firm k in year t are measured as the complement of the Herfindahl concentration Index. These are defined in Equations 1 and 2:

$$BLHHI_{kt} = 1 - \sum_{j=1}^{45} (\frac{NPW_{kjt}}{NPW_{kt}})^2. \tag{1}$$

$$GEOHHI_{kt} = 1 - \sum_{j=1}^{57} (\frac{NPW_{kjt}}{NPW_{kt}})^2. \tag{2}$$

where NPW_{kjt} is the net premium written for the business line j (or geographic area j). Business line diversification considers premiums written across 43 lines of business, [2] and the geographic diversification measure is based on net premiums written across 57 geographic areas, as reported in the NAIC statutory accounting statements. The historical trends in average firm-level business line and geographic

[2]Some previous studies have defined diversification based on a smaller number of lines of business, as in Berry-Stölzle et al. (2011) in which the researchers collapsed the 43 lines in the SNL reports to 24. The choice of how to collapse the lines is somewhat subjective, and we found similar results using the alternative measure of diversification. We report only the results for the larger number of lines corresponding to the statutory reports.

diversification from 2001 to 2012, not including single line firms and firms which operate in only one state are illustrated in Figure 1.

From 2001 to 2012, average BLHHI declined from 0.59 to 0.53, but over that same period, average GEOHHI was virtually unchanged at approximately 0.62. Paired t-tests for differences in means showed the decline in BLHHI to be significant at the .01 level.[3]

[Insert Figure 1 Here]

When broken out by terciles of firm size, as depicted in Figure 2, the larger and more diversified firms exhibited smaller changes than less diversified firms, but all three groups became significantly less diversified over this period. The largest declines in diversification occurred in the smallest firm-size tercile. Again, average GEOHHI was virtually unchanged for each of the three firm size categories as shown in Figure 3.

[Insert Figure 2 Here]

[Insert Figure 3 Here]

3.2 Widespread Adoption of Enterprise Risk Management

Coinciding with the decline in diversification among P&C insurers, there has been increased interest in the adoption of enterprise risk management. This is not unique to insurers, but adoption rates are much higher among these firms than in other industries (Deloitte, 2011; RIMS, 2013). Although the motivations for this trend may be different by firm, it is hypothesized that regulatory pressure, technological advances in risk monitoring and measurement, and perceived value have all played a role.

To assist outside stakeholders and regulatory authorities in assessing risk management quality as a component of broader assessments of credit quality and capital

[3]To see the economic significance of the decline in diversification, consider the following example. A firm with a BLHHI equal to 0.7 could have 50% of its business in one line of business and the remainder evenly distributed across 6 other lines of business. The same firm would have to drop two of the smaller lines of business for its BLHHI to be 0.6.

adequacy, rating agencies have begun to assess ERM as well. For example, as a component of its assessment of economic capital adequacy, Standard and Poor's rates each insurer's ERM program as: Excellent, Strong, Adequate, or Weak. This rating, which was first implemented in 2006, is based on an in-depth analysis of the firm's risk culture, processes for addressing current and future risk exposures, quality of risk modeling, and strategic integration. Beginning in 2009, the Adequate category was split into three sub-levels: Adequate, Adequate with Strong Risk Controls, and Adequate with Positive Trend (S&P 2013). Figure 4 illustrates the most recent distribution of these ratings for all insurers evaluated by Standard & Poor's Ratings Services in 2012. Detailed definitions for each of these rating categories are provided in Table A1 in Appendix.

[Insert Figure 4 Here]

[Insert Table A1 Here]

The number of rated P&C insurers has increased from 125 in 2006 to 146 in 2012 and is expected to increase in the future. Although this is a small fraction of the total number of P&C insurers, it represents a large percentage of publicly traded firms and more than half the industry by market capitalization. The vast majority of firms are given one of the three Adequate ratings. Comparing 2012 and 2013, a smaller proportion of firms were ranked as Weak and Excellent in 2013. The use of S&P ERM ratings as a control variable should improve performance model specification relative to previous studies employing subjective survey responses or hand-collected public announcements related to ERM adoption or CRO appointments.

4 Enterprise Risk Management, Diversification and Performance

As discussed in the earlier sections, ERM may add value to a firm by helping it better trade off the costs and benefits of geographic and product line diversification. Although diversification can offer synergies and scope economies, managing a more

diverse enterprise may be more costly due to agency costs and coordination. Firms with well-functioning ERM programs may be able to alleviate these costs, resulting in value creation. Given that previous studies have generally found more diversified firms to suffer a value discount, the purpose of this research is to evaluate the effects of ERM on value and performance, while controlling for the effect of firm characteristics and diversification strategies.

4.1 Sample Description

The sample consists of all U.S. property and casualty insurance companies in the SNL Financial database for the period from 2006 to 2012, the period for which S&P ERM quality ratings are available.[4] The analysis is at the group level, with the unit of observation being the group or unaffiliated firm. After limiting the sample to groups and unaffiliated firms with positive premiums, the final sample includes 346 groups, 882 unaliated frms and a total 7701 firm-years observations. Among all firms in our sample, 70 unique firms (62 groups vs 8 unaffiliated; 49 public vs 21 nonpublic) received S&P ERM ratings. The ERM rated P&C firms in our sample account for 61.8 percent of net premiums written during this period and 73.3 percent of net premiums written by public firms. Stock price data are from the Center for Research in Securities Prices (CRSP), and firm financial data are from SNL Financial database and COMPUSTAT. Table 1 summarizes all variables and their definitions.

[Insert Table 1 Here]

Table 2 provides the summary descriptive statistics for all U.S. property and casualty insurance companies in the SNL database for the period from 2006 to 2012, by ERM-rating status. Based on the raw summary statistics, we winsorize Tobin'Q at the 1% and 99% levels and cap the two control variables % COMMERCIAL and % INVESTMENT at their theoretical value 1. The results of paired t-tests indicate that the ERM-rated sample is significantly younger, smaller, and more diversified by both product line and geography. Interestingly, the univariate comparison shows that

[4]In the models using Tobin's Q, the sample includes only publicly traded firms.

the rated firms do not perform better than non-rated firms on average both in terms of accounting-based ROA measure and the market-value based Tobin's Q measure. This suggests that performance is not one of the considerations for receiving an ERM rating and is consistent with Baxter et al. (2013) that does not find a significant sample selection bias. However, we still caution that any conclusions drawn from our analysis of the rated firms may not be generalizable to the whole industry.

[Insert Table 2 Here]

4.2 The ERM-Diversification-Performance Relationship

Consistent with the diversification-performance literature, we run models of the general form:

$$Performance = f(ERM\,quality, diversification \mid firm\,characteristics) \quad (3)$$

The analysis is conducted for two alternative performance measures: Return on Assets (ROA) and Tobin's Q. ROA is measured as *Net Income/Book Value of Assets* and Tobin's Q is the *(Market Value of Equity + Book Value of Liabilities)/Book Value of Assets*. Diversification is measured based on the business line Herfindahl (BLHHI) and geographic Herfindahl (GEOHHI) defined in Equations 1 and 2.

Performance is alternatively measured as ROA and Tobin's Q to capture both the accounting-based value and the market value assessment. The Tobin's Q specification is only used for public insurers where market data is available and therefore does not include controls for stock ownership or group affiliation. In previous studies, researchers have suggested that ROA is a good representation of performance because so much of regulatory scrutiny focuses on accounting data. Although some studies have used ROE as a measure of performance, it is more difficult to compare across public and private firms and thus we do not use it in this study.

We include measures of both ERM quality and diversification as control variables.

As compared to ERM implementation variables that have been used in most previous studies, the S&P ERM rating score described above offers several advantages. First, it is clearly superior to measures based on announcements such as appointment of a CRO or ERM adoption. These are noisy measures and do not allow an assessment of the quality of ERM in place. For example, a firm may appoint a CRO but give the position very little authority to manage risk holistically. Second, the S&P ERM rating score provides a more precise measurement of quality and does not require subjective judgment of the researcher. Possible criticisms include the limited number of firms currently being rated, the lack of track record (7 years so far), subjectivity of many of the criteria from S&P's perspective, and the potential for manipulation or collusion with evaluators. The latter factor may be more of an issue in the future if these ratings are incorporated in risk-based capital requirements or may result in further regulatory scrutiny. Nevertheless, it is our opinion that this is a better measure of the quality of ERM implementation and will be useful for many research purposes, particularly as more years of rating data become available and represent a large and increasing share of P&C industry premiums written. As with many other performance metrics in the past, we expect that, as more insurers are rated, the relative quality of the ERM programs will improve.

The S&P ERM ratings are used to create dummy variables for ERM quality. Because of the small number of companies receiving Strong and Excellent ratings, we collapse those two groups into one category for analysis (ERM=E/S). Similarly, we collapse the three Adequate sub-categories (after year 2010) into one (ERM=A) for consistency with data from the previous years. The reference category is the firms rated as Weak (ERM=W).[5] Note that we also use an ERM score (ERM=1,2,3) corresponding to the three rating dummy variables in the two stage least squares models.

[5]Some studies have attempted to more finely categorize by ERM quality. For example, Baxter et al. (2013) create a rating of 1 to 6 from the original S&P ratings. With only three years of ratings, this creates some small sample issues which are somewhat alleviated by the inclusion of a range of financial services firms in their estimation. Further, there is no reason to believe that the value effect from going from one category of Adequate to better level of adequate is the same as that of going from Weak to Adequate or Adequate to Strong.

Figure 5 provides a graphical illustration of the relationship between the S&P ERM rating and performance for the pooled sample of rated firms from 2006-2012. Consistent with our expectation that better implementation of ERM in insurance company organizations may be value-enhancing, we see a clearly monotonic relationship between ERM rating and performance for both performance measures. Firms with Excellent and Strong ERM rating, on average, seem to perform better than the firms with Weak ERM rating.

[Insert Figure 5 here]

While univariate results in Figure 5 suggest a positive relationship between the effective enterprise risk management strategy and performance, they may disguise the interaction between ERM and diversification, as well as those from other firm characteristics. Explanations for the significant diversification discount found in other studies often focus on the complexities inherent in large organizations, agency costs, and internal capital market inefficiencies. These costs may be sufficiently large to offset the advantages of scope economies and risk reduction. Although the finance literature has often identified the relatedness of business segments as a potential problem for diversified firms, limiting our sample to the P&C industry removes much of that concern. We hypothesize that effective ERM programs are more valuable to diversified P&C firms than to more focused P&C firms in that they may alleviate some of the inefficiencies that can be a drag on performance. However, risk management is not without cost, so the performance effect is theoretically uncertain. To better understand these effects, we control for business line (BLHHI) and geographic (GEOHHI) diversification.

The effect of ERM quality on P&C insurer performance is estimated using two stage least squares (2SLS) to account for potential endogeneity. In the first stage, we estimate the ERM quality rating with a set of instrument variables (age, S&P financial strength rating, and geographic diversification as a proxy for complexity).[6] Older and less complex firms may have a better chance of implementing a high qual-

[6]Note that we estimate a linear model in the first stage and include all the control variables from the second stage in order to ensure that the error term and the estimated ERM rating is truly uncorrelated.

ity ERM program, thus receiving a higher ERM rating. Baxter et al. (2013) use the credit rating of a firm as an instrument variable for S&P ERM rating. We propose to use the insurer's financial strength rating as an alternative instrument. The insurer financial strength rating indicates an insurer's financial strength and ability to meet ongoing obligations to policyholders and S&P is one of the rating agencies that provide such a rating. As shown in Table 3, about 80% of the ERM rated firms have received a financial strength rating from S&P. Firms with higher financial strength ratings are not only more likely to receive an ERM rating but are rated higher as well.[7] The F-statistic from the first stage and the Hansen J test suggest that this combination of instruments satisfy the relevance and exclusion restriction requirements. Table 4 Panel A shows that, consistent with our expectation, higher financial strength rating and less complexity lead to a better ERM rating. Interestingly, older firms are found to have a lower ERM quality rating. The estimated ERM ratings from the first stage regression are then used in the second stage performance regressions.

[Insert Table 4 here]

The results of the second stage are reported in Table 4 Panel B. We report the results both with and without the inclusion of the BLHHI diversification control variable.[8] The dependent variables are ROA and Tobin's Q. To account for the panel structure of our sample, we estimate the models with year fixed effects and the standard errors are adjusted for firm-level clustering (Petersen 2009; Thompson 2011).[9] We include control variables for firm characteristics that have been used

[7]Note that following the credit rating and other finance literature, a large numeric value of the financial strength rating variable indicates a lower quality of rating.

[8]For comparison, we also estimate the model using an alternative Herfindhal diversification measure based on a collapsed set of lines as in Berry-Stölzle et al. (2011). Because the results are substantially the same, we limit our discussion and results to those using the broader diversification measure based on all lines of P&C business.

[9]The results of a Hausman test suggested that fixed effects was a better specification than random effects. Liebenberg and Sommer (2008) argue that year fixed effects were not advised with their sample because the key explanatory variable, a dummy for multiline firms, did not exhibit sufficient variation over time. The HHI measures used in this study exhibit much greater time variation. Because of the potential overlap between the ERM quality variable and the firm fixed effects, any ERM specific effects may be masked by the firm fixed effects. This is an empirical problem similar to one in the crediting rating literature. We follow the literature (Kuang and Qin

in previous studies of insurance company performance (Hoyt and Liebenberg, 2011; Liebenberg and Sommer, 2008; Elango et al., 2008).[10] Firm size (SIZE), measured as the natural log of total admitted assets, has been shown to significantly affect performance, although studies have differed on the sign. To the extent that there are diseconomies of scale and unmonitored agency costs, we would expect to see reduced value for larger firms. However, larger insurers may have lower insolvency risk, better market penetration, customer loyalty, reduced earnings volatility, and efficiency of operations that may lead to positive value effects (Liebenberg and Sommer, 2008).

Our analysis is at the group level and includes unaffiliated insurers. We include a dummy variable for those firms that are a member of a group (GROUP = 1) and expect that the ability to share capital across group members through the reinsurance mechanism should increase value relative to unaffiliated insurers (Schlütter and Gründl, 2012). Form of organization is controlled for by inclusion of a dummy variable for stock firms (STOCK = 1). The expected sign on this variable is ambiguous. Mutuals may have higher costs for managerial monitoring, but stock companies are exposed to owner-policyholder incentive conflicts. The benefits of access to capital markets may offset the disadvantages for stock-held firms. We also include controls for the firms' percentage of investments in risky assets such as stocks, bonds, and real estate (% INVESTMENT), and commercial lines exposure (% COMMERCIAL). Firms that invest more heavily in risky assets may perform better but also are subject to higher risk. Firms in highly competitive commercial lines are expected to have lower performance. Because our sample is limited to the firms that are rated by the S&P and are hence larger and publicly traded, GEOHHI does not substantially differ across firms. We therefore use this variable only in the first stage as a proxy for complexity, but do not include it as a control in the second stage regressions.

The results of the 2SLS analysis show that ERM quality has a positive and significant effect on ROA but is not a significant factor for Tobin's Q. Once we

2013) to not include firm fixed effects but adjust the standard errors for firm-level clustering.

[10]Note that we can only include a limited set of control variables because of the small sample size. We have selected the ones that are shown to be significant and important from the previous literature. Untabulated results show that inclusion of many of the other possible control variables does not change our results fundamentally.

control for ERM quality, the second stage results show that the control variables have the expected effect on performance or are insignificant. In general, we find that firms in highly competitive commercial lines have lower performance. The percentage of investments in risky assets has a significantly positive effect on ROA, but is only significant in the Tobin's Q regressions in which business line diversification is also included as a control.

To further investigate the joint value effects of diversification and ERM, we also run a pooled ordinary least squares (OLS) regression where the ERM ratings are measured as three different dummy variables. This specification also allows more direct comparison to results of the previous literature on the diversification-performance relationship. Again, the OLS regression is for the sample of property and casualty groups and unaffiliated firms with non-negative premiums and assets and S&P ERM ratings for the years 2006-2012. As in the previous model, we include ERM quality and diversification as independent variables, control for various firm characteristics, and for year fixed effects. The robust standard errors are adjusted for firm level clustering. We report the results of these estimations in Table 5. For each of the measures of performance (ROA and Tobin's Q), we estimate the model controlling for ERM in the first column, ERM and diversification (BLHHI and GEOHHI) in the second column, and including all three variables and the ERM $\times$ BLHHI interaction in the third column.

[Insert Table 5 Here]

These estimation results reported show that ERM quality has a strong positive impact on ROA but is not a significant factor determining Tobin's Q once we control for diversification effects. As compared to firms that receive Weak quality ratings, the firms rated as "Excellent/Strong" and "Adequate" both have significantly higher ROA. When both ERM quality and business line diversification are included in the model, the ERM coefficient is slightly lower but still positive and significant. In contrast to previous studies that suggest a negative performance effect for business line diversification, we find that BLHHI has a strong positive effect on ROA and is not a significant determinant of Tobin's Q. The coefficients for GEOHHI are not significant in any of our specifications. These results may be due to the more limited sample

of ERM-rated firms that are considered in this study. As previously reported in this paper, P&C insurers have been steadily reducing their product line diversification over the last decade. This may, in fact, be the observed results of ERM implementation, thus lessening the previously documented diversification discount effects. After controlling for the interactions between the ERM ratings and BLHHI, we find that the combined marginal effects of both diversification and ERM quality on ROA are still positive. More diversified firms benefit from high quality ERM programs to a greater extent than less diversified firms. The interactions do not have a significant affect on Tobin's Q.

We also investigate whether the ERM-diversification-performance relationship was affected by the financial crisis. By adding a financial crisis dummy (and omitting the year fixed effects) in our regressions, we find that our main results are not substantially different and firm performance is significantly worse during the financial crisis period. To conserve space, we do not report these results in the paper and they are available upon request from the authors.

5 Summary and Conclusions

This study considers the value effects of enterprise risk management and diversification for property and casualty insurers. With increasing regulatory pressure to adopt and implement enterprise-wide risk management programs, this research is both timely and important for large financial institutions. We find that ERM quality, as measured by the S&P ERM quality ratings, has a strong positive effect on performance. In contrast to previous studies that have found significant product line and geographic diversification discounts relative to more focused competitors, our analysis suggests that, after controlling for ERM quality, business line diversification has a significant positive value effect on ROA and geographic diversification is not a significant factor.

In theory, diversification offers the opportunity for scope economies, cost and rev-

enue efficiencies, and can act as a natural hedge that reduces the need for other, more costly, risk management tools such as derivatives and reinsurance. However, large conglomerate organizations can suffer from increased agency costs, reduced market discipline, and managerial inefficiencies. Proponents of enterprise risk management argue that these problems can be alleviated by adoption of an overarching approach to risk management that covers multiple risks across the enterprise. Although other studies have examined ERM adoption and program characteristics, this study adds to the literature by examining the effects of enterprise risk management in the context of the diversification-performance question. Despite a downward trend in business line diversification in recent years, it is still a prevalent strategy for most large insurance companies and it is interrelated with the firm's overall risk management strategy.

In part due to new regulatory requirements, insurance companies have all begun to implement ERM at some level. Given that ERM programs are multi-faceted and differ widely from firm to firm, assessment of the value of such programs requires more detailed understanding of the components. Our study adds to the growing body of research on the value of enterprise risk management by providing a unique perspective to assess its respective impacts on firms with different diversification strategies. Better understanding of the impact of ERM will inform the development of rating criteria, reporting requirements, and managerial decision-making.

There are two acknowledged limitations to this study. First, our sample is limited to P&C insurers that have received an ERM rating from the S&P. These firms are more likely to be stock-held and, on average, more likely to be large, publicly traded insurers. Therefore, the results will not necessarily be robust to the entire industry. Limiting the analysis to P&C insurers is an intentional choice to avoid previously documented issues related to industry-specific differences. However, because the sample represents more than half of all insurers based on premium volume, the results are economically significant. Second, we implicitly assume that ERM quality can be accurately measured based on the S&P ERM rating. Because the ERM rating is a component of a broader assessment of credit rating and capital adequacy, it is possible that the analysts more narrowly focus on aspects of ERM that are relevant to credit risk. Closer examination of the ERM rating criteria and the relationship

between the ERM rating and the financial strength ratings may be an avenue for future research.

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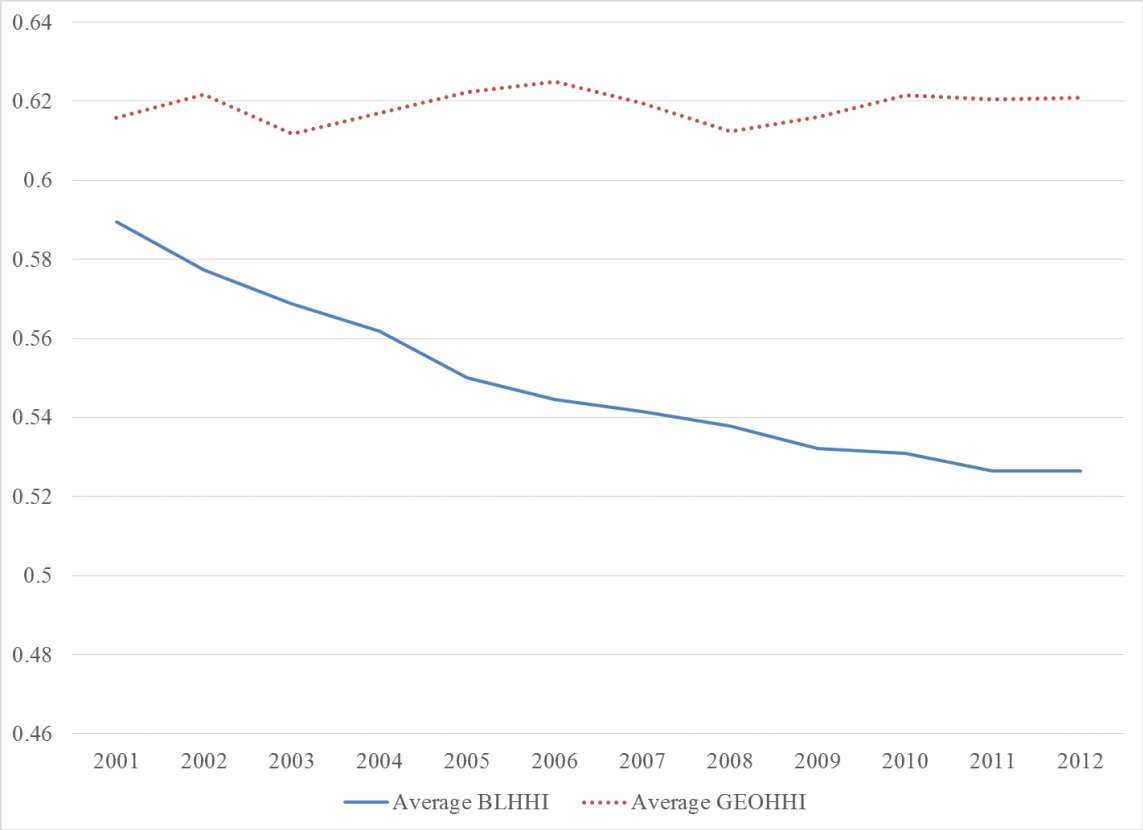
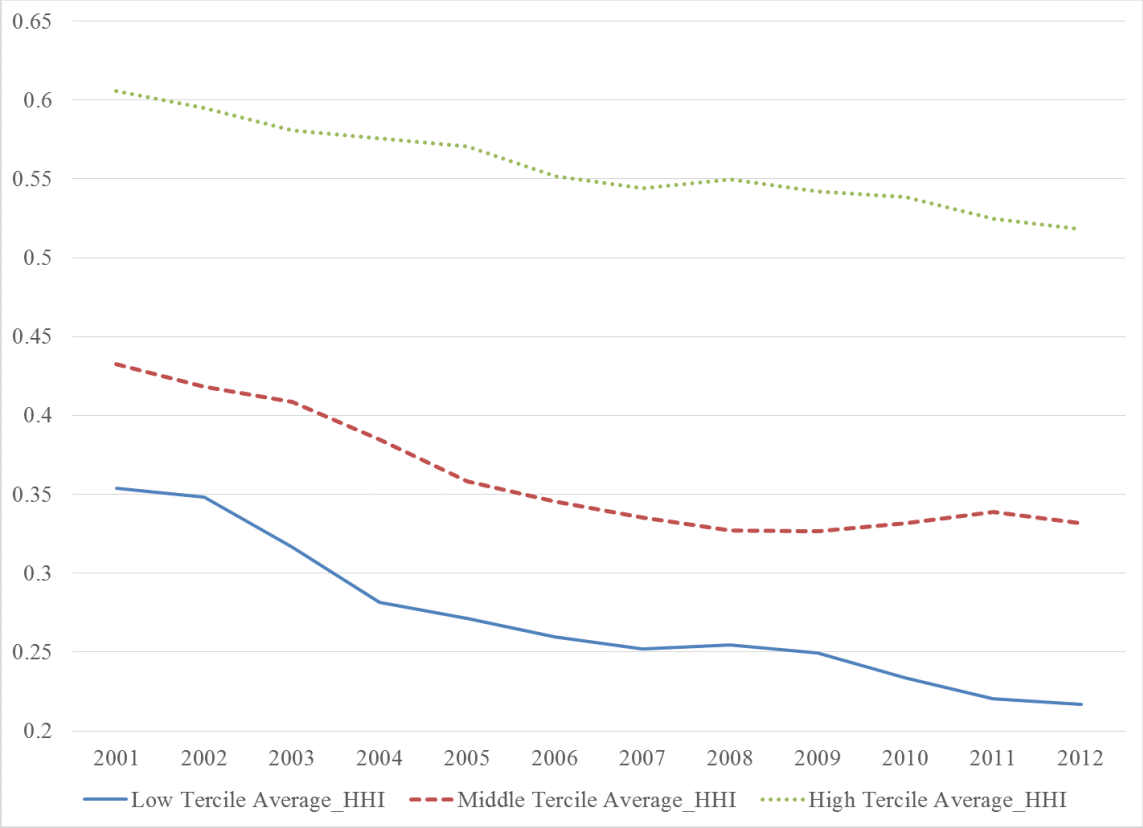
Figure 1: Business Line and Geographic Diversification, 2001-2012



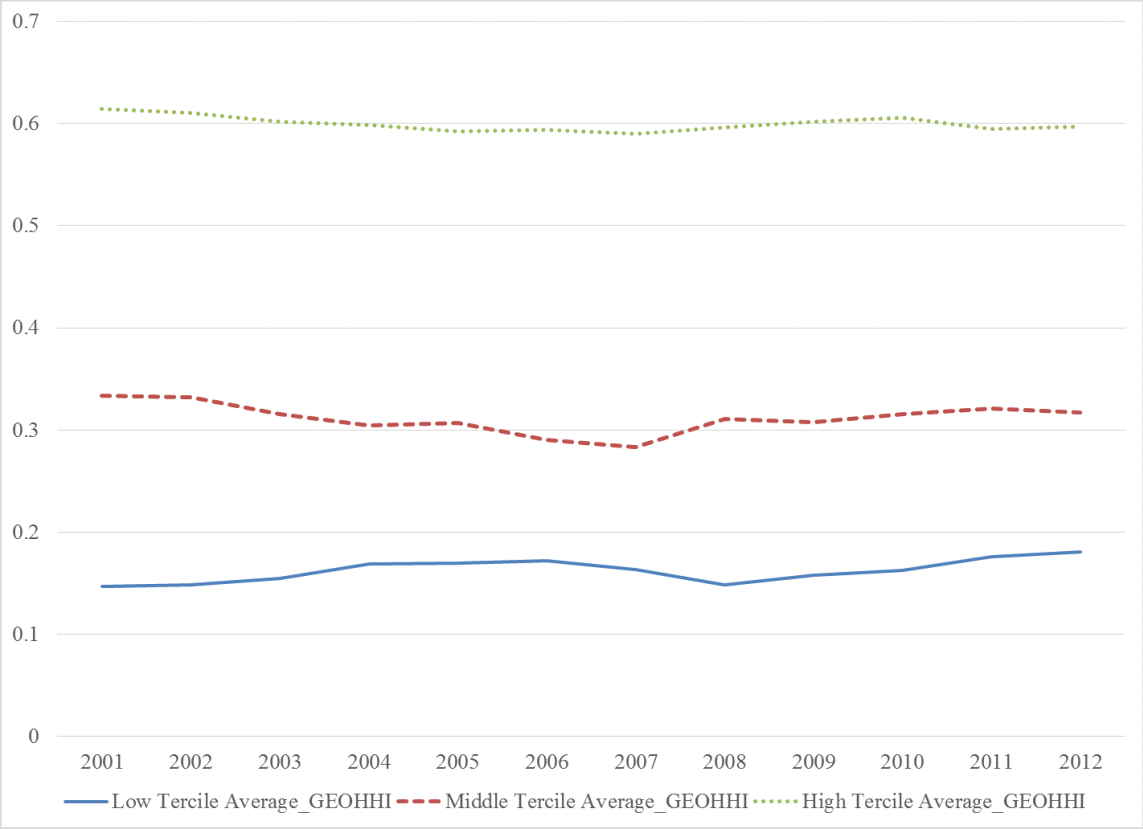
Note: This Figure shows the trends in average BLHHI and GEOHHI from 2001 to 2012. BLHHI measures an insurer's business line diversification and is the complement of the Herfindahl index calculated using direct premium written over all business lines. GEOHHI measures geographic diversification and is the complement of the Herfindahl index calculated using direct premium written over all states.

Figure 2: Business Line Diversification by Tercile of Firm Size, 2001-2012



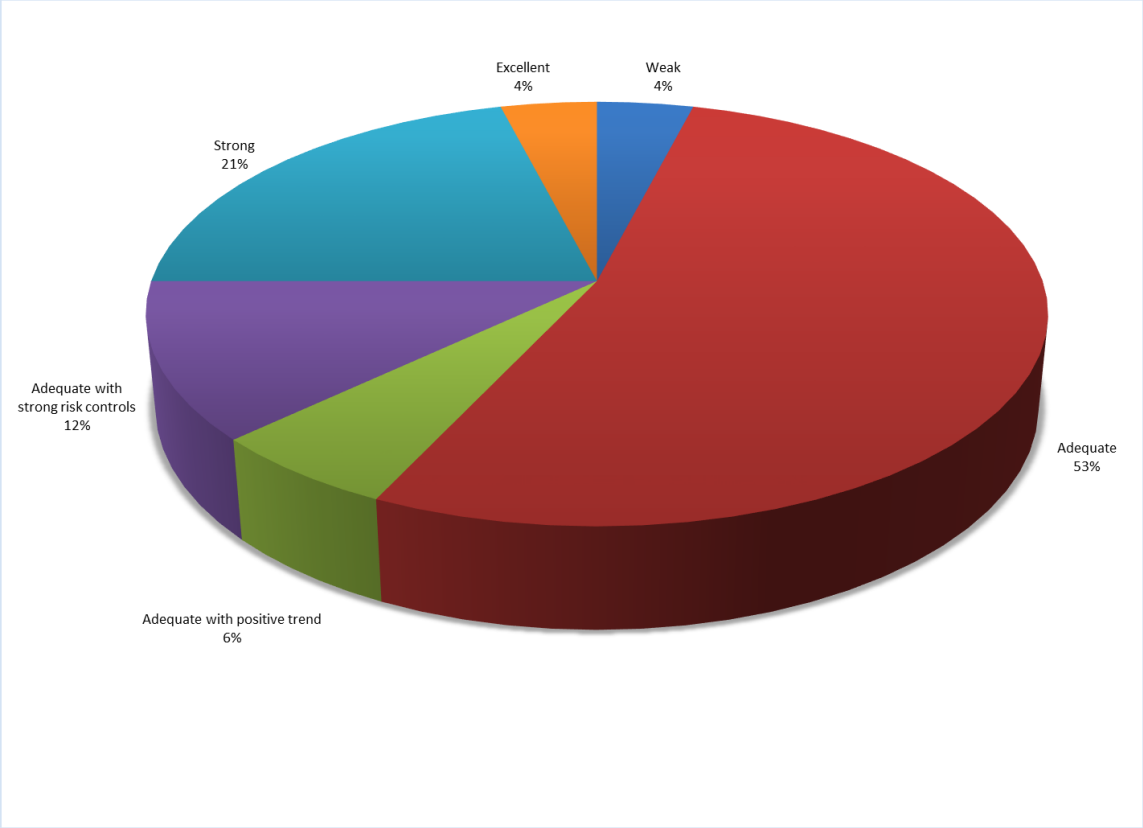
Note: This Figure shows the trend in average BLHHI for each tercile of firm size from 2001-2012. BLHHI measures an insurer's business line diversification and is the complement of the Herfindahl index calculated using direct premium written over all business lines.

Figure 3: Geographic Diversification by Tercile of Firm Size, 2001-2012



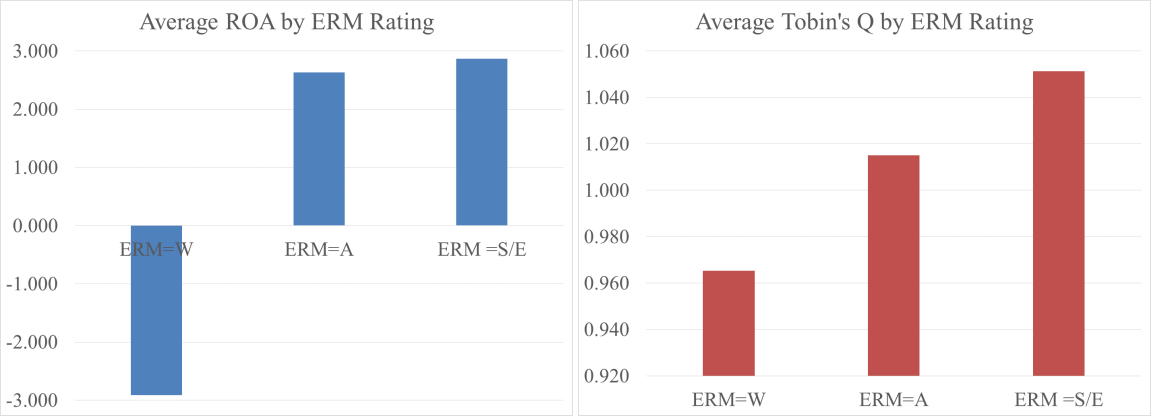
Note: This Figure shows the trend in average GEOHHI for each tercile of firm size from 2001-2012. GEOHHI measures geographic diversification and is the complement of the Herfindahl index calculated using direct premium written over all states.

Figure 4: Distribution of S&P ERM Rating Scores for all Rated P&C Insurance Companies, December 2012



Source: Standard and Poor's, 2013.

Figure 5: Performance by ERM Rating, Sample of Firms with S&P ERM Scores, 2006-2012



Note: Panel A illustrates the relationship between Average ROA and ERM Rating for rated firms in the pooled cross-sectional time series. For instance, The Average ROA is -2.912% for ERM Rating=Weak (W), 2.636% for ERM Rating=Adequate (A) and 2.870% for ERM Rating=Strong and Excellent (S/E). Panel B illustrates the relationship between Average Tobin's Q and ERM Rating in our sample.

Table 1: Summary of Variables and their Definitions

Variable	Definition
ROA	Net income/Total Admitted Assets
TOBIN'S Q	(MV of Equity + BV of Liabilities)/BV of Assets
AGE	Years in Business
FS RATING	S&P Insurer Financial Strength Rating
ERM RATING	S&P ERM Rating
BLHHI	The Complement of Business Line Herfindahl Index
GEOHHI	The Complement of Geographical Herfindahl Index
SIZE	Log (Net Admitted Assets)
GROUP	1 if firm is a group, 0 otherwise
STOCK-OWNED	1 if firm is a stock company, 0 otherwise
% COMMERCIAL	% of total premiums written in commercial lines
% INVESTMENT	% of total assets in stocks, mortgages, and real estate

Table 2: Summary Statistics, 2006-2012

Variable	Mean-Rated Firms	Mean-Unrated Firms	Mean Diffference	Std	Min	Max
ROA	2.233	1.844	0.388	4.719	-21.940	10.330
TOBIN'Q	1.018	1.038	-0.020	0.107	0.717	1.578
AGE	24.599	40.137	-15.538***	18.159	2.000	120.000
FS RATING	7.859	9.742	-1.882***	2.807	2	18
ERM RATING	0.935	0.676	0.26***	0.673	1.000	4.000
BLHHI	0.803	0.326	0.477***	0.316	0	0.930
GEOHHI	15.229	10.734	4.494***	0.300	0	0.965
SIZE	33.888	47.352	-13.463***	1.827	11.082	19.072
GROUP	0.715	0.043	0.672***	0.298	0	1.000
STOCK-OWNED	0.808	0.433	0.375***	0.394	0	1.000
% COMMERCIAL	66.939	68.950	-2.011	36.481	0	100.000
% INVESTMENT	12.617	12.032	0.585	11.509	0	62.342

Note: This Table reports the basic descriptive statistics (Mean, Standard Deviation (StdDev), Min, and Max) of all input data from the P&C insurer sample with ERM ratings. It also reports the corresponding Mean of firms with no ERM ratings (Mean-Unrated Firms) from 2006-2012 in the paper. The mean difference between the ERM-rated firms and the ERM-unrated firms is reported with *** indicating values significantly different at the 1% level.

Table 3: Summary of S&P Financial Strength and ERM Ratings

Data (2006-2012)					# of Obs.	# of Firms
All P&C Firms					7701	1228
All P&C Firms with S&P ERM Rating					386	70
All P&C Firms with S&P Financial Strength Rating					1036	184
All P&C Firms with S&P Financial Strength and ERM Ratings					320	57
Firms with Financial Strength Rating			Firms with ERM Rating			
Rating	# of Obs.	ERM=N/A	ERM=W	ERM=A	ERM=S	ERM=E
AAA	23	14			4	5
AA+	10	3		3	2	2
AA	96	63		20	9	4
AA-	68	31		21	6	10
A+	113	45	3	49	16	
A	248	176	3	53	12	4
A-	71	15	3	48	5	
BBB+	36	28	2	6		
BBB	212	212				
BBB-	12	10		2		
BB+	8	6		2		
BB	92	81	2	9		
BB-	3		1	2		
B+	9		9			
B	9	8		1		
B-	0					
CCC	22	20	2			
CC	2	2				
R	2	2				
Total	1036	716	25	216	54	25

Table 4: Panel A. Two Stage Least Squares Regression
First Stage: Estimation of ERM Quality Rating, 2006-2012

	ROA			TOBIN's Q		
FIRST STAGE	(1)	(2)	(3)	(4)	(5)	(6)
INTERCEPT	2.773***	2.804***	2.804***	2.617***	2.5329***	2.5329***
	(4.34)	(4.61)	(4.61)	(4.02)	(3.86)	(3.86)
AGE	-0.008**	-0.01**	-0.01**	-0.016***	-0.017***	-0.017***
	(-1.92)	(-2.32)	(-2.32)	(-3.02)	(-3.09)	(-3.09)
FS RATING	-0.125***	-0.117***	-0.117***	-0.147***	-0.14***	-0.14***
	(-8.77)	(-8.56)	(-8.56)	(-8.97)	(-7.62)	(-7.62)
GEOHHI	-0.704***	-0.777***	-0.777***	-0.361*	-0.416*	-0.416*
	(-4.09)	(-3.75)	(-3.75)	(-1.91)	(-1.75)	(-1.75)
BLHHI		0.217	0.217		0.1457	0.1457
		(0.94)	(0.94)		(0.65)	(0.65)
SIZE	0.071	0.069	0.069	0.067	0.066	0.066
	(1.52)	(1.5)	(1.5)	(1.54)	(1.53)	(1.53)
GROUP	-0.262	-0.393	-0.393			
	(-0.88)	(-1.37)	(-1.37)			
% COMMERCIAL	0.003**	0.003**	0.003**	0.003*	0.003*	0.003*
	(2.2)	(2.2)	(2.2)	(1.99)	(1.98)	(1.98)
% INVESTMENT	-0.003	-0.002	-0.002	-0.003	-0.002	-0.002
	(-0.65)	(-0.37)	(-0.37)	(-0.57)	(-0.43)	(-0.43)
Adjusted R Square	0.4496	0.4572	0.4572	0.4846	0.4879	0.4879

Note: This table shows the first stage of the two stage least square regression results for ERM quality ratings regressed on instrument variables and control variables from the second stage for the P&C insurers in period 2006-2012. % COMMERCIAL, and % INVESTMENT are capped at 1 (100%). The t-statistics are reported in parentheses (*** significant at the 1% level; ** significant at the 5% level; * significant at the 10% level).

Table 4: Panel B. Two Stage Least Squares Regression
Second Stage: Effect of S&P ERM Rating on Performance, 2006-2012

	ROA			TOBIN's Q		
SECOND STAGE	(1)	(2)	(3)	(4)	(5)	(6)
INTERCEPT	0.667	6.061	1.08	1.03***	1.052***	1.378***
	(0.15)	(1.49)	(0.16)	(8.04)	(7.98)	(7.18)
ERM RATING	5.391***	4.481***	5.629***	0.015	0.003	-0.069**
	(3.21)	(3.52)	(2.85)	(0.78)	(0.12)	(-2.11)
BLHHI		7.643***	14.96*		0.08**	-0.426**
		(3.16)	(1.75)		(2.09)	(-2.44)
BLHHI x ERM			-3.729			0.252***
			(-1)			(2.86)
SIZE	-0.205	-0.728*	-0.532	0.003	-0.0003	-0.012
	(-0.54)	(-1.86)	(-1.48)	(0.36)	(-0.03)	(-1.07)
GROUP	-1.644	-3.005	-3.222			
	(-0.91)	(-1.38)	(-1.38)			
% COMMERCIAL	-0.034**	-0.026**	-0.022***	-0.001*	-0.001	-0.001*
	(-2.35)	(-2.52)	(-2.74)	(-1.71)	(-1.46)	(-1.9)
% INVESTMENT	0.03	0.05*	0.048*	0.002*	0.002**	0.002**
	(0.81)	(1.84)	(1.89)	(1.86)	(2.04)	(2.21)
Adjusted R Square	0.2734	0.4358	0.4561	0.291	0.3156	0.3667

Note: This table shows the second stage results of the two stage least square regression for dependent variables ROA and Tobin's Q regressed on ERM quality rating, diversification measures and firm characteristics for the P&C insurers in sample period 2006-2012. All models include year fixed effects, and standard errors are adjusted for by firm level clustering. ROA is winsorized at the 1% level and the 99% level and % COMMERCIAL and % INVESTMENT are capped at 1 (100%). The t-statistics are reported in parentheses (*** significant at the 1% level; ** significant at the 5% level; * significant at the 10% level).

Table 5: OLS Regression: Effect of S&P ERM Rating on Performance, 2006-2012

	ROA			TOBIN's Q		
	(1)	(2)	(3)	(4)	(5)	(6)
INTERCEPT	0.608	4.173	1.350	1.060***	1.075***	1.109***
	(0.20)	(1.24)	(0.31)	(11.40)	(10.47)	(9.04)
ERM=A	5.603***	4.331***	6.127**	0.044	0.034	0.030
	(3.01)	(3.02)	(2.22)	(1.30)	(0.98)	(0.44)
ERM=E/S	5.801***	4.767***	8.184***	0.082*	0.072	0.000
	(2.87)	(3.34)	(3.55)	(1.85)	(1.41)	(0.00)
BLHHI		4.711**	8.796***		0.029	0.007
		(2.09)	(2.76)		(0.55)	(0.10)
GEOHHI		-0.633	-0.573		-0.014	-0.027
		(-0.59)	(-0.55)		(-0.17)	(-0.34)
BLHHI x ERM=A			-4.602			0.014
			(-1.14)			(0.16)
BLHHI x ERM=E/S			-6.869**			0.110
			(-2.15)			(1.25)
SIZE	0.070	-0.267	-0.179	0.001	0.000	-0.001
	(0.37)	(-1.17)	(-0.75)	(0.18)	(0.03)	(-0.09)
GROUP	-2.014**	-2.929**	-2.976**			
	(-2.20)	(-2.20)	(-2.10)			
STOCK-OWNED	1.574***	2.074***	1.895***			
	(3.95)	(3.54)	(3.17)			
% COMMERCIAL	-0.018*	-0.011	-0.009	-0.001**	-0.001*	-0.001
	(-1.87)	(-1.64)	(-1.35)	(-2.07)	(-1.69)	(-1.55)
% INVESTMENT	0.010	0.023	0.019	0.002**	0.002**	0.002**
	(0.43)	(0.96)	(0.85)	(2.39)	(2.33)	(2.50)
Adjusted R Square	0.222	0.279	0.287	0.285	0.283	0.286

Note: This table shows the pooled OLS regression results for P&C insurers for sample period 2006-2012, where the dependent variable is ROA or Tobin's Q and the controls are firm characteristics, diversication measures, and S&P ERM quality Ratings. We have combined all subcategories of "Adequate" in our analysis and combine the "Strong" and "Excellent categories" for the small number of observations. The "Weak" category is used as the reference category. All models include the year fixed effects and standared errors are adjusted for firm level clustering. ROA is winsorized at the 1% level and at the 99% level and % COMMERCIAL and % INVESTMENT are capped at 1 (100%). The t-statistics are reported in parentheses (*** significant at the 1% level; ** significant at the 5% level; *significant at the 10% level).

APPENDIX

Table A1. Summary of S&P Ratings Guidelines

Assessment	Guideline
Excellent	Positive score for all subfactors and economic capital model (ECM) is assessed either good or superior under our criteria.
Strong	The risk management culture, risk controls, and strategic risk management subfactors are scored positive, one or both of the other two subfactors is scored neutral, and no subfactor is scored negative.
Adequate with strong risk control	The risk controls subfactor is scored positive, the strategic risk management subfactor is scored neutral, and no subfactor is scored negative.
Adequate	The risk controls and risk management culture subfactors are scored at least neutral; overall does not satisfy the requirement for adequate with strong risk control.
Weak	One or both of the risk controls and risk management culture subfactors are scored negative.

Source: Standard and Poor's, 2013.